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CASE REPORT

Diphtheria Resurgence: Where did We fail?

S Chandrakala, S Vinayababu, Philip John Kottaram, Khaji Mohammed Tanveer

ABSTRACT

Objective: This report aims at highlighting the persistence of diphtheria in India and the need for better vaccine coverage of both primary as well as booster doses and accessibility of anti-diphtheric serum (ADS) at all tertiary medical centers.

Case report: An 11-year-old girl, previously unimmunized against diphtheria, presented with history of fever, cough, difficulty in swallowing and change in voice within 1 week duration. Examination revealed bilaterally enlarged tonsils with a grayish white patch over them. A provisional diagnosis of faucial diphtheria and the patient was started on antibiotics.

Next day, child developed respiratory distress and generalized swelling over the neck. An emergency tracheotomy was performed, and shifted to a center where ADS was available. She received 5 doses of ADS but succumbed to myocarditis 5 days later. Membranous patches removed from the trachea were positive for *Corynebacterium diphtheriae* and the diagnosis was confirmed by culture.

Conclusion: Vaccination coverage for both primary as well as boosters should be improved, so as to reach coverage advocated by WHO. All tertiary hospitals should have ADS. Health care personal should be sensitized to maintain a high degree of suspicion when presented with a patch over the tonsil.

Keywords: Diptheria, Antidiptheric serum, *Corynebacterium diphtheriae*.

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INTRODUCTION

Diphtheria is a highly contagious, potentially life-threatening, vaccine preventable disease caused by *Corynebacterium diphtheria*. In 2008, India contributed to 86.66% of the global burden of diphtheria. The annual incidence of diphtheria in India has increased in 2011 when compared with the previous years, probably due to a drop in diphtheria vaccine coverage.

This report aims at highlighting, firstly the persistence of diphtheria in India, the need for better vaccine coverage of both primary and booster doses to maintain adequate herd immunity and accessibility of ADS at all tertiary medical centers for early and effective management of the cases.

CASE REPORT

An 11 years old muslim girl, a resident of Bangarpet in Kolar district, partially immunized, and treated by a general practitioner for a 6 days, presented to the otorhinolaryngology outpatient Department of RL Jalappa Hospital, with history of moderate grade fever, persistant cough, progressive dysphagia and hoarseness of same duration. There was no history of nasal regurgitation, dyspnea, stridor or epistaxis.

On examination, her vital parameters were within normal limits and she was afebrile. ENT examination revealed bilaterally enlarged tonsils with a grayish white patch over them. This membranous patch extended to the posterior pharyngeal wall as well (Fig. 1). The membrane was tough, leathery and bled on an attempted removal. Bilateral non-tender cervical lymphadenopathy was present. Ear, nose and other systemic examination showed no abnormality.

Patient was provisionally diagnosed as a case of faucial diphtheria and started on injectable crystalline penicillin and metronidazole. This was supplemented with analgesics and throat gargles. Initial throat swab was negative for *Corynebacterium diphtheriae* on Gram stain and Albert's stain.

The course of disease was dramatic with sudden increase in the size of bilateral cervical lymph nodes causing diffuse swelling of the neck and respiratory distress within a 24 hours period. An emergency tracheostomy was performed during which membranous patches were found within the trachea (Fig. 2). The diagnosis was confirmed by staining the membrane removed from the trachea which showed *Corynebacterium diphtheriae* (Fig. 3). It could also be cultured on blood agar and Tellurite medium (Fig. 4). Since, there was no ADS available at our center the child was immediately shifted to a pediatric nodal center where the serum (ADS) was available and patient received 5 doses of the same. On follow-up it was found that patient died secondary to myocarditis, probably due to a delay in receiving ADS.

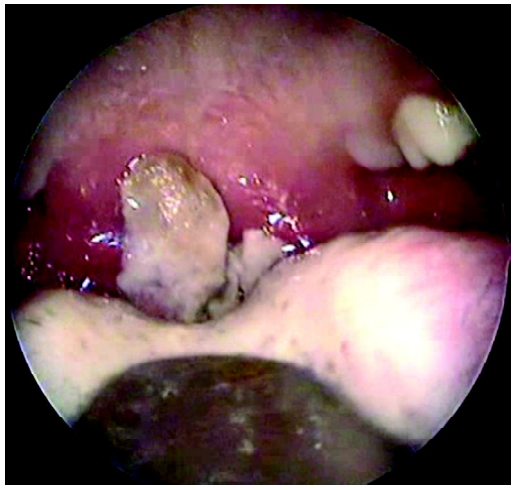

Fig. 1: Telescopic view of the membrane

Diphtheria being a notifiable disease, its incidence was informed to District Health Officer (DHO) for vaccinating or administrating antibiotic prophylaxis to all contacts.

DISCUSSION AND REVIEW OF LITERATURE

Diphtheria is caused by toxin-producing *C. diphtheriae*, *C. ulcerans*, and *C. pseudotuberculosis*. The best known and most widely studied species is *C. diphtheriae*, which accounts for the majority of cases. The disease has an incubation period of 3 to 4 days, following which the patient presents with symptoms, such as sore throat with varied degree of respiratory embarrassment and dysphagia, leading to misdiagnosis of a simple acute upper respiratory tract infection. On clinical examination patient can have, moderate grade fever (often <38 °C) and an adherent grayish white membrane on the tonsils, pharynx and/or nasal cavity. The severity of the disease is assessed based on the degree of obstruction of the upper respiratory tract caused by the membrane. It can also cause systemic manifestations due to dissemination of the toxin leading to myocarditis, polyneuritis, etc.

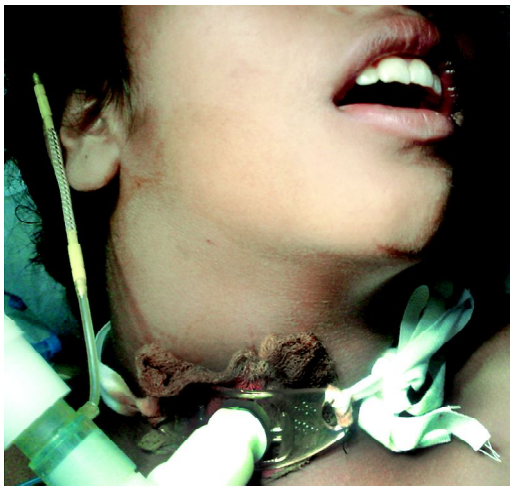

Fig. 2: Tracheostomized child with bull neck appearance

Diphtheria still persists in India in spite of the universal immunization program calling for introspection into the program implementation and its outreach. The data on vaccine preventable diseases indicate persistence of diphtheria without much decline over past 15 year. It shows 5,125 reported cases of diphtheria in the year 2000 and 3,485 in 2011 indicating marginal decline in total number of cases.[1] India has the highest incidence of diphtheria in the world and the figures are 17 times higher than the second highest country, Indonesia with just 183 reported cases.[2] Universal immunization program implemented in India (1985) conforms to WHO recommendation, that all newborn infants be administered five doses of diphtheria toxoid containing vaccine. The first 3 doses are to be administered at 6, 10 and 14 weeks of age followed by fourth at 16 to 24 months, and the last dose at 5 to 6 years.[1] In spite of best efforts to implement the UIP, there have been sporadic cases of diphtheria reported from various corners from time to time. The vaccine efficacy ranges from 95 to 98% for 3 doses and 90 to 99.9% for 5 doses.[3,4] India's official estimate for vaccination coverage shows 90% for DTP1 and 85% for DTP3. According to WHO-UNICEF, coverage estimates the figures are still lower with 83 and 72% respectively, indicating need for improving vaccine coverage.[1] Outbreaks have also been reported in various corners, Dhule (Maharashtra state)–2005, Hyderabad (Andhra Pradesh state) 2005, Borboruah block, Dibrugarh district (Assam state)–2009, Panipat (Haryana state)–September 10, 2012.

Incidence was found to be higher among unimmunized or partially immunized, however, an increasing incidence was also found among females and members belonging to muslim community.[5,6] There is a need to study whether these increasing incidences are a mere coincidence or attributable

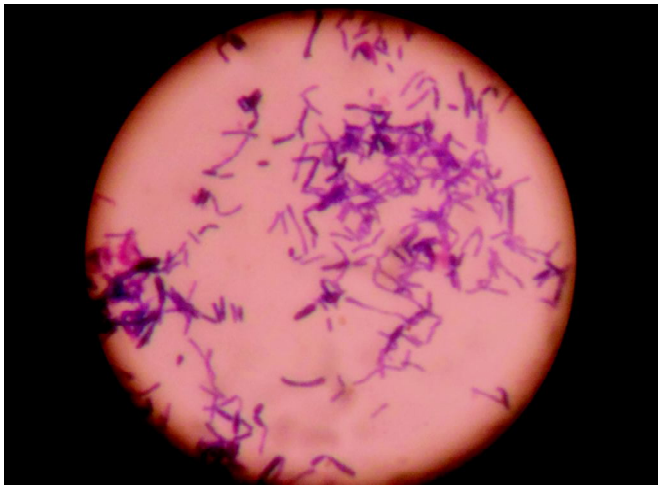

Fig. 3: Albert stain showing Chinese letter pattern

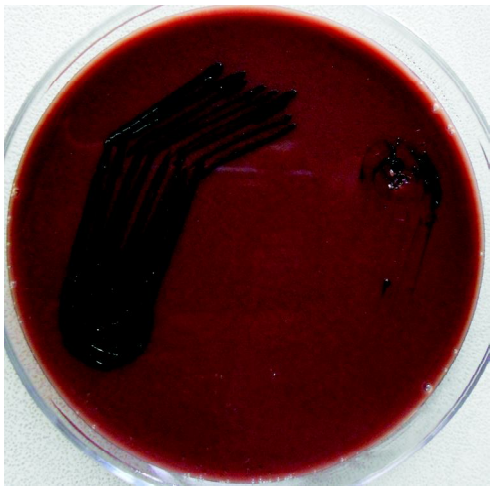

Fig. 4: Growth on tellurite medium

to any cause, such as social or religious customs, educational status, etc, in order to bring about remedial measures. Disease which was common among, under 5 years in the past is now affecting older children (5-19 years) and adults. The re-emergence of diphtheria especially among older children is observed to be due to weaning of vaccine induced immunity in the absence of routine adult revaccination.[7] Similar factors was observed in our case. Patient was 11 years old adolescent female and belonged to muslim community and she was unimmunized.

Treatment involves administration of ADS and antibiotics. Early administration of ADS is essential to neutralize the circulating toxins in the blood. The tissue bound antitoxin are however not affected by the ADS. Any delay in administering ADS directly affects the mortality. The delay in treatment could be due to either a delay in seeking medical care or a delay in referral by primary health care personnel owing to the similarity of symptoms with an URI. Lack of availability of ADS at tertiary care setting leads to an increase in vaccine preventable deaths. Reports on case fatality shows 32 to 56.3% over different centers in North India, and 13.2% in South India.[8,9] Higher case fatality is attributed to non-availability of ADS at many centers in India and in Russia.[9,10] In this case there was a delay of 6 days between onset of symptoms and presenting to our center, and a further delay of 1 days for reaching a center with availability of ADS. There was a delay of 7 days by the time she received ADS.

Population in general should be educated regarding the need for complete immunization and to seek early medical care in an instance of a persisting sore throat. All health care personnel should be sensitized to a possibility of such infections, though rare when presenting with atypical symptoms or not responding to conventional treatment modality and for an early referral of these patients to higher centers.

CONCLUSION

- Vaccination coverage both primary as well as boosters should be improved, so as to reach coverage as advocated by WHO.
- All tertiary hospitals should have access to ADS.
- Health care personal should maintain a high degree of suspicion when presented with a patch over the tonsil.

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