ELEVEN-YEAR-OLD-GIRL WITH MEMBRANOUS SORE THROAT

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ABSTRACT

Diphtheria is caused by Corynebacterium diphtheriae primarily affecting mucous membrane of upper airways. Global incidence of diphtheria has reduced due to worldwide immunization programs. Yet cases of diphtheria are reported across the world because of poor vaccine coverage, large population and low socio economic status. We report here a case of diphtheria in an 11-year-old girl who presented with fever, sore throat, difficulty in swallowing and hoarseness of voice for 3 days. Hematological analysis showed neutrophil leukocytosis with normal lymphocytes, CRP was raised, cardiac profile, renal function test, hepatic functions and chest x-ray were normal. Microscopy of throat swab revealed rods containing metachromatic granules on Albert stain. Intramuscular penicillin was started and diphtheria antioxin was administered. The child recovered uneventfully and was kept on follow up.

Keywords: Bull neck, Chinese letter appearance, Corynebacterium diphtheriae.

INTRODUCTION

Diphtheria though a preventable disease is still a major cause of morbidity and mortality in children among developing countries[1]. The organism is transmitted by airborne respiratory droplets; thus the disease is prevalent in congested areas associated with poor hygiene. The signs and symptoms of diphtheria are fever, sore throat, pseudo membrane, muffled voice and bull neck[2]. Diagnosis is primarily clinical, however visualization of C. Diphtheria on microscopy, cultures and positive toxin assay on Elek test are required for definitive diagnosis. Antitoxin is the mainstay of the treatment and its dose ranges from 20,000 to 120,000 units depending upon clinical state of the patient. Antibiotics like penicillin or erythromycin are given to eradicate the bacteria, halt toxin production and prevent disease transmission[3]. Patients are placed on respiratory droplet precautions, patency of airway are assessed by physician frequently. Serial cardiac monitoring and neurological status is assessed. Cultures are done at admission and they are repeated after completion of therapy. Immunization for Diphtheria is advised at the end of therapy. Treatment of contacts includes Erythromycin for 7 to 10 days with prior cultures and vaccination irrespective of past immunization status[3]. Complications due to diphtheria include respiratory failure, myocarditis, neurotoxicity and renal failure[4].

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CASE REPORT

An 11 year old girl was transferred from CMH Kharian to MH Rawalpindi in Oct 2012, with three days history of continuous high-grade fever of sudden onset not relieved by any medication (not associated with rigors or chills), severe sore throat rendering her unable to eat, drink and a change in character of voice. She also developed gradual neck swelling along with nausea, headache and malaise from second day of illness. She was taken to CMH Kharian. Where her condition further deteriorated despite of adequate management as she was unable to speak and neck swelling further progressed. Clinical diagnosis of diphtheria was made, intravenous penicillin was started and she was transferred to MH Rawalpindi due to unavailability of diphtheria antitoxin. On arrival to MH Rawalpindi, a detailed history was taken with special emphasis on immunization history, and any contact with infectious disease in school. She was vaccinated as per expanded program on imunization(EPI).

Detailed examination revealed an 11-year-old well-nourished, sick looking girl, oriented in time place and person, lying on bed with obvious respiratory distress. Anterior cervical lymph nodes were diffusely enlarged and tender. Her voice was soft and muffled at the moment. Yet she was unable to take liquid diet.

She had tachycardia, tachypenia, low grade fever and normal blood pressure. Both her height and body mass index for age were at 50th centile. Rest of the general physical examination was unremarkable.

She was irritable, had marked stridor with swelling of neck, breathing difficulty with suprasternal and sub costal recessions along with drooling of saliva. She was admitted to Pediatric ICU. Her vital signs and oxygen saturation was closely monitored. After initial stabilization her throat was examined in controlled settings while keeping ventilatory support standby. It showed marked congestion and a grey white membrane covering tonsils and posterior pharyngeal wall was noticed as shown in picture 1 & 2. Movement of soft palate was bilaterally equal. And there were no haemorrhagic spots. Conjunctiva and skin was not affected. Pupillary light reflex was equally present on both sides. Cervical lymph nodes were markedly enlarged and tender leading to diffuse swelling of neck conventionally called BULL NECK and breathing difficulty. Immediate ENT consultation was requested. Throat swab containing portion of membrane and blood was sent for culture and sensitivity along with other investigations.

Systemic examination revealed that her breath sounds were harsh vesicular, vocal resonance was equal on both sides and there were no adventitious sounds. Abdomen was soft with no hepatosplenomegaly. Her precordium was normal with regular apex beat and no clinical evidence of congestive cardiac failure. Central nervous system examination showed no focal neurological deficit or altered sensorium and intact cranial nerves.

Haemotological analysis revealed haemoglobin 10.4 g/dl (Ref Range 12.0 – 15 g/dl), a white blood count of 22x109/l (normal value 4-10 x109/l) and a platelet count 107 x109/l. Neutrophils were elevated to 76% (40 - 70%). Lymphocytes were normal and no atypical lymphocytes were found. C-Reactive protein was raised 18 mg/l (Ref Range < 6 mg/L). Cardiac profile showed CK 22 ng/ml (Ref range 0-120 ng/ml) and CK-MB 2 ng/ml (Ref range 0-3 ng/ml). Liver Function Tests and Renal Profile were normal with serum total bilirubin 7µmol/L (Ref range 0-17 µmol/L), serum ALT 16 U/L (Ref range 0-35 U/L), serum ALP 138 U/L (Ref range 65-106 U/L), and serum urea 3 mmol/L (Ref range 0-17 mmol/L), serum creatinine 52 µmol/L (Ref range 0-35 µmol/L), serum sodium 142 mmol/L (Ref range 65-106 mmol/L), serum potassium 4.4 mmol/L (Ref range 3.5-5.5 mmol/L) and there was no Oliguria or protienuria. ECG was advised and showed sinus rhythm, normal axis with no arrhythmia or atrioventricular block. Echocardiography revealed structurally and functionally normal heart. On chest x-ray lung fields and heart size were normal. Microbiologist was notified about suspicion of diagnosis. Chinese letter appearance was seen on gram staining. While on Albert stain club shaped rods containing metachromatic granules were found.

Treatment with barrier nursing techniques along with strict bed rest was started. Efforts were made to procure diphtheria anti toxin from WHO representative and 40,000 units were transfused over 2 hours upon availability on the same day. All contacts including healthcare workers and family members were given prophylactic Erythromycin with prior throat cultures of family members. Family members were also vaccinated against diphtheria with Td (tetanus-diphtheria vaccine). Continuous cardiac monitoring was done for early detection of myocarditis. Repeat cultures were performed on 24 and 48 hours after admission which were found negative later on. On 8th day of admission she was transferred back to referring hospital with the follow up advice to monitor cardiac activity for 2 weeks. Neurological assessment was advised for 3 months. Follow up cultures and vaccination was advised after completion of antibiotic therapy. Case was also notified to WHO health authorities in Pakistan. Patient was followed for three months and throat examination showed that diphtheritic membrane and congestion has resolved and patient developed none of the complications i.e. myocarditis or neuropathy.

CASE DISCUSSION

Diphtheria is caused by Corynebacterium diphtheriae having four subtypes, Gravis being more toxic, in settings of incomplete or absent immunization, low socio economic status, and overcrowding or immunocompromised host. Corynebacterium Ulceran, hemo-liticum and pseudotuberculosis can also cause similar symptoms but they are rare. First described by Hippocrates in 5th century diphtheria is a Greek word meaning leather or hide. In 1826 the disease was given its official name "diphtherite" by a French physician Pierre Bretonneau and in 1890 diphtheria antitoxin was prepared by Von Behring who won Nobel Prize in 1901 for his work on diphtheria[5]. In the developed countries the incidence of diphtheria has decreased over the last 50 years but still it is public health issue in the developing world[1]. In the United States about 1.25 millions cases were reported annually and it was a leading cause of death in Canada in early 19th century[3]. In Pakistan the incidence of diphtheria has reduced drastically from 1980 (14,328 cases) to 2012 (98 cases)[6].

The diagnosis of respiratory tract diphtheria should be considered in patients presenting with low grade fever, cervical lymphadenopathy, muffled voice, pseudu-membrane formation on tonsils and pharyngeal mucosa, general malaise, headache and sore throat[3]. Complications like neuropathy, respiratory, renal failure and myocarditis are directly proportional to severity of the local infection. The most serious complications occur with cardiac involvement which includes arrhythmia, myocardial dysfunction and complete heart block. Mortality approaches up to 70% in diphtheria myocarditis[4]. Most of these complications are caused by diphtheria toxin which is a Polypeptide Exotoxin that enters the cell, inactivates Elongation Factor-2 and inhibits protein synthesis causing local tissue necrosis[3]. In this patient all the clinical features of respiratory tract diphtheria were present along with pseudo membrane formation however no complications occurred which might be due prompt diagnosis and treatment. Presumptive diagnosis of diphtheria can be made on clinical suspicion and finding of gram positive rods on microscopy of throat swab. In patient with diphtheria there is leukocytosis

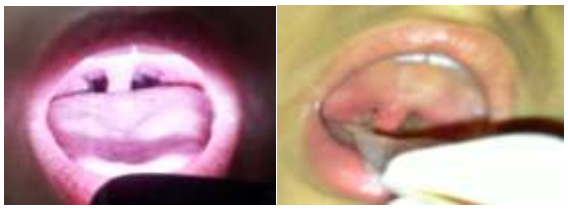

Figure-1&2: Diphtheritic membrane present on tonsillar membrane and posterior pharyngeal membrane.

with neutrophilia and the C- reactive protein may be raised[7]. In this patient total leukocyte count was raised and metachromatic granules were detected on Albert stain along with raised C-reactive protein thus fulfilling the criteria of presumptive diagnosis.

Mainstay of treatment in diphtheria is administration of diphtheria anti toxin. Dose of anti toxin ranges from 20,000 to 120,000 units depending upon clinical state, site and size of membrane and administered on clinical diagnosis. Antibiotics halt the toxin production and prevent disease transmission. Either Penicillin or Erythromycin is given for 14 days. Respiratory droplet precautions and patency of airway is assessed by physician himself repeatedly. Tracheostomy may be required to prevent airway obstruction. Serial monitoring of cardiac activity is advised for three weeks. Neurological status is assessed upto three months. Cultures are done at the start of treatment, after 24 and 48 hour of admission two cultures are repeated after completion of 2 weeks therapy at least 24 hours apart. Immunization against Diphtheria is advised at the end of antibiotic therapy as disease itself does not confer immunity. Treatment of contacts is done with erythromycin for 7 to 10 days with prior cultures and vaccination is offered irrespective of past immunization status[3]. We treated this patient with benzath in penicillin 8 lac units 6 hourly given by intramuscular route. Diphtheria anti toxin was given in dose of 40,000 units intravenously over 30 minutes after test dose. Patient was also given antipyretics and intravenous fluids for maintaining of hydration. To this treatment

regimen the patient responded promptly and recovered without any complications.

Diphtheria is an infectious disease with high mortality and morbidity. Therefore, any child presenting with membranous sore throat, must be evaluated for diphtheria. Timely intervention and treatment of patient as well as contacts can save life and prevent complications. We need to boost up immunization coverage to > 90% for effective control of the disease.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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