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INFECTIOUS DISEASES OF DIGESTIVE AND RESPIRATORY TRACTS

COLLECTION OF CASE STUDIES

Tutorial

Tomsk
Siberian State Medical University
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ИНФЕКЦИОННЫЕ БОЛЕЗНИ ЖЕЛУДОЧНО-КИШЕЧНОГО И РЕСПИРАТОРНОГО ТРАКТОВ

СБОРНИК ЗАДАЧ

Учебное пособие

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И 740 **Инфекционные болезни желудочно-кишечного и респираторного трактов. Сборник задач: учебное пособие** / Е.Н. Ильинских, А.В. Семенова, П.В. Богинская, Л.В. Лукашова. – Томск: СибГМУ, 2022. – 142 с.

Учебное пособие разработано в соответствии с рабочей программой блока модуля «Инфекционные болезни» для студентов, обучающихся по направлению подготовки «31.05.01 Лечебное дело (билингвальное образование)». В сборник включены задачи по темам подразделов блока модуля: «Кишечные инфекции», «Энтеровирусные инфекции» и «Инфекции дыхательных путей». Данное пособие может быть использовано как для аудиторной, так и для самостоятельной работы студентов.

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INTRODUCTION

A collection of case studies for monitoring knowledge in the course “Infectious Diseases” was prepared by the staff of the Division of Infectious Diseases and Epidemiology, Siberian State Medical University.

The tutorial includes 76 case studies compiled in accordance with modern classifications and recommendations for the diagnosis and treatment of infectious diseases of digestive and respiratory tracts. These case studies contribute to the most comprehensive understanding of the material by students in accordance with various options for the course of infectious diseases. This tutorial can be used for both students’ classroom and individual work.

LIST OF ABBREVIATIONS

ALP – alkaline phosphatase
ALT – alanine aminotransferase
aPTT – activated partial thromboplastin time
ASO – antistreptolysin O
AST – aspartate aminotransferase
BNP – brain natriuretic peptide
bpm – beats per minute
BUN – blood urea nitrogen
CMV – cytomegalovirus
CRP – C-reactive protein
CSF – cerebrospinal fluid
CT – computed tomography
DIC – disseminated intravascular coagulation
EBV – Epstein-Barr virus
ECG – electrocardiography
ECMO – extracorporeal membrane oxygenation
EEG – electroencephalography
ELISA – enzyme-linked immunosorbent assay
EMB agar – eosin methylene blue agar
ESR – erythrocyte sedimentation rate
EV – enterovirus
GGT – gamma-glutamyl transpeptidase
HFMD – hand, foot and mouth disease
HIV – human immunodeficiency virus
HPF – high-power field
HSV – herpes simplex virus

IU	– international unit(s)
IV	– intravenous
LDH	– lactate dehydrogenase
LVEF	– left ventricular ejection fraction
MenACWY	– a vaccine against 4 strains of the meningococcal bacteria – A, C, W and Y
MRI	– magnetic resonance imaging
mRS	– modified Rankin Scale
OIM	– oil immersion microscopy
PCR	– polymerase chain reaction
PCT	– procalcitonin
PEX	– plasma exchange
PT-INR	– international normalized ratio of prothrombin time
RA	– reaction of agglutination
RT-PCR	– reverse transcription polymerase chain reaction
spp.	– species
TCBS agar	– thiosulfate-citrate-bile salt-sucrose agar
VZV	– varicella zoster virus
WBC	– white blood cells

CHAPTER I. DIGESTIVE TRACT INFECTIONS

1.1. CHOLERA. FOOD MICROBIAL INTOXICATION. BOTULISM

Case study No. 1. On November 4 2015, a 56-year-old German businessman was hospitalized in Tubingen, Germany, with acute frequent watery stool (6–8 times per day; stool was clear with white mucus), vomiting (4 times per day), abdominal cramps, hypotension, malaise, weight loss of 5 kg and oligoanuria. The symptoms appeared on October 30 at the end of his return flight from a short business trip to the Philippines, where he visited Subic Bay and Manila from October 27 to 29. Symptoms included painless passage of large, non-bloody stools (8–12 times per day) and mild nausea. On November 2, he consulted with his doctor, and was prescribed increased fluid intake. However, his condition worsened despite therapy.

Upon hospital admission he looked unwell, he had fever; heart rate was 90 bpm, blood pressure was 70/50 mm Hg; his skin was pale and dry with cyanotic lips, his tongue was white but still moist; the rest of physical examination was unremarkable. He was on antihypertensive medication (amlodipine 10 mg, candesartan 16 mg) and had a history of polycystic kidney syndrome with previously normal kidney function.

He had only been eating in high standard restaurants with a variety of foods including Japanese dinner (Sashimi and other raw fish) on 28 October in Subic Bay and briefly cooked/fried seafood on 29 October in Makati, Manila. He had not drunk tap water or drinks with ice cubes.

Laboratory tests showed hematocrit of 49%, creatinine of 4.4 mg/dL, urea 80 mg/dL, potassium of 3.5 mmol/L, and sodium of 135 mmol/L. WBC count showed 9,860/μl of leucocytes with 73% neutrophils. Abdominal ultrasound confirmed a polycystic kidney disease without further obvious changes.

Questions

1. What is the provisional diagnosis? Justify your answer.
2. Assess the degree of dehydration of this patient and fluid deficit as % of body weight (body weight before the disease is 80 kg). Plan of management and treatment of this patient. Select the appropriate plan to treat or prevent dehydration and the plan of antimicrobial therapy.

3. Plan laboratory tests for this patient. What are the laboratory tests to confirm this diagnosis?
4. What is the ionic composition of IV infusion solutions and oral rehydration salts?
5. What is the best way to prevent cholera in travelers?

Case study No. 2. In July 2013, an Italian tourist in his mid-40s who was returning from India, where he had spent two weeks in West Bengal, was admitted to the Infectious Diseases Hospital with a 2-day history of watery diarrhea. He did not seek medical care before a trip. While in India, he drank tap water and ate fruits and vegetables washed with tap water. He reported no direct contact with sick people there. On the last day of his stay, he ate raw seafood including sea urchins and crabs. The next day, during his flight to Italy, he did not have fever and developed watery diarrhea, severe weakness, tachycardia, calf muscle cramps, dizziness, abdominal pain, nausea and vomiting.

The day after his return, he was admitted to the hospital with watery diarrhea about 20 times per day, vomiting about 20 per a day, generalized clonic seizures, tachypnea, aphonia, hypotension with blood pressure less than 60 mm Hg, very rapid peripheral pulse, sunken eyes, dry and diffusely cyanotic skin and mucous membranes with skin pinch going back more 2 seconds, and severe oligoanuric renal failure. On admission, laboratory test of peripheral blood showed hematocrit of 56%, WBC 16,810/μL, serum creatinine level of 5.69 mg/dL, pH of 7.16, bicarbonate of 11.3 mmol/L, potassium of 2.7 mmol/L.

Questions

1. What is the provisional diagnosis? Justify your answer.
2. Assess the degree of dehydration of this patient and fluid deficit as % of body weight (body weight before the disease is 70 kg).
3. Plan of management and treatment of this patient. Select the appropriate plan to treat or prevent dehydration and the plan of antimicrobial therapy.
4. Plan of laboratory tests of this patient. What are the laboratory tests to confirm this diagnosis?

Case study No. 3. A 38-year-old businessman from India was admitted to a hospital in Canada with watery diarrhea through the Emergency

Department on March 27, 2017. Beginning March 16, a week before leaving his country, he had a "flu-like" illness, which was treated by his family doctor with cough syrup and two kinds of pills (which are impossible to identify). His symptoms disappeared after 4 days.

He boarded an airplane in Delhi on March 22. He stopped for a day on business in Luanda, Angola, where he had a cup of coffee at the airport and breakfast at a local hotel, and then continued on another flight to Lisbon. He spent the night in Lisbon at a local hotel, visited the city, and flew to New York and then to Montreal. On March 25, while he was visiting his friends in Kingston, he suddenly developed profuse, watery, yellowish diarrhea, recurring several times an hour and associated with abdominal cramps. On March 26, nausea appeared, and he vomited a whitish-grey liquid several times.

On March 27, he developed pain in his calves and he felt very weak and thirsty. His body temperature was 35^{o}C, blood pressure was 70 mm Hg and his heart rate was regular and thready, with a rate of 110 bpm. Slight tenderness was present in the left lower abdominal quadrant. Bowel sounds were present. There was no blood in the rectum. The stool (about 25 times per day) and the vomitus (about 15 times per day) were light brown and liquid and contained numerous small (0.5 to 1 mm) whitish flecks. He had sunken eyes, dry and diffusely cyanotic skin and mucous membranes with skin pinch going back more than 2 seconds, and severe oligoanuric renal failure. On admission, laboratory tests of peripheral blood showed hematocrit of 61%, WBC 20,300/μL, serum creatinine level of 4.2 mg/dL, blood urea nitrogen (BUN) value of 24.5 mg/dL, pH of 7.22, bicarbonate of 6.0 mmol/L, potassium of 3.9 mmol/L, and sodium of 140 mmol/L.

Questions

1. What is the provisional diagnosis? Justify it. Assess the degree of dehydration of this patient and fluid deficit as % of body weight (body weight before the disease is 90 kg).
2. What is the differential diagnosis?
3. Plan of laboratory tests and instrumental examination of this patient. What are the laboratory tests to confirm this diagnosis?
4. Plan of management and treatment of this patient. Select the appropriate plan to treat or prevent dehydration and the plan of antimicrobial therapy.

Case study No. 4. A 70-year-old man was referred to the Infectious Diseases Department of a Paris hospital in April 2010 for fever and watery diarrhea, after spending 3 weeks in Senegal. The patient presented with a previous history of myocardial infarction, hypertension, hepatitis A in 1954 and cholecystectomy. No alcohol abuse, malignant or immunocompromised conditions were reported. The patient had one episode of watery diarrhea, vomiting and dizziness associated with a brief loss of consciousness on the day of his return to France, and a three-kilogram weight loss. Over the following days, he complained of a high fever with chills and abdominal pain. The patient did not report swimming in the sea or freshwater; however, he reported consuming significant amounts of fish and shellfish, sometimes undercooked, while no other cases were reported among his fellow travelers.

On arrival, his body temperature was 38.1°C and his vital signs were stable. The results of physical examination were normal except for abdominal tenderness, mainly on the upper right quadrant. No jaundice was reported.

Laboratory tests revealed WBC of 13×10^9/L and C-reactive protein of 397 mg/L. Liver function test results included aspartate aminotransferase, 119 IU/L; alanine aminotransferase, 216 IU/L; and alkaline phosphatase, 163 IU/L, without hepatocellular insufficiency. Abdominal ultrasonography revealed two heterogeneous masses from 3 to 5 cm in the right liver compatible with abscesses, confirmed by CT scan. Neither of the two imaging techniques revealed evidence of underlying chronic hepatopathy or damage to the biliary ducts or portal vessel.

Results of microscopic analysis, antigen detection tests and PCR of three fresh stool samples for *Entamoeba histolytica* or other protozoa were negative. ELISA was not able to detect serum antibodies to *Entamoeba histolytica* in the peripheral blood of the patient. Both serologic tests and the bacteriologic stool and blood cultures were negative for *Escherichia*, *Shigella spp*., *Salmonella spp*., *Campylobacter spp*., *Staphylococcus aureus* and *Clostridium spp*. One of the two sets of blood cultures collected upon admission yielded a Gram-negative rod, compatible with *Vibrio cholerae*.

Questions

1. What is the provisional diagnosis? Justify your answer.
2. What is the differential diagnosis?
3. What are the laboratory tests to confirm this diagnosis? Plan of laboratory tests and instrumental examination of this patient.
4. Plan of management and treatment of this patient.

Case study No. 5. A 38-year-old housewife was admitted to the hospital on February 20, 2013, because of watery diarrhea and lower abdominal cramps. Symptoms had begun 23 hours after she had eaten undercooked shellfish grown in the Bahamas that she had bought at a Miami fish market. The shellfish had been packed in ice, airlifted to California and eaten the same day when received. The patient's lower abdominal pain was sudden in onset and was followed shortly by profuse watery diarrhea 5-6 times per day and vomiting 4 times per day. She denied chills, headache and myalgia. In 48 hours before the onset of symptoms, she had eaten only dry or canned foods and a sausage. On admission, she was in minimal distress. The body temperature was 36.6^{o}C, heart rate 84 bpm and regular, blood pressure 140/100 mm Hg. The abdomen was moderately tender diffusely, and bowel sounds were intermittently active, with no pathological sounds. The rest of the physical examination was unremarkable. Laboratory tests included WBC 25,700/μL on admission, with 82% polymorphonuclear cells, 7% banded forms, 6% lymphocytes, 3% monocytes, and 2% eosinophils. Serum sodium was 139 mmol/L, potassium 3.9 mmol/L, and chloride 105 mmol/L. Serum urea nitrogen, hemoglobin content, and results of urinalysis, examination of the chest and an electrocardiogram were within normal limits. Two stool samples were negative for occult blood. An abdominal X-ray showed diminished bowel gas. On sigmoidoscopy the lumen could be viewed only to a distance of 15 mm but in that portion everything was unremarkable.

Both serologic tests and the bacteriologic stool cultures on Salmonella-Shigella agar or EMB agar were negative for *Escherichia spp., Shigella spp., Salmonella spp.,* and *Campylobacter spp*. The stool cultures were negative for *Staphylococcus aureus* and *Clostridium spp*. One of the two sets of stool cultures collected upon admission on TCBS agar yielded a Gram-negative rod, compatible with a halophilic (salt-requiring) Vibrio spp. that caused β-hemolysis of human erythrocytes (the Kanagawa reaction).

Questions

1. What is the provisional diagnosis? Justify your answer.
2. What is the differential diagnosis?
3. What are the laboratory tests to confirm this diagnosis? Plan laboratory tests and instrumental examination of this patient.
4. Plan of management and treatment of this patient.

Case study No. 6. On Sunday, late January 2015, eighteen employees became ill after eating lunch at an industrial plastic plant. The warm portion consisted of calf meat, sauce, rice and mixed vegetables. The meat had been purchased deep-frozen. It was fresh and inspected. Long grain American rice and industrially precooked, deep-frozen mixed vegetables (pea-corn-paprika) were used. The sauce was made of beef extract, wheat flour and water. After the rice was boiled it was cooled under cold running tap water to make the temperature drop to 150°C. Then the rice was put into plastic containers on Friday that were kept in a cold storage room at 9°C for 24 hours. The individual food portions from fried meat, rice and vegetables were made on Saturday. The warm portions were individually packed into cardboard boxes in the central kitchen, kept in cold storage at 9 °C overnight and warmed up in a microwave oven for 60-90 seconds in the office kitchen just before it was eaten on Sunday.

The first employees began to vomit 30 min after the lunch that was served at about 10 a.m. All patients developed symptoms within 4 hours after lunch. The main symptoms were nausea, vomiting and abdominal pain. No one was hospitalized and no deaths were reported. Seventeen cases recovered within one day; only in one case, vomiting persisted for 48 hours.

The warm meal portion was immediately suspected of causing food-poisoning cases and a sample of the meal was kept in a refrigerator till the following day and sent by the factory officers to a laboratory for bacteriological analysis. The sample was transported in a thermal insulated package and it was cold until examined.

Samples of the meal were tested for several enteric pathogens (*B. cereus, Campylobacter, Clostridium perfringens, Enterobacteriaceae, E. coli, Listeria monocytogenes, Salmonella spp., Staphylococci*) using routine methods. Vomitus and fecal specimens were also collected from cases within 24 hours of onset. Analysis revealed large numbers of gram-positive, optionally anaerobic rod-shaped bacilli in the meal (rice) and in the vomitus specimens obtained from most of the patients. The cultures were negative for the other bacteria.

Questions

1. What is the provisional diagnosis? Justify your answer.
2. What is the differential diagnosis?
3. What are the laboratory tests to confirm this diagnosis?
4. Plan of management and treatment of these patients.

Case study No. 7. On 25 February 2013, 115 of 715 passengers of a Caribbean cruise ship had reported symptoms of vomiting and/or diarrhea to the ship's physician. They became ill after midnight on February 25 shortly after eating cream-filled cakes (after 2 to 4 hours) at dinner on February 24. According to the initial report, the illness was characterized by severe vomiting (94%) often accompanied by diarrhea (79%) with three or more loose or watery feces, abdominal cramps (63 %); headache (29%), no fever, and duration of only a few hours.

A medical epidemiologist and a quarantine inspector boarded the ship in the evening on February 25 to meet the ship's captain and physician and began an investigation. The epidemiologic investigation confirmed the illness was associated with consumption of cream-filled dessert pastries. Enterotoxigenic strains of gram-positive, non-spore-forming cocci were isolated from stool samples of 5 (38%) of 13 patients cultured and none of 9 controls. Enterotoxin-producing strains of the same bacteria were grown from perirectal swabs and swabs from pustular lesions and scabs on the forearm from 2 of the 7 crew members who made pastry, including the chief pastry chef.

Questions

1. What is the provisional diagnosis of this disease? Justify it.
2. What is the differential diagnosis?
3. Plan of epidemiologic investigation of this outbreak. What are the laboratory tests to confirm this diagnosis?

Case study No. 8. A 47-year-old woman came to an outside hospital with subacute and progressive dizziness, diplopia, dysarthria, and bilateral ptosis, which started 8 hours before admission. Cranial CT and MRI revealed normal results. A CSF analysis was normal. Blood chemistry test, hemogram, and performed chest X-ray did not reveal any pathological findings. Gastroscopy revealed gastritis.

Her neurological symptoms worsened rapidly including complete bilateral ptosis with the inability to open her eyes, descending quadriparesis, and paralysis of her respiratory musculature. Approximately 24 hours following admission she required intubation and mechanical ventilation. Her husband presented with similar signs and symptoms a day later.

Their son remembered that his parents had eaten home-canned beans of unknown age two days before the admission of his mother. The son was present at dinner but refused to eat the beans because of an odd odor.

A 51-year-old man, the husband, presented to an outside hospital with nausea, dizziness, progressive dysarthria, and diplopia, which had started the day before to admission. After transfer to the Department of Neuro-resuscitation, he showed bilateral ptosis, ophthalmoparesis with diplopia in all directions, dysarthria, dysphagia with disturbance of oral and pharyngeal phases, and moderate bilateral facial nerve paralysis.

Questions

1. What is the provisional diagnosis? Justify your answer.
2. What are the laboratory tests to confirm this diagnosis?
3. Plan of management and treatment of these patients.

Case study No. 9. A 40-year-old man was presented to a level-one-trauma center in 2016. He first was assigned to the neurological unit because of suffering from several neurological symptoms. The patient was a normal weighting young man with a reduced general condition. The symptoms were present for two days. He had no additional chronic diseases except for IV drug use of heroin for about ten years. The last use of heroin in his left groin was about ten days ago. The first examination showed a patient with a normal conscious level. He felt not well and in the morning of the day he came to the hospital, he noticed dry mouth with a numb tongue.

He had a fever of about 38.7 °C and suffered from several neurological symptoms, especially from cranial nerve dysfunction like ptosis, dysarthria and dysphagia. He had no paresis or paresthesia in the upper or lower extremity and the Babinski sign was negative. Furthermore, he had normal blood pressure, no dyspnea or meningism.

The clinical examination showed a typical abscess formation from about 10×10 cm in the left groin region and tenderness of palpation of the inguinal lymph node. The first time the patient noticed this formation was ten days ago and he remarked that it has grown and was more painful in the few days.

CT-scan of the cerebrum and a CSF examination were carried out first. They did not reveal any pathological results. Especially the liquor showed a normal high of WBC, RBC, protein, lactate and glucose. The examination of the blood serum showed a high C-reactive protein of 10.8 mg/dL but normal number of WBCs 10,800 /μL. All other blood tests were normal, except the toxic screen for heroin, methadone and paracetamol, which were all positive. The following CT-scan of the pelvic region showed a typical abscess formation in the subcutaneous and also in the ad-

ductor muscular region along with typical inguinal and paraaortic lymphadenopathy.

Questions

1. What is the provisional diagnosis of this disease? Justify it.
2. What is the differential diagnosis?
3. Plan of laboratory tests and instrumental examination of this patient. What are the laboratory tests to confirm this diagnosis?
4. Plan of management and treatment of this patient.

Case study No. 10. A 41-year-old woman with active IV and subcutaneous heroin use complicated by recurrent methicillin-resistant *Staphylococcus aureus* endocarditis presented to the Emergency Department with 2 days of progressive dyspnea. Two days prior to presentation, she had 2 episodes of vomiting and one of diarrhea, but no headache, fever, chills, weakness, numbness, or confusion.

While in the Emergency Department, she developed hypoxic respiratory failure requiring intubation and was admitted to the medical intensive care unit. The next day, upon weaning sedation for planned extubation, the patient was unable to open her eyes or move her limbs. On examination, her vital signs were notable for normothermia, heart rate 79–90 bpm, blood pressure range 120–140/70–85 mm Hg, pulse oximetry 97%–99%, with FiO_2 of 0.4.

She was alert and fully oriented, unable to speak due to weakness (endotracheal tube in place), and answering "yes" or "no" with faint hand movements. Otherwise, her strength was 0/5 per the Medical Research Council scale. She had complete bilateral ptosis and mydriatic, reactive pupils. Eye movements were limited in all cardinal directions. She had areflexia, except for trace reflexes in the patellar tendon bilaterally; toes were mute. The sensation was grossly intact.

Initial laboratory tests including serum creatine kinase, CRP, and chemistry panel was unremarkable. A lumbar puncture revealed the following: 1 WBC per mm^3, 1 RBC per mm^3, glucose 99 mg/dL (serum 168 mg/dL), protein 26 mg/dL. Venereal disease research laboratory, cryptococcal antigen, fungal culture, viral PCRs (herpes simplex virus, varicella-zoster virus, West Nile virus, cytomegalovirus, Epstein-Barr virus, and enterovirus) were all negative. An extended panel of blood laboratory tests and including HIV antibodies, viral hepatitis serology testing, Lyme antibodies, heavy metals, and thyroid function tests were notable only for a

moderately elevated ESR at 66 mm/hour. Brain and cervical spine MRI was unremarkable. A thorough skin evaluation was only notable for track marks on bilateral forearms.

Questions

1. What is the provisional diagnosis of this disease? What is the differential diagnosis for a patient with rapidly progressive weakness and ophthalmoplegia?
2. What diagnostic evaluation should be performed on this patient? What evaluations can be used to confirm the diagnosis?
3. What treatment should be prescribed?

1.2. ENTEROVIRAL INFECTION

Case study No. 1. A 34-year-old white man was referred to a dermatology center with a chief complaint of a painful rash. Six days before arrival at the clinic, the patient stated he had a low-grade fever and painful sores in his mouth. Subsequently, painful, burning blistering of the hands, feet, and face developed along with crusts of the scalp. He denied any significant medical or surgical history, takes no medications, and has no allergies. However, social history revealed that the patient's one-year-old son recently had the hand-foot-mouth disease (HFMD) from an outbreak at his daycare.

Physical examination found dusky erythematous macules on the tips and medial and lateral aspects of the digits and on the palmar surfaces bilaterally. Similar lesions were noted on the medial plantar surfaces on both feet but in lesser quantity.

Erythematous crusted macules were noted diffusely on the scalp. In addition to the few vesicles that were noted on the superior helices of the ears, left and right nasal sidewalls, and in the nasolabial folds, there were also vesicles and erythematous, eroded and crusted papules noted in the perioral area. The oral mucosa had extensive erythematous macules. Oral ulcers were located on the tongue, hard and soft palate, and buccal mucosa.

The complete blood count and blood chemistry test were unremarkable. Shave biopsy on the right superior helix showed interface vacuolar dermatitis with numerous suprabasal necrotic keratinocytes, early intraepidermal vesicle formation, and few eosinophils.

Questions

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect of the diagnosis?
2. What are the laboratory tests to confirm the diagnosis of the patient?
3. What is the treatment of this patient?

Case study No. 2. A 10-day-old male infant endured fever and plenty of maculopapular rashes on face, trunk, breech, arms, legs, palms, and feet for one day. He received breastfeeding and was in contact with his brother who then had a common cold. His mother got maculopapular rashes on her

palms and feet. Laboratory tests revealed WBC 8.25×10^9/L, percentage of neutrophils 75.2%, procalcitonin (PCT) 1.06 ng/dL, CRP 3.82 mg/dL, CSF cell 42×10^6/L.

Questions

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm the diagnosis of the patient?
3. What is the treatment of this patient?

Case study No. 3. A 40-year-old woman with no significant medical history presented with a nonpruritic rash that developed rapidly over three days and was progressively worsening. Three days before the rash appeared, she had a fever of 39.4 °C, sore throat, and headache. Diphenhydramine (Benadryl) provided no relief. Ten days before her symptoms developed, the patient's eight-year-old daughter had a fever, diarrhea, and a similar rash on her feet. The patient had not been exposed to any new medications, foods, or soaps and had not traveled recently.

On physical examination, the patient's body temperature was 38.3 °C. She had a diffuse erythematous papulovesicular rash on her distal upper and lower extremities, including her palms and soles. She had a similar rash on her face, predominantly around her lips and an isolated macule on the soft palate. There was no rash on her trunk. The remainder of her examination was unremarkable.

Questions

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm the diagnosis of the patient?
3. What is the treatment of this patient?

Case study No. 4. A male child, 19 months old, weighed 3 lb. 11 oz. at birth. He was born prematurely at 36 weeks after induction for maternal toxemia. He had pneumonia at two months of age and recurrent attacks of bronchitis subsequently. Two weeks before admission he had a further at-

tack of pneumonia, treated with antibiotics, and since then was having repeated attacks of dyspnea.

On examination, he was pale and showed slight peripheral edema. The body temperature was 38.6 ^{o}C. The heart rate was 120 bpm and he had tic-tac heart sounds and a systolic murmur along the left sternal margin. The liver was enlarged to 3 cm below the costal margin. The chest was clear.

Examination showed hemoglobin of 80 g/dL and WBC 8.4 $\times 10^{9}$/L with 38% neutrophils, 55 % lymphocytes, 5 % monocytes, 1 % eosinophils and 1% basophils. The RBCs were hypochromic with anisocytosis. The cold agglutinin and tuberculin skin tests were negative. A chest X-ray showed slight enlargement of the heart shadow. ECG was normal. Phonocardiography three weeks after admission demonstrated only physiological splitting of the second sound and a loud third sound. Feces were examined for virus only three weeks after admission and no isolations were made.

Serum specimens were obtained after the second and fifth weeks in hospital; both showed titers of more than 500 of Coxsackie B5 antibody. Antibodies against the other Coxsackie B viruses were all < 5 in titer. The child had been vaccinated against poliomyelitis and low levels of antibodies for the three types were present. Eleven days after the child returned home his mother was admitted to hospital with aseptic meningitis and two days later his father and aunt, who lived in the same house, were also admitted with the same illness.

Questions

1. What are the diagnosis and the differential diagnoses in this patient?
2. What is your approach to diagnosis and treatment?

Case study No. 5. A 2-month-old boy was admitted to a hospital in May 2016 due to high-grade fever for one day without significant lethargy or abnormal neurological findings, except for minor anterior fontanelle bulging. Laboratory tests showed CRP 0.17 units, WBC 20,820 UI (neutrophils 42%, lymphocytes 49%) and hematocrit 31.5%, and CSF examination showed a cell number of 184/μL with 41% mononuclear cells. Bacterial cultures from the blood and CSF were negative. After 5 days of treatment, his temperature returned to normal and he was discharged on day 8 after admission without neurological sequelae.

Questions

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm the diagnosis of the patient?
3. What is the treatment of this patient?

Case study No. 6. A 63-year-old man was admitted to a hospital with a three-day history of dyspnea and fatigue, which had gradually increased until he experienced dyspnea and fatigue at rest. He had taken amlodipine (5 mg/day) for hypertension for the preceding five years, but had no other remarkable past history or family history. He did not smoke or drink alcohol. Two weeks before, he had presented with flu-like symptoms, including fever, sore throat, cough, and diarrhea, which had completely resolved within a week.

On admission, his height was 168.3 cm, weight 65.0 kg, and body temperature 35.8 °C. He was hypotensive, with blood pressure of 72/52 mm Hg, but heart rate was not elevated (61 bpm). A physical examination revealed cyanosis of the lips, distended external jugular veins, pretibial edema in both legs, coarse crackles over the lower bilateral lung fields, and mild enlargement of the liver. He was short of breath indoors, with blood O_2 saturation of 93%, partial O_2 pressure of 61.7 mm Hg, and partial CO_2 pressure of 16.7 mm Hg. A chest X-ray showed mild pulmonary congestion and right pleural effusion. ECG showed atrial fibrillation and an accelerated idioventricular rhythm, suggesting complete atrioventricular block. Transthoracic echocardiography showed moderately impaired left ventricular function with diffuse hypokinesis, but no pericardial effusion or enlargement of the right heart.

The end-diastolic left ventricular dimension was 56 mm, the end-systolic left ventricular dimension was 44 mm, and LVEF calculated with the Teicholz formula was 42.9%. The interventricular septal thickness was 11 mm and the posterior left ventricular wall thickness was 12 mm. The diameter of the inferior vena cava was increased to 22 mm, with no respiratory variation. Color Doppler echocardiography showed mild tricuspid regurgitation and the estimated pressure gradient between the right atrium and right ventricle was 25.1 mm Hg.

Laboratory tests showed neutrophil-dominant leukocytosis (WBC 13.7×10^9/L with segmented neutrophils of 70.0% and band cells of

15.0%), liver dysfunction (aspartate aminotransferase of 2660 IU/L, alanine aminotransferase of 2037 IU/L, gamma-glutamyl transpeptidase (γ-GTP of 197 IU/L), alkaline phosphatase of 793 IU/L, total bilirubin of 1.7 mg/dL, direct bilirubin of 1.0 mg/dL) and renal insufficiency (blood urea nitrogen of 63.4 mg/dL, creatinine of 3.01 mg/dL). His serum creatine phosphokinase (978 IU/L), MB isoenzyme (231 ng/ml), serum troponin I (28.4 ng/ml), international normalized ratio of prothrombin time (PT-INR of 2.19), lactate dehydrogenase (LDH of 3307 IU/L), and plasma brain natriuretic peptide (BNP of 4806 pg/ml) levels were markedly elevated. Abdominal ultrasonography was unremarkable, other than moderately dilated hepatic veins. Coronary angiography was not performed because of the patient's reduced renal function. The patient developed hemodynamically significant bradycardia (28 bpm) soon after admission, and a temporary transvenous pacing wire was placed in the right ventricle. On day 5, he complained of epigastric pain, and laboratory tests showed increased serum and urine amylase levels. Abdominal computed tomography showed swelling of the pancreatic body and tail, with increased retroperitoneal adipose-tissue density, suggesting pancreatitis. No cholelithiasis or tumor occluding the common bile duct or pancreatic duct was observed, and his plasma immunoglobulin G4 level was normal.

Questions

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm the diagnosis of the patient?
3. What is the treatment of this patient?

Case study No. 7. An 8-month-old female presented to the Emergency Department of the hospital with right-sided hemiparesis and a mild right-sided facial paresis, which had been progressive for one day. Further clinical examination was normal and there were no apparent skin lesions. The week before, she had experienced high fever for two days followed by irritability, anorexia, and low-grade fever. She was born full-term via uncomplicated vaginal delivery after a normal pregnancy and was the third child of healthy non-consanguineous parents from African European descent. Besides an uncomplicated Varicella infection at the age of 6 months, anamnesis and family history did not reveal any relevant information.

Laboratory tests, including complete blood count, C-reactive protein, liver function tests, kidney function, and electrolytes, were unremarkable.

Brain computed tomography was unremarkable, whereas the magnetic resonance imaging (MRI) with angiography of the brain revealed a (sub) acute ischemic lesion of the left capsule- thalamic region with irregularities of the left arteria cerebri media, which suggested vasculitis. The vasculitis lesion could be classified as benign (single, concentric, graduated, and smooth aspect of the lesion) and proximal (location on the M1 segment of the left middle cerebral artery). Electroencephalography was unremarkable. A lumbar puncture was done showing normal liquor opening pressure. Examination of liquor indicated an elevated WBC (186 cells/mm^3) with normal glucose (55 mg/dL) and protein levels (20 mg/dL). While in- house PCR for Varicella zoster virus and Herpes simplex virus were negative, PCR for enterovirus was positive. Bacterial culture was negative. Echocardiography and Doppler ultrasound of the lower limbs and abdomen were unremarkable. Hereditary and acquired hypercoagulability workup (activated partial thromboplastin time, prothrombin time, fibrinogen, D- dimers, antithrombin III, protein C activity, activated protein C resistance, protein S activity, prothrombin G20210A mutation) was normal. Test for lupus anticoagulant was negative. Since the focal origin of the vasculitis, and the suspected cause of this, brain biopsy was not considered.

Questions

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm the diagnosis of the patient?
3. What is the treatment of this patient?

Case study No. 8. A 28-year-old Japanese woman with a history of atopic dermatitis initially presented with low-grade fever and symptoms of upper airway inflammation in September 2015. She was admitted to a hospital 1 week later, after experiencing distal muscular weakness predominantly in the right upper limb. She had no obvious cardiorespiratory or abdominal abnormalities. Flaccid paralysis of the right upper limb was observed, without loss of sensation and in the absence of cranial nerve abnormalities. Blood test results were as follows: WBC 7.5×10^9/L (reference values: 3.6–8.0 $\times10^9$/L); CRP levels, 0.2 mg/dL (reference values: <0.3

mg/dL); and creatine kinase levels, 48 IU/L (reference values: 62–287 IU/L). Analysis of CSF revealed a cell count of 59/mL (mononuclear leukocytes, 17/mL; polymorphonuclear leukocytes, 42/mL) and a protein level of 39 mg/dL. Herpes simplex virus, varicella-zoster virus, poliovirus, or enterovirus 71 were not detected in the CSF. Gray matter hyperintensities were observed on T2-weighted cervical MRI, primarily in the right anterior horn at levels C4–7.

On the fifth day after hospitalization, flaccid paralysis appeared in her upper left limb as well. A second cervical MRI revealed bilateral hyperintensities in the anterior horn. During nerve conduction testing, the right median-ulnar nerves failed to conduct motor neuron action potentials, while severe amplitude reductions were observed in the left median-ulnar nerves. Examination of the lower limbs or sensory nerves was unremarkable.

Symptoms of pneumonia appeared after admission, and subsequent hypoxemia was treated with noninvasive positive pressure ventilation for a total of 10 days. Six months later, flaccid paralysis in her upper limbs did not improve.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What are the principles of antibacterial therapy of this patient?

Case study No. 9. An 8-month-old infant with a viral exanthem presented with lethargy and hemodynamic instability requiring mechanical ventilation. Echocardiography showed reduced ejection fraction (40%). He had been diagnosed with herpangina 7 days before admission. The previous week he had developed fever and oral ulcers. Brain and a spinal cord MRI demonstrated dorsal brainstem and cervical diffuse and poorly defined T2-hyperintensities, compatible with encephalomyelitis. CSF showed pleocytosis.

Five days later he was extubated and examination revealed bulbar palsy and upper limb hyperreflexia. These symptoms improved over the following week. He then presented with myoclonus, decreased movements and lethargy, leading to reintubation. A new brain MRI showed persistent brainstem T2-hyperintensities in dorsal brainstem. On the other hand, hy-

perintense T2 signal of the anterior horn of the spinal cord was also observed.

After treatment, the consciousness status, muscular tone and motor function improved notably from the second day. Two weeks later he had axial hypotonia with lack of head control and tetraparesis (4/5 on the Medical Research Council scale in all limbs) with hyperreflexia and mild hypertonia. During the follow-up, a progressive improvement of the tetraparesis was observed. At 3-month follow-up, mild hypertonia of the right arm and lack of full head control persisted (mRS = 3). At 12 months, cognitive and motor functions were normal except for mild axial hypotonia (mRS = 1).

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What is the treatment of this patient?

Case study No. 10. A two-year-old girl had a fever up to 40.0 °C for six days before admission. She had no cough, rhinorrhea, vomiting, diarrhea, or abdominal pain. She had previously been treated with amoxicillin and cefixmycin prescribed by a local medical doctor for five days, but a low-grade fever persisted. On admission, the results of the hematological and biochemical tests, urinalysis, and adenovirus rapid test were normal. Two days after admission, the conscious disturbance was observed.

Analysis of CSF revealed WBC 144/μl (lymphocytes 99%, neutrophils 1%), but protein and glucose were within normal limits. Brain MRI revealed hyperintense lesions in the midbrain, dorsal pons, and cerebellar dentate nuclei on fluid-attenuation inversion recovery (FLAIR) and T2-weighted images (T2WI). These lesions did not demonstrate enhancement after administration of contrast medium. Based on the MRI findings, the initial diagnosis was enterovirus 71 (EV71) encephalitis. IV immunoglobulin was administered immediately after the MRI. However, anti-EV71, anti-mycoplasma, anti-herpes simplex virus (HSV), and anti-Epstein Barr virus immunoglobulin M and immunoglobulin G antibodies were all absent in the serum. EV71 RNA and HSV DNA were not detected in the CSF by PCR. None of the viruses was isolated in the throat and rectal swabs, CSF, or serum. There was no bacteria growth in blood and CSF

cultures. Finally, Coxsackievirus B3 was detected in the CSF by reverse transcription-PCR. The girl recovered gradually and, uneventfully, was discharged without neurological sequelae.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What is the treatment of this patient?

Case study No. 11. A 27-year-old male presented with a history of complains of fever, sore throat, dysphagia and anorexia for five or six days. He had felt very tired for the same period. There was pharyngitis and a small group of herpetiform greyish-white aphthous lesions (thin-walled vesicles) with a red rim on the soft palate and a cervical lymph node was palpable on the left side. He had mumps and herpes as a child. Fever with a body temperature of 37.5-38.5 ^{o}C lasted for 4 days. It is of interest that he was in contact with his 4-year-old son who was ill with symptoms of fever and stomatitis.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?

1.3. FOODBORNE YERSINIOSIS

Case study No. 1. A 60-year-old butcher who had hepatic cirrhosis was admitted to the hospital with a four- day history of severe pain in his left shoulder and fever of one day's duration. He received a course of non-steroidal anti-inflammatory agents without improvement. He had a history of regular ingestion of undercooked pork or pork products as well as a seven-day history of high fever, mucoid diarrhea, maculopapular rash, positive Padalka symptom and colicky right lower abdominal pain about a fortnight before the beginning of the arthritis. There was no history of shoulder trauma, transfusion of blood products or recent travel.

On admission, his body temperature was 39.5 °C, his blood pressure 140/80 mm Hg, and his heart rate was 98 bpm. The left shoulder showed no signs of inflammation, but the range of motion was extremely limited due to severe pain. The initial laboratory tests included the following: ESR 70 mm/hour, WBC 19 $\times 10^9$/L, with 91% polymorphonuclear cells, hemoglobin concentration of 150g/L, hematocrit of 43%, and platelet count 134 $\times 10^9$/L. Chest and left shoulder X-rays were unremarkable. Cultures of blood, stool, urine, and an aspirate of the affected joint were obtained and empiric treatment with cefotaxime (IV, 3 g/day) was begun. Cultures from the aspirate of the affected joint grew Gram-negative bacteria. Over the next 10 days his body temperature gradually became normal, but shoulder pain persisted. On day 11, swelling, warmth, and tenderness were noted over the left shoulder. The patient still did not have fever. On day 16 in hospital, his body temperature increased again to 39.5 °C. Cefotaxime was then substituted for netilmicin (IV, 200 mg/day) according to the results of susceptibility.

Questions

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm the diagnosis of the patient?
3. What is the antimicrobial therapy to treat this disease?

Case study No. 2. A 29-year-old woman presented with a two-week history of abdominal pain, mucoid diarrhea, and vomiting. She had a fever (39.0 °C) and mild tenderness in the right iliac fossa. She had WBC count

of 26.1 $\times 10^9$/L (neutrophils 90%) and CRP concentration of 46 mg/L (reference value < 8 mg/L). The culture of stool, blood, and urine yielded negative results for *Salmonellae* and *Shigella*. She had a history of regular ingestion of undercooked pork or pork products as well as unpasteurized milk. She improved spontaneously over the chloramphenicol course of a week.

She presented again a fortnight later with diarrhea, abdominal pain, weight loss, malaise, generalized lymphadenopathy, and an abdominal mass. Colonoscopy showed thickened folds of terminal ileum. Biopsy specimens showed mild inflammatory changes, especially in the sigmoid colon. Rubbery lymph nodes in the small bowel mesentery and mesocolon were found at laparotomy. Histological examination showed necrotizing granulomatous lymphadenitis. She had similar clinical remarkable symptoms and remarkable test results to those seen previously but also had normochromic anemia (hemoglobin concentration 90 g/L).

Questions

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. What is the antimicrobial treatment to treat this disease?

Case study No. 3. A 17-year-old female presented with recent onset of an oligoarthritis affecting the right knee, ankles and right 2nd metacarpal joint. There was no history of eye symptoms, sexual contact and no relevant family history. However, she had a watery diarrheal illness about three weeks ago. The joint manifestations were accompanied by tender raised lumps on both shins and forearms typical of erythema nodosum.

Laboratory tests revealed hemoglobin of 12.8 g/dL, WBC of 8.4 $\times 10^9$/L, platelets of 324 $\times 10^9$/L, ESR of 46 mm/h, CRP of 34 mg/L, RA latex and antinuclear factor were negative, ASO titer <200 IU/l, serology for *brucellosis*, *Shigella* and *salmonella* were negative. Culture of feces, urine and throat swab were negative. Chest X-ray was unremarkable and there was no evidence of an erosive arthritis on hand, feet, ankle or knee radiographs.

Questions

1. What are the diagnosis and complication of this disease?

2. What are the laboratory tests to confirm this diagnosis?
3. What is the therapy to treat this disease?

Case study No. 4. A 19-year-old man was admitted to the Department of Surgery at a university hospital with complaints of constantly escalating abdominal pain during the previous 3 days. Initially, the pain embraced the whole abdominal cavity (mainly the epigastrium and middle abdominal region). On the admission day, the pain was sensed in the right lower quadrant of the abdomen, near the right hip bone.

The patient's body temperature was elevated (38.5 °C). Physical examination of the abdomen revealed slight distention, slow peristalsis, abdominal guarding, and Blumberg's sign (rebound tenderness) in the right hypogastric region. Blood chemistry test revealed leukocytosis with "left shift" (WBCs 15.1×10^9/L, band cells 19%, neutrophils 60%, lymphocytes 9%, monocytes 10% and anemia (RBCs – 3.52×10^{12}/L, hemoglobin – 10.3 g/dL, hematocrit – 35.5%) as well as increased concentration of CRP – 93.8 mg/dL. Abdominal ultrasonography showed a small amount of fluid between the intestinal loops in the right lower quadrant of the abdomen and numerous enlarged mesenteric lymph nodes of 20–45 mm.

The patient was qualified for surgical treatment ad hoc. During the operation, a large amount of clear, amber-colored fluid in the peritoneal cavity was observed as well as rarely inflammatory appendix, numerous enlarged (1–2 cm) mesenteric lymph nodes, and Meckel's diverticulum with broad base without inflammation, located approximately 50 cm from the ileocecal valve. Appendectomy was performed along with biopsy of mesenteric lymph nodes. Histopathological examination of removed appendicitis revealed catarrh appendicitis, and, in mesenteric lymph nodes, significant hyperplasia of lymphoid follicles with enlargement of proliferation centers with visible infiltration from multilayer neutrophilic granulocytes was observed.

Questions

1. What is the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What are the principles of therapy to treat this disease?

Case study No. 5. A 31-year-old man was admitted to a hospital with high fever and a sore throat in late February. He also had myalgia, arthral-

gia and gastrointestinal symptoms, including abdominal pain in the right lower abdominal quadrants and watery diarrhea 3–4 times a day. The patient was previously healthy and did not take any medications. He lived with his wife and 11-year-old boy and got a dog one month before the onset of his symptoms. The family grew vegetables (lettuce, cabbage and carrot) in their own garden and had well water. Three weeks previously, his son suffered from high fever, strawberry tongue, and desquamation of the fingertips, which resolved within a few days without any treatment.

On admission, his body temperature was elevated to 39 ^{o}C. Physical examination revealed a swollen and reddened pharynx and erythema of the trunk and right thigh. The results of streptococcal antibody tests including antistreptolysin O and anti-streptokinase antibodies were negative.

Ampicillin/sulbactam (3 g, 8-hourly) was empirically administered based on the suspicion of bacterial infection of the upper respiratory tract or scarlet fever. However, the patient went into septic shock, requiring noradrenalin support. On arrival, the patient was alert and oriented, and his vital signs were as follows: blood pressure 112/54 mm Hg on continuous infusion of noradrenaline (0.19 μg/kg/min); heart rate 110 bpm; respiratory rate 24 per minute; oxygen saturation 96% (on 3 L/min of oxygen); and body temperature 37.3 ^{o}C. Both conjunctivae were congested, and multiple areas of erythema were seen on his right lower limb. Laboratory tests demonstrated an increased WBC count (17 $\times 10^{9}$/L), a normal platelet count (269 $\times 10^{9}$/L), an elevated ESR (79 mm/h), increased levels of C-reactive protein (27.7 mg/dL), total and direct bilirubin (5.88 mg/dL and 4.09 mg/dL respectively), and decreased serum levels of total protein (4.5 g/dL) and albumin (1.7 g/dL). Blood, urine, and cerebrospinal fluid cultures were unremarkable throughout the admission. Contrast-enhanced CT revealed enlarged ileocecal and posterior cervical lymph nodes, pulmonary congestion, and mild splenomegaly. It was noticed a bilateral desquamation of patient's fingertips on the 10th day of the disease.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What are the principles of antibacterial therapy to treat this disease?

1.4. SALMONELLOSIS. TYPHOID FEVER. PARATYPHOID FEVERS

Case study No. 1. A 55-year-old man, resident of a village and a farmer, was admitted to an infectious diseases hospital in India, in October, 2005, with a 10-day history of high-grade continuous fever and altered level of consciousness lasting two days. The disease started gradually with low-grade fever, weakness, flatulence, and constipation. There was no associated headache or vomiting. However, mild dry cough was noted with the onset of the illness. Physical examination revealed pallor face, dry, yellow coated tongue, dull percussion sounds and mild tenderness over the right lower abdominal quadrant, slight distension of the abdomen, some enlargement of the liver and the spleen, as well as several subtle, slightly raised, salmon-colored macules on the abdomen measuring about from 2 to 4 mm, which blanch with pressure. The body temperature was 39.8 °C, heart rate was 62 bpm, blood pressure – 90/65 mm Hg. There was no icterus or lymphadenopathy. Examination of the rest of the cardiovascular and respiratory systems was unremarkable.

Questions

1. What is the clinical diagnosis? Provide differential diagnosis.
2. Plan of management and laboratory tests of the patient.
3. What is the antimicrobial therapy and symptomatic treatment of this disease?

Case study No. 2. A 4-year-old Asian boy presented to the emergency room at a children's hospital in Sydney, Australia, 1 day after returning from travel to Bangladesh with a persistent fever for 10 days. He had visited Bangladesh with his parents and stayed there for 8 weeks. He had high-grade continuous fever which was low-grade at first, weakness, mild vomiting, greenish stools with loose consistency, about 2 to 4 times a day, after arriving in Bangladesh, for which he was given oral ciprofloxacin for 3 days. The vomiting and diarrhea resolved after 1 week, but he continued to have intermittent fever up to 40.0 °C.

The family denied eating street food or drinking tap water in Bangladesh. There was no history of contact with patients with tuberculosis. The child's immunizations were up to date, according to the Australian sched-

ule. He did not receive any travel vaccines prior to travel or malaria prophylaxis. His medical history was unremarkable.

In the emergency room, he appeared unwell, pallor, with dry and yellow coated tongue and moderately dehydrated. He was febrile at 39.8 °C, tachycardic with a heart rate of 160 bpm, and his respiratory rate: 32 per minute. There was no icterus or lymphadenopathy. Skin examination revealed several salmon-colored macules on the chest. Chest and cardiovascular examination was unremarkable. His abdomen was soft, mildly tender over the right lower abdominal quadrant, and distended with the liver enlargement. There was no clinical ascites and his bowel sounds were present. He was alert and oriented, with normal neurological examination. He had no bone or joint pains or swelling.

Hemoglobin concentration was 102 g/L and reached a nadir of 89 g/L on day 11 of admission. He had a nadir WBC of 4.30×10^9/L (neutrophils 2.6×10^9/L and lymphocytes 0.9×10^9/L) on presentation, which gradually improved to 11×10^9/L by day 11. His initial platelet count was 97×10^9/L. His renal function was normal apart from mild hyponatremia, while his liver function tests showed hypoalbuminemia and mild transaminitis with normal bilirubin concentrations.

Questions

1. What is the clinical diagnosis? Provide differential diagnosis.
2. Plan of management and laboratory tests of the patient.
3. What is the antimicrobial therapy and symptomatic treatment for this disease?

Case study No. 3. A 16-year-old male with a 12-day history of high-grade fever presented to an emergency center in India complaining of abdominal pain for 3 hours associated with anorexia, vomiting, dark diarrhea, and high-grade fever. The patient came to the emergency centre because of worsening abdominal pain. Vital signs were documented as temperature of 36.2 ^{o}C, heart rate of 109 bpm, blood pressure 100/90 mm Hg, respiratory rate: 32 per minute, and oxygen saturation of 91% on room air.

The patient was appearing ill but alert with normal neurological examination and supple neck. He appeared dehydrated. He had 3 cm non-tender hepatomegaly and 2 cm splenomegaly. His abdominal examination revealed mild distension, decreased bowel sounds, and moderate diffuse ten-

derness without acute peritoneal signs. Ultrasound was performed to assess for free fluid in the peritoneum.

The bedside ultrasound revealed findings consistent with free fluid. The fluid was complex (echogenic and heterogeneous) and was visualized bathing the liver in the right upper quadrant. Other images showed complex fluid in the perisplenic view as well as anterior to a peristaltic small bowel.

Based on surgical evaluation and the ultrasound findings, the patient was taken for immediate laparotomy. The patient was sent directly to undergo surgery. At surgery, about 600 ml of a feculent peritoneal fluid was drained. There were found two small (<1 cm) perforations of the terminal ileum and diffuse fibrinous exudates covering the small bowel and mesentery.

Questions

1. What are the clinical diagnosis and a complication of this disease? Justify your answer.
2. Plan of management, laboratory tests, and imaging for the patient.
3. What is the antimicrobial therapy to treat this disease?

Case study No. 4. A 52-year-old woman, a cook, was admitted to Tokyo University Hospital, Tokyo, Japan, because of lower back pain radiating to both legs. It started insidiously 2 weeks before and the intensity of the pain gradually increased over days with the daily activities. Worsening lower back pain not relieved with rest at night made her take medical attention. The patient denied any history of fall or lifting a heavy object. However, she had a week history of high-grade fever, weakness, vomiting and several episodes of greenish loose stools approximately a month before. She was diagnosed with diabetes 5 years ago. She had no history of travelling to tropical areas before admission.

On physical examination, diffuse tenderness was present at the lower lumbar and sacral region associated with paravertebral muscle spasm. The cervical and thoracic vertebrae were normal. The cranial nerves and fundi were normal, so were muscle power and tone. The sensation was intact and reflexes were normal; the plantar reflexes were flexor on both sides. No bony deformity or any neurological deficit were noted. She had no jaundice, rash, lymphadenopathy or neck stiffness. Chest X-ray showed clear lung fields and her cardiovascular system was normal. The abdomen was soft, with no organomegaly. Rectal examination was normal. On admis-

sion, her blood pressure was 125/78 mm Hg, heart rate – 71 bpm and body temperature – 37.6 °C.

Her blood glucose concentration was 8.5 mmol/L, with glycated hemoglobin being 9.5%. WBC count was $14{,}6\times10^9$/L, ESR was 44 mm/h and CRP levels were 22.5 mg/dL, respectively. Her serum creatinine was 1.05 mg/dL. Urinalysis showed bacteriuria with many WBC casts.

MRI of the thoracic and lumbar spine showed spondylodiscitis at L4-L5 associated with the mild paravertebral abscess. Stabilization of the spine followed by intraoperative biopsy sample was taken for histopathological and microbiological workup. Histopathology revealed granulomatous osteomyelitis with degenerative disc changes.

Questions

1. What are a clinical diagnosis and a complication of this disease? Justify your answer.
2. Plan of management, laboratory tests, and imaging for the patient.
3. What is the antimicrobial therapy to treat this disease?
4. What are the criteria to discharge the patient from the hospital?
5. What is epidemiological surveillance for such convalescents?

Case study No. 5. A 7-year-old Kurdish girl from northern Iraq presented to a local hospital with high-grade fever, abdominal pain, nausea, vomiting and several loose greenish stools for the one-week duration, followed by fresh bleeding per rectum after 10 days from her illness for two days before her admission. She had a history of neither chronic medical disease nor surgical operation.

On admission, her physical examination revealed the following: pallor, blood pressure of 80/50 mm Hg, heart rate of 102 bpm, rapid respiration (shock state), body temperature of 37.2^{o}C. Her abdominal examination revealed mild splenomegaly with diffuse abdominal tenderness mainly in the right lower quadrant. Blood profile showed a hemoglobulin concentration of 71 g/L, and WBC of 4.5×10^9/L. Urgent colonoscopy was arranged for this patient, which showed that her colon was full of fresh blood. The bleeding could not be controlled by endoscopic hemostasis using thermal coagulation or any other endoscopic intervention.

The biopsy specimen of the distal 25 cm of her ileum located 20 cm from her right colon had numerous irregularly shaped perforated ulcers, extensive inflammation, and focal suppuration infiltrating mucosa and submucosa. Macroscopic examination revealed a vascular malformation

with a visible clot within. Microscopy revealed some deep ulcers. Mixed inflammatory cell infiltrate predominated the ulcers without caseous necrosis. The mesenteric lymph nodes of the patient revealed reactive sinus hyperplasia.

Questions

1. What are the clinical diagnosis and a complication of this disease? Justify your answer.
2. Plan of management and laboratory tests and imaging for the patient.
3. What is the antimicrobial therapy to treat this disease?

Case study No. 6. A 20-year-old man from Indonesia presented with a history of high-grade fever with chills, abdominal pain, nausea, vomiting and weakness which all lasted for two weeks. The patient came to the hospital because of worsening weakness and giddiness. On examination, he was found to suffer from anemia (hemoglobin of 86 g/L), with increased values of liver function tests (total bilirubin 5.3 mg/dL; direct bilirubin 4.7 mg/dL, serum alanine aminotransferase 105 IU/L, albumin 2.3 mg/dL). Two days after admission, he developed an increased frequency of stools with hematochezia and his hemoglobin dropped to 66 g/L; however, he did not have any loss of consciousness and was hemodynamically stable except for tachycardia (98 bpm). Colonoscopy was performed as an elective procedure to know the site of the bleeding and to plan further management. Colonoscopy revealed multiple punched-out ulcers of varying sizes starting from the hepatic flexure extending into the ascending colon, caecum and terminal ileum. All the ulcers had a clean base except for an ulcer of the caecum which had an adherent clot without active bleeding, suggesting that the bleed was from that caecal ulcer.

Questions

1. What are this disease and a complication of this disease?
2. What are the laboratory tests and imaging to confirm this diagnosis?
3. What is the treatment and prognosis?

Case study No. 7. A previously fit and healthy 24-year-old Caucasian man presented to the emergency department with a one-day history of severe lumbar back pain radiating into the right buttock and lower limb, ren-

dering him unable to walk. He also complained of fever with chills and chills, associated with a generalized headache and vomiting.

The patient had been suffering from seven-day fever and watery diarrhea, which had ceased 2 days prior to admission. He denied having any contact with acutely ill individuals. The patient believed that he contracted the infection from a chicken burger he had consumed in a fast-food restaurant, prior to his illness.

There was no significant medical history or relevant other risk factors for infection, such as travel and pets. He was not on any regular medication and did not report any allergies. He did not smoke or drink any alcohol. There was no significant family history.

His initial observations were as follows: heart 92 bpm, blood pressure 101/50 mm Hg, body temperature 39.2 °C, saturation 96% on room air and respiratory rate 22 per minute. He was fully conscious with a Glasgow Coma Scale of 15/15.

Initial examination revealed severe pain in the right buttock on palpation. There were no rashes or signs of meningism. He had dry mucous membranes, increased bowel sounds on abdominal auscultation, and mildly enlarged liver on palpation (2 cm below the ribs). The rest of his examination, including neurological examination, was unremarkable.

He was transferred to the acute medical unit and was initially managed with IV fluids. An ultrasound showed a 2.8 cm×2 cm ill-defined region within the right gluteus maximus; magnetic resonance imaging (MRI) of the pelvis with contrast showed a small gluteal abscess inferior to the right sacroiliac joint.

He was subsequently transferred to a medical ward, where he was noted to be significantly hypoxic and persistently febrile by the nursing staff. He was given oxygen and the doctors were informed.

Unfortunately, his clinical condition deteriorated rapidly over the following hours and he became profoundly septic, hypoxic and had a significant metabolic acidosis. He was peripherally shut down and mildly icteric. His observations showed cardiorespiratory compromise and auscultation of the chest revealed fine bilateral basal crackles. Chest X-ray showed left lower lobe consolidation. On day 4 after his admission, examinations showed the following: heart rate of 100 bpm, blood pressure of 110/60 mm Hg, respiratory rate 18 per minute, oxygen saturations 82% on room air, capillary refill time < 5 s.

Routine blood tests showed the following results: hemoglobin of 138 g/L on day 1 and 119 g/L on day 5, WBC count of 14.7×10^9/L on day 1

and 7.1×10^9/L on day 5, total lymphocyte count of 0.84×10^9/L on day 1 and 0.7×10^9/L on day 5, neutrophil count of 13.7×10^9/L on day 1 and 5.9×10^9/L on day 5, platelets of 120×10^9/L on day 1 and 90×10^9/L on day 5. Additionally, on day 5 blood sugar was 6.9 mmol/L, alkaline phosphatase – 132 IU/L, alanine transaminase – 58 IU/L, total bilirubin – 54 μmol/L, CRP – 296 mg/L. The rest of his blood, including urea, creatine and electrolytes, was all normal.

Questions

1. What are this disease and complications of this disease? How unusual is such a case for a seemingly immunocompetent patient?
2. What are the laboratory tests to confirm this diagnosis? What are the examinations and management of this patient?
3. What is the antimicrobial therapy to treat this disease?

Case study No. 8. A 20-year-old male with a 3-day history of fever and diarrhea was consulted by a local general practitioner. The patient had no significant past medical or travel history and was not on any regular medications. He was working as a cook in a cafe. He developed symptoms of fever up to 39 ^{o}C, mild headache and watery diarrhea about 5 times per day. He had no contact with ill individuals and no significant exposures to animals or fresh water. The patient was prescribed amoxicillin along with paracetamol and metoclopramide. He got outpatient treatment. The symptoms of diarrhea and fever resolved on day 7 of gastroenteritis.

Three weeks after recovery, the patient presented to the emergency department of an American metropolitan hospital with a seven-day history of high-grade fever, lethargy and mild headache. On presentation, he was febrile at 39.8 ^{o}C, with heart rate 110 bpm, and was hypotensive (90/60 mm Hg); however, his blood pressure improved with IV fluid resuscitation. His abdomen was soft with mild tenderness in the right upper quadrant. He had no abdominal pain or diarrhea. There were no respiratory or urinary symptoms and no rashes. Initial examination revealed hemoglobin (Hb) of 141 g/L, WBC count of 3.9×10^9/L and platelets of 101×10^9/L; creatinine 90 of μmol/L, elevated CRP of 218 mg/L, and deranged liver function tests (ALT of 421 IU/L, AST of 743 IU/L, GGT of 171 IU/L, ALP of 175 IU/L, bilirubin of 14 μmol/L). An abdominal ultrasound revealed mild hepatosplenomegaly with no focal lesions as well as a normal appearance of the gallbladder without cholelithiasis.

Examination of his cardiovascular system demonstrated dual heart sounds with no murmurs. There were no peripheral stigmata of infective endocarditis. Multiple examinations were undertaken to identify a possible occult infective focus. Transthoracic echocardiogram identified a small, mobile vegetation on the anterior leaflet of the mitral valve. The remaining valves were structurally normal; there was no evidence of abscess formation and no features to suggest myocarditis. The 4 mm mitral valve vegetation was again demonstrated on transesophageal echocardiography and a diagnosis of endocarditis.

Questions

1. What are this disease and complication of this disease?
2. What are the laboratory tests to confirm this diagnosis?
3. What are laboratory tests and imaging for this patient?
4. What is the antimicrobial therapy to treat this disease?

Case study No. 9. A 55-year-old man presented to a general surgical unit with a 3-day history of general malaise, high-grade fever and right iliac fossa pain. He had developed watery diarrhea 3 weeks earlier. He was managed conservatively by his general practitioner with the resolution of symptoms prior to admission. His medical history included long-standing hypertension, an anterior myocardial infarction and quadruple coronary artery bypass grafting 6 and 8 years earlier, respectively, renal colic and a 5-cm diameter infrarenal abdominal aortic aneurysm.

The latter had been diagnosed incidentally the year before during a hospital admission for pneumonia and an elective repair of this aneurysm had been cancelled when he was found to have a poor left ventricular function. His medications were aspirin, diltiazem, enalapril, isosorbide mononitrate, frusemide and omeprazole. On examination body temperature was 39.0 °C. Chest auscultation was normal and abdominal palpation revealed a tender but soft right iliac fossa and a nontender aortic aneurysm. Initial investigation showed hemoglobin of 110 g/L, WBC count of 8.5×10^9/L with a normal differential, CRP of 168 mg/L and amylase of 77 IU/L.

Chest X-ray showed right basal atelectasis and an abdominal ultrasound scan revealed a 5-cm diameter infrarenal aortic aneurysm. Echocardiography showed no evidence of endocarditis. He was initially commenced on IV antimicrobial therapy.

On day 2 the patient became hypotensive with blood pressure of 70/40 mm Hg. A central venous line was inserted for fluid management.

Abdominal computed tomography (CT) on days 2 and 5 showed no evidence of either a change in size or leakage from the aneurysm but did identify small bilateral pleural effusions and renal calculi. Despite continuing antimicrobial therapy, he remained unwell with general malaise, and intermittent pyrexia and he developed severe left loin and iliac fossa pain.

IV urography showed bilateral renal calculi and delayed emptying of the left ureter, and an abdominal CT scan confirmed an 8.5-cm diameter leaking aortic aneurysm with retroperitoneal extension causing compression of the left ureter. Aortic aneurysm repair was performed using a straight celsoft/rifampicin graft. At operation, the aorta and surrounding tissues were inflamed, edematous and friable. Microscopy of the aortic wall revealed the presence of Gram-negative bacilli, although bacterial culture was negative. He was discharged home 27 days after admission but antimicrobial therapy was continued for one month after discharge.

Questions

1. What are this disease and complication of this disease?
2. What are the laboratory tests to confirm this diagnosis? What are laboratory tests and imaging for this patient?
3. What is the antimicrobial therapy to treat this disease?

Case study No. 10. A previously healthy 22-month-old female, a restaurant bartender, presented with a 4-day history of nausea, and vomiting twice a day, watery greenish frequent stools from 5 to 7 times a day, crampy abdominal pain at right lower and upper abdominal quadrants, malaise, and fever from 38° to 39° C that had begun a day after she ate undercooked eggs and a chicken burger. She had been evaluated at an outpatient clinic, where she was found to be dehydrated. Significant laboratory test results at that time included WBC count of 8.5×10^9/L with a normal differential, serum sodium of 133 mmol/L, and albumin of 23 g/L.

The patient returned for reevaluation 2 days later due to ongoing fever up to 39.8 ^{o}C, watery diarrhea about 11 times a day, and poor oral intake. She was admitted to the hospital for further management and treatment. The patient's older sister, who had also consumed undercooked eggs during the same time period, had a diarrheal illness that self-resolved 3 days prior to the case patient's hospital admission.

Questions

1. What is the diagnosis?
2. What are the laboratory tests to confirm this diagnosis? Plan of management and laboratory tests for the patient.
3. What is the treatment for this patient?
4. What are the criteria to discharge the patient from the hospital? What is epidemiological surveillance for the convalescents of diarrheal diseases?

1.5. SHIGELLOSIS. AMOEBIASIS

Case study No. 1. A 39-year-old woman was admitted to the Infectious Diseases Hospital with a 3-day history of fever, abdominal cramps, generally in the left lower abdominal quadrant, false urge to defecate, painful straining in the anus, frequent low-volume loose stools with mucus and blood up to 15 times a day, loss of appetite, weakness and dizziness.

Physical examination revealed a dry, white-coated tongue, tenderness over the left lower abdominal quadrant. A painful crampy sigmoid colon was palpated. The body temperature was 38.6 °C, heart rate was 92 bpm, blood pressure – 110/65 mm Hg. Examination of the rest of the cardiovascular and respiratory systems was normal.

Questions

1. What is the clinical diagnosis? Justify your answer.
2. Plan of management and laboratory tests of the patient.
3. What are the antimicrobial therapy and symptomatic treatment of the patient?

Case study No. 2. A 60-year-old woman was admitted to the Infectious Diseases Hospital with symptoms of acute infectious diarrhea. The illness was suddenly started in the evening with a high fever up to 39.4 °C, chills, dizziness, anorexia, headache, insomnia, repeated vomiting, diffuse abdominal cramps, generally in the left lower abdominal quadrant, frequent loose stools with mucus and blood up to 20-25 times a day. She did not sleep that night. The abdominal colicky was gradually increased. In the morning, she was taken by ambulance to the hospital. On examination, the patient had body temperature of 39.0 °C, dry lips, heart rate more than 100 bpm, quiet heart sounds, tenderness over the left lower abdominal quadrant with crampy sigmoid colon, and low-volume mucoid and bloody stool.

Questions

1. What is the clinical diagnosis? Justify your answer.
2. Plan of management and laboratory tests for the patient.
3. What are the antimicrobial therapy and symptomatic treatment of the patient?

Case study No. 3. A 24-year-old woman, a child-care worker, was admitted to the Infectious Diseases Hospital with a diagnosis of *Shigella* carrying. On admission, the patient had no complaints and felt healthy. Bacteriological stool culture revealed *Shigella flexneri*. The gastrointestinal system examination, fecal WBC examination, and WBC blood count were normal. On day 3 in hospital, the sigmoidoscopy did not reveal any inflammation features in the mucous membrane of the rectosigmoid.

Questions

1. What are the criteria for hospitalization of patients with diarrheal diseases?
2. What is the clinical diagnosis? Justify your answer.
3. Plan of management and treatment of the patient.

Case study No. 4. A 36-year-old woman, a restaurant bartender, was hospitalized in the Infectious Disease Hospital with a diagnosis of acute shigellosis (*Sh. Flexneri 2a*), colitis, moderate severity.

Questions

1. What are the criteria to discharge the patient from the hospital?
2. What is epidemiological surveillance for the convalescents of shigellosis patients?

Case study No. 5. Acute shigellosis (*Sh. Flexneri 2a*), colitis, moderate severity was diagnosed in a 32-year-old waiter, and confirmed with epidemiological, clinical data and positive bacteriological stool culture.

Questions

1. What are the criteria for hospitalization of patients with diarrheal diseases?
2. Plan of management and laboratory tests of the patient.
3. What are the antimicrobial therapy and symptomatic treatment of the patient?

Case study No. 6. A 29-year-old man was admitted to the Infectious Diseases Hospital with a 4-week history of malaise, weight loss, abdominal pain, and frequent bloody mucoid stools. It was also found out that he had recently traveled to Indonesia. On examination, he did not have

fever but had right lower quadrant tenderness over the cecum and ascending intestines. A blood count showed hemoglobin of 11.1 g/dL, absolute RBC count of 3.9×10^6 /μL, ESR of 22 mm per hour, total WB count of 6,800/μl with 5 % eosinophils, 3% band neutrophils, 60% polymorphonuclear neutrophils, 22% lymphocytes, and 10% monocytes. Fecal WBC examination revealed few WBCs, mainly eosinophils (1-2 cells per oil immersion microscopic field (OIF)), many RBC (from 60 to 90 per OIF), and Charcot-Leiden crystals. Colonoscopy revealed erythematous, ulcerated mucosa in the cecum (numerous ulcers with pinhead center and raised undermined edges averaging 1 to 2 mm in diameter).

Questions

1. What disease is this? What would the ulcer biopsy demonstrate?
2. What are the laboratory tests to confirm this diagnosis?
3. What is the treatment and prognosis?

Case study No. 7. A 49-year-old man was admitted to the Infectious Diseases Hospital with a 2-week history of malaise, and abdominal pain in the right upper quadrant. He worked as a builder and had previously worked at a sewage treatment facility. He had traveled to Indonesia two months before that. On examination, the patient had febrile of 38.5 °C, pale skin, weight loss, hepatomegaly with a point tenderness over the liver below the ribs, and right-sided pleural pain. The clinical features were accompanied by elevated alkaline phosphatase (185.9 IU/L). A blood count showed total WBC count of 14,800/μL with 79% neutrophils, and ESR of 38 mm per hour. X-ray showed an elevation of the right hemidiaphragm. Ultrasonography revealed a large mass in the right lobe of the liver which was confirmed by a computerized tomography (CT) scan. A pyogenic liver abscess was suspected and empirical IV antibiotics were commenced. An aspirate obtained percutaneously revealed brown, purulent material; however, bacteriologic cultures were negative.

Questions

1. What disease is this? What would the histological examination demonstrate?
2. What are the laboratory tests to confirm this diagnosis?
3. What is the treatment and prognosis?

Case study No. 8. A 25-year-old man from Laos presented with a 3-day history of right iliac fossa pain. He did not have fever, but had tender abdomen, and a computed tomography scan revealed a large inflammatory mass. The provisional diagnosis was acute appendicitis with a periappendicular abscess. The patient received broad-spectrum antibiotics. On day 4, an attempted ultrasound-guided aspiration obtained no fluid, whereas core biopsy revealed only chronic inflammation. The patient was discharged on day 5 on oral amoxicillin/clavulanate and outpatient follow-up was organized. On day 6, he represented with continuing pain; the second biopsy again revealed only chronic inflammatory changes. On day 8, he had a laparotomy and right hemicolectomy. The appendix was normal but there was a mass within the colonic wall. Stool microscopy revealed no parasites. Bacteriological stool cultures were also negative.

Questions

1. What is this disease? What would the histological examination demonstrate?
2. What are the laboratory tests to confirm this diagnosis?
3. What is the treatment and prognosis?

Case study No. 9. A 28-year-old man was hospitalized for diarrheal syndrome that developed during the previous four days. He had consulted his family physician who had prescribed symptomatic and antibiotic treatments (Loperamide®, Bactrim Forte® and Ciprofloxacin®) but without any improvement.

On admission to the Emergency Unit, abdominal pains in the left lower abdominal quadrant, fever, vomiting and more than ten liquid greenish stools per day were still present. The pulmonary and neurologic examinations were normal. The abdomen was painful and distended but it remained soft with moderate tenderness and active intestinal peristaltic was present. The patient presented slight hypotension (114/77 mm Hg) and slightly increased heart rate (85 bpm).

Laboratory tests showed biologic inflammatory syndrome (CRP 111 mg/L), extracellular dehydration with severe hypokalemia (Na 118 mmol/L, K 2.9 mmol/L, Cl 79 mmol/L) and initial functional renal deficiency (Urea 10.3 mmol/L, Creatinine 122 mmol/L). There was nothing remarkable in his medical history. He was not taking any medications, was not immunocompromised and there was no history of travel or chronic inflammatory bowel disease.

However, the patient worked on a farm where he contacted with various domestic animals including pigs. Colonoscopy revealed erythematous, ulcerated mucosa in the sigmoid. The ulcers varied in shape, and the ulcer bed may be full of pus and necrotic debris. The stool specimen was watery and contained blood and mucus. The fresh stool examination was negative for bacteriological pathogens (*Salmonella*, *Shigella*, *Campylobacter*, *Yersinia* and *Clostridium difficile*) but revealed numerous mobile ciliated trophozoites.

Questions

1. What is this infectious agent and disease?
2. What is the treatment and prognosis?

Case study No. 10. An eleven-month-old infant female was taken to the emergency department of a hospital, Kathmandu, Nepal, at 4:30 pm on 9 July 2016 with complaints of abdominal pain, frequent passage of loose, bloody, and frothy stool for the last 6 days. She did not have any history of fever, nausea, and vomiting. She belonged to the low-socioeconomic status family and living in the earthquake-affected remote area of the Dhading district. They took drinking water from the nearby stream but have no history of eating anything unusual or unhygienic. On examination, she was conscious but lethargic and appeared pale. Her abdomen was soft with increased bowel sound but apparent hepatosplenomegaly was not noted. The chest was clinically clear. Her body temperature was 38.2 °C, heart rate was 115 bpm, and respiratory rate: 30 per minute. The patient was provisionally diagnosed as a case of acute diarrheal illness with suspicion of dysentery and immediate management was started. The patient was then admitted to the pediatric unit for further treatment. There was a reduction in the hemoglobin concentration but a normal level of total white blood cell count with adequate cellular distribution (52% granulocytes and 48% lymphocytes). While the infant girl was being treated in the hospital, her 2.5-year-old brother was taken to the hospital on July 12 with major complaints of fever, bloody diarrhea, and abdominal cramps lasting for the last three days.

Questions

1. What is this disease?
2. What are the laboratory tests to confirm this diagnosis? Plan of management and laboratory tests for the patient.
3. What is the treatment and prognosis?

CHAPTER II. RESPIRATORY TRACT INFECTIONS

2.1. DIPHTHERIA. TONSILLITIS

Case study No. 1. A 20-year-old male from Bagalkot, India, was presented to a hospital with chief complaints of fever and sore throat in the last 5 days. Fever was of high degree with chills and chills, gradually progressive, and patient took some treatment from a local doctor. He noticed patches over the tonsils 2 days later, and this condition was treated by the same doctor as streptococcal tonsillitis. Incision and drainage were attempted. As the symptoms did not disappear, he was referred to the tertiary hospital.

On examination, the patient was febrile. In the oropharynx, the anterior pillars were hyperemic bilaterally; tonsils were hypertrophied, congestive greyish-white patches presented over tonsils and soft palate. Soft palate movements were normal. Posterior pharyngeal wall was congested, traumatic wound was present over the right side of tonsil. Indirect laryngoscopy was within normal limits. In the neck, bilateral tender jugular lymphadenopathy was present. Nose and ear examination was unremarkable. Throat swab was positive for Albert's stain. Electrocardiography was normal, echocardiography was normal too.

Questions

1. What is clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. What would be the approach to treat this patient?
4. What are the prevention and control of this disease?

Case study No. 2. A 9-year-old boy was referred to University Hospital in Thailand with low-grade fever, cough and sore throat for 5 days. On day 1 of illness, he had been taken to a rural clinic and doctor diagnosed pharyngitis. The patient was prescribed some unknown oral antibiotic and acetaminophen. By day 3 of illness his fever had gradually declined and the sore throat had resolved. However, he subsequently became worse and experienced neck swelling, dyspnea and dysphagia. He also had a hoarse breath sound. On day 5 of illness his parents took him to a local hospital.

His vital signs showed blood pressure of 110/90 mm Hg, heart rate of 153 bpm, temperature of 37.5 °C, respiratory rate: 22 per min and oxygen saturation of 75% on room air. His tonsils were inflamed and had white patches, and he had inspiratory stridor and poor air entry but no adventitious sounds. He was subsequently endotracheally intubated at the local rural hospital and had copious amounts of white as well as bloody secretions suctioned from the tube. A nasogastric tube was placed and 20 mL of fresh blood and a significant amount of coffee ground emesis were detected.

On initial examination at University Hospital, the patient did not have fever (37.5 °C), had tachycardia (130 bpm), normal respiratory rate (20 per min) and normal blood pressure (106/74 mm Hg). His weight was 22 kg (10^{th} centile) and his height was 130 cm (50^{th} centile). He was able to follow commands, move all his extremities equally well and open his eyes spontaneously. His pupils were equal, round and reactive to light with normal accommodation. The examination revealed bilateral neck tissue swelling that was soft, tender and without fluctuation or rash. His tonsils were enlarged, bleeding and had white patches on them. His lungs were bilaterally clear to auscultation. A chest X-ray showed bilateral neck swelling and patchy infiltration of the right lower lobe. The ECG on day 1 of admission was unremarkable showing a normal sinus rhythm at 90 bpm without significant ST segment changes, cardiac output of 2 L/min, cardiac index of 2.5 L/min/m^2, mild tricuspid regurgitation, no chamber enlargement and no pericardial effusion.

The patient was born at a rural hospital in Thailand via normal vaginal delivery and his birth weight was 2700 g. He had received BCG and hepatitis B vaccinations at birth, but without any other additional vaccinations. In total, there were nine people in the patient's house including his mother, grandparents, aunt and cousins. The patient had no history of close contact with other sick individuals.

The complete blood count was notable for hemoglobin (11.4 g/dL), hematocrit (31.4%), WBC count of 22 600 cells/mm^3 (neutrophils 74%, lymphocytes 12% and monocytes 11%) and platelet count of 80 000/mm^3. The patient's blood urea nitrogen (40 mg/dL) and creatinine (1.0 mg/dL) were elevated at admission. Liver function tests and ESR were within normal limits. Urinalysis showed 5–10 red blood cells/hpf, WBC 10–20 cells/hpf, 2+ albumin and trace glucose. The troponin T level was 74 ng/mL (normal <14) and creatine kinase-MB level was 7.6 ng/mL (normal 0.63–5.1). A throat swab Gram stain showed Gram-positive bacilli.

Questions

1. What is the clinical diagnosis of this patient? What are the differential diagnoses?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?
4. How would you approach the prevention and control of this disease?

Case study No. 3. On 27 March 2012, a 68-year-old woman presented to the Ear, Nose and Throat (ENT) department in a hospital in western Sweden, with a five-day history of fever, coughing, hoarseness of voice and increasing pain in the throat. She had a medical history of adult-onset diabetes mellitus and was under observation for thrombocytopenia and suspected liver cirrhosis. Six days prior to the onset of fever and throat symptoms she had returned from a two-week holiday in western Africa where she had travelled together with her husband and a friend.

On admission to the hospital, she had fever (38.1°C), swelling of the soft palate, and severe sore throat. On the same day, a laryngoscopy was performed, which revealed grayish membranes on and around the vocal cords, as well as on the base of the tongue, and swollen larynx.

Upon admission, the blood count was only mildly affected with slight decrease of the platelet count of 119×10^9/L, (reference values: 165–387×10^9/ L) and total WBC count of 6.0 $\times10^9$/L (reference values: 3.5–8.8×10^9/L) with neutrophils of 75%. CRP was 46 mg/L (reference values: < 5 mg/L) and serum creatinine – 76 μmol/L (reference values: 45–90 μmol/L).

Questions

1. What is the clinical diagnosis of this patient? What are the differential diagnoses?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?
4. How would you approach the prevention and control of this disease?

Case study No. 4. A 23-year-old man from Bangladesh who had been a construction worker in Singapore had complaints of fever, sore throat,

and neck pain which developed on July 30, 2017. He visited a primary healthcare clinic on July 31 and was given symptomatic treatment. However, his symptoms worsened, and he came to an emergency department because of odynophagia and hemoptysis on August 1. He was hypoxic and required ventilation through a tracheostomy. Throat examination and subsequent intraoperative findings showed extensive soft palate edema covering the uvula and tonsils; purulent secretions obstructing the airways; and pseudomembranous mucosa over bilateral necrotic-looking tonsils, base of the tongue, and larynx. Computed tomography showed extensive soft tissue edema causing almost complete airway narrowing from the choana to epiglottis and multiple enlarged cervical lymph nodes. The patient was immediately given adequate treatment. However, his condition deteriorated rapidly, and he died of airway obstruction 48 hours after hospitalization.

Questions

1. What is the clinical diagnosis of this patient?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?
4. How would you approach the prevention and control of this disease?

Case study No. 5. A 67-year-old woman presented to the emergency department with a 3-day history of a small non-traumatic raised nodule on the back of her right hand. She reported a pronounced increase in pain, swelling, and redness of her right hand immediately before presentation, and two episodes of systemic fever and chills. She also complained of itching on the palmar surface of the ipsilateral forearm. Her past medical history included hypothyroidism, for which she was on thyroid replacement therapy. She denied any travel history in the preceding 12 months, and she had not ever visited countries where diphtheria is known to be prevalent. She reported being an avid gardener and had an extensive animal contact history, with 16 pet cats, six pet dogs, and contact with a semi-tame fox that entered the house for food. She reported feeding and petting the domestic animals but denied direct contact with the fox, or receiving any bites or scratches from any of the animals. Although one cat had malignant neoplastic disease, none had been reported with respiratory symptoms or cutaneous ulcers.

Physical examination of the patient confirmed deep non-blanching erythema of both dorsal and palmar sides of the right hand with tense tissue swelling and associated tenderness. A necrotic lesion at the base of the index finger was noted, but the skin was intact. Blanching, raised erythema of the distal right forearm was apparent, which by contrast with the hand, was non-tender and itchy, with an appearance consistent with an allergic urticaria. Tachycardia (105 bpm) and fever (38.2 °C) were noted, with other physiological observations remaining normal. Laboratory blood tests revealed raised WBC count (10.9×10^9/L), with normal hemoglobin count (123 g/L), platelet count (249×10^9/L), and blood clotting parameters. She had an increased concentration of CRP (186 mg/L), but all other laboratory values, including lactate and blood chemical analysis values, were within normal limits, and the electrocardiogram was normal. Two sets of blood cultures and a swab of the necrotic lesion did not yield microbial growth. Radiographs of the affected hand showed no bone injury, but there was an evident soft tissue swelling at the base of the right index finger.

The patient was treated empirically with cefuroxime and clindamycin, and referred for plastic surgical consultation. Findings at surgical exploration were consistent with a flexor sheath infection. Two tissue samples from the first exploratory procedure did not reveal any organism on direct Gram staining, but subsequently showed growth of Gram-positive rods. Specific cultures for mycobacteria and fungi were negative. Histopathological analysis of a biopsy sample from the palmar surface of her right hand showed necrotic fat and fibrovascular material. The second surgical revision the next day allowed further local debridement and application of a surgical vacuum dressing. Short-term bacterial, mycobacterial, and fungal cultures at this stage yielded no growth. Histopathological analysis of the debrided tissue again showed extensive necrosis, whereas, by contrast, a proximal right arm skin biopsy in the area of blanching erythema showed viable tissue with an eosinophilic infiltrate.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?
4. How would you approach the prevention and control of this disease?

Case study No. 6. A 9-year-old boy presented to the pediatric emergency department for multiple skin lesions of the upper and lower limbs. These lesions had been present for 1 month. The patient had no prior medical history and had been correctly vaccinated. He lived on the French mainland but he had returned from a month-long family visit to Mali a month earlier. He reported neither skin trauma nor insect bites during his travel. On admission, he did not have fever. The skin ulcers were painless but pruritic, with no satellite lymphadenopathy. Hemogram results and CRP levels were normal. A swab of a skin lesion was obtained, and an empirical antibiotic treatment with amoxicillin plus clavulanic acid was started. PAS/Ziehl-Neelsen and Giemsa stains remained negative. HIV and syphilis serology as well as PCR for Treponema pallidum, Haemophilus ducreyi, and HSV-1/-2 were negative.

Questions

1. What is the clinical diagnosis of this patient? What are the differential diagnoses?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?

Case study No. 7. A 2.5-year-old female child was admitted to the outpatient department of a Medical College, India, with complaints of rhinitis, intermittent fever (38.5-39.0 ^{o}C) and bilateral conjunctival mucopurulent profuse discharge lasting for four days. Clinical examination revealed conjunctival congestion and chemosis associated with mild edema of both eyelids, while cornea, iris, anterior chamber and pupil were unremarkable when examined with a flashlight.

Gram and Giemsa-stained smears from the inflamed conjunctivae showed abundance of polymorphonuclear leucocytes and a few gram-positive bacilli. Conjunctival swab and scraping were inoculated onto the usual media. The colony smears showed gram-positive bacilli while Albert’s staining revealed 3-4 mm long slender bacilli studded with characteristic metachromatic granules. Subculture on Loffler's serum slope showed moist, confluent growth while potassium tellurite agar revealed greyish black, 1-2 mm sized circular low convex colonies. The morphological features of the colony smears were identical to those of the primary smear.

Questions

1. What is the clinical diagnosis of this patient?
2. What are laboratory tests to confirm the diagnosis of the patient?

3. How would you approach the treatment of this patient?

Case study No. 8. A previously healthy 6-year-old boy developed acute fever of 39.0 °C, severe sore throat, aggravated by swallowing, headache, and malaise. On examination his tonsils were symmetrically enlarged, red, with purulent follicular exudate. He had multiple enlarged, painful anterior neck lymph nodes, but no other lymphadenopathy and no splenomegaly. He had no runny nose or cough, and no difficulty breathing.
Questions

1. What are the diagnosis and the differential diagnosis in this patient?
2. What is your approach to diagnosis and treatment?

Case study No. 9. A 24-year-old woman presented to the emergency department with a three-day history of worsening sore throat, pain when swallowing and fever. She was seen by her primary care physician one day before admission because of sore throat and fever, and was given oral amoxicillin. She was previously well with no history of recurrent tonsillitis, previous peritonsillar abscess or drug allergies. On physical examination, her temperature was 39.8 °C, heart rate was 90 bpm, respiratory rate was 24 per min, and blood pressure was 110/70 mm Hg. She spoke in a muffled voice without significant stridor or respiratory distress. Examination of the oral cavity and oropharynx showed moderate trismus, pooling of saliva, symmetrically enlarged and inflamed tonsils, and a bilaterally congested and bulging soft palate with a midline uvula. There was also bilateral, tender submandibular lymphadenopathy. The rest of the physical examination was unremarkable.

A complete blood count showed a WBC count of 17.6 (reference values 4.5–11.0)×10^9/L with an elevated absolute neutrophil count of 15.7 (reference values 1.8–8.1)×10^9/L. The absolute lymphocyte count and monocyte count were within normal limits. The CRP level was 3926.8 (reference value < 47.6) nmol/L. A monospot test was not done. On her arrival at the emergency department, the patient was given IV fluids and IV amoxicillin–clavulanic acid for a provisional diagnosis of peritonsillar abscess.

Contrast-enhanced computed tomography of the neck showed bilateral hypodense masses with thick margin enhancement at the upper poles of the peritonsillar regions measuring 2.6×1.8 cm and 0.8×0.8 cm, respectively, and extending downward to the peritonsillar regions with a multilocular

appearance, which corresponds to bilateral peritonsillar abscesses. The patient underwent bilateral needle aspiration by the otolaryngologist; a total of 10 mL of purulent material was obtained from the left side and 3 mL from the right side.

Questions

1. What is the clinical diagnosis of this patient? What are the differential diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?

Case study No. 10. A healthy 19-year-old woman presented with sore throat, gingivitis, low-grade fever (37.5 ^{o}C), and malaise and was diagnosed with a viral pharyngitis. Her throat was slightly inflamed with canker-like sores in the left tonsil and under the tongue. She developed vomiting and productive cough, and at a follow-up visit 3 days later, new tender anterior cervical lymphadenopathy and heart rate of 151 bpm were found. Laboratory tests showed WBC count of 28.4×10^{9}/L with a predominance of neutrophils, platelets of 79×10^{9}/L, BUN of 19, and creatinine of 1.7 mg/dL. She was given empiric ceftriaxone and levofloxacin at the clinic and sent home but later developed worsening dyspnea and pleuritic chest pain. Examination in the emergency room was notable for marked right-sided neck tenderness and swelling and crackles over the right lung field. Chest X-ray showed multifocal bilateral infiltrates. Computed tomography (CT) scan showed thrombosis of the right external jugular vein and retropharyngeal phlegmon along with multiple pulmonary opacities with central necrosis suggestive of septic embolism.

Questions

1. What is the clinical diagnosis of this patient? What are the differential diagnosis?
2. How would you confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?

Case study No. 11. A 3.5-year-old girl was admitted to hospital with a suspicion of lymphoproliferative disease. In the emergency room, the child was ill-looking and had fever to 40.0 °C. Physical examination revealed cervical and submandibular lymphadenopathy, enlarged pharyngeal

tonsils, and hepatosplenomegaly that was confirmed by ultrasonography. Blood test showed high leukocytosis (61.6×10^9/L), mildly elevated uric acid level (6.9 mg/dL), and high lactate dehydrogenase (LDH) (1708 UI/L) and alanine aminotransferase (67 UI/L). A standard screening for immunodeficiency and HIV infection was performed. All results were negative. Peripheral blood smear showed massive lymphocytosis with a 62% share of atypical lymphocytes. Bone marrow cytology corresponded to reactive hyperplasia. Trepanation biopsy and lumbar puncture was performed. There was no evidence of lymphoproliferative disease.

Questions

1. What are the diagnosis and the differential diagnosis in this patient?
2. What is your approach to diagnosis and treatment?

2.2. INFLUENZA AND ACUTE VIRAL RESPIRATORY INFECTIONS

Case study No. 1. On February 3 2014, a 30-year-old woman presented for medical evaluation at an outpatient department of the infectious disease hospital, in Italy. She reported high fever, dry cough, headache, and generalized weakness in the night between February 2 and 3. She was in her usual state of health before an abrupt onset of these symptoms. On admission, the patient was febrile (38.8 °C), and reported a runny nose and bilateral earache. Chest X-ray did not show any evidence of pneumonia.

Several viral diseases have affected her during the current winter, but not to such a severity. She reports contacts with sick people at work and has not receive the influenza vaccine this season.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?
4. How would you approach the prevention and control of this disease?

Case study No. 2. On December 10 2009, a 16-year-old girl was admitted to the emergency department of the hospital with complaints of high temperature, dyspnea, cough, hemoptysis and sore throat for one day. She had no history of recent travel abroad, and nobody was ill among her family or classmates. On examination, the patient had fever (39.0 °C) and tachycardia (117/min). Chest auscultation revealed inspiratory crackles in right lower lung field. The results of initial laboratory tests were as follows: WBC count of 6.9×10^9/L, neutrophil 91% and CRP of 4.85 mg/dL. Initial chest X-ray showed an ill-defined increased opacity in right lower lung zone. Three days later, as the chest X-ray showed worsening pneumonia, a high-resolution chest CT was performed, which showed indistinct ground-glass opacities with interlobular septal thickening and several ill-defined nodules in right middle and lower lobes. These findings of CT scans were consistent with those of viral pneumonia. After the continued

medical treatment, the symptoms and infiltration on the chest X-ray improved.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?

Case study No. 3. A 58-year-old woman was admitted with high fever, chills, severe myalgias, sore throat, dry cough, profound malaise, and mental confusion. She had no past medical history of seizures. Three days prior to admission, she was febrile (T=39.0 °C) with chills. Two days prior to admission, she had prominent fatigue and remained febrile. One day prior to admission, she came to a doctor and she was given oseltamivir. The next day, the day of admission, her mental confusion had worsened, her fever and chills continued, and she was hospitalized. On admission, her temperature was 39.5 °C with heart rate of 104 bpm. Her physical examination was unremarkable, except that she had a confused mental state.

Her WBC count was 3.9×10^9/L with 12% lymphocytes (reference value: 21%). ESR was 33 mm/h and CRP was 4.46 mg/L (reference value: 3 mg/L). Brain MRI was unremarkable. EEG showed bilateral diffuse global slowing. She was started on levetiracetam 500 mg (IV) q 12 h for her seizures. She remained febrile with a T=40,0 °C and had heart rate of 103 bpm and was given acetaminophen. The patient remained obtunded and encephalopathic without improvement. Lumbar puncture revealed a clear (non-xanthochromic) CSF with WBC count of 9 cells/hpf (reference value: <5 cells/hpf) with 41% lymphocytes and 47% monocytes. CSF glucose was 64 mg/dL and CSF protein was 120 mg/dL (reference value: 8–32 mg/dL). CSF viral PCR was negative for cytomegalovirus (CMV), varicella-zoster (VZV), and Herpes simplex virus (HSV) 1 and 2.

She had no further seizures, and completed a 5-day course of oseltamivir. On day 5 in hospital, her mental state returned to normal and she was discharged home without any subsequent encephalitic or neuropsychiatric manifestations.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?

Case study No. 4. A previously healthy 31-year-old van driver was admitted to a local clinic in Shenzhen on June 7, 2006 with a 4-day history of high fever (39.9 ^{o}C), chills, and cough with clear sputum. On June 8 high fever (40 ^{o}C) persisted and he developed frequent and severe coughing, dyspnea, and watery diarrhea. After chest X-ray revealed large opacities in his left lung, the patient was hospitalized with a diagnosis of pulmonary infection and possible respiratory failure in the evening on June 9. Although the patient was a van driver, he had not traveled outside of Shenzhen in the recent past. However, he had visited a local poultry market twice between 30 and 20 days before onset of symptoms and purchased poultry. He raised chickens in his backyard and noticed some of them got sick and died 5–10 days before his illness. Some of these chickens were slaughtered, cooked and eaten by the patient. None of his close contacts had any recent symptoms of respiratory disease. When he was admitted to the hospital, the laboratory tests revealed WBC count of 2.9×10^{9}/L, the platelet count was 105×10^{9}/L, aspartate aminotransferase and alanine aminotransferase levels were 280 and 52 IU/L, respectively.

RT-PCR assay of tracheal aspirate obtained on June 12 were positive for influenza A (H5N1) virus. The virus Shenzhen/406H/06 was successfully isolated from this tracheal specimen. On June 16, a pure growth of Pseudomonas aeruginosa was obtained from a tracheal aspirate and the possibility of hospital-acquired secondary infection was considered. Drug sensitivity tests have shown that the isolate was resistant to all available antibiotics except polymyxin. Following antibiotic treatment, the patient had recovered by early August.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. How would you confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?
4. How would you approach the prevention and control of this disease?

Case study No. 5. On January 26 2016, a 2-year-old boy presented to his family doctor with body temperature of 38.2 °C, rhinorrhea, mild cough and malaise. The result of the rapid influenza-antigen test performed on his nasal swab was negative. Bacteriologic cultures were also negative. Complete blood count was within normal limits. Neither anti-influenza drug nor antibiotics were prescribed, and careful follow-up was recommended. His body temperature peaked at 39.0 °C on day 3. In addition to fever, the patient had a persistent barking dry cough and dysphonia. He developed an episode of mild laryngospasm (stridor). Physical examination showed erythema of the oropharynx and edema of the posterior pharyngeal wall. After the peak, body temperature began to decrease, and 36 hours after the onset of the fever, the body temperature was almost normal.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. How would you confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?

Case study No. 6. A 12-year-old Korean boy was admitted to a hospital with a 3-day-hystory of cough, dyspnea, rhinorrhea, malaise and fever. He denied any previous medical history. Several other school-age children in the home also have respiratory symptoms. The vital signs were as follows: blood pressure 120/80 mm Hg, heart rate 96 bpm, respiratory rate 22 per minute, and body temperature 38.2°C. He had nasal flaring, head bobbing, and suprasternal and intercostal retractions. Auscultation reveals bilateral crackles and wheezes with prolonged expiration in both lungs.

Laboratory tests revealed WBC count of 7.8×10^9/L with slight left shift (neutrophils 88.6%), CRP level of 223.6 mg/dL (normal < 5.0 mg/dL), total bilirubin level of 1.5 mg/dL, and alanine transaminase and aspartate transaminase levels of 59 and 61 IU/L, respectively. Sodium level was 125 mEq/mL. In arterial blood gas analysis, which was checked in ambient conditions, pH, partial pressure of carbon dioxide in arterial blood ($PaCO_2$), partial pressure of oxygen in arterial blood (PaO_2), bicarbonate, and oxygen saturation levels were 7.50, 30 mm Hg, 48 mm Hg, 23.4 mmol/L, and 87%, respectively. The result of a test for human immunodeficiency virus was negative. Serologic tests for Mycoplasma and Chlamyd-

ia were negative. Streptococcal and Legionella urinary antigens were negative. Antinuclear and anti-neutrophilic cytoplasmic antibodies were negative.

Chest X-ray revealed diffuse haziness dominant in his right lung field. Chest computed tomography revealed ground-glass opacity in both lungs with small amounts of pleural effusion dominant in the right hemithorax. At initial assessment for community-acquired pneumonia, nasal oxygen was administered at a rate of 4 L/min and empiric antibiotic therapy with a respiratory quinolone was started. On day 2 of hospitalization, thoracentesis was performed in the right one-thorax, cloudy yellowish liquid was obtained. Pleural fluid analysis revealed lymphocyte-dominant exudate with WBC count of 560/mm^3 and adenosine deaminase level of 4.4 IU/L. On the same day, chest X-ray showed opacities and hypoxemia progressed rapidly, necessitating high-flow oxygen delivery with fraction of inspired oxygen (FiO_2) 0.8 at a flow rate of 40 L/minute. The initial PaO_2/FiO_2 after application of mechanical ventilator was 65. Potential cardiac dysfunction was ruled out using transthoracic echocardiography. Multiplex real-time reverse transcriptase polymerase chain reaction (RT-PCR) was conducted using a respiratory virus real-time RT-PCR kit to detect respiratory viruses using tracheal aspirate. Results revealed positive for human respiratory syncytial virus type B.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. How would you confirm the diagnosis of the patient?
3. How would you approach the treatment of this patient?

Case study No. 7. A 37-year-old woman developed lacrimation and redness in her right eye within 1 week. On physical examination, bilateral tonsillar hypertrophy with pharyngeal injection was identified. During the third week, she developed a subacute attack of dizziness, nausea, unsteady gait, and difficulty focusing on close objects. Visual acuity and visual fields were normal. The conjunctiva of the right eye was white with a tarsal papillary reaction and diffusely scattered non-staining subepithelial corneal opacities. Extraocular movements showed frequent bursts of 4–8 conjugate horizontal back-to-back saccades lasting less than 1 second in

total occurring both in the primary position and during smooth pursuit. The saccadic intrusions were manifest, but not exclusively, on near effort.

Neurological examination was normal apart from slightly wide-based gait and impaired tandem gait, suggestive of mild cerebellar ataxia. Repeat examination 1 week later revealed significant improvement in her eye movements with very subtle saccadic intrusions. Hematological, biochemical, inflammatory, and autoimmune profiles and brain MRI were unremarkable. Lumbar puncture showed normal opening pressure, 7×10^6/L lymphocytes of abnormal shape, negative CSF virology for varicella-zoster virus (VZV), herpes simplex virus (HSV), Epstein-Barr virus (EBV), enterovirus polymerase chain reaction (PCR), protein of 0.4 g/L, and glucose of 3.0 mmol/L compared to serum glucose 4.3 mmol/L. Symptoms and signs resolved 3 weeks later and she has remained asymptomatic after 18 months of follow-up.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. How would you confirm the diagnosis of the patient?

Case study No. 8. A 3-year-old girl undergoing induction chemotherapy for pre-B-cell acute lymphoblastic leukemia presented with a history of fever up to 38.9 °C. She had a 2-day history of cough and nasal congestion. She was refusing solid food and taking minimal liquids. She had one episode of vomiting that did not contain blood or bile. On physical examination, she appeared ill and was having difficulty breathing. Body temperature was 39.5 °C, heart rate was 130 bpm, respiratory rate was 40 per minute, blood pressure was 90/60 mm Hg, and oxygen saturation on room air was 92%. She had a bulging, erythematous, immobile right tympanic membrane and rhinorrhea. Her lung examination findings were remarkable for tachypnea with retractions and diffuse wheezing.

A viral infection was suspected, but since she was undergoing chemotherapy, she had to be tested for serious bacterial infection. WBC count was 12.0×10^9/L (80% lymphocytes, 10% neutrophils, 10% monocytes), hemoglobin level was 89 g/L, and platelet count was 169×10^9/L. The blood culture was performed. Chest X-ray revealed diffuse perihilar infiltrates. As she had fever and neutropenia, she was hospitalized and broad-

spectrum antibiotics are administered. She received IV fluids and oxygen via nasal cannula.

During the next 48 hours, her respiratory status worsened, and she required intubation and mechanical ventilatory support. Blood culture result remained negative. After 5 days, her respiratory status improved, and she was extubated.

Questions

1. What is the provisional diagnosis of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. What is the therapy for this patient?
4. How would you approach the prevention and control of this disease?

Case study No. 9. In early March 2003, a 26-year-old man was admitted to a general medical ward of the Prince of Wales Hospital, Hong Kong; he was ill for 1 week with fever, chills, and rigor. He had a productive cough with whitish sputum for 2 weeks. He also had diarrhea and vomited several times before his admission. His previous health was good, and he had no recent travel history. Physical examination showed fever of 40.2 °C and bronchial breath sounds at the upper lobe of right lung. Chest X-ray confirmed right upper lobe consolidation. A complete blood count on admission showed WBC count 3.1×10^9/L, absolute neutrophil count 2.0×10^9/L, lymphocyte count 0.7×10^9/L, platelet count 112×10^9/L, and hemoglobin 14.7 g/dL. The patient had mild renal impairment, with a creatinine of 119 μmol/L, urea and electrolytes within normal limits, and alanine transaminase mildly elevated at 90 IU/L (reference value <58 IU/L). Bilirubin, alkaline phosphatase, and albumin levels were normal. CRP was 6.5 mg/L (reference value <9.9 mg/L). A diagnosis of atypical or viral pneumonia was suspected because of the low WBC count and normal CRP. Other laboratory tests were performed, including blood, sputum, and urine cultures, nasopharyngeal aspirate for influenza and parainfluenza, indirect immunofluorescence for respiratory syncytial viral antigen detection, and atypical pneumonia titer (for adenovirus, Chlamydia psittaci, Q fever, influenza A and B, and Mycoplasma). All results of nasopharyngeal aspirates were negative. Sputum culture yielded normal oral flora, and spu-

tum smears were negative for acid-fast bacilli. The patient received treatment with IV amoxicillin-clavulanate and oral clarithromycin.

The patient was placed in a general medicine ward with no specific isolation. After admission, he had high fever and productive cough, now with thick yellowish sputum. He also complained of progressive dyspnea, headache, dizziness, generalized malaise, and myalgia. His heart rate and blood pressure were normal, and his oxygen saturation was approximately 98% on room air.

A chest radiograph on day 4 showed progression of pneumonia, with consolidation in the upper and lower lobes of the right lung. A repeat complete blood profile showed WBC count of 5.4×10^9/L with persistent lymphopenia and platelet count of 98×10^9/L. Amoxicillin-clavulanate was changed to IV cefotaxime, 1 g every 8 h; with clarithromycin 500 mg twice a day. As the patient's condition deteriorated progressively and he had difficulty in expectorating sputum, salbutamol, 0.5 g four times a day, driven by a jet nebulizer at 6 L of oxygen per min, was given to assist mucociliary clearance. His oxygen saturation remained normal without supplemental oxygen.

From day 6, the patient's fever and chest condition gradually improved. However, over the next 2 weeks, 138 persons (mostly healthcare workers) in contact with him developed a similar illness with high fever and pneumonia. The patient was subsequently confirmed to be the patient zero in this hospital-acquired SARS outbreak. Three family members were also infected. Further history revealed that he had visited a hotel in Kowloon, Hong Kong, where a 64-year-old physician from southern China had stayed for 2 days; this physician later died of severe atypical pneumonia 10 days after admission to a regional hospital in Kowloon. The cause of the disease was not known at the time of the physician's death. After this patient completed a 7-day course of cefotaxime and a 10-day course of clarithromycin, his pneumonia gradually resolved, and serial chest X-rays confirmed resolution of his consolidation. His diarrhea and other systemic symptoms also resolved spontaneously.

Questions

1. What is the provisional diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. What is the therapy of this patient?
4. How would you approach the prevention and control of this disease?

Case study No. 10. A previously healthy 49-year-old male, a Qatari national, developed a mild, undiagnosed respiratory illness during a visit to Saudi Arabia in August 2012, which resolved completely. He subsequently presented to a physician in Qatar on 3 September, with complaints of cough, myalgia and arthralgia, and was prescribed oral antibiotics. While in Qatar, he spent time on a farm, where he keeps camels and sheep, although no direct contact with these animals was reported. Five days later, he was admitted to a Qatari hospital with fever (38.4 °C) and hypoxia, with oxygen saturation of 91% on room air. Chest X-ray showed bilateral lower zone consolidation. He was treated with ceftriaxone, azithromycin and oseltamivir. After 48 hours, he required intubation and ventilation. On admission to intensive care, he remained severely hypoxic, achieving an arterial PaO_2 of 6.5 kPA (normal range: 11–13 kPA) on 100% oxygen with optimized pressure ventilation, and required low-dose norepinephrine to maintain blood pressure. WBC count was 9.1×10^9/L (reference values: 4–11 $\times10^9$/L), CRP 350 mg/L (reference values: 0–10 mg/L) and creatinine 353 μmol/L (reference values: 53–97 μmol/L), with normal liver function and coagulation. He was treated with corticosteroids and broad-spectrum antibiotics, initially meropenem, clarithromycin and teicoplanin. Colistin and liposomal amphotericin B were subsequently added.

His condition deteriorated between 11 and 20 September, with progressive hypoxia. CRP level peaked at 440 mg/L and procalcitonin at 68 ng/ml (reference value: <0.5 ng/ml). His renal function worsened and hemofiltration was initiated on 14 September. He was transferred to intensive care unit and on 20 September (day 17 of illness), extracorporeal membrane oxygenation (ECMO) was started. As of 2 October, he remained stable but fully dependent on ECMO after 13 days (day 30 of illness).

Microbiological diagnostics in Qatar were used to look initially for common viral and bacterial causes of severe respiratory illness and subsequently for pathogens endemic in the Middle East. By mid-September, the syndrome was considered most compatible with viral pneumonia. Upper and lower respiratory tract samples were sent to the Health Protection Agency (HPA) Respiratory Virus Unit for extended influenza testing; all of them were negative.

Questions

1. What is the provisional diagnosis?
2. What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?

2.3. MENINGOCOCCAL DISEASE

Case study No. 1. The patient was a one-year-old boy weighing 7 kg who was brought to the pediatric emergency room with seizures, a history of high fever, vomiting, lethargy and decreased oral intake in the past three days. He had multiple episodes of generalized tonic-clonic seizures in the last 24 hours. He was delivered at full term through a vaginal delivery without any complications. Immunization history was appropriate for age. There was no history of such diseases among family members and close contacts. On examination, child was conscious, had no cyanosis and had bilaterally constricted pupils with sluggish reaction to light. He was febrile (38.7 ^{o}C) with heart rate of 172 bpm and respiratory rate 42 per minute. Capillary filling time was less than 3 sec. Anterior fontanelle was full and pulsatile. Neck rigidity was present. There was increased tone in all four limbs, deep tendon reflexes were brisk on the plantar extensors on both sides. He had no skin rash.

Laboratory tests revealed that the child had hemoglobin of 8.1 g/dL with total WBC count of 10.6×10^{9}/L (76% neutrophils, 18% lymphocytes, 3.9% monocytes and 1.2% eosinophils), and platelet count of 59.9 $\times10^{9}$/L; CRP was raised (178.97 mg/L). The blood procalcitonin levels were 118.23 ng/mL ($\geq$10 ng/mL and plasma lactate levels were also elevated (30.5 mg/dL). Renal function tests and serum electrolytes were within the normal range. CSF showed raised protein levels (113 mg/dL), and low levels of glucose (26 mg/dL). CSF cytology was characterized by 1500 WBC, 90% of which were polymorphonuclear WBCs. CSF lactate levels were increased at 83.93mg/dL and CSF chloride levels were 123 nmol/L. Latex agglutination was performed on the CSF sample and was reactive for N. meningitidis group B. The cranial ultrasonography showed slight ventricular prominence with normal cerebral parenchyma.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. What is the antimicrobial and emergency therapy to treat this disease?
4. How would you approach to prevention of this disease?

Case study No. 2. A 21-year-old man who previously had only intermittent asthma presented to the emergency room in March 2018 with a one-day history of headache, nausea, sore throat, and generalized muscle pain. An initial consultation, family physician diagnosed him with influenza but after 24 hours the patient developed chills and photophobia. A subsequent physical examination found new purpuric lesions on the trunk and upper limbs, which led to hospitalization.

At admission, the patient's blood pressure was 121/47 mm Hg, heart rate was 116 bpm, oxygen saturation was 94% on room air, and his temperature was 38.4 °C. He was slightly drowsy with a Coma Glasgow Scale score of 13, with left parietal headache, nausea and neck stiffness. Cardiovascular, pulmonary and abdominal examination was normal. Laboratory blood tests revealed high levels of CRP (106 mg/L), hyperleukocytosis (24×10^9 WBC /L, of which 94% were neutrophils), and acute non-obstructive renal failure (3.46 mg/dL serum creatinine, corresponding to creatinine clearance of 24 mL/min).

Blood cultures were taken and a lumbar puncture was performed, followed immediately by IV (IV) administration of 2 g cefotaxime. CSF was crystal clear and no hyper-pressure was observed upon puncture of the dura mater. Biochemical analysis of CSF revealed normal glycose levels (3.0 mmol/L, with 4.8 mmol/L glycaemia), normal protein content (0.22 g/L) and elevated levels of lactate (5.8 mmol/L). The cyto/microbiological analysis found no CSF pleocytosis (6 WBCs/mm^3) and the absence of bacteria as determined by Gram staining.

The patient was admitted to the intensive care unit (ICU) with a diagnosis of purpura fulminans with uncertain meningitis. During the following 12 h, multiple organ dysfunction syndrome progressively appeared with the following features: disseminated intravascular coagulation (DIC) [elevated prothrombin time (PT) (26%), elevated activated partial thromboplastin time (aPTT) (2.54), low fibrinogen (1.4 g/L), thrombopenia (62 $\times10^9$ platelets/L), elevated D-dimers (>10.000 ng/mL) and low factor V (21%)]; severe hypotension resistant to 20 mL/kg fluid resuscitation and requiring treatment with 0.4 μg/kg/min norepinephrine; non-obstructive acute renal failure; acute lung injury with mild pulmonary edema upon chest X-ray and no cardiac failure upon the first echocardiographic examination (left-ventricular ejection fraction (LVEF) 70%), requiring oxygen delivery through a mask up to 9 L/min flow, and metabolic acidosis (pH7.28, lactate 6.4 mmol/L). In addition, plasma procalcitonin (PCT) levels were very high (521 μg/L).

Encephalic computed tomography (CT) scan and magnetic resonance imaging (MRI) ruled out the presence of a pharyngeal or cerebral abscess, cerebral thrombophlebitis, sinusitis, mastoiditis, and ethmoiditis. Furthermore, pathological examination of skin biopsies taken from purpuric areas revealed thrombosis of all the dermal capillaries associated with the presence of cocci in several vessels. Organ failure improved by the second day after admission.

After treatment, creatinine serum levels decreased to 2.1 mg/dL (estimated clearance of 40 mL/min), hemostasis parameters improved (PT 42%, APTT 1.85, fibrinogen 4.5 g/L), and blood lactate concentration decreased to 5.7 mmol/L. However, echocardiography revealed decreased left-ventricular ejection fraction (LVEF) of 40%, diffuse left-ventricular hypokinesia, and low left-ventricular output (2.4 L/min/m2 with aortic velocity–time integral of 13.5 cm). An electrocardiogram revealed an elevation of the ST segment in the inferolateral area. Blood levels of hypersensitive troponin Ic increased rapidly to reach a peak of > 13,000 ng/L 44 h after admission, and then decreased and normalized within 14 days. The patient had never been vaccinated against meningococcus. Human immunodeficiency virus serology was negative.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. What is the antimicrobial and emergency therapy of the patient?
4. How would you approach to prevention of this disease?

Case study No. 3. A 23-year-old male presented to the emergency department with one-day history of right-sided pleuritic chest pain, hemoptysis, and fever. He had no history of a recent travel or contact with sick individuals. The patient had no significant medical background, and he was not taking any regular medication.

On admission, blood pressure was 140/60 mm Hg, heart rate 89 bpm, body temperature 40.0 °C, respiratory rates 20 per min, and oxygen saturation 98% on room air. Physical examination revealed crackles and bronchial breathing in the right subscapular region. There was no clinical evidence of meningitis. Laboratory tests showed the following: hemoglobin level 146 g/L (reference value 140–175), platelets count 373 $\times 10^9$/L (nor-

mal), WBC count 19.6 $\times 10^9$/L (reference value 3.5–10.0) (90% neutrophils and 10% lymphocytes), sodium 140 mmol/L (reference value 135–145), potassium 3.6 mmol/L (reference value 3.5–4.5), urea 3.7 mmol/L (reference value 2.5–7.0), creatinine 104 μmol/L (reference value 50–100), CRP at 58.5 mg/L (reference value < 3), and an unremarkable liver function test. Chest X-ray demonstrated right lower lobe consolidation.

With the history of hemoptysis and pleuritic chest pain, computed tomography pulmonary angiogram (CTPA) was performed, and it did not show pulmonary embolism.

Sputum culture was found to be positive for oropharyngeal Candida species. However, a day later, N. meningitides grew in one blood culture bottle, and it was sensitive to penicillin and ceftriaxone. Additional results included undetectable urinary Streptococcus and Legionella pneumophila serogroup 1 antigens and a negative HIV serology test. On day 4, the patient was discharged from the hospital and was reviewed at an outpatient clinic two weeks later. He showed complete resolution of his symptoms.

Questions

1. What is a clinical diagnosis? What are your differential diagnoses?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. How would you approach treatment and prevention of the disease?

Case study No. 4. An otherwise healthy 61-year-old Caucasian male presented to an outpatient clinic in the USA with nonspecific, flu-like symptoms. The patient had been traveling with his wife to Austria, Switzerland, and Germany one month prior to presentation. They had boarded a riverboat, had been in close proximity to other people on the cruise, and there were reportedly several people who had similar symptoms. Upon returning to the USA, the patient's condition initially improved. However, his symptoms then progressed about 4–16 days after potential exposure.

Initially, in the emergency unit, the patient complained of malaise, dyspnea, chills, mild intermittent headache, and fever. He quickly decompensated with high fever, tachycardia, leukocytosis, and lactic acid of 7.69 mmol/L. Infectious etiology was suggested. The patient was prescribed broad-spectrum antibiotics; vancomycin, piperacillin/tazobactam, and levofloxacin, and given aggressive fluid resuscitation. He was admitted to the intensive care unit and after a few hours his condition worsened, requiring intubation, three vasopressors, and continuous renal replacement therapy. During the following days of hospitalization, the patient devel-

oped DIC and progressed to purpura fulminans. However, his clinical status did improve in the coming days, but ultimately required a bilateral transmetatarsal and digit amputations, as well as allograft in these areas.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?
3. What is the antimicrobial and emergency therapy for the patient?

Case study No. 5. A young university student developed sore throat, dysphonia and mild dysphagia over 48 h. This combination of symptoms preceded the onset of chills, vomiting, drowsiness and myalgia, prompting presentation to a local emergency department (ED). On examination, the patient was feverish at 40.0 °C and her tonsils were found to be large, inflamed and showing evidence of scarring.

There was no evidence of peritonsillar abscesses or cellulitis. Cervical lymphadenopathy was present and most prominent on the left side. No photophobia, headache or other findings were recorded.

The student had a history of recurrent tonsillitis but no other medical conditions, medications or relevant family history. The white cell count was 16.7 $\times 10^9$/L (with neutrophils of 15.5×10^9/L). Blood cultures were taken in line with local guidelines.

Two days after the admission, Gram-negative diplococci were found in the blood cultures and the patient was recalled to the emergency department. On examination, she felt very well, showing no signs of systemic inflammatory response syndrome, Kernig's sign was negative. Additional blood tests showed improving inflammatory markers (WBC count 7.3×10^9/L with neutrophils of 5.6×10^9/L). After considering microbiology, it was decided that a lumbar puncture was not necessary due to the clinical picture but IV ceftriaxone was started in place of oral erythromycin. She was considered to be well enough to continue her course of IV antibiotics on an outpatient basis.

Questions

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are laboratory tests to confirm the diagnosis of the patient?

3. How would you approach the antimicrobial therapy and prevention of this disease?

Case study No. 6. An 18-year-old female with paroxysmal nocturnal hemoglobinuria (PNH) presented to the emergency department with one day of progressively worsening malaise, nausea, vomiting, diarrhea, fever, and rash. The patient's significant past medical history was PNH, which was diagnosed two years prior to presentation in the setting of primary Budd-Chiari syndrome caused by hepatic vein thrombosis. She was also noted to be anemic at that time. The hepatic vein thrombosis was treated with a transjugular intrahepatic portosystemic shunt (TIPS) and anticoagulation with warfarin was initiated as secondary prevention for further thrombosis. In addition to warfarin, her other medications included eculizumab (initiated upon diagnosis of paroxysmal nocturnal hemoglobinuria), vitamin B12, and folate. The MenACWY-D conjugated vaccine was given prior to receipt of eculizumab.

Upon presentation to the emergency department, the patient was noted to be lethargic and hypotensive with a diffuse purpuric rash. Her initial vital signs were consistent with distributive shock: blood pressure 63/39 mm Hg.

The patient was immediately intubated for airway protection. Resuscitation was initiated with IV fluids and vasopressors. Her blood pressure remained low despite maximum doses of vasopressors. IV antibiotics were administered including vancomycin, cefepime, and ampicillin. Hydrocortisone was administered as adjunctive therapy in the setting of sepsis and concern for Waterhouse-Friderichsen syndrome. She was admitted to the intensive care unit for further management. There her hemodynamics stabilized 24 hours after her initial presentation. Blood cultures grew Gram-negative diplococci.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What are the principles of antibacterial therapy to treat this disease?

Case study No. 7. A 56-year-old woman presented to the emergency department by ambulance, with a 5-hours history of progressively worsen-

ing pleuritic chest pain and dyspnea. In the previous four days, she had non-specific viral symptoms including sore throat, myalgia, chills, fatigue, diarrhea and fever of 39.0 °C. She had no significant medical history. Initial examination showed blood pressure of 70/50 mm Hg, heart rate 95 bpm, normal respiratory rate and oxygen saturation, and body temperature was 36.5 °C. Examination demonstrated marked pallor, dry mucous membranes and cool peripheries.

Her conscious state was normal with no meningism or sensorimotor impairment. Initial laboratory tests revealed high CRP (369 mg/L), leukopenia (3.5×10^9/L), thrombocytopenia (64×10^9/L) and elevated troponin T (72 ng/mL). Other routine biochemical tests were otherwise unremarkable. Electrocardiography demonstrated saddle-sloped sequence-type (ST)-elevation anterolaterally with an elevated J point. Bed-side transthoracic echocardiogram (TTE) showed reduced biventricular contractile function and a well-filled inferior vena cava. Cerebrospinal fluid was not collected given the absence of meningeal signs.

Her systemic hypotension was initially treated with IV (IV) crystalloids but improvement did not occur until epinephrine infusion was started. Piperacillin/tazobactam (4.5 g, IV, four times daily) was administered 5 h after the initial presentation to the emergency department for empiric treatment of septic cardiomyopathy. Formal TTE on ICU admission demonstrated improvement in ventricular function following the commencement of adrenaline. Everything else was unremarkable. The infusion was weaned within 48 h as hemodynamics stabilized with troponin T peaking at 30,000 ng/mL.

A repeated TTE post-cessation of adrenaline showed normal left ventricle (LV) size and global systolic function but reduced global longitudinal strain (previously normal) with a small circumferential pericardial effusion. She continued to convalesce with gradual resolution of electrocardiogram changes and troponin. Cardiovascular MRI was performed on day 9 of her admission and demonstrated normal LV morphology and function, normal valvular function, small pericardial effusion and post-contrast imaging consistent with acute myopericarditis.

On Day 2, Gram-negative diplococci were isolated from an aerobic blood culture bottle taken at admission. Urine and fecal culture, nasopharyngeal swab for respiratory viral polymerase chain reaction and serological results for atypical organisms (human immunodeficiency virus, influenza viruses, cytomegalovirus and hepatitis B and C) were negative. Auto-immune screening tests were also negative.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What are the principles of antibacterial therapy to treat this disease?

Case study No. 8. A 42-year-old woman came to a local emergency room with a 1-day history of nausea, emesis, and non-bloody diarrhea. According to her medical history, she only had inflammatory bowel disease. She was found to be somnolent and febrile (temperature 40.0 °C), with hypotension (70/40 mm Hg) and tachycardia (130 bpm). Physical examination was significant for profound acrocyanosis and a diffuse truncal purpuric rash. Computed tomography revealed hyposplenism, previously unknown to the patient, an ill-defined contour of the adrenal glands, and thickening of the transverse and sigmoid colon. Because of suspected septic shock, empiric therapy using broad-spectrum antibiotics with vancomycin and ceftriaxone was started.

Mental status and blood pressure initially improved after resuscitation. However, the patient rapidly deteriorated, becoming hypotensive and unresponsive, with the development of profound acidemia. Arterial blood gas tests revealed pH 7.098, pCO_2 46 mm Hg, pO_2 49 mm Hg, HCO_3 14.1 mEq/L, O_2 saturation 66%, and lactate 8.7 mmol/L. Hypoxic respiratory failure with the development of acute respiratory distress syndrome and anuric renal failure quickly ensued.

Initial blood cultures grew Gram-negative diplococci within 4 hours of patient admission. Speciation revealed N. meningitidis. WBC count increased from 2.4 cells/μl on presentation to 19.3 cells/ μl with a 21% bandemia in 19 hours. The patient's acidosis and coagulopathy continued to worsen. The coagulation panel revealed prothrombin time of 37.1 seconds, internal normalized ratio of 3.5, and partial thromboplastin time of 157 seconds, with a haptoglobin of less than 80 mg/dL. Four units of fresh frozen plasma and vitamin K were administered. Despite aggressive fluid resuscitation and goal-directed therapy, acidemia and organ dysfunction continued to worsen, disseminated intravascular coagulopathy (DIC) developed, and she died within 24 hours of admission. Postmortem examination revealed bilateral adrenal hemorrhages and a 2-cm spleen.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What is the antimicrobial and emergency management of the patient? How would you approach to control the disease?

Case study No. 9. A 22-year-old woman with no relevant medical background was admitted to the emergency room (ER) with a 7-day history of fever, anorexia and a papular non-pruritic rash that first appeared in both arms and gradually progressed involving all body surface, affecting palms and soles. The color of the lesions evolved from erythematous to purple over 6 days. Symmetric polyarthralgia affecting both knees and elbows were also present and the patient recalled odynophagia on the first day of fever, which resolved spontaneously. There was no history of travel, and no unprotected sex was reported in the previous 6 months.

In the ER, the patient was febrile (auricular temperature of 38.5 ^{o}C), with a blood pressure of 106/65 mm Hg, heart rate of 100 bpm, respiratory rate of 12 and well-perfused extremities. The previously described rash was present and did not disappear with finger pressure. She had an otherwise healthy appearance, oropharynx examination revealed no changes, cardiac and pulmonary auscultation was normal as well as abdominal examination. Painful sensations in the knees and elbows occurred on both sides during passive and active movements, but apart from pain, there were no signs of inflammation of the joints. Nuchal rigidity was absent and neurological examination showed no deficits. Blood tests in the ER revealed leukocytosis of 25 $\times 10^{9}$/L, C-reactive protein (CRP) of 205 mg/L and normal renal function (creatinine of 0,62 mg/dL and BUN of 23 mg/dL). HIV testing was negative. Since the patient had a good general condition, good home support and she was not willing to be hospitalized, she was made aware of possible alarming signs and she was discharged after collecting blood for culture (2 samples) and for CMV, EBV and syphilis serologies, with a scheduled medical appointment in two days at the outpatient clinic. Symptomatic treatment was prescribed.

On reassessment, the patient maintained a good general appearance. She did not have feevr for 48 h, her polyarthralgia had resolved and the rash was regressing. However, rare petechial lesions had appeared in her

lower limbs. Blood tests were repeated which showed an improvement in inflammatory markers, with a leukocytosis of 14.4 $\times 10^9$/L and CRP 140 mg/L. Blood cultures collected two days before in the ER were positive and Gram-negative diplococci was isolated in both samples. She did not have fever, asymptomatic and stable and she was discharged after a 7-day course of antimicrobial therapy with normalized blood tests. Blood cultures collected both on hospital admission and at 24 h after treatment initiation were negative. On her follow-up appointment, 2 weeks after discharge, she was feeling well and remained asymptomatic.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What are the principles of antibacterial therapy of this patient?

Case study No. 10. The patient D., 19-year-old male, without known allergies, was an active consumer of cocaine and marijuana and had a single sexual partner in the last 6 months. He arrived at the emergency room complaining of knee pain, swelling, and fever for two days. He denied a traumatic event and took two doses of one gram of azithromycin at his own discretion.

Physical exams revealed an axillar temperature of 37.8 degrees Celsius, swelling +++/+++, range of motion of 20°/30° (extension/flexion), and a localized temperature increase. It was decided to perform an upper lateral arthrocentesis, which released purulent fluid. Articular fluid analyses showed 80.000 cells count and a Gram-negative diplococcus. Laboratory tests showed WBC count of 17.6×10^9/L, CRP of 62 mg/L, and an ESR of 17 mm/hr. No X-ray was requested.

Three hours after admission, arthroscopy was carried out, synovial cultures were taken, and ceftriaxone (2 grams per day) was started. A total of 12 liters of saline solution was used. It was noted that the cartilage tissue was healthy in three sections of the knee, as well as in the meniscus and cruciate ligaments. Since the patient's condition improved, it was decided to administer IV ceftriaxone (2 grams per day) for 14 days. In the first 10 days, the patient achieved progress to a full range of motion (0° extension and 120° flexion), walked with two crutches, and had no signs of sepsis, no meningitis symptoms, and decreased CRP and ESR.

On day 10, the patient complained of knee pain. During the physical exam, the extension was preserved, but he had only 90° of flexion associated with mild knee swelling. CRP and ESR on that day increased compared with the previous day. Arthrocentesis was performed, synovial fluid was clear, and cells count was 28000. Arthroscopy showed normal cartilage aspect in patellofemoral, medial, and lateral tibiofemoral compartments and so were both meniscus and the cruciate ligaments. The major finding was a suprapatellar septum that was debrided. Response after the second arthroscopy was excellent; no pain or swelling was detected. The patient recovered full range of motion and walked assisted by two crutches without pain.

Questions

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
2. What are the laboratory tests to confirm this diagnosis?
3. What are the principles of antibacterial therapy of this patient?

ANSWER KEY

1.1. CHOLERA. FOOD MICROBIAL INTOXICATION. BOTULISM

Case study No. 1.

1. What is the provisional diagnosis of this disease? Provide its justification.
   Cholera undetermined etiology, typical form, moderate severity (moderate dehydration).
2. Assess the degree of dehydration of this patient and fluid deficit as % of body weight (body weight is 75 kg). Plan of management and treatment of this patient. Select the appropriate plan to treat or prevent dehydration and the plan of antimicrobial therapy.
   This patient has moderate dehydration with the fluid deficit (as % of body weight) from 5 to 10% according to WHO or from 4 to 6 % according to V.I. Pokrovskiy classification.
   It is necessary to start IV rehydration therapy immediately with Ringer's Lactate Solution according to Treatment Plan B (it was found that this patient has weight loss of 5 kg (≈ 5 L); 6% of fluid deficit of body weight of 80 kg is 4.8 L (≈ 5 L); moderate dehydration require about 75 mL/kg per the first day of fluid in addition to ongoing losses via the IV and oral routes (≈ 6 L for the body weight of 80 kg). The 5 L should be given IVly within 4 hours to restore euvolemia.
   ORS (rice-based oral rehydration salts or Rehydron) should be given as soon as the patient can drink (within 2-3 hours).
   Antimicrobial therapy may include Ciprofloxacin (500 mg orally BID for 3 days) or Azithromycin (1 g orally, a single dose) or Doxycycline (300 mg, a single dose).
3. Plan of laboratory tests for this patient. What are the laboratory tests to confirm this diagnosis?
   The main laboratory test to confirm this diagnosis is bacteriological method: stool cultures for Vibrio spp. (a gold standard). Dipstick rapid tests are being used in the endemic areas but do not yield an isolate for antimicrobial susceptibility testing and subtyping, and should not be used as routine diagnostic tests. Also, a real-time PCR can be performed to confirm the diagnosis.

4. What is the composition of IV infusion solutions and oral rehydration salts?
   IV Ringer's Lactate Solution (Na+ of 130 mmol/L, K+ of 4 mmol/L, Cl- of 109 mmol/L; Lactate of 28 mmol/L);
   Oral rehydration salts (ORS) with reduced the osmolarity (NaCl of 2.6 g/L, KCl of 1.5 g/L, trisodium citrate 2.9 g/L; glucose 13.5 g/L); Rehydron (Dextrose of 10 g/L + Potassium chloride of 2.5 g/L + Sodium chloride of 3.6 g/L + Sodium citrate of 2.9 g/L);
5. What is the best way to prevent cholera in travelers?
   Several live-attenuated oral cholera vaccines including VAXCHORA (PaxVax, USA) may protect travelers against cholera. This patient had not received a cholera vaccination prior to his trip.

Case study No. 2.

1. What is the provisional diagnosis? Provide its justification.
   Cholera undetermined etiology, typical form, severe severity (severe dehydration).
2. Assess the degree of dehydration of this patient and fluid deficit as % of body weight (body weight before the disease is 70 kg).
   This patient has severe dehydration with fluid deficit > 10% of body weight according to WHO classification. During the first 3 hours, this patient should receive about 7-8 L of Ringer's lactate according to Treatment Plan C (it was found that > 10% of fluid deficit of body weight of 70 kg is about from 7 to 10 L).
3. Plan of management and treatment of this patient. Select the appropriate plan to treat or prevent dehydration and the plan of antimicrobial therapy.
   Initial treatment was directed at correction of the severe dehydration and metabolic acidosis with large volumes of Ringer's lactate and normal saline. During the first 3 hours, the patient should receive 8 L of Ringer's lactate according to Treatment Plan C (it was found that > 10% of fluid deficit of body weight of 70 kg is about from 7 to 10 L). After the initial replacement of fluid loss in treating the patient, subsequent administration of saline solution was determined by monitoring fluid losses in the stool. In addition, serum electrolytes and acid-base balance should be monitored regularly and maintained.
   Oral fluid therapy with glucose and saline (rice-based oral rehydration salts or Rehydron) should be started to tolerance immediately after ad-

mission and should be gradually increased while the proportion of IV fluids is being decreased.

Antimicrobial therapy may include Ciprofloxacin (500 mg orally BID for 3 days) or Azithromycin (1 g orally, a single dose) or Doxycycline (300 mg, a single dose).

4. Plan of laboratory tests for this patient. What are the laboratory tests to confirm this diagnosis?

   The main laboratory method to confirm this diagnosis is bacteriological – stool cultures for *Vibrio* spp. (a gold standard). Dipstick rapid tests are being used in the endemic areas but do not yield an isolate for antimicrobial susceptibility testing and subtyping, and should not be used as routine diagnostic tests. Also, a real-time PCR can be performed to confirm the diagnosis.

Case study No. 3.

1. What is the provisional diagnosis? Provide its justification. Assess the degree of dehydration of this patient and fluid deficit as % of body weight (body weight before the disease is 90 kg).

   Provisional diagnosis: Cholera undetermined etiology, typical form, severe severity (severe dehydration).

   This patient has severe dehydration with fluid deficit > 10% of body weight according to WHO classification. During the first 3 hours, this patient should receive about 7-8 L of Ringer's lactate according to Treatment Plan C (it was found that > 10% of fluid deficit of body weight of 90 kg is about from 9 to 11 L).

2. What is the differential diagnosis?

   At the time of admission, the following possible diagnoses were entertained:

   – Enterotoxin-induced diarrhea.
   – Infection with Shigella.
   – Malaria.
   – Pseudomembranous enterocolitis.

3. Plan of laboratory tests and instrumental examination of this patient. What are the laboratory tests to confirm this diagnosis?

   The main laboratory method to confirm this diagnosis is bacteriological – stool cultures for *Vibrio* spp. (a gold standard). Dipstick rapid tests are being used in the endemic areas but do not yield an isolate for antimicrobial susceptibility testing and subtyping, and should not be used as

routine diagnostic tests. Also, a real-time PCR can be performed to confirm the diagnosis.

Sigmoidoscopy can be done to exclude pseudomembranous enterocolitis.

4. Plan of management and treatment of this patient. Select the appropriate plan to treat or prevent dehydration and the plan of antimicrobial therapy.

   Initial treatment must be directed at correction of the severe dehydration and metabolic acidosis with large volumes of Ringer's lactate and normal saline. During the first 3 hours, the patient should receive 10.2 L of Ringer's lactate according to Treatment Plan C (it was found that > 10% of fluid deficit of body weight of 90 kg is from 9 to 11 L). After the initial replacement of fluid loss in treating the patient, subsequent administration of saline solution was determined by monitoring fluid losses in the stool. This approach stresses the importance of collecting the excreta to measure the volume (by using a cholera cot). In addition, serum electrolytes and acid-base balance should be monitored regularly and maintained.

   Antimicrobial therapy may include Ciprofloxacin (500 mg orally BID for 3 days) or Azithromycin (1 g orally, a single dose) or Doxycycline (300 mg, a single dose).

Case study No. 4.

1. What is the provisional diagnosis? Provide its justification.
   Bacteremia caused by *Vibrio cholera* (liver abscesses).
2. What is the differential diagnosis?
   The differential diagnosis of this disease should include the following infections:
   - Extraintestinal amoebiasis with liver abscesses caused by *Entamoeba histolytica*;
   - Salmonella sepsis;
   - Bacterial sepsis due to *Staphylococcus* spp., *Streptococcus* spp., *Haemophilus influenza*, or due to another Gram-negative organism with pyogenic liver abscesses.
3. What are the laboratory tests to confirm this diagnosis? Plan of laboratory tess and instrumental examination of this patient.
   - Blood and stool cultures to detect *Vibrio* spp., sensitivity to antibacterial drugs

- Agglutination of strains with O1 and O139 antisera
- Blood cultures for *Staphylococcus* spp., *Streptococcus* spp., *Haemophilus influenza*, etc. (for the differential diagnosis)
- An abdominal ultrasound and/or abdominal CT

4. Plan of management and treatment of this patient.
   The patient should be hospitalized immediately. Empirical parenteral treatment with IV ceftriaxone (1 g every 24 h) could be initiated then shifted to oral ciprofloxacin (500 mg every 12 h) after 15 days. Also, the symptomatic treatment should be given (including antipyretics, spasmolytics).

Case study No. 5.

1. What is the provisional diagnosis? Provide its justification.
   Acute gastroenteritis, probably caused by *Vibrio parahaemolyticus*, mild severity, no dehydration.
2. What is the differential diagnosis?
   The differential diagnosis should include the following infections:
   a. cholera;
   b. other halophilic (salt-requiring) pathogenic *Vibrio* spp. (*V. vulnificus* is primarily associated with a severe, distinctive soft tissue infection; *V. alginolyticus*, *V. fluvialis*, and *V. furnissii* also can cause gastroenteritis).
   c. Salmonella or Shigella gastroenteritis;
   d. Escherichia gastroenteritis;
   e. Foodborne *Bacillus cereus* intoxication;
   f. Norovirus infection.
3. What are the laboratory tests to confirm this diagnosis? Plan of laboratory tests and instrumental examination of this patient.
   Bacteriological stool cultures should be performed. The strain should be sent to the National Reference Center for Vibrios and Cholera for confirmation of the identification by biochemical, molecular and cultural methods, agglutination with O1 and O139 antisera to exclude Vibrio cholerae. One of the helpful investigations is Kanagawa reaction that proves an ability of V. parahaemolyticus to cause hemolysis. The antibiotic susceptibility testing should be performed too.
4. Plan of management and treatment of this patient.
   She should be given IV metoclopramide as antiemetic treatment, oral rehydration salts (Rehydron) and encouraged to drink as much as possible. No treatment is required for most patients because gastroenteritis is

usually self-limited. However, antimicrobial therapy could be considered for those patients with diarrhea lasting longer than 5 days. Therapy with doxycycline (100 mg per day orally for three days) or a quinolone would be expected to shorten the clinical course and duration of pathogen excretion.

Case study No. 6.

1. What is the provisional diagnosis? Provide its justification.
   Foodborne Bacillus cereus intoxication, emetic form.
2. What is the differential diagnosis?
   Clinical symptoms of the emetic form are similar to foodborne *Staphylococcus aureus* intoxication and has an even faster onset (1 to 5 hours). Food poisoning caused by *C. perfringens* has a longer incubation period (from 6 to 24 hours) and patients often suffer from diarrhea. Heavy metal poisoning starts very fast (from 5 to 120 minutes) and has a specific anamnesis.
3. What are the laboratory tests to confirm this diagnosis?
   Selective polymyxin pyruvate egg-yolk mannitol-bromothymol blue agar (PEMBA) medium can be used to isolate B. cereus from the meal and stool samples. Part of the specimens checked for Salmonella spp., Shigella, Campylobacter, Vibrio, and other enteropathogens using standard methods.
4. Plan of management and treatment of these patients.
   No treatment is required by most patients because gastritis is usually self-limited. The patients should be encouraged to drink as much as possible. In the cases of severe vomiting IV Metoclopramide should be given.

Case study No. 7.

1. What is the provisional diagnosis? Provide its justification.
   Foodborne *Staphylococcus aureus* intoxication.
2. What is the differential diagnosis?
   Staphylococcus aureus or *Bacillus cereus* food poisoning may be suspected because of a short incubation period within 1 to 8 hours.
3. Plan of epidemiologic investigation of this outbreak. What are the laboratory tests to confirm this diagnosis?

A medical epidemiologist and a quarantine inspector should board the ship to begin an investigation. A case-control study should be done by administering questionnaires to all known patients (those who had reported to the ship's physician) and to every tenth person from the passenger list. A substantial proportion of persons as controls (or cases) should be added by administering the questionnaires to a random sample of people attending dinner on 24 February. The questionnaire is a standard form, which included information on age, sex, time of onset, clinical symptoms, duration of illness, cabin number, dining table number, and water exposure. Ill persons and controls should be also asked to indicate from menus which foods they had eaten at lunch and dinner on 24 February.

Swabs from people and the environment should be plated on blood agar and mannitol salt agar.

Case study No. 8.

1. What is the provisional diagnosis? Provide its justification.
   Foodborne botulism, severe form
2. What are the laboratory tests to confirm this diagnosis?
   Initial diagnosis is based on clinical symptoms and treatment should begin without laboratory confirmation. A mouse bioassay test with the serum of the woman and her husband revealed the presence of botulinum toxin A. The remainder of the home-canned beans should be also checked for botulinum toxin A.
3. Plan of management and treatment of this patient.
   Trivalent botulinum antitoxin should be administered to the woman (as 500 ml with slow IV infusions 8 h apart). To avoid anaphylactic shock in the usage of serotherapy, the Besredka’s method should be used before the administration of antitoxin.

   However, botulinum antitoxin should not be administered to the husband because of the prolonged time interval from ingestion of the presumed poisoned beans of more than 72 hours.

   The importance of supportive therapy for botulism is underlined by the progressive improvement in mortality rates with advances in critical care, especially ventilatory support (intubation and mechanical ventilation). Since both patients had not defecated since the first signs of the intoxication both should receive treatment with lactulose syrup (a purga-

tive) and in the case of the husband additional saline solution clyster to prevent paralytic ileus.

Case study No. 9.

1. What is the provisional diagnosis? Provide its justification.
   Wound botulism, moderate severity.
2. What is the differential diagnosis?
   There are a few differential diagnoses like:
   a. myasthenia gravis,
   b. encephalitis,
   c. stroke syndromes,
   d. and wound botulism.
3. Plan of management and treatment of this patient.
   An immediate operation with incision, abscess debridement and insertion of drainage in general anesthesia should be performed. After the operation the patient is taken to the ICU for one day. Complementary we can give a high dose of IV Penicillin G (5 M QID a day) in total for nine days.
   Additionally, he should be given 2 doses of trivalent botulinum antitoxin, which is always made after the application of the test dose without any complications like allergic reaction or other.
   In conclusion, the best treatment for wound botulism is still the rapid surgical debridement, acquirement of several samples and the calculated antibiotic and antitoxic treatment.
4. Plan of laboratory tests and instrumental examination of this patient. What are the laboratory tests to confirm this diagnosis?
   To exclude encephalitis, we should perform a CT-scan of the cerebrum and a CSF examination first. Both of them will be without any pathological results.
   The patient's serum or other materials like feces or vomit can be cultivated in order to determinate *C. botulinum*. Real-time PCR or mouse-assay are two more laboratory diagnostic tests, which can detect the toxin, but they are often not reachable in a rapid way.

Case study No. 10.

1. What is the provisional diagnosis? What is the differential diagnosis for a patient with rapidly progressive weakness and ophthalmoplegia?

Wound or foodborne botulism.

2. What diagnostic evaluation should be performed on this patient? What evaluations can be used to confirm the diagnosis?
   The diagnosis of botulism is made using a mouse inoculation assay. Serum or stool samples from affected individuals are injected into mice along with toxin type-specific antitoxin. Symptoms develop in mice without the antitoxin against the specific toxin type the affected individual carries. The assay is dependent on the presence of active botulinum toxin and most sensitive within 24 hours of presentation, but can still be remarkable up to 7 days after presentation.
   If the mouse inoculation assay is unremarkable, we can perform mass spectroscopy on the serum sample to detect botulinum toxins.
3. What treatment should be prescribed?
   Due to the potency of botulinum toxin, antitoxin should be empirically administered immediately if the clinical suspicion is high though clinical trial data are scarce.

1.2. ENTEROVIRAL INFECTION

Case study No. 1.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Enteroviral vesicular stomatitis with exanthem (Hand, foot and mouth disease)".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   The acute Coxsackievirus antibody serum panel and enterovirus panels should be used to detect titers for causative agent. Also, PCR assay should be performed.
3. What is the treatment of this patient?
   There is no specific treatment for enterovirus infection. Symptomatic treatment should be prescribed according to the symptoms, the patient should be given prescriptions for viscous and topical lidocaine for the painful oral and scalp lesions, respectively. In addition, as-needed analgesics, such as ibuprofen, and maintaining adequate oral fluid intake should be given.

Case study No. 2.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Enteroviral vesicular stomatitis with exanthem (Hand, foot and mouth disease)".
2. What are laboratory tests to confirm the diagnosis of the patient?
   Both throat and CSF PCR assay should be performed. Blood and CSF cultures will be helpful for differential diagnosis.
3. What is the treatment of this patient?
   There is no effective antiviral therapy for hand, foot and mouth disease and antibiotic is not beneficial. Neonates are continued to be breastfed. We may put a water bag under the occiput when the body temperature is above normal. Antibiotics could be given to such patients at first before the laboratory test comes out because bacterial infection could not be ruled out according to the management of febrile neonates. Once HFMD

is confirmed and no bacterial cultures are obtained, we should remove the antibiotics as soon as possible.

Case study No. 3.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Enteroviral vesicular stomatitis with exanthem (Hand, foot and mouth disease)".
2. What are laboratory tests to confirm the diagnosis of the patient?
3. The acute Coxsackievirus antibody serum panel and enterovirus panels should be used to detect titers for causative agent. Also, PCR assay should be performed.
4. What is the treatment of this patient?
   Treatment is supportive and includes fluids, antipyretics, and analgesics. Topical lidocaine and mouthwashes can be used for pain relief if oral ulcers are present. In addition, as-needed analgesics, such as Tylenol and ibuprofen, and maintaining adequate oral fluid intake should be given.

Case study No. 4.

1. What are the diagnosis and the differential diagnosis in this patient?
   "Severe enteroviral acute laryngotracheobronchitis complicated by croup with paroxysmal dyspnea and myocarditis with respiratory and cardiac failure caused by Coxsackie B5 virus."
2. What is your approach to diagnosis and treatment?
   Serum specimens were obtained after the second and fifth weeks in hospital; both showed titers of more than 500 of Coxsackie B5 antibody. Antibodies against the other Coxsackie B viruses were all < 5 in titer. Also, PCR assay should be performed.
   He was treated with iron and one month later the hemoglobin level was 12.3 g/dL. One week after admission the signs of cardiac failure had disappeared and there were no further attacks of dyspnea.

Case study No. 5.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Enteroviral meningitis".
2. What are laboratory tests to confirm the diagnosis of the patient?
   Both throat and CSF PCR assay should be performed. Blood and CSF cultures will be helpful for differential diagnosis.
3. What is the treatment of this patient?
   The fluid infusion IV and gamma globulin IV should be given. Also, symptomatic treatment can be used.

Case study No. 6.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Enteroviral acute myocarditis with concomitant hepatitis and pancreatitis caused by Coxsackievirus A4".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Both throat and CSF PCR assay should be performed. Blood and CSF cultures will be helpful for differential diagnosis.
   The antibody titer against Coxsackievirus in sera of the patient should be positive.
3. What is the treatment of this patient?
   The IV administration of dopamine (10 μg/kg/min), unfractionated heparin (15,000 units/day), and furosemide (20 mg/day) should be begun on the day of admission. Then a low-dose IV administration of human atrial natriuretic peptide (0.025 μg/kg/min) should be given. After the IV administration of human atrial natriuretic peptide is stopped, a regimen of oral losartan (25 mg/day), spironolactone (12.5 mg/day), azosemide (30 mg/day), and Warfarin (3.0 mg/day) can be prescribed.
   For patient's abdominal symptoms IV gabexate mesylate (600 mg/day) and ceftriaxone (2 g/day) for 7 days could be given.

Case study No. 7.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Enteroviral acute meningoencephalitis with cerebral vasculitis".
2. What are laboratory tests to confirm the diagnosis of the patient?
   While in- house PCR for Varicella zoster virus and Herpes simplex virus were negative, PCR for enterovirus was positive. Bacterial culture was unremarkable.
3. What is the treatment of this patient?
   IV methylprednisolone (1 mg/kg/d, 5 days) and acyclovir (30 mg/kg/d, 14 days) were administered as initial therapy. Even though PCR for Varicella zoster and Herpes simplex were found to be unremarkable, the treatment with corticosteroids and acyclovir was completed because of the clear neurologic deficit and the history of the Varicella zoster infection.
   Because of the severity of the neurologic deficit and in anticipation of the results of the coagulopathy screening, subcutaneous enoxaparin (2 mg/d) should be started.

Case study No. 8.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Acute Enteroviral flaccid paralysis of upper limbs due to Enterovirus D68".
2. What are laboratory tests to confirm the diagnosis of the patient?
   Stool, throat and CSF PCR assay should be performed. Blood, stool and CSF cultures will be helpful for differential diagnosis.
3. What is the treatment of this patient?
   Suspecting acute flaccid paralysis due to inflammation of the anterior spinal horn, steroid pulse therapy consisting of 1,000 mg/day of methylprednisolone should be administered for 3 days. The patient subsequently should receive 2 courses of IV immunoglobulin therapy (400 mg/kg for 5 days).

Case study No. 9.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Acute Enteroviral encephalomyelitis with cardiorespiratory failure".
2. What are laboratory tests to confirm the diagnosis of the patient?
   Cerebrospinal fluid showed pleocytosis. The patient's serum should be investigated for immunoglobulins M and G antibodies against enterovirus and Coxsackievirus. Stool, throat and CSF PCR assay should be performed. Blood, stool and CSF cultures will be helpful for differential diagnosis.
3. What is the treatment of this patient?
   Methylprednisolone (30 mg/kg/day, for 6 days), milrinone and IV immunoglobulin (1 g/Kg/day for 4 days) should be started at admission. When administered in the early stages, IV Ig may improve outcomes by decreasing plasmatic cytokines. Despite current treatments, however, neurological deficits remain in around 10% of patients. If the symptoms are worsening, plasma exchange therapy could be started, four sessions performed every other day.
   No specific antiviral treatment has shown any benefit to date. Cytokine removal from plasma could also prevent enteroviral neurological complications. Cytokine and other inflammatory humoral factors can be removed with PEX.

Case study No. 10.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Acute Coxsackievirus encephalitis due to Coxsackievirus B3".
2. What are laboratory tests to confirm the diagnosis of the patient?
   CSF analysis revealed WBC of 144/μl (lymphocytes 99%, neutrophils 1%), but protein and glucose were within normal limits.
   The patient's serum should be investigated for immunoglobulins M and G antibodies against enterovirus and Coxsackievirus. Stool, throat and CSF PCR assay should be performed. Blood, stool and CSF cultures will be helpful for differential diagnosis.
3. What is the treatment of this patient?

Methylprednisolone (30 mg/kg/day, for 6 days), milrinone and IV immunoglobulin (1 g/Kg/day for 4 days) should be started at admission. When administered in the early stages, IV Ig may improve outcomes by decreasing plasmatic cytokines. Despite current treatments, however, neurological deficits remain in around 10% of patients. If the symptoms are worsening, plasma exchange therapy could be started, four sessions performed every other day.

No specific antiviral treatment has shown any benefit to date. Cytokine removal from plasma could also prevent enteroviral neurological complications. Cytokine and other inflammatory humoral factors can be removed with PEX.

Case study No. 11.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?

   "Enteroviral vesicular pharyngitis (herpangina)".
2. What are the laboratory tests to confirm the diagnosis of the patient?

   The patient's serum should be investigated for immunoglobulins M and G antibodies against enterovirus and Coxsackievirus. Stool and throat PCR assay should be performed. Blood and stool cultures will be helpful for differential diagnosis.

1.3. FOODBORNE YERSINIOSIS

Case study No. 1.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?

   "Foodborne yersiniosis (*Y. enterocolitica*), extraintestinal (invasive) infection, sepsis, septic arthritis".

   Septicemia due to *Y. enterocolitica* is very rare and generally associated with infancy, advanced age, or an underlying debilitating illness-specifically diabetes, hepatic cirrhosis, and blood dyscrasias. Most of patients with *Y. enterocolitica* septic arthritis had underlying illnesses such as thalassemia, cirrhosis, and lymphoma.
2. What are the laboratory tests to confirm the diagnosis of the patient?

   Yersinia infection can be confirmed in the laboratory using serological tests, culture studies (blood, urine, stool and aspirate from the affected joint), polymerase chain reaction, and histopathological examination.
3. What is the antimicrobial therapy and symptomatic treatment of the disease?

   There is no well-established antibiotic regimen for the treatment of serious *Y. enterocolitica* infections, so first of all the empiric therapy was prescribed. Then it was found that *Y. enterocolitica* obtained from this patient was susceptible to netilmicin and it was prescribed (200 mg/day). The continuation of therapy should be at least 3 weeks. The symptomatic treatment may include antipyretics, spasmolytics, analgesics.

Case study No. 2.

1. What is the correct clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?

   "Foodborne yersiniosis (*Y. enterocolitica*), abdominal infection, mesenteric adenitis, relapsing course."

   She had a history of regular ingestion of undercooked pork or pork products as well as unpasteurized milk. Rubbery lymph nodes in the small bowel mesentery and mesocolon that were found at laparotomy as well as a necrotizing granulomatous lymphadenitis at histological examination are typical for *Yersinia* infection.

2. What are the laboratory tests to confirm the diagnosis of the patient?
   Yersinia infection can be confirmed in the laboratory using serological tests, culture studies (blood, urine, stool and aspirate from the affected lymph nodes), polymerase chain reaction, and histopathological examination. *Yersinia spp.* grow on cefsulodin-irgasan-novobiocin (CIN), MacConkey agar, and Salmonella-Shigella (SS) agar at room temperature and at 37° C and in buffered saline at 4° C. Colonies are difficult to detect after incubation for 24 hours but are readily apparent at 48 hours.
   Serological testing is a diagnostic adjunct for evidence of acute infection with *Y. enterocolitica*.
   The diagnosis should be confirmed by abdominal ultrasound (alternatively CT or MRI) and serological studies to avoid unnecessary surgery. If an early diagnosis could have been achieved using serological studies, abdominal ultrasound, and fecal culture, and appropriate antibiotics were administered, surgery may have been avoided.
3. What is the antimicrobial therapy of the patient?
   Most patients with mild yersiniosis do not require treatment because the disease usually is self-limited. Seriously ill patients generally have responded to treatment with chloramphenicol, tetracyclines (doxycycline), third-generation cephalosporins, aminoglycosides or fluoroquinolones. It may be often resistant to chloramphenicol.

Case study No. 3.

1. What are the diagnosis and complication of this disease?
   "Foodborne yersiniosis (*Y. enterocolitica*), gastroenterocolitis complicated by postinfectious syndromes of reactive arthritis (of right knee, ankles and right 2nd metacarpal joint) and erythema nodosum."
   She had a history of a watery diarrheal illness about three weeks ago.
2. What are laboratory tests to confirm the diagnosis of the patient?
   Culture of stool, throat swab, and urine yielded negative results. Blood culture and culture of aspirate from the affected joints also could be performed. *Yersinia spp*. grow on cefsulodin-irgasan-novobiocin (CIN), MacConkey agar, and Salmonella-Shigella (SS) agar at room temperature and at 37° C and in buffered saline at 4° C. Colonies are difficult to detect after incubation for 24 hours but are readily apparent at 48 hours.
   Serology tests for *Yersinia enterocolitica* should be positive in this case.
3. What is the therapy for the patient?

Patients generally have responded to treatment with chloramphenicol, tetracyclines (doxycycline), third-generation cephalosporins, aminoglycosides or fluoroquinolones. It may be often resistant to chloramphenicol. The patient may also be recommended bed rest and prescribed naproxen 500 mg and physiotherapy.

Case study No. 4.

1. What is the correct diagnosis?
   "Foodborne yersiniosis (*Y. enterocolitica*), abdominal infection with appendicitis and mesenteric adenitis."
   The most common and diagnostically difficult type is intestinal yersiniosis, as well as the abdominal type similar to appendicitis in children and young adults.
2. What are the laboratory tests to confirm this diagnosis?
   The diagnosis should be confirmed by abdominal ultrasound (alternatively CT or MRI) and serological studies to avoid unnecessary surgery. Histopathological examination of removed appendicitis revealed catarrh appendicitis, and, in mesenteric lymph nodes, significant hyperplasia of lymphoid follicles with enlargement of proliferation centers with visible infiltration from multilayer neutrophilic granulocytes was observed, which suggested mesenteric adenitis caused by *Y. enterocolitica*.
   Final recognition of yersiniosis should be confirmed by serological test performed with ELISA. This examination of serum is conducted in order to find antibodies for Yersinia outer proteins and purified O antigens (lipopolysaccharide) obtained from microbes from different serological groups of *Y. enterocolitica*.
3. What are the principles of therapy of this patient?
   Patients generally have responded to treatment with chloramphenicol, tetracyclines (doxycycline), third-generation cephalosporins, aminoglycosides or fluoroquinolones. If antibiotics were not effective in treating the abscess it should be used surgery. If an early diagnosis could have been achieved using serological studies, ultrasound of the abdomen, and fecal culture, and appropriate antibiotics were administered, surgery may have been avoided.
   If the postoperative complications are not observed, the patient could be dismissed home with recommendations of further antibiotic therapy for two weeks and control visit in the Surgical Outpatient Clinic 7 days after the surgery.

Case study No. 5.

1. What are the correct diagnosis and complication of this disease? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?

   "Foodborne yersiniosis (*Y. pseudotuberculosis*), extraintestinal (invasive) infection, severe Far East scarlet-like fever (FESLF) complicated by septic shock and Jarisch Herxheimer reaction".

   Y. pseudotuberculosis septicemia in adults typically affects patients with hepatic and hematologic diseases and is rare in healthy individuals. It is interesting to note that prior to the onset of the disease, his son had suffered from similar symptoms, suggesting the domestic transmission of the pathogen, probably from the single source.

   Far East scarlet-like fever (*Y. pseudotuberculosis* infection) generally develops in childhood, causing fever, hyperemia of the hands and feet (glove and sock symptom) and erythematous scarlet-like rash (on the 2^{nd} – 4^{th} days of the onset of disease) with the following desquamation, abdominal symptoms (diarrhea and abdominal pain), eye congestion, strawberry tongue, myalgia, arthralgia, and lymphadenopathy in the acute phase. Patients with the disease can be complicated by renal failure, erythema nodosum, and desquamation at the distal portion of the extremities in the subacute phase.

   Probable risk factor of the infection in this case may be the using of contaminated well water or vegetables (lettuce, cabbage and grated carrots) contaminated by excrement of mice and rats. Another possibility is that his dog was the source of infection, since domestic animals can be carriers of *Y. pseudotuberculosis*. Previous cases have reported the transmission of *Y. enterocolitica* infection from household dogs to humans.

2. What are the laboratory tests to confirm this diagnosis?

   Paired serum samples should be positive for anti-Y. pseudotuberculosis antibodies. Also, Yersinia infection can be confirmed in the laboratory using culture studies (blood, urine, stool and throat swab), polymerase chain reaction, and histopathological examination.

3. What are the principles of antibacterial therapy of this disease?

   Patients generally have responded to treatment with chloramphenicol, tetracyclines (doxycycline), third-generation cephalosporins, aminoglycosides or fluoroquinolones. The symptomatic treatment may include antipyretics, spasmolytics, analgesics.

1.4. SALMONELLOSIS. TYPHOID FEVER. PARATYPHOID FEVERS

Case study No. 1.

1. What is a clinical diagnosis? Provide differential diagnosis.
   "Typhoid (enteric) fever, typical manifestations, moderate degree of severity, uncomplicated" or "invasive non-typhoid salmonella infection: typhoid-like fever" based on the symptoms of a 10-day history of continuous fever that started gradually with a low grade of the fever, weakness, altered level of consciousness, flatulence, and constipation, mild dry cough, pallor face, dry, yellow coated tongue, dull percussion sounds and mild tenderness over the right lower abdominal quadrant, slight distension of the abdomen, hepatomegaly and spleen enlargement, low blood pressure, relative bradycardia as well as several subtle, salmon-colored macules on the abdomen measuring about from 2 to 4 mm, which blanch with pressure.
   Differential diagnosis could be provided with such diseases:
   – Paratyphoid fevers,
   – Yersiniosis,
   – Brucellosis,
   – Salmonellosis,
   – Malaria, etc.
2. Plan of management, laboratory tests, and imaging of the patient:
   - hospitalization;
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum alanine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - parasitological stool examinations for amoebas and some helminths;
   - thick and thin blood films for malaria parasites;
   - a serologic test for dengue IgM, IgG, and NS1 antigen;
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological "rose spots", urine and stool cultures for *Salmonella spp*.;

- serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including *Salmonella Typhi and Paratyphi* antigens).

3. Antimicrobial therapy and symptomatic treatment of the patient.
   He should be admitted to the hospital. He should be given ciprofloxacin (the drug of choice), IV fluids, and antipyretic drugs (paracetamol). If the strains are resistant to quinolones, macrolides or cephalosporins could be prescribed (e.g., Azithromycin, ceftriaxone). Also, the patient should strictly stay in bed during the course of treatment.

Case study No. 2.

1. What is the clinical diagnosis? Provide differential diagnosis.
   "Typhoid (enteric) fever, typical manifestations, moderate degree of severity, not complicated" or "invasive non-typhoid salmonella infection: typhoid-like fever".
   Differential diagnosis could be provided with such diseases:
   – Paratyphoid fevers,
   – Yersiniosis,
   – Brucellosis,
   – Salmonellosis,
   – Malaria, etc.
2. Plan of management, laboratory tests, and imaging of the patient:
   - hospitalization;
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum alanine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - parasitological stool examinations for amoebas and some helminths;
   - thick and thin blood films for malaria parasites;
   - a serologic test for dengue IgM, IgG, and NS1 antigen;
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological "rose spots", urine and stool cultures for *Salmonella spp*.;

- serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including Salmonella typhi and paratyphi antigens).

3. Antimicrobial therapy and symptomatic treatment of the disease.
   He should be admitted to the hospital. He should be given Ciprofloxacin (the drug of choice), IV fluids, and antipyretic drugs (paracetamol). If the strains are resistant to quinolones, macrolides or cephalosporins could be prescribed (e.g., Azithromycin, ceftriaxone). Also, the patient should stay in bed during the course of treatment.

Case study No. 3.

1. What are the clinical diagnosis and a complication of this disease? Provide its justification.
   "Typhoid (enteric) fever, typical manifestations, severe degree of severity complicated by intestinal perforation and peritonitis".
2. Plan of management, laboratory tests, and imaging of the patient:
   - hospitalization;
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum ala-nine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - parasitological stool examinations for amoebas and some helminths;
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological "rose spots", urine, peritoneal fluid and stool cultures for *Salmonella spp*.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including *Salmonella Typhi* and *Paratyphi* antigens).
3. Antimicrobial therapy and symptomatic treatment of the disease.
   The patient should be given IV fluids and antibiotics before the operation. The patient had ileal resection and ileo-transverse anastomosis following large volume saline peritoneal lavage and was administered on broad spectrum IV antibiotics (Ceftriaxone 2 g/day IV and Metronidazole).

Case study No. 4.

1. What are the clinical diagnosis and a complication of this disease? Provide its justification.

   "Typhoid (enteric) fever, atypical manifestation complicated by pyogenic spondylodiscitis" or "invasive non-typhoid salmonella infection".
2. Plan of management, laboratory tests, and imaging of the patient:
   - hospitalization;
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum ala-nine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - parasitological stool examinations for amoebas and some helminths;
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological urine, and stool cultures for *Salmonella spp*.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including Salmonella typhi and paratyphi antigens);
   - MRI of the abdominal cavity and lumbar spine;
   - histopathological and microbiological investigations of a biopsy samples from the affected area.

   The samples are cultured on 5% sheep blood agar and MacConkey agar & incubated for 24 h at 37^{o}C.
3. Antimicrobial therapy and symptomatic treatment of the disease.

   The antimicrobial therapy is given based on antibiotic susceptibility report. Macrolides, cephalosporins or quinolones should be prescribed for a long period (up to 3 months). Symptomatic treatment should include fluid intake, analgesics, antipyretics.
4. What are the criteria to discharge the patient from the hospital?

   There are the following criteria for discharge of the patient from the hospital: after complete clinical recovery; after a negative bacteriologic stool culture for *Salmonella spp*. (stool samples must be obtained 48 h after the end of antimicrobial therapy).
5. Epidemiological surveillance for such convalescents.

   Epidemiological surveillance for the convalescents of shigellosis patients from special professional groups "decreed categories" or jurisdictional groups including food handlers (the patient is a cook by profes-

sion): outpatient examination can last 1 month and more and includes a clinical examination by a physician specialized in infectious diseases, and repeated bacteriologic stool, urine, and bile cultures as well as serum antibodies to Vi-antigen.

Case study No. 5.

1. What are the clinical diagnosis and a complication of this disease? Provide its justification.
   "Typhoid (enteric) fever, typical manifestations, severe degree of severity complicated by severe intestinal hemorrhage and shock" or "invasive non-typhoid salmonella infection".
2. Plan of management, laboratory tests, and imaging of the patient:
   - hospitalization;
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum ala-nine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - parasitological stool examinations for amoebas and some helminths;
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological urine, and stool cultures for *Salmonella spp*.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including *Salmonella Typhi* and *Paratyphi* antigens);
   - colonoscopy with punch biopsy and further histopathological and microbiological investigations of a biopsy samples.
3. Antimicrobial therapy and symptomatic treatment of the disease.
   The antimicrobial therapy is given based on antibiotic susceptibility report. Macrolides, cephalosporins or quinolones should be prescribed for a long period (up to 3 months). Symptomatic treatment should include fluid intake, analgesics, antipyretics. Based on the severity of the process, blood transfusion should also be performed.

Case study No. 6.

1. What are the clinical diagnosis and a complication of this disease?
   "Typhoid (enteric) fever, typical manifestations, severe degree of severity complicated by intestinal hemorrhage" or "invasive non-typhoid salmonella infection".
2. Plan of management, laboratory tests, and imaging of the patient:
   - hospitalization;
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum ala-nine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - parasitological stool examinations for amoebas and some helminths;
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological urine, and stool cultures for *Salmonella spp*.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including *Salmonella typhi* and *paratyphi* antigens);
   - colonoscopy with punch biopsy and further histopathological and microbiological examinations of a biopsy samples.
3. Antimicrobial therapy and symptomatic treatment of the disease.
   The antimicrobial therapy is given based on antibiotic susceptibility report. Macrolides, cephalosporins or quinolones should be prescribed for a long period (up to 3 months). Symptomatic treatment should include fluid intake, analgesics, antipyretics. Based on the severity of the process, blood transfusion should also be performed. Since there is no active bleeding, endoscopic or surgery intervention may not be performed.

Case study No. 7.

1. What are the clinical diagnosis and a complication of this disease? How unusual is such case for a seemingly immunocompetent patient?
   "Invasive non-typhoid salmonella infection: bacteremia (*S. Enteritis*) with metastatic focal infection complicated by a pneumonia, gluteal abscess and associated sacroiliitis".
2. Plan of management, laboratory tests, and imaging of the patient:
   - hospitalization;

- chest X-ray;
- abdominal ultrasound;
- a peripheral blood WBC count;
- routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum ala-nine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
- urinalysis;
- HIV testing, sickle cell screen, T-lymphocyte and cytokine profile testing;
- parasitological stool examinations for amoebas and some helminths;
- thick and thin blood films for malaria parasites;
- a serologic test for dengue IgM, IgG, and NS1 antigen;
- several bacteriological blood culture for *Salmonella spp*.;
- bacteriological urine and stool cultures for *Salmonella spp*., *Shigella spp*., *Enterobacteriaceae spp*.;
- serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including *Salmonella typhi* and *paratyphi* antigens).

3. Antimicrobial therapy and symptomatic treatment of the disease.
   The patient could be treated administered IV ceftriaxone for 14 days. Additional therapy consists of fluconazole as antifungal prophylaxis, parenteral rehydration with fluids, 20% human albumin as antiedema treatment for the signs of encephalopathy, probiotics, hepatoprotectors, and antipyretics.

Case study No. 8.

1. What are the clinical diagnosis and a complication of this disease?
   "Typhoid fever, complicated by endocarditis" or "invasive non-typhoid salmonella infection: bacteremia (*S. Enteritis*) complicated by endocarditis".
2. What are the laboratory tests to confirm this diagnosis?
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological urine and stool cultures for *Salmonella spp*.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including *Salmonella typhi* and *paratyphi* antigens).
3. What are laboratory and imaging examinations of this patient?
   - chest X-ray;

- abdominal ultrasound;
- a peripheral blood WBC count;
- routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum ala-nine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
- urinalysis;
- transthoracic and transesophageal echocardiography;
- parasitological stool examinations for amoebas and some helminths;
- thick and thin blood films for malaria parasites;
- a serologic test for dengue IgM, IgG, and NS1 antigen

4. What is the antimicrobial therapy of this disease?
   He was treated with a 3-week course of IV ceftriaxone 2 g/day, followed by six weeks of oral ciprofloxacin 500 mg BID daily.

Case study No. 9.

1. What are the clinical diagnosis and a complication of this disease?
   "Invasive non-typhoid salmonella infection: bacteremia (*S. Typhimurium*) with vascular infection complicated by aortitis".
2. What are the laboratory tests to confirm this diagnosis? What are laboratory tests and imaging examinations of this patient?
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological urine and stool cultures for *Salmonella spp*.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella* spp. antigens including *Salmonella typhi* and *paratyphi* antigens).

   Other laboratory and imaging investigations include:
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum alanine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - transthoracic and transesophageal echocardiography;
   - abdominal CT scan;
   - parasitological stool examinations for amoebas and some helminths.

   Bacterial aortitis is difficult to diagnose and a high index of suspicion is therefore important. There is often no history of gastroenteritis and back

or abdominal pain in a patient with fever appears to be the most consistent feature. A pulsatile abdominal mass is palpable in only 42% of cases. Blood culture is positive in three-quarters of all cases of *Salmonella* aortitis. The most useful investigation is CT, but this may be negative. The most appropriate management is aortic repair combined with antimicrobial therapy.

3. Antimicrobial therapy and symptomatic treatment of the disease.
   He was initially commenced on IV antimicrobial therapy cefuroxime 750 mg and metronidazole 500 mg, both TID a day. On day 2m he was commenced on IV Ceftriaxone 2g/day. Oral ciprofloxacin 500 mg BID was continued for one month after discharge.

Case study No. 10.

1. What is this disease?
   "Gastrointestinal salmonellosis (*S. Enteritis*), gastroenteritis variant, moderate severity with moderate dehydration" (or "Non-invasive non-typhoid salmonella infection: gastroenteritis with moderate dehydration").
2. What are the laboratory tests to confirm this diagnosis? Plan of management and laboratory tests of the patient:
   - several bacteriological blood culture for *Salmonella spp*.;
   - bacteriological urine and stool cultures for *Salmonella spp*.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Salmonella spp*. antigens including *Salmonella typhi* and *paratyphi* antigens).

   Other laboratory and imaging investigations include:
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum alanine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - parasitological stool examinations for amoebas and some helminths.
3. What is the treatment of this disease?
   She was found to be dehydrated, so she should be given IV fluid replacement and IV metoclopramide as antiemetic treatment. Then, she should be given oral rehydration salts (Rehydron) and encouraged to

drink as much as possible. The other treatment should include ciprofloxacin 500 mg orally BID for 3 days; dietary; probiotic preparations (*Lactobacillus* and *Bifidobacterium* species); antipyretic drugs (Paracetamol).

4. What are the criteria to discharge the patient from the hospital? Epidemiological surveillance for the convalescents of diarrheal diseases.
   There are the following criteria to discharge the patient from the hospital: after complete clinical recovery; after a negative bacteriologic stool culture for *Salmonella spp*. (stool samples must be obtained 48 h after the end of antimicrobial therapy).
   Epidemiological surveillance for the convalescents of shigellosis patients from special professional groups “decreed categories” or jurisdictional groups including food handlers (the patient is a restaurant barmaid): outpatient examination can last 1 month and more and includes clinical examination by a physician specialized in infectious diseases, and bacteriologic stool cultures.

1.5. SHIGELLOSIS. AMOEBIASIS

Case study No. 1.

1. "Acute shigellosis, colitis, moderate severity" based on the symptoms of moderate-grade fever, infectious toxicity, heart rate 92 bpm, blood pressure of 110/65 mm Hg, and proctosigmoiditis with low-volume mucoid diarrhea 15 times a day, abdominal pain in the left lower abdominal quadrant, false urge to defecate, and tenesmus.
2. Plan of management and laboratory tests of the patient:
   - hospitalization;
   - peripheral blood WBC count;
   - fecal WBC examination;
   - bacteriological stool cultures for *Shigella* spp., *Salmonella* spp., and *Campylobacter* spp.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Shigella* antigens).
3. Antimicrobial therapy and symptomatic treatment of the disease.
   Tab. Ciprofloxacini 500 mg orally BID for 3 days; dietary; oral rehydration with oral rehydration salts; probiotic preparations (*Lactobacillus* and *Bifidobacterium* species); antipyretic drugs (Paracetamol).

Case study No. 2.

1. "Acute shigellosis, colitis, severe form" based on high-grade fever, severe infectious toxicity, dizziness, anorexia, headache, insomnia, repeated vomiting, heart rate more than 100 bpm, and proctosigmoiditis with low-volume bloody and mucoid diarrhea 20 to 25 times a day, and abdominal pain in the left lower abdominal quadrant with the crampy sigmoid colon.
2. Plan of management and laboratory tests of the patient:
   - hospitalization;
   - peripheral blood WBC count;
   - fecal WBC examination;
   - bacteriological stool cultures for *Shigella spp*., *Salmonella spp*., and *Campylobacter spp*.;

- serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with Shigella antigens).

3. Antimicrobial therapy and symptomatic treatment of the disease.
   Tab. Ciprofloxacini 500 mg orally BID for 5 days; dietary; oral rehydration with oral rehydration salts; Ringer's lactate IVly at the beginning of the treatment, probiotic preparations (*Lactobacillus* and *Bifidobacterium* species); antipyretic drugs (Paracetamol).

Case study No. 3.

1. Criteria for hospitalization of patients with diarrheal diseases:
   - Clinical criteria for hospitalization
   – moderate or severe clinical symptoms
   – children before the age of two
   – patients with comorbidities or with a chronic diarrhea
   – elderly persons
   – pregnant women
   - Epidemiological criteria for hospitalization
   – special professional groups "decreed categories" or jurisdictional groups
   – homeless persons
   – persons living in hostels or community
   – persons from elderly care facilities
   – children from boarding schools or orphanage
2. What is the clinical diagnosis? Provide its justification.
   "Subclinical *Shigella Flexneri* carrying" based on the positive results of the bacteriological stool culture, the absence of any clinical symptoms as well as the normal results of a fecal WBC examination, a WBC blood count, and the sigmoidoscopy.
3. Plan of management and treatment of the patient:

- serologic tests (blood samples for indirect hemagglutination test or ELISA with *Shigella* antigens);
- personal hygiene;
- *Shigella* carriers from special professional groups must be employed outside food service and child care facilities;
- Outpatient examination can last 3 months and more and includes a clinical examination by a physician specialized in infectious diseases, a bac-

teriologic stool culture for *Shigella* spp. and *Salmonella* spp. once a month.

- Probiotic preparations (*Lactobacillus* and *Bifidobacterium* species), Ciprofloxacin, 500 mg perorally BID for 5 days and/or Bacteriophagum dysentericum, 30–40 ml or 2–3 tablets perorally TID an hour before meal for 7 to 10 days.

Case study No. 4.

1. There are the following criteria to discharge the patient from the hospital:
   - after complete clinical recovery;
   - after a negative bacteriologic stool culture for *Salmonella* spp., *Shigella*, and *Campylobacter* (stool samples must be obtained 48 h after the end of antimicrobial therapy).
2. Epidemiological surveillance for the convalescents of shigellosis patients from special professional groups "decreed categories" or jurisdictional groups: outpatient examination can last one month and more and includes clinical examination by a physician specialized in infectious diseases, and bacteriologic stool cultures.

Case study No. 5.

1. Criteria for hospitalization of patients with diarrheal diseases:
   - Clinical criteria for hospitalization
     - moderate or severe clinical symptoms
     - children before the age of two
     - patients with comorbidities or with a chronic diarrhea
     - elderly persons
     - pregnant women
   - Epidemiological criteria for hospitalization
     - special professional groups "decreed categories" or jurisdictional groups
     - homeless persons
     - persons living in hostels or community
     - persons from elderly care facilities
     - children from boarding schools or orphanage
2. Plan of management and laboratory tests of the patient.

- hospitalization;
- peripheral blood WBC count;
- fecal WBC examination;
- bacteriological stool cultures for *Shigella* spp., *Salmonella* spp., and *Campylobacter* spp.;
- serologic tests (blood samples in a week after the beginning of the disease for indirect haemagglutination test or ELISA with *Shigella* antigens).

3. Antimicrobial therapy and symptomatic treatment of the patient.
   Tab. Ciprofloxacin 500 mg orally BID for 5 days; dietary; oral rehydration with oral rehydration salts; Ringer's lactate IVly at the beginning of the treatment, probiotic preparations (*Lactobacillus* and *Bifidobacterium* species); antipyretic drugs (Paracetamol).

Case study No. 6.

1. What is this disease? What would the ulcer biopsy demonstrate?
   Acute intestinal amoebiasis.
   Amoeba burrow into lamina propria and cause tissue necrosis with relatively little inflammation. Early lesions show scattered neutrophils; more developed cases generally show broad based "flask" shaped ulcers 1 to 2 mm in diameter. The trophozoites of *Entamoeba histolytica* are 6 to 40 nm and resemble macrophages. They are round to oval and may be surrounded by a halo. The cytoplasm is abundant and vacuolated and may contain ingested red blood cells that indicate tissue invasion. The nuclei are small and round with prominent nuclear membranes and a central karyosome (chromocenter). They are often found clustered at the luminal surface or within debris.
2. What are the laboratory tests to confirm this diagnosis?
   Motile magna trophozoites of *Entamoeba histolytica* can be microscopically visualized in the colonoscopy-obtained samples of a fresh smear of the ulcer exudate or a scraping of the ulcer edge. The stool sample has to be collected directly into a wide-mouthed container and examined without delay (within 20 min after passing). It should be inspected for macroscopic and microscopic features, as well as routine examination for other parasites also. Examination of three separate samples is recommended. The cellular exudate is scanty and consists of a few pus cells, epithelial cells and macrophages. The red cells are aggregated and yellowish or brownish-red in color. Charcot-Leyden crystals are often pre-

sent. In freshly passed stool, actively motile trophozoites of *E. histolytica* can be demonstrated in unstained saline mounts. The presence of ingested erythrocytes clinches the identity of *E. histolytica*, as they are not found in any other intestinal amoeba. Stained films may not be necessary as a routine for diagnosis in acute cases, but trichrome or iron-hematoxylin-stained films provide the most dependable identification and differentiation. Among the serologic tests, the indirect hemagglutination assay is reported to be the most sensitive; however, the ELISA is most commonly available. A stool PCR test for *E. histolytica* can also be used.

3. What is the treatment and prognosis?
   Metronidazole – 750 mg orally TID for 5 days. Tinidazole – 2000 mg orally every day for 3 days. Tinidazole has been used more and is better tolerated than metronidazole, and it can be administered for only 3 days. A potential new agent for intestinal amebiasis is nitazoxanide. This drug, administered at 500 mg perorally BID for three days, was associated with the resolution of *E. histolytica*/*E. dispar*-associated diarrhea in 80–90% of patients along with microscopic improvement.

Case study No. 7.

1. What is this disease? What would the histological examination demonstrate?
   Extraintestinal amoebiasis, amebic liver abscess.
   Invasive magna form of amoeba can be found only at the abscess periphery in almost normal liver tissue. Amoebic liver abscess may be multiple or more often solitary, usually located in the upper right lobe of the liver (varying from a few mm to several cm in size). The center of the abscesses contains thick chocolate brown pus (“anchovy sauce-like pus”).
2. What are the laboratory tests to confirm this diagnosis?
   Motile magna trophozoites of *Entamoeba histolytica* can be microscopically visualized in the samples of liver abscess wall. The stool sample has also to be collected directly into a wide-mouthed container and examined without delay (within 20 min after passing). It should be inspected for macroscopic and microscopic features, as well as routine examination for other parasites also. Among the serologic tests, the indirect hemagglutination assay for *Entamoeba histolytica* is reported to be the most sensitive; however, the ELISA is most commonly available.

3. What is the treatment and prognosis?
   It was recommended the standard high dose of metronidazole for 10 days or Tinidazole for 5 days (metronidazole – 750 mg perorally TID regimen for 10 days; Tinidazole – 2000 mg perorally every day for 5 days). In the severely ill patients, IV metronidazole (1500 mg every day) would be effective. In patients with either colitis or liver abscess failing or progressing on metronidazole, a potential alternative or additional therapy is dehydroemetine. The drug is given 1–1.5 mg/kg/day IM for 5 days. The drug is cardiotoxic and congestive failure and deaths have been reported.

Case study No. 8.

1. What is this disease? What would the histological examination demonstrate?
   Chronic intestinal amoebiasis, ameboma of intestine.
2. What are the laboratory tests to confirm this diagnosis?
   Among the serologic tests, the indirect hemagglutination assay is reported to be the most sensitive; however, the ELISA is most commonly available. A stool or ameboma sample polymerase chain reaction (PCR) test for *E. histolytica* can also be used.
3. What is the treatment and prognosis?
   Laparotomy and right hemicolectomy should be done. The patient should be treated with metronidazole (750 mg orally TID regimen for 5-10 days) and paromomycin (25-35 mg/kg/day orally TID for 7 days).

Case study No. 9.

1. What is this infectious agent and disease?
   Trophozoites of *Balantidium coli*, balantidiasis (Balantidial dysentery).
2. What is the treatment and prognosis?
   Treatment is effective with metronidazole (750 mg orally TID a day regimen for 5 days).
   Balantidiasis can become chronic if untreated. Persistent diarrhea can lead to high fluid loss and dehydration. Abdominal bleeding can lead to death. In other cases, prognosis is favorable.

Case study No. 10.

1. What is this disease?
   "Acute shigellosis, colitis, severe form" based on eleven-month-old age of the patient, the symptoms of fever, severe infectious toxicity, heart rate of 115 bpm, and respiratory rate of 30/min., and colitis with abdominal pain, increased bowel sound, frequent passage of loose, bloody, and frothy stool.
2. What are the laboratory tests to confirm this diagnosis? Plan of management and laboratory examination of the patient.
   - hospitalization;
   - peripheral blood WBC count;
   - fecal WBC examination;
   - bacteriological stool cultures for *Shigella spp*., *Salmonella spp*., and *Campylobacter spp*.;
   - serologic tests (blood samples in a week after the beginning of the disease for indirect hemagglutination test or ELISA with *Shigella* antigens);
   - abdominal ultrasound;
   - colonoscopy.
3. What is the treatment and prognosis?
   The antimicrobial regimen of 1 g/24 hours of ceftriaxone and 500 mg/24 hours of metronidazole could be initiated as empiric therapy for acute diarrheal illness along with zinc tablets (10 mg/24 hour), probiotic Bifilac (10 ml/24 hours), and oral rehydration solution (100 ml per stool episode). Despite continuous fluid replacement and IV therapy of cephalosporin (ceftriaxone) and metronidazole, apparent prognosis in the disease was not observed. After the bacteriological report the antimicrobial therapy should be changed according to the sensitivity.

2.1. DIPHTHERIA. TONSILLITIS

Case study No. 1.

1. What is the provisional diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Pharyngeal diphtheria (=Diphtheritic membranous angina, Tonsillar diphtheria), moderate severity".
2. What are the laboratory tests to confirm the diagnosis?
   The diagnosis of diphtheria is established by a combination of history, physical examination, and positive cultures for *Corynebacterium diphtheriae*. *C. diphtheriae* should be isolated by a local laboratory from the throat swab obtained from this patient.
   If the clinical picture is atypical or confusing, PCR testing can provide supporting evidence for the diagnosis, although PCR is not yet an accepted criterion for laboratory confirmation.
   The diagnosis of diphtheria requires confirmation by microbiological culture and microscopy. This requires the use of selective culture media such as tellurite blood agar, enriched Loeffler, Hoyle, Mueller, or Tindale media. Cultures are obtained from nose and throat swabs in suspected diphtheria patients and their close contacts. Where possible, swabs should be taken from bottom of the pseudo membrane.
   Culture allows *C. diphtheriae* to be distinguished from other *Corynebacterium* species that are part of the natural flora of the nasopharynx and skin (e.g., diphtheroids). Even if the patient's culture is negative, isolation of *C. diphtheriae* from close contacts may enable confirmation of the diagnosis. A modified Elek test is used to determine the toxigenicity of isolated *C. diphtheriae* strains. This is a technically difficult test and unavailable in many laboratories.
   Diphtheria antibody levels can also be measured. If levels are high, the disease is less likely to produce a severe illness. However, if antibodies are low (a non-protective diphtheria antibody titer is <0.01 international units/mL) a diagnosis of diphtheria cannot be excluded.
3. How would you approach the treatment of this disease?
   The patient should be immediately treated with IV fluids, injection of antidiphtheritic serum given 60,000 IU, IVly in normal saline dilution after giving test dose.
   Amoxicillin and clavulanic acid should be given IVly 1.5 gm BID for 3 days, combined with IV metronidazole 100 ml TID for 3 days. Alterna-

tively, antibiotic treatment may include Roxithromycin, 300 mg daily for 14 days.

4. How would you approach the prevention and control of this disease?
   The main factors leading to the epidemic include low immunization coverage among infants and children, waning immunity to diphtheria among adults. Booster diphtheria tetanus immunization should be advised for such patients. Chemoprophylaxis tablet erythromycin 500 mg thrice daily for 14 days for the family members and all other contacts should be advised.
   Immediately upon receipt of the positive results from the local laboratory, an investigation should be conducted by the local health authorities to identify the source of infection, close contacts and to implement control measures. The investigation should be followed the national guidelines for diphtheria case management.
   All close contacts should be identified around the patient(s). These persons may include family members, close friends or work colleagues, healthcare workers and patients waiting with the case in the same room of the emergency department and not wearing protective masks. All contacts should be contacted and physically examined, and were all offered throat swabs and antibiotic prophylaxis.
   Close contacts and household members of patients should be followed throughout the incubation period for evidence of infection. Nasopharyngeal, oropharyngeal, and cutaneous lesion cultures should be taken. Prophylactic antibiotics should be given, irrespective of the immunization status, although efficacy has not been proved. Individuals who are not fully immunized (i.e., have received fewer than three doses of vaccine) or whose immunization status is unknown should be fully vaccinated. Children who have not received their fourth dose of vaccine should be immunized. Previously immunized patients should receive a booster vaccine if they have not received one in the previous 5 years. Healthcare providers who are in direct contact with patients should receive one dose of Tdap for booster immunization against tetanus, diphtheria, and pertussis.
   Universal immunization with a diphtheria toxoid-containing vaccine is the only effective measure. In the US, this is usually achieved during infancy with DTaP, a vaccine that contains diphtheria toxoid in combination with tetanus toxoid and acellular pertussis vaccine. The CDC’s Advisory Committee on Immunization Practices (ACIP) recommends that a series of 5 doses of DTaP vaccine are given at 2, 4, 6, and 15 to 18

months and at 4 to 6 years of age. The fourth dose may be administered early, from age 12 months, if at least 6 months has passed since the third dose. If the fourth dose of DTaP vaccine is inadvertently administered early, ACIP recommends that it does not need to be repeated if it was administered at least 4 months after the third dose, and the child was aged 12 months or older. The fifth dose of DTaP is not considered necessary if the fourth dose was administered at age 4 years or older.

Adolescents aged 11 to 18 years receive a single dose of Tdap vaccine for booster immunization if they have completed the recommended DTaP vaccination series (Tdap vaccine contains lesser quantities of diphtheria and pertussis proteins than DTaP vaccine and so is less likely to cause side effects such as pain, redness, and tenderness). Thereafter, adults should receive a booster dose of Td vaccine every 10 years (Td is a combination vaccine containing tetanus and diphtheria toxoids). ACIP recommends that unvaccinated adults aged 65 years and older may receive Tdap. ACIP recommends administering one dose of Tdap vaccine to pregnant women during each pregnancy (preferably between 27-36 weeks' gestation) regardless of time since prior Td or Tdap vaccination. Tdap vaccination during pregnancy is not associated with an increased risk of infant hospitalization or death in the first 6 months of life.

Case study No. 2.

1. What is the provisional diagnosis? What are the differential diagnoses?
   "Severe pharyngeal diphtheria with progressive fulminant myocarditis".
   Differential diagnosis may include the following:
   - Botulism;
   - Infectious endocarditis;
   - Influenza;
   - Streptococcal tonsillitis;
   - Infectious mononucleosis, etc.
2. What are the laboratory tests to confirm the diagnosis of the patient?
   The diagnosis of diphtheria is established by a combination of history, physical examination, and positive cultures for *Corynebacterium diphtheriae*. *C. diphtheriae* could be isolated by a local laboratory from the throat swab obtained from this patient.

   If the clinical picture is atypical or confusing, PCR testing can provide supporting evidence for the diagnosis, although PCR is not yet an accepted criterion for laboratory confirmation.

Diphtheria antibody levels can also be measured. If levels are high, the disease is less likely to produce a severe illness. However, if antibodies are low (a non-protective diphtheria antibody titer is <0.01 international units/mL) a diagnosis of diphtheria cannot be excluded.

3. How would you approach the treatment of this patient?
   Delay in treatment leads to high morbidity and mortality. On the first day of hospitalization the patient should be administered diphtheria antitoxin (120,000 units IV, after hypersensitivity testing), penicillin G (200,000 U/kg/day IV every 6 h), cefotaxime (150 mg/kg/day IV every 6 h) and milrinone. Methylprednisolone IV (2 mg/kg/day) should be also administered for the patient's severe myocarditis.
   In general, the therapy for myocarditis during the acute phase in children includes supportive care to maintain hemodynamic stability and adequate systemic perfusion. In fulminant cases mechanical support of the circulation with extracorporeal membrane oxygenation or a ventricular assist device followed by cardiac transplantation may be necessary. Children with diphtheritic myocarditis are challenging to manage. Often, several organ systems are affected by the infection and toxin.
   The primary aim of emergency tracheostomy is the management of upper airway obstruction. In this patient, the intubation process may have introduced diphtheria to his lower respiratory tract. Physicians should avoid endotracheal intubation in diphtheria with upper airway obstruction because it could introduce bacteria to the lower respiratory tract causing severe complications and mortality.
4. How would you approach the prevention and control of this disease?
   Pediatricians should routinely check vaccination histories and schedules of all children under their care, especially newly migrated children. Disease prevention through vaccination and early identification/treatment are the major keys in reducing the morbidity and mortality of this particular disease. The patient's household contacts should be investigated and chemoprophylaxis with erythromycin for 10 days should be performed.

Case study No. 3.

1. What is the provisional diagnosis? What are the differential diagnoses?
   "Laryngeal diphtheria (=Diphtheritic laryngotracheitis), moderate severity without toxic symptoms".
   Differential diagnosis may include the following:
   - Botulism;

- Epiglottitis;
- Influenza;
- Streptococcal tonsillitis;
- Infectious mononucleosis,
- Oropharyngeal/esophageal candidiasis, etc.

2. What are the laboratory tests to confirm the diagnosis of the patient?
   The diagnosis of diphtheria is established by a combination of history, physical examination, and positive cultures for *Corynebacterium diphtheriae*.
   If the clinical picture is atypical or confusing, PCR testing can provide supporting evidence for the diagnosis, although PCR is not yet an accepted criterion for laboratory confirmation.
   Diphtheria antibody levels can also be measured. If levels are high, the disease is less likely to cause a severe illness. However, if antibodies are low (a non-protective diphtheria antibody titer is <0.01 international units/mL) a diagnosis of diphtheria cannot be excluded.
3. How would you approach the treatment of this patient?
   The patient should be immediately treated with IV fluids, injection of antidiphtheritic serum given 60,000 IU, IV in normal saline dilution after giving test dose.
   Amoxicillin and clavulanic acid should be given IVly 1.5 gm BID for 7-10 days. Alternatively, antibiotic treatment may include Roxithromycin, 300 mg daily for 14 days.
4. How would you approach the prevention and control of this disease?
   Disease prevention through vaccination and early identification/treatment are the major keys in reducing the morbidity and mortality of this particular disease. The patient's household contacts should be investigated and chemoprophylaxis with erythromycin for 10 days should be performed.

Case study No. 4.

1. What is the provisional diagnosis?
   "Severe laryngeal and pharyngeal diphtheria with toxic symptoms and lethal outcome".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Laboratory diagnosis is obtained through parallel culture of tonsillar and pharyngeal tissue on trypticase soy agar containing 5% sheep blood, chocolate agar, and MacConkey agar. All cultures are incubated at 37.0

°C in the atmosphere of 5% CO_2 in a primary laboratory. Toxin A and B subunits of the *C. diphtheriae* toxin (tox) gene can be detected in the tonsil isolate by using an adapted PCR.

3. How would you approach the treatment of this patient?
   The patient should be isolated immediately and given adequate treatment including diphtheria antitoxin and IV erythromycin. However, his condition deteriorated rapidly, and he died of respiratory obstruction 48 hours after admission.
4. How would you approach the prevention and control of this disease?
   Pediatricians should routinely check vaccination histories and schedules of all children under their care, especially newly migrated children. Disease prevention through vaccination and early identification/treatment are the major keys in reducing the morbidity and mortality of this particular disease. The patient's household contacts should be investigated and chemoprophylaxis with erythromycin for 10 days should be performed.

Case study No. 5.

1. What is the provisional diagnosis? What are the main clinical and epidemiological clues that are allowed to suspect of the diagnosis?
   "Cutaneous diphtheria caused by toxigenic *Corynebacterium* complicated by distant cutaneous allergic (eosinophilic) reaction".
2. What are laboratory tests to confirm the diagnosis of the patient?
   Two tissue samples from the first exploratory procedure did not reveal any organism on direct Gram staining, but subsequently showed growth of Gram-positive rods described as diphtheroids (Corynebacterium-like). Identification via a matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) Biotyper (Bruker Daltonics GmbH, Bremen, Germany) could be performed.
   Identification of *C. diphtheriae*, *C. ulcerans*, or *C. pseudotuberculosis* from clinical samples must then be followed by determination of toxigenic potential, historically with the Elek test. Difficulties with this method are well documented, and modifications have been described that decrease the test time from 48 h to 16 h. Previous difficulties in detection of toxigenicity by PCR arising from tox gene sequence variation between *C. diphtheriae* and *C. ulcerans* have been overcome by development of real-time PCR methods that detect the tox gene of both species.
3. How would you approach the treatment of this patient?

The patient should be treated by broad spectrum antibiotics firstly, and then therapy could be changed according to the investigations of sensitivity. Cephalosporins, rifampicin, doxycycline, erythromycin can be used.

Treatment of diphtheria focuses on antimicrobial therapy and adjunctive antitoxin use. In cutaneous diphtheria, although patients occasionally need surgical intervention, assessment should be sought early to decide whether affected tissues might need debridement, as was done in this case.

Diphtheria antitoxin is integral to management of diphtheria, particularly if the risk of toxin-mediated sequelae is high. The antitoxin neutralizes only non-tissue-bound toxin and should therefore be given early in the course of the disease, on the basis of clinical suspicion rather than laboratory diagnosis. Although the protective effect of this antitoxin was first described for *C. diphtheriae*, evidence suggests that this antitoxin also has a role in *C. ulcerans* diphtheria, despite tox genes and prophages varying between these two species at the molecular level.

4. How would you approach the prevention and control of this disease?

This includes screening for carriage of *Corynebacterium*, confirmation of vaccine status, and tetanus, diphtheria, and inactivated polio vaccine immunization. Evidence that cats and dogs might act as potential reservoirs for this organism prompted consideration as to whether the contact animals should be swabbed and screened for *Corynebacterium*. Veterinary advice should be asked in this case. For human contacts, nasal and pharyngeal swabs and samples from any open wounds should be sent for culture testing before starting chemoprophylaxis with either parenteral benzathine benzylpenicillin or oral erythromycin. Carriers of a toxigenic corynebacteria should be treated and have control measures instigated; if these carriers are inpatients, measures should include barrier nursing until two sets of cultures (nasal and pharyngeal, and wound where appropriate) taken 24 h after stopping antimicrobial chemotherapy, and again at least 24 h later, remain negative. In addition to chemoprophylaxis, vaccination also plays an essential part in managing the public health implications of a diphtheria case. Vaccine administration (one booster for individuals previously immunized, three monthly low-dose diphtheria-containing vaccines if unimmunized) is not only necessary as a preventive intervention for contact with diphtheria, but also as an adjunct to treatment for the index case during convalescence, since natural infection does not always confer immunity.

Case study No. 6.

1. What is the provisional diagnosis? What are the differential diagnoses?
   "Cutaneous diphtheria".
   Differential diagnosis may include the following:
   - Pyoderma gangrenosum;
   - Cutaneous leishmaniasis;
   - Arthropod bites;
   - Dermatologic diseases (eczema, impetigo, psoriasis);
   - Cutaneous anthrax, etc.
2. What are the laboratory tests to confirm the diagnosis of the patient?
   The suspected colonies can be rapidly identified as *Corynebacterium diphtheriae* by use of a Microflex LT Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometer (MALDI-TOF MS) (Bruker Daltonics, Bremen, Germany). Also, bacteriological examinations of the lesion swab samples should be performed.
   Diphtheria antibody levels can also be measured. If levels are high, the disease is less likely to produce a severe illness. However, if antibodies are low (a non-protective diphtheria antibody titer is <0.01 international units/mL) a diagnosis of diphtheria cannot be excluded.
3. How would you approach the treatment of this patient?
   Recommended treatment of skin diphtheria includes thorough cleaning of the lesion, penicillin or macrolide therapy, and, in cases of toxigenic symptoms, antitoxin.

Case study No. 7.

1. What is the provisional diagnosis? What are the differential diagnoses?
   "Diphtheritic catarrhal conjunctivitis".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   - Bacteriological examinations (including glucose, sucrose and starch fermentation by the strain when tested in Hiss serum water, phosphatase and urease tests);
   - in vivo animal pathogenicity tests;
   - PCR tests;
   - Diphtheria antibody levels.
3. How would you approach the treatment of this patient?
   Treatment with antibiotics should be carried on for a total duration of 14 days and allowed for a complete recovery. Recommended treatment of

diphtheria includes thorough cleaning of the lesion, penicillin or macrolide therapy, and, in cases of toxigenic symptoms, antitoxin.

Case study No. 8.

1. What are the diagnosis and the differential diagnoses in this patient?
   "Acute Streptococcal follicular tonsillitis."
2. What is your approach to diagnosis and treatment?
   Throat culture is the standard test for the definitive diagnosis of bacterial tonsillitis; however, the delay in results (usually more than 48 hours) limits its usefulness as a first test.
   Rapid streptococcal antigen test: sensitivity is lower than with culture but it has the benefit of providing immediate results; this test should be ordered in children over 3 years old and adults with high probability of GABHS infection, as assessed by at least 3 Centor Criteria.
   Anti-streptolysin (ASO), anti-deoxyribonuclease B, or other streptococcal antibody titers (e.g., hyaluronidase, streptokinase, or nicotinic acid dehydrogenase) are measured. However, increase in them that could be used for diagnostic purposes occur after 2 or 3 weeks, which limits their usefulness.
   Serological testing for streptococci may be useful in suspected rheumatic fever.
   A full blood count may be helpful in patients with suspected infectious mononucleosis, in immunocompromised patients, and in patients with signs or symptoms of severe infection or sepsis. A raised WBC count with neutrophilia is suggestive of a bacterial infection, whereas an elevated WBC count with lymphocytosis and atypical lymphocytes is suggestive of infectious mononucleosis.
   Testing for reactive heterophile antibodies is also useful to rule out infectious mononucleosis and is indicated for patients with symptoms that persist, as well as for those with posterior (or anterior) cervical lymphadenopathy.
   Vaginal and cervical, or penile, and rectal cultures should be performed if there is reason to suspect a gonococcal throat infection, especially in sexually active adolescents, in particular those engaging in oral-genital sex.
   An HIV viral load assay is indicated for patients at risk of HIV infection who have persistent tonsillitis accompanied by severe constitutional symptoms.

Lateral cervical view X-ray exposed for soft tissue should be performed in patients whose condition does not improve, in those who present with severe symptoms and/or significant trismus, and in those with neck swelling.

In most cases, acute tonsillitis is a viral, self-limiting condition that requires only analgesic treatment: Paracetamol (acetaminophen) can be used for symptom relief.

Antibiotics have been found to confer relative benefits in the treatment of sore throat compared with placebo, but the absolute benefits are modest. The use of antibiotics results in reduction of the duration of symptoms by about 16 hours by the first week.

A Centor score ≥3 may be a decision rule for considering antibiotics, but these should be used with caution in low prevalence setting of GABHS pharyngitis, such as primary care.

Tonsillectomy may be considered for patients who have recurrent symptoms of tonsillitis that do not become less common with time and for whom there is no other explanation for the recurrent symptoms. In children, tonsillectomy can reduce days and number of episodes of sore throat in the first year. More benefit was reported in those children who were more severely affected. Tonsillectomy is also indicated in children with additional exacerbating factors such as obstructive sleep apnea; peritonsillar abscess; and periodic fever, aphthous stomatitis, pharyngitis, adenitis (PFAPA) syndrome.

Case study No. 9.

1. What is the provisional diagnosis? What are the differential diagnoses?
   "Acute tonsillitis complicated by bilateral peritonsillar abscess".
   Differential diagnosis may include the following:
   - Pharyngeal diphtheria;
   - Vincent and Ludwig angina;
   - Infectious mononucleosis;
   - Retropharyngeal abscess;
   - Epiglottitis, etc.
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Bacteriological method: cultures of the aspiration swab. Amoxicillin and clavulanic acid covers the group A β-hemolytic streptococcus, the most common offending organism; however, it was the drainage procedure that was also curative.

3. How would you approach the treatment of this patient?
   Treatment with combined needle aspiration and antibiotic therapy should be successful. The drug of choice is amoxicillin and clavulanic acid which covers the group A β-hemolytic streptococcus, the most common offending organism.
   Peritonsillar abscess is a specific deep-neck space infection. It is important to diagnose and treat peritonsillar abscess rapidly and adequately, partly to prevent respiratory obstruction, and partly to avoid perforation of the abscess into the parapharyngeal space with spread along the neck vessels to the mediastinum or skull base.
   Once an abscess has formed, antimicrobial therapy alone may be inadequate and surgical drainage may be necessary. Needle aspiration, incision and drainage, or quinsy tonsillectomy are considered acceptable for the surgical management of acute peritonsillar abscess.

Case study No. 10.

1. What is the provisional diagnosis? What are the differential diagnoses?
   "Fusospirochaetal tonsillitis (Plaut-Vincent's tonsillitis) and gingivitis complicated by Lemierre's syndrome and sepsis".
   Differential diagnosis may include the following:
   - Pharyngeal diphtheria;
   - Streptococcal tonsillitis;
   - Infectious mononucleosis;
   - Retropharyngeal abscess;
   - Epiglottitis, etc.
2. How would you confirm the diagnosis of the patient?
   Laboratory confirmation is obtained when *F. necrophorum* (anaerobic Gram-negative rods) grows in blood or fluid cultures.
3. How would you approach the treatment of this patient?
   The patient could be started on piperacillin-tazobactam and metronidazole. Anticoagulation should be held due to thrombocytopenia, and lack of thrombus extension.
   Treatment is directed at oral anaerobes. *Fusobacterium spp*. have 100% sensitivity to metronidazole, ticarcillin and clavulanate, cefoxitin, and imipenem and are resistant to gentamicin and quinolones. In addition, resistance rates to penicillins and macrolides are as high as 22% and 66%, respectively. Duration of treatment is not well established, ranging from 9 to 84 days depending on severity and patient response. Patients

are generally treated with IV antibiotics for 2 to 3 weeks until clinical improvement, followed by oral treatment to complete a 4- to 6-week course. Any parapharyngeal or peritonsillar abscess, empyema, septic arthritis, or other cavitation should be drained. Anticoagulation remains controversial in Lemierre's syndrome. Possible indications for anticoagulation include lack of improvement despite 48 to 72 hours of adequate antimicrobial therapy, concomitant thrombophilia, and advancement of the jugular vein thrombosis.

Case study No. 11.

1. What are the diagnosis and the differential diagnoses in this patient?
   "Infectious Mononucleosis, severe clinical course."
   Differential diagnosis may include the following:
   - Pharyngeal diphtheria;
   - Streptococcal tonsillitis;
   - Adenovirus infection;
   - Lymphoproliferative disease, etc.
2. What is your approach to diagnosis and treatment?
   - hospitalization;
   - chest X-ray;
   - abdominal ultrasound;
   - a peripheral blood WBC count;
   - routine blood assessment for albumin, blood glucose, total and direct bilirubin, serum alanine and aspartate aminotransferases, alkaline phosphatase, creatinine, urea, fibrinogen, etc.
   - urinalysis;
   - HIV testing, sickle cell screen, T-lymphocyte and cytokine profile testing;
   - thick and thin blood films for malaria parasites;
   - serologic tests (blood samples in a week after the beginning of the disease for ELISA with EBV and CMV antigens);
   - immunophenotyping of blood lymphocytes;
   - PCR assay.

   There's no specific therapy available to treat infectious mononucleosis. So, supportive treatment should be administered, including fluid intake, antipyretics, analgesics.

2.2. INFLUENZA AND ACUTE VIRAL RESPIRATORY INFECTIONS

Case study No. 1.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Influenzal acute upper respiratory infection".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   A nasopharyngeal swab should be taken, and a rapid test for Influenza should be performed. Rapid Influenza testing is based on BinaxNOW Influenza A & B, able to detect and differentiate Influenza A and B. The test is performed on freshly collected nasopharyngeal swab samples, immediately upon arrival to the laboratory.
   A RT-PCR test should also be performed.
3. How would you approach the treatment of this patient?
   The treatment with Oseltamivir (75-mg capsule BID for 5 days for adults, weight-based for children) or Zanamivir (5-mg inhalations BID for 5 days for adults and children older than 7-year-old) is usually administered to patients.
4. How would you approach the prevention and control of this disease?
   Influenza immunization is a main preventive measure. Chemoprophylaxis for contacts with Oseltamivir 75-mg capsule OD for 10 days for adults.

Case study No. 2.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Influenzal pneumonia".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   A nasopharyngeal swab should be taken, and a rapid test for Influenza should be performed. Rapid Influenza testing is based on BinaxNOW Influenza A & B, able to detect and differentiate Influenza A and B. The test is performed on freshly collected nasopharyngeal swab samples, immediately upon arrival to the laboratory.
   A RT-PCR test should also be performed.
   Additional methods as blood and sputum cultures are helpful for differential diagnosis.

3. How would you approach the treatment of this patient?
   The treatment with Oseltamivir (75-mg capsule BID for 5 days for adults, weight-based for children) or Zanamivir (5-mg inhalations BID for 5 days for adults and children older than 7-year-old) is usually administered to patients. If the secondary bacterial infection appears, the antimicrobial drugs should be prescribed.

Case study No. 3.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Influenzal acute meningoencephalitis".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   One day prior to admission, she saw a doctor and a nasal swab real-time reverse transcriptase-polymerase-chain-reaction (RT-PCR) test was positive for influenza A. The blood culture or other examinations to detect the coinfected pathogens were all negative.
3. How would you approach the treatment of this patient?
   The treatment with Oseltamivir (75-mg capsule BID for 5 days for adults, weight-based for children) or Zanamivir (5-mg inhalations BID for 5 days for adults and children older than 7-year-old) is usually administered to patients. Symptomatic treatment includes fluid intake, antipyretics, anticonvulsants, and osmotic diuretics.

Case study No. 4.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Avian Influenza A (H5N1), influenzal pneumonia of the left lung complicated by acute respiratory distress syndrome and respiratory failure due to avian highly pathogenic Influenza A (H5N1) strain".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   The recommended and definitive HPAI H5N1 diagnostic testing is by reverse transcription-polymerase chain reaction (RT-PCR) of respiratory specimens, including real-time or conventional RT-PCR, using H5-specific primers and probes. Oropharyngeal swabs have a higher diagnostic yield than other upper respiratory specimens.

RT-PCR assay of tracheal aspirate obtained on June 12 was positive for influenza A (H5N1) virus. The virus Shenzhen/406H/06 was successfully isolated from this tracheal specimen.

3. How would you approach the treatment of this patient?
   The patient should receive high-dose oxygen, antibiotics (according to sensitivity of Pseudomonas), and intubated mechanical ventilation. Oseltamivir is an antiviral drug which is prescribed 150 mg BID for 10 days. In the severe cases patients can be also treated with convalescent plasma obtained from a patient who recovered from H5N1 infection.
4. How would you approach the prevention and control of this disease?
   To prevent infection in humans, Oseltamivir usually used for chemoprophylaxis. Close observation and post-exposure Oseltamivir or Zanamivir chemoprophylaxis is recommended for healthcare workers after unprotected close exposure to a symptomatic, suspected, or confirmed HPAI H5N1 case (within 2 m) in the healthcare setting, as well as for household members and close contacts of a person with suspected or confirmed HPAI H5N1 virus infection.

Case study No. 5.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Parainfluenza, acute laryngotracheobronchitis".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   PIV can be diagnosed by culture, antigen detection, or nucleic acid testing. Swabs, aspirates and washes from the nasopharynx or oropharyngeal secretions are appropriate specimens for making a diagnosis, with paired oropharyngeal and nasopharyngeal samples associated with the highest sensitivity.
3. How would you approach the treatment of this patient?
   Presently there are no licensed antiviral agents for the treatment of PIV infection. Treatment is primarily symptomatic; aerosolized or systemic ribavirin in combination with IV gamma globulin was used in patients with severe pneumonia in small, uncontrolled series, and case reports. For children with croup, glucocorticoids, and nebulized epinephrine have been associated with improved clinical outcomes. Glucocorticoids, generally dexamethasone and budesonide, are associated with improvement.

Case study No. 6.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Respiratory syncytial virus type B, acute pneumonia, severe acute respiratory distress syndrome (ARDS)".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Potential cardiac dysfunction was ruled out using transthoracic echocardiography. Multiplex real-time reverse transcriptase-polymerase chain reaction (RT-PCR) was conducted using a respiratory virus real-time RT-PCR kit to detect respiratory viruses using tracheal aspirate. Results revealed positive for human respiratory syncytial virus type B.
   Definitive diagnosis of RSV can be confirmed by identification of typical plaque morphology with syncytium formation using immunofluorescent staining. However, this is time-consuming and costly. Nucleic acid detection using multiplex real-time RT-PCR test is used in clinical practice as it enables rapid detection with increased sensitivity.
3. How would you approach the treatment of this patient?
   He had to be intubated and mechanically ventilated due to worsening hypoxemia.
   Under the diagnosis of RSV-induced ARDS based on the Berlin definition, it should be started antiviral therapy of orally administered ribavirin 400 mg every 12 hours with concomitant IVly administered methylprednisolone 30 mg every 24 hours.

Case study No. 7.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Adenovirus infection with acute kerato-conjunctivitis, tonsillitis, complicated by encephalitis".
   This is patient with a transient encephalitis developing 2 weeks after adenovirus conjunctivitis.
   The presence of sub-epithelial corneal infiltrates in the context of acute conjunctivitis is virtually pathognomonic of adenoviral epidemic kerato-conjunctivitis. The transient encephalitis most likely localizes to the pons and cerebellum, with vertigo, nausea, and motion sickness suggesting vestibular system involvement, ocular flutter suggesting paramedian pontine reticular formation or cerebellar involvement, and ataxia suggesting vestibular and/or cerebellar involvement.

The abnormal CSF findings of two unmatched monoclonal bands, abnormal lymphocytes, and failure to demonstrate direct viral presence in the CSF raises the possibility of a post-infectious immune process mediating the transient encephalitic syndrome. Clinicians should be made aware of the possibility of a transient encephalitic illness following adenoviral conjunctivitis.

2. What are the laboratory tests to confirm the diagnosis of the patient?
   Adenovirus should be isolated from the conjunctiva and CSF by using multiplex real-time reverse transcription-polymerase chain reaction (RT-PCR).

Case study No. 8.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Human metapneumovirus infection with severe bilateral pneumonia complicated by acute respiratory distress syndrome".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   A nasopharyngeal swab is investigated by polymerase chain reaction (PCR) testing.
   MPV can be initially identified in cell culture; LLC-MK2 monkey kidney cells are commonly used for the growth of MPV, but viral cultures take up to 10 to 14 days and are, therefore, not useful clinically. MPV produces small round plaques with occasional syncytia and can take between 3 and 23 days to produce a cytopathic effect.
3. What is the therapy of this patient?
   No antiviral drug against MPV exists. Supplementary oxygen and assisted ventilation may be needed in the hospitalized setting. IV fluids can be used for hydration when vomiting and diarrhea occur or a patient is unable to tolerate oral hydration because of tachypnea or dyspnea.
   Bronchodilators and steroids may be used in the management of MPV contributing to asthma or chronic obstructive pulmonary disease exacerbations, and antibiotics may be needed in cases of bacterial superinfection, such as acute otitis media or suspected community-acquired bacterial pneumonia. In vitro data suggest that ribavirin and IV immunoglobulin inhibit MPV infection. Ribavirin has been found to decrease inflammation in a mouse model. Ribavirin and IV immunoglobulin have been used together to treat immunocompromised adults and children in isolated case reports.

4. How would you approach the prevention and control of this disease?
   Similar to other respiratory viruses, good hand hygiene and curtailing respiratory secretions are currently the only preventive measures. However, vaccine discovery efforts are underway. The fusion protein is immunogenic and highly conserved, making it an excellent target for vaccine research. Soluble fusion protein vaccines reduce viral titers in animal models, and vectored vaccines encoding the fusion protein are protective. Thus, cold-passaged MPV or recombinant viruses may prove to be a useful vaccine approach.
   Other strategies for prevention include the generation of monoclonal antibodies that could potentially be used as prophylaxis in high-risk populations.

Case study No. 9.

1. What is the clinical diagnosis? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Severe acute respiratory syndrome with severe pneumonia in the right lung complicated by acute respiratory distress syndrome".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Detecting SARS-CoV-specific RNA directly using an RT-PCR assay is the mainstay of laboratory diagnosis and should be ordered in all suspected cases immediately. Multiple specimen sources should be obtained. During the first week, nasopharyngeal, oropharyngeal, and serum/plasma specimens should be tested and following this, nasopharyngeal, oropharyngeal, and stool specimens should be sampled.
   Serological testing for SARS-CoV-specific antibodies. Tested using an immunofluorescent antibody assay (IFA) or enzyme-linked immunosorbent assay (ELISA).
   Viral culture is not recommended for routine detection. Given the potential risk of transmission, growth of the SARS-CoV virus should be restricted to biosafety level III (or IV) laboratories.
   Rapid immunoswab assay for SARS-CoV detection is an emerging diagnostic test. The key feature of this simple immunoswab diagnostic assay is its ability to detect the presence of the SARS-CoV antigen (nucleocapsid protein) within 45 to 60 minutes following availability of the body fluid samples.
3. What is the therapy for this patient?

This patient was treated presumptively for bacterial community-acquired pneumonia with conventional antimicrobials, without antiviral agents or corticosteroids.

During the global outbreak in 2003, treatment of SARS was empiric. Several groups have reported the use of ribavirin and corticosteroids with generally favorable outcomes.

4. How would you approach the prevention and control of this disease?

Healthcare workers entering the room should wear disposable gloves and N95 masks. The patient should be isolated in a private room until the day when his nasopharyngeal aspirate and urine samples were confirmed to be negative for SARS-CoV.

Primary prevention.

Implementation and maintenance of appropriate control measures on the handling and trading of wild animals offered for human consumption in food markets are critical in the primary prevention of SARS.

Secondary prevention.

As disease transmission appears to occur through close interactions with infected individuals, early recognition of new SARS cases is the cornerstone for preventing the spread of the disease. A high level of suspicion is required in the inter-epidemic period, especially when "unusual" cases of severe lower respiratory tract infection are identified.

Case study No. 10.

1. What is the clinical diagnosis?

"Middle East respiratory syndrome infection with severe bilateral pneumonia complicated by acute respiratory distress syndrome".

This is a case of a Qatari patient with a mild respiratory illness that became severe six days later with the development of bilateral pneumonia.

2. What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?

The Middle East respiratory syndrome (MERS) is an acute viral respiratory tract infection caused by the novel betacoronavirus Middle East respiratory syndrome coronavirus (MERS-CoV). It was first identified in Saudi Arabia in 2012. Cases have been limited to the Arabian Peninsula and its surrounding countries, and to travelers from the Middle East or their contacts. Since then, many cases and clusters have been reported with the majority of infections acquired in the Arabian Peninsula and its

surrounding countries, most commonly Saudi Arabia, the United Arab Emirates (UAE), Oman, Qatar, and Jordan.

The clinical spectrum of infection varies from no symptoms or mild respiratory symptoms to severe, rapidly progressive pneumonia, acute respiratory distress syndrome, septic shock, or multi-organ failure resulting in death.

MERS may present in a similar way to the common cold. The majority of patients present with fever and respiratory symptoms (e.g., cough, dyspnea).

- Fever (temperature >38.0 °C: common symptom reported in 40% to 98% of cases. Fever may be absent in older patients, immunocompromised patients, pregnant women, and patients with end-stage renal disease, diabetes mellitus, or haemochromatosis; therefore, absence of fever should not preclude work-up for MERS.
- Cough: common symptom reported in 54% to 86% of cases. It is usually dry; however, has been reported to be productive in 23% to 36% of patients.
- Dyspnea: common symptom reported in 60% to 72% of cases.
- Hemoptysis: less common symptom reported in 7% to 17% of cases.

Patients may also present with gastrointestinal symptoms:

- Diarrhea: reported in 7% to 26% of cases.
- Abdominal pain: reported in 17% to 24% of cases.
- Nausea/vomiting: reported in 7% to 21% of cases.

Patients may present with gastrointestinal symptoms only, going on to develop respiratory symptoms or pneumonia later in the course of infection. Other symptoms include myalgia, arthralgia, headache, chills/chills, sore throat, and rhinorrhea.

2.3. MENINGOCOCCAL DISEASE

Case study No. 1.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Severe meningococcal meningitis complicated by cerebral edema".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   CSF, blood, skin biopsies, nasopharyngeal swabs and aspirates are relevant specimens for the diagnosis of meningococcal disease. As meningococci are susceptible to desiccation and temperature extremes, collected specimens should be cultured as soon as possible.
   Direct detection of meningococcal capsular polysaccharides in CSF is performed by latex agglutination and coagulation tests with polyclonal antibodies for serogroups A, B, C, Y and W135.
   Blood and CSF samples could be tested for *N. meningitides* using real-time PCR assay.
3. What is the antimicrobial and emergency therapy of the patient?
   The patient should receive broad spectrum antibiotics such as IV ceftriaxone or Amoxicillin. He should be put on mechanical ventilation because of repeated seizures and should receive anticonvulsants. High-grade fever should be treated by IV antipyretics. Dexamethasone IV 1 mg 8 hourly should also be administered.
4. How would you approach to prevention of this disease?
   The patient should be placed under isolation and chemoprophylaxis with ciprofloxacin given to the close contacts of the patient.
   Effective vaccines are available for meningococcal serogroups A, C, Y and W135. Consequently, serogroup B, *N. meningitis* has become the major cause of bacterial meningitis especially in countries where vaccine for other serotypes has been introduced. Vaccine against serogroup B strains for global use has been challenge. This is due to frequent antigenic variations among this serogroup. Antigenic mimicry of serogroup B polysaccharide with human neurologic tissues is also a problem. Vaccines based on other bacterial cell components have shown poor protective immune response in children under 24 months of age.

Case study No. 2.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Acute severe meningococcemia complicated by purpura fulminans, septic shock with multiple organ dysfunctions: disseminated intravascular coagulation, renal failure, encephalopathy, and myocarditis".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Cerebrospinal fluid, blood, skin biopsies, nasopharyngeal swabs and aspirates are relevant specimens for the diagnosis of meningococcal disease. As meningococci are susceptible to desiccation and temperature extremes, collected specimens should be cultured as soon as possible.
   Direct detection of meningococcal capsular polysaccharides in CSF is performed by latex agglutination and coagulation tests with polyclonal antibodies for serogroups A, B, C, Y and W135.
   Blood and CSF samples could be tested for N. meningitides by Real-time PCR assay.
3. What is the antimicrobial and emergency therapy of the patient?
   The patient should receive broad spectrum antibiotics such as IV cefotaxime 250 mg/kg/day. In addition, he should receive oxygen delivery, IV dobutamine 10 μg/kg/min for hypotension, systemic and local vasodilators (Iloprost, Trinitrine), antipyretics.
4. How would you approach to prevention of this disease?
   The patient should be placed under isolation and chemoprophylaxis with ciprofloxacin given to the close contacts of the patient. Meningococcal carriage screening of the patient and the parents did not yield any positive results.
   Effective vaccines are available for meningococcal serogroups A, C, Y and W135.

Case study No. 3.

1. What is the clinical diagnosis? What are the differential diagnoses?
   "Meningococcal disease with pneumonitis of the right lower lobe."
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Sputum culture was found to be positive for oropharyngeal *Candida* species. However, a day later, *N. meningitides* grew in one blood culture bottle, and it was sensitive to penicillin and ceftriaxone. Using polymerase chain reaction (PCR), we can identify a serogroup of *N. meningitidis*.

3. How would you approach to treatment and prevention of the disease?
   The patient can be started at 2 g of IV ceftriaxone and 100 mg of doxycycline according to the hospital guidelines for the management of community-acquired pneumonia. However, doxycycline should be discontinued after getting the blood culture result.
   Early antibiotic treatment is the most effective therapy in meningococcal disease. Prior to 1990, majority of cases were treated with penicillin. However, after 1990, cephalosporins were used due to the emergence of penicillin-resistant strains and high lethality of untreated meningococcal disease (16%). No definite guidelines exist with regard to glucocorticoid administration in meningococcal pneumonia and it is generally not recommended.
   Chemoprophylaxis is recommended for household or close contact exposure, those exposed to patients' oral secretions, and day-care contacts, with single dose fluoroquinolones such as ciprofloxacin or ofloxacin, or a single dose of azithromycin.
   Currently, the US Center for Disease Control and Prevention recommends vaccination for *N. meningitidis* only in patients with complement deficiencies: damaged spleen or splenectomy, HIV, taking eculizumab, traveling or living in countries where the disease is common, microbiologists routinely exposed to *N. meningitidis*, military recruits, not up to date with this vaccine, and first-year college residents living in dorms or residence halls. No recommendations currently exist with regard to vaccinating the elderly or those who have been in close contact with affected individuals.

Case study No. 4.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Acute severe meningococcemia complicated by purpura fulminans, necrosis, and septic shock".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   CSF, blood, skin biopsies, nasopharyngeal swabs and aspirates are relevant specimens for the diagnosis of meningococcal disease. As meningococci are susceptible to desiccation and temperature extremes, collected specimens should be cultured as soon as possible.

Direct detection of meningococcal capsular polysaccharides in CSF is performed by latex agglutination and coagulation tests with polyclonal antibodies for serogroups A, B, C, Y and W135.

Blood and CSF samples could be tested for *N. meningitides* by real-time PCR assay.

3. What is the antimicrobial and emergency therapy of the patient?

Diagnostic procedures should never delay the initiation of antibiotics. Penicillin G, ampicillin, 3rd generation cephalosporins, and chloramphenicol are acceptable choices. However, due to resistance, chloramphenicol is only used as empiric therapy in endemic areas. At the emergency department he received intubation, vasopressors, and continuous renal replacement therapy.

Case study No. 5.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?

"Acute meningococcal pharyngitis, tonsillitis complicated by moderate severity of meningococcemia".

2. What are the laboratory tests to confirm the diagnosis of the patient?

Cerebrospinal fluid, blood, skin biopsies, nasopharyngeal swabs and aspirates are relevant specimens for the diagnosis of meningococcal disease. As meningococci are susceptible to desiccation and temperature extremes, collected specimens should be cultured as soon as possible.

Direct detection of meningococcal capsular polysaccharides in CSF is performed by latex agglutination and coagulation tests with polyclonal antibodies for serogroups A, B, C, Y and W135.

Blood and CSF samples could be tested for *N. meningitides* by real-time PCR assay.

PCR is much more sensitive than blood culture, has a specificity of around 99% and can be completed in a fraction of the time.

3. How would you approach the antimicrobial therapy and prevention of this disease?

Penicillin G, ampicillin, 3rd generation cephalosporins, and chloramphenicol are acceptable choices. The patients with documented allergies to penicillins could be treated by IV macrolides.

The patient should be isolated and chemoprophylaxis with ciprofloxacin given to the close contacts of the patient. Meningococcal carriage screening of the patient and the parents did not yield any positive results.

Effective vaccines are available for meningococcal serogroups A, C, Y and W135.

Case study No. 6.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Acute severe meningococcemia complicated by severe septic shock and Waterhouse-Friderichsen syndrome".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   CSF, blood, skin biopsies, nasopharyngeal swabs and aspirates are relevant specimens for the diagnosis of meningococcal disease. As meningococci are susceptible to desiccation and temperature extremes, collected specimens should be cultured as soon as possible.
   Blood and CSF samples could be tested for *N. meningitides* by real-time PCR assay.
3. What is the antimicrobial and emergency therapy of the patient?
   Neisseria meningitidis is susceptible to penicillins or cephalosporins, e.g., ceftriaxone 2 grams every 12 hours and then later switched to cefotaxime 2 grams every 6 hours to avoid potential hepatic toxicity. High dose steroids were carefully tapered off and the patient displayed no signs of Waterhouse-Friderichsen syndrome. Eculizumab dosing was continued at her normal dosing interval. IV antibiotics were continued for a total of 14 days, after which she began taking penicillin-VK 250 mg orally BID to be continued indefinitely for *Neisseria meningitidis* prophylaxis.
4. How would you approach to prevention of this disease?
   The patient should be isoldated and chemoprophylaxis with ciprofloxacin given to the close contacts of the patient. Meningococcal carriage screening of the patient and the parents did not yield any positive results. Effective vaccines are available for meningococcal serogroups A, C, Y and W135.

Case study No. 7.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Acute severe meningococcemia caused by *Neisseria meningitidis* complicated by severe myopericarditis".

This case highlights the following:

- Patients with MenW infection may present to clinicians in atypical ways.
- Myopericarditis can rarely be a dominant feature of MenW sepsis.
- Cardiac MRI may provide important diagnostic information in cases of MenW infection.
- The early recognition and susceptibility testing of MenW infections are essential to avoid inappropriate antibiotic use and treatment failure.
- The epidemiology of meningococcal infections is changing as a result of changes to the vaccine composition and availability.

2. What are the laboratory tests to confirm the diagnosis of the patient?
   Blood cultures grew Gram-negative diplococci suspected as *Neisseria meningitides*. The isolate could be sent to the reference laboratory for serogroup identifying.
3. What is the antimicrobial and emergency therapy of the patient?
   Penicillin G, ampicillin, 3rd generation cephalosporins, and chloramphenicol are acceptable choices. The patients with documented allergies to penicillins could be treated by IV macrolides. For instance, parental ceftriaxone (dose adjusted to 2 g daily when susceptibility results were available) could be given.

Case study No. 8.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Acute severe meningococcemia caused by *Neisseria meningitidis* B serogroup complicated by severe septic shock, Waterhouse-Friderichsen syndrome (bilateral adrenal hemorrhage), disseminated intravascular coagulopathy, purpura fulminans with fatal outcome".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Blood cultures grew Gram-negative diplococci identified as *Neisseria meningitides*. The clinical diagnosis of meningococcal meningitis relies on the recognition of fever, rash, meningeal signs, and altered mental status, and is confirmed by pleocytosis and Gram stain with or without a culture of CSF, blood or skin lesions. Meningococcal meningitis causes a polymorphonuclear leukocytosis in the CSF, which can be evaluated using a lumbar puncture. Early diagnosis of meningococcemia can be challenging because the petechial rash may not be present initially. In meningococcemia, Gram-stain results of the CSF test are often negative.

Blood cultures should be obtained before antibiotic therapy is started, if possible, to aid in the diagnosis.

3. What is the antimicrobial and emergency management of the patient? How would you approach to control the disease?

Because of her hemodynamic instability, rash, and hyposplenism, *Neisseria meningitidis* was suspected. The patient was subsequently placed in isolation and started on a broad-spectrum antibiotic treatment with vancomycin and ceftriaxone. The patient should be intubated and started on bilevel mechanical ventilatory support. Large-volume crystalloid infusion and vasopressor support with norepinephrine and vasopressin should have begun to maintain end-organ perfusion.

Components of therapy include antibiotic therapy, ventilatory support, inotropic support, and IV fluids. Corticosteroids should be administered because adrenal hemorrhage and subsequent adrenal insufficiency are common in these patients. In addition, corticosteroids have potent anti-inflammatory effects and have been widely used in patients suspected to have bacterial meningitis. Central venous access is often required and aids in the administration of volume expanders and inotropic drugs. If DIC is present, fresh frozen plasma may be indicated. The use of activated protein C has been approved by the Food and Drug Administration in the treatment of severe sepsis. It is a regulator of coagulation, fibrinolysis, and inflammation and has been found to reduce 28-day all-cause mortality in severe sepsis.

All close contacts and medical personnel should be given prophylactic ciprofloxacin per Center for Disease Control recommendations. Spread of meningococci occurs through close contact with respiratory secretions, which creates the potential for outbreaks and increases risks to medical staff. Early suspicion, with respiratory isolation for 24 hours after the start of treatment, is essential for the protection of all staff. This is paramount and should be done prior to confirmation of infection. Prophylactic antibiotics are recommended for all persons with greater than 8 hours of contact in close proximity (3 feet) of the patient or those who had direct exposure to the patient's oral secretions (face-to-face contact, mouth-to-mouth resuscitation, management of an endotracheal tube, or kissing) within 1 week before the onset of the patient's symptoms until 24 hours after appropriate antimicrobial therapy has been initiated. Chemoprophylaxis can be initiated with rifampin 600 mg BID for 2 days, 1 dose of oral ciprofloxacin 500 mg, or 1 intramuscular injection

of ceftriaxone 250 mg. Chemoprophylaxis is intended to eradicate any potential colonization by *N. meningitides*.

Case study No. 9.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Chronic meningococcemia (without meningitis) with polyarthritis".
2. What are the laboratory tests to confirm the diagnosis of the patient?
   Blood cultures collected two days before in the ER were positive and Gram-negative diplococci were isolated in both samples. The diagnosis is confirmed by the presence of *N. meningitidis* in blood cultures, which is often difficult to obtain and may require multiple samples, since bacteremia is thought to be present only intermittently.
3. What is the antimicrobial therapy of the patient?
4. Penicillin G, ampicillin, 3rd generation cephalosporins, and chloramphenicol are acceptable choices. The patients with documented allergies to penicillins could be treated by IV macrolides.

Case study No. 10.

1. What is the clinical diagnosis of this patient? What are the main clinical and epidemiological clues that allowed you to suspect the diagnosis?
   "Primary meningococcal septic arthritis".
   Primary arthritis due to *Neisseria meningitidis* is rare. Serotypes B, C, D, and W135 are well known to account for major infections. Nevertheless, more frequent serotypes are B, C, and Y. Although immunodeficiency could be a risk factor for *Neisseria meningitidis* infection, most cases present in immunocompetent patients as does our case.
2. What are the laboratory tests to confirm the diagnosis of the patient?
   CSF, blood, skin biopsies, nasopharyngeal swabs and aspirates are relevant specimens for the diagnosis of meningococcal disease. As meningococci are susceptible to desiccation and temperature extremes, collected specimens should be cultured as soon as possible.
   Blood and CSF samples could be tested for *N. meningitides* by real-time PCR assay.
3. What is the antimicrobial therapy of the patient?
   Standard septic arthritis treatment nowadays is arthroscopy lavage and antibiotics. The elected antibiotics depend on local epidemiology, cul-

tures, and patient characteristics. The use of drains is disputable. Little evidence is published about corticoids used in the adult population for septic arthritis treatment. A recent meta-analysis performed by Farrow shows the consistent positive effect when dexamethasone is added to antibiotics treatment. It can usually be used IV ceftriaxone 2 g BID and prednisone from 20 mg to 60 mg/day. Nevertheless, the data is insufficient to make a recommendation. In this case, corticoids were not used, but it was a treatment option that arose when CPR was raised in the second week of treatment, but it was discarded because there was no record in the literature for use in meningococcus knee infection.

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COLLECTION OF CASE STUDIES

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