Gastrointestinal Anthrax: A Case and Review of Literature

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ABSTRACT

Anthrax which is caused by Bacillus anthracis is typically a disease of herbivores. Spores existing in the skin, meat, hair or mouth and nose of animals are transmitted to humans through contact with a break in the skin, consumption of infected meat or inhalation of spores [1]. Infected uncooked or insufficiently cooked meats cause oropharyngeal and gastrointestinal system (GIS) anthrax. When this infected materials swallowed anthrax spores may cause lesions from the oral cavity to the caecum. The diagnosis of gastrointestinal system (GIS) anthrax is difficult due to insidious clinical progression of the disease and difficulty in the isolation of agent pathogen. Related symptoms of GIS anthrax are sore throat, neck swelling, difficulty swallowing, stomach pain, anoreksia, bloody diarrhea, nausea, bloody vomiting and fever. Supportive and antibiotic treatments are required. Benzylpenicillin, rifampicin, clindamycin, chloramphenicol, imipenem/cilastatin, or vancomycin can be used for treatment, ciprofloxacin or doxycycline may be added to this treatment for serious cases. To emphasize the necessity of taking precautions, an oropharyngeal and intestinal anthrax case due to consumption of infected and insufficiently cooked meat is presented below.

Keywords: Bacillus anthracis; Oropharyngeal Disease; Gastrointestinal System; Anthrax; Consumption of Infected Meat

1. Case

Forty-two year-old female patient, presenting with swelling which initiated on the right side of the neck and spread all around the neck and chest, difficulty in swallowing and breathing, chills and fever symptoms, referred to the emergency department and hospitalized for evaluation.

Detailed history of the patient revealed that she lived in the countryside, dealt with livestock farming and two days before the swelling appeared, she cooked and ate the meat of an animal which was designated as ill by veterinarian surgeon.

In the initial examination, general status is regarded as intermediate, axillary temperature 37.8°C, heart beat 76/min and arterial blood pressure was measured as 110/60 mmHg. Painless oedema was observed all over the neck, being more prominent on the right side and also on the upper 1/3 region of the chest. During palpation, a number of lymph nodes were detected but the dimension of lymphadenopathy (LAP) could not be determined because of oedema. In the pharyngeal examination, a mass resembling an abscess with darker color in the center and entirely covering the posterior wall of the pharynx was observed (Figure 1(a)).

The findings of the initial laboratory evaluation of the patient are as follows: in whole blood cell count, white blood cells (WBC) 13,300/mm³ with differential count of polymorphonuclear WBC (PNL) 86%, lymphocytes 7.4%, monocytes 6.6%; hemoglobin 11.5 gr/dL, hematocrit 34.9%; platelet count 144,000/mm³; red blood cell (RBC) sedimentation rate (ESR) 13 mm/hr; C-reactive protein (CRP) 24 mg/L. Transaminase values were detected as AST 32 IU/L and ALT 12 IU/L, urea as 67 mg/dL, creatinine as 1.3 mg/dL; the other biochemical and urine analysis values were found to be within normal limits.

Emergency neck computerized tomography showed a lobulated mass compatible with abscess, with approximate dimensions of 3 × 2.5 × 4 cm according to peripheral and internal septal contrast and constricting the trachea. Multiple LAPs with conglomerated appearance and largest with a dimension of 3.2 cm were detected in the right submandibular, sublingual and cervical regions. On the right side of the neck, subdermal soft tissue with oedematous appearance was observed (Figure 2(a)). The details of the radiologic findings of this case were described previously [2].

Two blood cultures and culture from the wound were performed. Bacillus anthracis was grown in the pharyngeal culture of the patient. The patient was pre-diagnosed

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as having oropharyngeal anthrax and placed on a daily treatment of intravenous 24 million units penicillin G (6 × 4 million units) and 500 mg levofloxacin. Due to dispnea, dexametason 8 mg i.v. and cold steam were added to treatment.

On the second day of hospitalization, oedema on the neck and chest started to recover and ecchymosis developed in the same region (Figure 1(e)). Airway passage was evaluated on a daily basis. Passage was observed to be relieved in due course.

On the 4th day of treatment, general status of the patient was good and passage improved considerably. Repeat whole blood cell count results were as follows: white blood cells 9200/mm³; hemoglobin 11.0 gr/dL, hematocrit 32.6%; platelet count 187.300/mm³; ESR 12 mm/hr.

Observations of day 6 were significant recovery of the abscess and improvement in respiration; the only symptom observed was dysphagia (Figure 1(b)). Unfortunately, even though the patient was advised not to touch the abscess, her husband informed healthcare personnel that she popped up the abscess with her finger. Upon interview of the patient, she admitted that she popped up the abscess with her finger and swallowed the draining fluid.

On the 8th day of treatment, the patient presented with bloody defecation 4 times in a day; following findings were observed at this stage: axillary temperature 37.0°C, heart rate 105 /min, arterial blood pressure 130/80 mmHg, pallor of skin and sclera, abdominal distention, diminishing intestinal tones, voluntary resistance and tenderness upon palpation. Melena was observed in rectal touch examination. Following findings were determined in the laboratory evaluation: in whole blood cell count, white blood cell count results were as follows: white blood cells 9200/mm³; hemoglobin 11.0 gr/dL, hematocrit 32.6%; platelet count 187.300/mm³; ESR 12 mm/hr.

Blood transfusion, fresh frozen plasma, platelet suspension and albumin replacement were administered to the patient whose hemoglobin, hematocrit and platelet values decreased continuously. Unfortunately, deterioration of general status persisted. Following bleeding symptoms, a septic state developed with signs of tachycardia, hypotension and tachypnea. Bacillus anthracis grew on two concurrent blood cultures (Figure 1(d)). Patient deceased on the 17th day of penicillin G and levofloxacin treatment.

2. Discussion

Bacillus anthracis is a Gram (+), spore-forming, encapsulated and non-motile bacteria. Spores may be located centrally or paracentrally and do not cause dilatation in the bacteria dimensions [1-4].

Around 90% - 95% of anthrax infections are cutaneous infections due to easy transmission. Transmission by inhalation causes pulmonary anthrax and oral transmission leads to gastrointestinal anthrax. Rate of sepsis following internal organ anthrax infections is extremely high. Gastrointestinal anthrax frequently causes multiple and superficial ulcers all along gastrointestinal tract starting from oral cavity to caecum; in some cases, ulcers may also be seen in the colon. Massive and fatal bleeding is seen in serious cases of ulcerative lesions [1-4].

When Bacillus anthracis spores are ingested orally, they attach to the epithelial cells of tonsilla and M cells over the payer plaques of small intestine. Live bacteria releases a toxin while it reproduces. The disease presents a wide spectrum of states ranging from subclinical infection to death.

The exact infectious dose in humans is not known but for oral anthrax, the determined minimal infectious dose (Mid50) 50 mg is approximately 10¹¹ spores [5].

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Clinical findings in oropharyngeal anthrax includes fever, inflammatory lesions in the oral cavity or oropharynx, oedema and lymphadenopathy in the neck; the mortality rate of the disease is high [1]. Oropharyngeal anthrax should be differentiated from diptheria, complicated tonsillitis, streptococcal pharyngitis, vincent angina, ludwing

Figure 1. (a) Abscess of anthrax oroferangeal; (b) The observed bleeding after anthrax abscess decrease; (c) Were reduced after drenation abscess oroferangeal of anthrax; (d) Gram stained preparations of the *Bacillus anthracis* in the blood culture

Figure 2. (a) In contrast CT: cervical region and in multiple necrotic LAPs in that are contrast. Right to be more specific with soft tissue edema in the air passages provided in the plan from the recession is being monitored; (b) The common areas in the region prevertebral cervical fluid (hemorrhagic exudative) increase.
angina, parapharyngeal abscess and deep neck abscess [6].

Ulcerative lesions of gastrointestinal (GIS) anthrax are usually more than one and superficial. Lesions located in gastrum, oesophagus and jejunum may cause fatal massive bleeding. In addition, these lesions may lead to obstruction [7-10], perforation or various combinations of these complications. GIS anthrax may cause ascites. In some cases, dehydration from the vascular compartment may cause shock and fatality [10-15].

Intestinal anthrax presents with three clinical phases:

Phase I: includes fainting, asthenia, mild fever and headache. Patients are rarely treated at this stage because of few symptoms. In a small number of patients, rash on the face or redness of the conjunctiva may be seen.

Phase II: starts in 24 hours and abdominal pain is added to symptoms. Abdominal pain, which is initially mild, intensifies and adopts a continuous course. Mild fever, nausea and vomiting is seen frequently; diarrhea, if present, is mild. On physical examination, mass and abdominal distension is detected in right lower quadrant and periumblical area.

Phase III: there is a persistent and rapidly intensifying abdominal pain and in most cases, GIS bleeding develops. In patients where laparotomy is performed, abundant and viscous, yellow fluid, hypertrophic mesenteric lymph nodes especially in the ileocaecal area (3 - 5 cm) and oedema in some parts of the small intestine, caekum and ascending colon is observed. In case of failure on surgical removal of the diseased part, a transient recovery is seen. In these patients, ascites develops again and most of the patients are lost, due to shock states [16].

During surgery and in autopsy series, small red nodules (0.5 - 1 cm) with surrounded necrotic centers (2 - 3 cm) are seen in hemorrhagic areas surrounded by oedema in the intestinal wall [17].

GIS anthrax should be differentiated from causes leading to early acute abdominal syndrome as well as Clostridium perfringens which causes necrotizing enteritis and other bacterial or parasite agents which lead to bloody diarrhea.

There are few literature review and case reports. Most of the this case reports and related articles about GIS anthrax says that, this disease is very dangerous and its mortality rates 25% - 60%. Death due to GIS anthrax is reported to occur in 2 - 5 days [2,7,8,19-21].

In our case, the patient presented with oropharyngeal anthrax. We suspected oropharyngeal anthrax with patient’s epidemiological history. Then we recieved blood and wound cultures and B. anthracis investigated at this cultures. Computerized tomography (CT) used for diagnosis and oropharyngeal abscess detected at CT images. On the 6th day of treatment, her general status improved and the abscess in the pharynx showed considerable decrease. The patient drained the abscess with her own finger and consequently caused GIS anthrax. Since the patient presented with dysphagia, it was not possible to give oral contrast material and therefore, abdominal computerized tomography with contrast material could not be performed; as a result, it could not be confirmed whether she had or did not have GIS anthrax initially. Nevertheless, absence of abdominal pain, diarrhea and vomiting in the beginning, improvement of general status in 7 days and her own statement on draining the abscess with her finger and swallowing the fluid lead us to conclude that GIS anthrax developed later on.

In Turkey, anthrax is reported to show an endemic course with 96.9% of the cases presenting with cutaneous anthrax [18-21]. In an investigation, oropharyngeal anthrax is seen in 7 cases and intestinal anthrax is diagnosed in 1 case [19]. In Turkey, no resistance was observed against penicillin G for Bacillus anthracis; therefore, penicillin G is the treatment of choice as an effective agent. It has been reported that aminoglycoside, together with penicillin G is more effective in oropharyngeal or intestinal anthrax [18-21]. In our case, aminoglycoside was not preferred as an adjunctive antimicrobial because creatinine levels of the patient were high (creatinine: 1.3 - 1.5 mg/dL). Even though the usual treatment period is indicated as 10 - 14 days, due to insufficient improvement in our patient, treatment was not terminated.

In conclusion, due to the high mortality rates of GIS anthrax must be prevented. In countries which are endemic anthrax areas, carving and eating the meat of sick animals should absolutely be prevented plus people should be informed and warned to take precautions about the disease. Besides, in cases of oropharyngeal abscesses, anthrax should be considered and a careful patient history should be taken, laboratories should be warned under suspicious conditions and necessary evaluations should be performed. We should approach oropharyngeal anthrax cases carefully, taking into account intestinal anthrax cases.

REFERENCES


