

# A Child with Complicated Diphtheria in this Vaccine Era: A Case Report

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## Abstract

Diphtheria is a disease of the respiratory tract caused by *Corynebacterium diphtheriae* with characteristic tonsillar membrane formation and bull neck. Its associated complications include acute kidney injury, cardiomyopathy, polyneuropathy, and respiratory failure. Mortality is due to respiratory and cardiac compromise. In recent times, the re-emergence of diphtheria is being reported in India despite the widespread immunization coverage. Here, we report a case of diphtheria in a 12-year-old boy confirmed with a positive throat swab culture. He presented with clinical features of bull neck, subcutaneous emphysema, toxic cardiomyopathy, polyneuropathy with palatal palsy, and acute kidney injury. He was treated with antibiotics and diphtheria antitoxin (DAT) and recovered over a period of 4 weeks.

**Key words:** *Corynebacterium*, Diphtheria, Palatal palsy, Polyneuropathy, Subcutaneous emphysema, Toxic cardiomyopathy

## INTRODUCTION

In the pre-vaccination era, diphtheria was a leading cause of childhood mortality.<sup>1,2</sup> In developing countries, although the incidence has drastically declined, it still accounts for 80-90% of global burden. Disease in these countries affects both children and young adults.<sup>2</sup> Diphtheria, meaning leather hide in Greek, is an acute toxin-mediated disease caused by *Corynebacterium diphtheriae* and rarely by toxic strains of *Corynebacterium ulcerans*. The bacterium was first noted by Klebs, cultivated by Loeffler and hence called “Klebs-Loeffler bacilli.” Toxin absorption will lead to cardiomyopathy, demyelination and acute kidney injury. The aim of this report is to emphasize the importance of booster doses of immunization.

## CASE REPORT

A 12-year-old male child admitted with swelling over the neck and difficulty in swallowing for 15 days, followed by nasal regurgitation of feeds and drooling of saliva. The child was immunized up to 1 and 1/2 years of age as per the Universal Immunization Programme (UIP). Child was not immunized after that. On admission, child was drowsy, febrile, severely dehydrated had dyspnoea, tachypnoea, tachycardia and subcutaneous emphysema extending to arms and the upper chest. Child had a symmetric weakness with absent reflexes of the lower limbs and palatal palsy. The child also had elevated renal parameters suggestive of acute kidney injury and also features of toxic cardiomyopathy with high troponin levels, PR prolongation and nonspecific ST changes with global hypokinesia. A provisional diagnosis of diphtheria was made based on clinical features, and throat swab was sent for culture. Throat swab showed the growth of *Corynebacterium*. Child's treatment included dehydration correction with fluid boluses, diphtheria antitoxin 1 lakh units intravenous (IV), injection Clindamycin (IV), and oral erythromycin. With above measures, renal parameters normalized, troponin levels decreased, and palatal palsy

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recovered. Repeat throat swab culture was negative. Child started taking orally well without regurgitation and was able to walk without support by 4 weeks of treatment. He was discharged with a booster dose of Tdap (tetanus, diphtheria, acellular pertussis).

## DISCUSSION

*C. diphtheriae*, an exclusive inhabitant of mucous membrane and skin, spreads mainly by airborne respiratory droplets. Incubation period is 2-5 days. Its major virulence lies in its ability to produce potent polypeptide exotoxin which inhibits protein synthesis. The presence of tonsillar pseudomembrane which bleeds on removal is a characteristic finding in diphtheria. The local manifestations are due to the inflammatory reaction of the pathogen *per se*. Toxin absorption leads to systemic effects such as acute kidney injury, cardiomyopathy, demyelination of nerves, and palatal palsy.

Gram staining shows multiple club-shaped bacilli resembling Chinese letters. Use of selective medium like Tinsdale/cysteine tellurite blood agar is recommended. Specific antitoxin is the mainstay of treatment. Antitoxin is administered in a single empirical dose of 20,000-100,000 units based on the degree of toxicity, site, size of membrane, and duration of illness. IVIG (IV immune globulin) is not usually recommended because of inadequate antibodies against diphtheria. *C. diphtheriae* is usually susceptible to antibiotics such as penicillin, erythromycin, clindamycin, rifampicin, and tetracycline.

Primary immunization consists of three doses of DPT (diphtheria, pertussis, tetanus) given at 6, 10, and

14 weeks of age. Booster doses are at 15-18 months and 5 years of age. After primary immunization 94-100% of infants develop protective antibody titers. Disease in the previously immunized individuals is milder and less likely to be fatal.

## CONCLUSION

In India, with the advent of Expanded Programme of Immunisation (EPI) in 1978 and Universal Immunisation Programme (UIP) in 1985, most of the vaccine preventable diseases have shown a decline but diphtheria is still endemic in our country.<sup>3</sup> The recent resurgence of diphtheria is noted in southern parts of India, reasons being poor vaccination services, overcrowding, increase in migrant population and low awareness among parents. The case fatality rate ranged from 3% to 23%.<sup>4</sup> Case fatality rate is high in children <5 years. A minimum immunization coverage of 90% in children and 75% in adults is required to prevent spread of diphtheria.<sup>5</sup> Emphasis should be made on primary immunization along with booster doses every 10 years for diphtheria.

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