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A RARE CASE OF MEASLES WITH SUPERIMPOSED INFECTION OF DIPHTHERIA- A CASE REPORT

Clinical Microbiology

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ABSTRACT

Measles and diphtheria are vaccine-preventable diseases that rarely coexist but can cause severe morbidity in unimmunized children. Globally measles causes ~11 million cases annually while diphtheria contributes several thousand cases with a higher burden in India. We report a rare pediatrics co-infection with microbiological confirmation highlighting persistent immunization gaps and the importance of early diagnosis and targeted therapy.

KEYWORDS

Diphtheria, Measles, Co-infection, Vaccine Preventable Diseases, Kleb's Loffler Bacilli,.

INTRODUCTION

Measles is a highly contagious *Morbillivirus* infection[1,2] and diphtheria is a toxin-mediated disease caused by *Corynebacterium diphtheriae*, predominantly affect the paediatrics population.[3] Although typically occurring independently their coexistence is rare. We report an unusual case of measles with superimposed diphtheria confirmed by clinical and microbiological evaluation.

Case Report

A 3-year-old unvaccinated male child from rural Ajmer was admitted with a 7–8 days history of fever followed by a centrifugal maculopapular rash appearing on day four of illness. This was associated with oral ulcers, dysphagia, dyspepsia, progressive dyspnoea, and aphonia. Subsequently the child developed coryza, non-exudative cough, and conjunctival congestion, suggestive of the classical measles triad.

On examination the patient was febrile with pallor, inspiratory stridor, and wheezing. Cervical lymphadenopathy was noted initially unilateral and later becoming bilateral. Oropharyngeal examination revealed congested tonsils with bilateral greyish-white pseudomembranous exudates. In view of respiratory distress the child was isolated and shifted to the paediatric intensive care unit where positive pressure ventilator support was initiated and the patient was started on – injections amoxyclave, amikacin, metronidazole, tab erythromycin along with antitoxin and vitamin A.

Based on clinical findings a provisional diagnosis of measles with superimposed diphtheria was made. Two throat swab specimens were sent to the Department of Microbiology for confirmation of *Corynebacterium diphtheriae,* one was proceed for direct microscopy and other for culture. Laboratory diagnosis was established using gram staining, Albert staining, culture on Loffler's serum slope and blood agar and relevant biochemical tests. Smears prepared from different segments of the Loffler's slope after incubation were stained by Albert–Laybourn method while culture isolates were further characterized by colony morphology and biochemical reactions.

Microbiological confirmation of diphtheria prompted targeted therapy following which the patient showed significant clinical improvement and was successfully weaned off ventilator support within 48 hours. During the patients follow-up the prognosis was good. .

The throat swab was evaluated for *Corynebacterium diphtheriae* showed:

Gram stain revealed pleomorphic, slender, non-sporing, non-capsulated Gram-positive bacilli in characteristic V- and L-shaped (cuneiform) arrangements. On Loffler's serum slope- dull, granular, greyish-white colonies with irregular margins were observed, while blood agar showed small, smooth, non-hemolytic grey colonies. Albert staining demonstrated club-shaped green bacilli in Chinese-letter arrangement with prominent metachromatic granules. The isolate was urease positive and fermented glucose and maltose.

Hence presence of *Corynebacterium diphtheriae* was confirmed in throat swab and patient also had clinical presentation with membranous pharyngitis, fever and neck swelling which is a classic finding for clinical diphtheria case. Owing to lack of resources, analysis for toxin production could not be performed.

Figure 1:Showing centrifugal maculopapular rash

Figure 2: Metachromatic granules in Albert staining

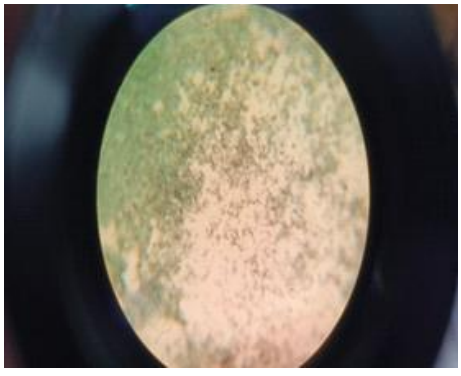
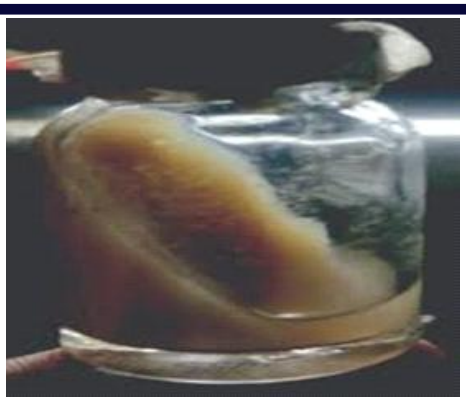


Figure 3: Loffler's serum slope showing- dull, granular, greyish-white colonies



DISCUSSION

Historically diphtheria has been recognized as a significant cause of morbidity and mortality among children particularly in the pre-vaccination era when a substantial proportion of cases occurred in individuals below 15 years of age. The introduction of the Expanded Programme on Immunization (EPI) in 1978 followed by the Universal Immunization Programme (UIP) in 1985 led to a marked decline in vaccine-preventable diseases (VPDs). Nevertheless diphtheria continues to remain endemic in India indicating persistent gaps in immunization coverage and public health implementation.[5,6]

To the best of our knowledge the present case represents one of the few recent reports from this region demonstrating microbiologically confirmed diphtheria superimposed on measles infection. Previous studies by Singh et al. (2013) from the Kumaun region of Uttarakhand documented multiple clinically suspected cases of diphtheria; however none could be confirmed microbiologically as both smear and culture findings were negative.[7] This highlights the ongoing diagnostic challenges associated with diphtheria particularly in resource-constrained settings.[4,7]

In contrast the current case achieved definitive microbiological confirmation alongside clinical diagnosis underscoring the importance of integrating classical microbiological techniques with clinical evaluation. Similar observations have been reported by Ray et al. who emphasized the low rates of laboratory confirmation and advocated for greater reliance on clinical diagnosis in endemic areas.[5,8]

The unimmunized status of the child in this case further emphasizes the critical role of immunization in disease prevention. Epidemiological studies including those by Nandi et al. and Saikia et al. have demonstrated a shifting age distribution of diphtheria cases towards older children likely attributable to waning immunity and inadequate booster dose coverage.[10,11] Seroepidemiological data from various regions also suggest increasing susceptibility among adults due to lack of booster immunization and declining natural immunity.[12]

Additionally studies such as that by Walekhwa et al. have shown an increased risk of measles in children above five years of age potentially due to waning maternal antibodies thereby reinforcing the importance of booster immunization strategies such as the measles–rubella vaccination campaigns.[14] The coexistence of susceptible populations including unimmunized children and inadequately immunized adults creates a conducive environment for outbreaks of both measles and diphtheria.[9,13]

Socio-demographic factors may also play a contributory role. Although no direct association with socio-economic status was evident in the present case parental education appeared to influence health-seeking behaviour and immunization uptake. This underscores the importance of health education and awareness in improving vaccination coverage although existing literature on this aspect remains limited.[15]

Furthermore partial or no immunization against measles and diphtheria along with missed Vitamin A supplementation were significant contributing factors in this case. Similar findings have been reported in recent studies including those from Mumbai[16] and other regions which highlight suboptimal immunization coverage as a key risk factor for the persistence of VPDs.[14-17]

Overall this case underscores the continued burden of vaccine-preventable diseases in endemic settings and highlights the urgent need for strengthening routine immunization programs ensuring booster dose compliance and enhancing public health awareness to prevent such potentially life-threatening co-infections.

CONCLUSION

Persistent gaps in immunization awareness necessitate sustained health education. Early diagnosis is key to reducing co-infection morbidity and mortality. This case highlights the value of classical microbiology, the critical role of vaccination and the need for strengthened policies to achieve disease elimination.

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