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Sporadic Emergence of Probable Cases of Diphtheria

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Abstract

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Background: Vaccine preventable diseases still account for a large proportion of childhood morbidity and mortality in children less than five of age. The decline in immunization coverage over the years has worsened this resulting in the re-emergence of hitherto controlled infections such as diphtheria.

Objective: To review the presentation, management and outcome of cases of probable diphtheria seen at the children emergency centre at the Lagos University Teaching Hospital.

Methods: The hospital records of all cases of suspected diphtheria admitted from September 2007 to September 2008 were reviewed retrospectively. The biodata, presenting complaints, duration of complaints, immunization status, management and outcome were analyzed.

Results: Five cases of probable diphtheria were admitted during the study period. Two of the children died, two survived and one absconded. Three of the children had three doses each of diphtheria, pertussis and tetanus (DPT) toxoid immunization but none had the 18-month booster dose. Diphtheria specific antitoxin was not available for use in the management of any of the cases neither was bacteriological confirmation possible.

Conclusion: Efforts to increase immunization coverage rates should be intensified and a policy to include an 18-month booster dose as part of the routine immunization in the National Programme on Immunization may be beneficial. It is recommended that diphtheria specific antitoxin be made available in the country in the event of cases with similar presentation.

Key words: Sporadic, diphtheria, toxoid, booster dose, antitoxin.

Introduction

VACCINE preventable diseases are among the major causes of morbidity and mortality in children less than five years of age, accounting for about 25 percent of the 10 million deaths occurring annually worldwide among children in this age group.[1] The increased immunization coverage rates achieved in the early 1990s have however continued to suffer setbacks over the years, resulting in a decline in national immunization coverage rates.[2]

Diphtheria is one of the vaccine preventable diseases and is caused by *Corynebacteria diphtheriae*. The organism produces a toxin which is responsible for most of the symptoms and signs of the disease. The most common and severe form of the disease is the pharyngeal disease. Non-toxigenic strains cause cutaneous disease which is usually mild. The spread of the disease is primarily by contact with airborne respiratory droplets, and direct contact with respiratory secretions of symptomatic individuals or with exudates from infected skin lesions. A dense necrotic coagulum of organisms, epithelial cells, fibrin, leucocytes and erythrocytes forms within the first few days of the respiratory tract infection and this becomes a gray-brown adherent pseudo-membrane. Removal is difficult and usually reveals a bleeding and oedematous submucosa. Paralysis of the palate and hypopharynx is an early local effect of the toxin. Absorption of the toxin can lead to necrosis of the kidney tubules, thrombocytopenia, cardiomyopathy and demyelination of nerves. The pathophysiological mechanism of the latter two conditions may be immunologically mediated in

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some patients since they occur 2-10 weeks after the mucocutaneous infection. Prognosis depends on the virulence of the organism, the age and immunization status of the patient, site of involvement and timeliness of the administration of the antitoxin.[3]

Clinical description of diphtheria is that of an upper-respiratory tract illness characterized by sore throat, low-grade fever, and an adherent membrane of the tonsil(s), pharynx, and/or nose. Criteria for laboratory diagnosis include the isolation of *Corynebacterium diphtheriae* from a clinical specimen or histopathological diagnosis of diphtheria.[4] From the public health aspect, diphtheria cases can be classified as probable or confirmed. A probable case is a clinically compatible case that is not laboratory confirmed and is not epidemiologically linked to a laboratory-confirmed case, while a confirmed case is a clinically compatible case that is either laboratory confirmed or epidemiologically linked to a laboratory-confirmed case.[4]

The aim of this communication is to review the presentation, management and outcome of a series of cases of probable diphtheria seen over a short period at the children emergency centre of the Lagos University Teaching Hospital with a view to drawing attention to the possibility of sporadic cases of diphtheria and the epidemiological implications.

Patients and Methods

The hospital records of all children admitted into the children emergency centre of the Lagos University Teaching Hospital with a clinical diagnosis of diphtheria from September 2007 to September 2008 were reviewed retrospectively. The biodata, presenting complaints and duration of complaints were noted. The immunization status, management and outcome were also recorded and analyzed.

Results

During the period, five cases of probable diphtheria were seen out of a total number of six thousand and twenty children who presented at the centre. They were aged between five and 10 years. The records of only four cases were available for review while that of the fifth patient who absconded, could not be traced. The immunization status, clinical parameters and outcome of the patients are shown in Table I.

All the four patients had probable diphtheria as they all had fever, sore throat and an adherent gray pharyngeal membrane but *Corynebacterium diphtheriae* was not isolated from any of the patients, while histopathology was not done in any of the cases neither were they linked epidemiologically to laboratory-confirmed cases. All of them had pharyngeal disease characterized by fever, sore throat, pharyngeal membrane and bull's neck. Two patients died – one did not receive any immunization in infancy except for two doses of oral polio on National Immunization days (and the mother thought he was fully immunized), while the other received the three primary doses of DPT in infancy. The former died within 24 hours of admission and the latter, four days after admission in the intensive care unit where she was intubated and ventilated. At postmortem, evidence of aspiration pneumonitis was

Table I

Immunization Status, Clinical Parameters and Outcome in Children with suspected Diphtheria

Age (yrs)	*Sex*	*Immunization status (No of DPT doses)*	*Duration of Symptoms (days)*	*Main Presenting Features*	*Outcome/ Complications*
5	MF	0	4	Fever, lower jaw and neck swellings, pain on swallowing and pharyngeal membrane at post mortem	Died Aspiration found
7	F	3	3	Fever, pain on swallowing, neck swelling and pharyngeal membrane	Died. Subtotal lung collapse found at utopsy)
7	F	3	4	Fever, neck swelling, pain on swallowing and pharyngeal membrane	Alive. Palatal paralysis which resolved.
10	F	0	3	Fever, bilateral jaw and neck swellings, inability to swallow, dyspnoea and	Alive. Myocarditis and congestive heart failure (resolved)

found in the patient who died within 24 hours of admission while subtotal lung collapse was found in the patient who had endotracheal intubation and ventilatory support.

One of the two survivors developed myocarditis characterized by heart failure and low voltage seen on electrocardiographic tracings, while the other survivor had paralysis of the soft palate characterized by difficulty in swallowing and nasal speech which resolved over a six-month period. These two patients are still being followed at the outpatient clinic of the hospital and are both doing well.

None of the children received booster doses of DPT and none was given diphtheria antitoxin as this was not available and could not immediately be sourced from outside the country to be beneficial to them. Bacteriological confirmation was also marred by lack of facilities at the time. All the patients were from overcrowded environments and low socioeconomic status families.

Discussion

These cases suggest a re-emergence of this potentially fatal disease and this may be due to a number of factors that include a decline in our routine immunization coverage, lack of education of the public on the fact that the national immunization days (NIDS) do not replace the routine immunization schedule. In this connection, it is instructive that one of the patients that died had only two doses of oral polio vaccine during the NIDS, whereas the mother believed that her child was fully immunized. None of the children in the series had a booster dose of DPT vaccine. The three doses of DPT received in infancy did not have any effect on mortality in this series; this may be due to waning immunity as the two children who had three doses of DPT in infancy were over five years of age and both had no booster doses. Booster doses have been shown to protect against diphtheria. Bisgard *et al* [5] reported that in children aged 3-5 years, cases of diphtheria were 4.3 times more likely to occur in those who received only three doses of DPT compared to controls who received four doses (95% CI:1.5-12.1; p=0.006) and also in children aged 6-14 years, the odds ratio for the development of diphtheria was 2.0 (95% CI: 1.3-3.1; p= 0.002) in those who received three doses of DPT compared to controls who received four doses.

The administration of diphtheria specific antitoxin is the mainstay of therapy and this should be administered on the basis of clinical diagnosis because it neutralizes only free toxin and its efficacy diminishes with elapsing time after the onset of mucocutaneous symptoms. Early commencement of antibiotics also results in the eradication of the organism. Supportive care to ensure adequate respiration (proper nursing care, tracheostomy or endotracheal intubation) and normal cardiac function are also essential.

All the four cases fulfilled the clinical case description of probable diphtheria but none were confirmed and this could be attributed to the non-availability of the specific media (tellurite agar),[6] and relevant histopathology studies at the time of diagnosis. The membrane was not seen at autopsy in the two cases that died, a situation that could have been due to the possibility that such membrane might have been dislodged by the endotracheal tube or during suctioning and attempted resuscitation.

Other conditions such as Ludwig's angina could also present with bull neck but this is commoner in adults and is usually not associated with a grey pharyngeal membrane. Peritonsillar abscess could also present with cervical lymphadenopathy but this is not as marked as in diphtheria and does not present with a pharyngeal membrane. Patients with epiglottitis also present with sore throat and fever but they tend to drool saliva and have no typical pharyngeal membrane.

Prevention is still the best approach to the management of diphtheria and adequate childhood immunization remains the method of choice. Efforts should be made to increase routine immunization coverage rates in the country. The 18-month booster dose using DPT and the five-year or preschool booster dose using the diphtheria and tetanus vaccine (DT) to avoid the possible risk of encephalitis often blamed on the pertussis component of DPT), should also be included as part of the routine immunizations in the National Immunization Programme as this confers longer immunity than the three doses currently in the schedule.[7,8] All the four patients in this study were aged between five and 10 years, two of them received the three DPT doses in infancy and only one of these two survived.

It is also important that methods of identification and confirmation of suspected cases be strengthened in our health care facilities. This will help in reporting identified cases as this can be a pointer to the efficacy of our immunization programme. Diphtheria is however currently not on the priority list of diseases for integrated disease surveillance and response for Nigeria[9] and this suggests, howbeit falsely, that this potentially fatal condition is no longer a problem in Nigeria.

Conclusion

It is recommended that the diphtheria specific antitoxin be made available in the country in special

strategic stores to ensure early availability for use. Diagnostic facilities for suspected cases should be provided in our health facilities. Furthermore, the early institution of treatment in clinically diagnosed cases will aid prognosis. It is also *recommended that diphtheria should not be* totally discountenanced as one of the diseases for notification, as data from this source could affect policy decisions concerning prevention and management of the disease.

References

1. WHO. Challenges in global immunization and the Global Immunization Vision and Strategy 2006-2015. *Weekly Epidemiol Rec* 2006; 81:190-5.
2. WHO/UNICEF. Review of National Immunization Coverage 1980-2007, Nigeria.
3. Long SS. Diphtheria. In: Behrman RE, Kliegman RM, Arvin HB, eds. Nelson Textbook of Pediatrics. Philadelphia: W B Saunders (Publishers), 1996:775-9.
4. CDC Adanta. Case definitions for infectious conditions under public health surveillance. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 1997; **46:** 1-55.
5. Bisgard KM, Rhodes P, Hardy IR, Litkina IL, Filatov NN, Monisov AA, Wharton M. Diphtheria toxoid vaccine effectiveness: A case-control study in Russia. *J Iinfect Dis* 2000;**181**(Suppl 1):S184-7.
6. *Efstratiou A, Engler KH,* Mazurova IK, Glushkevich T, Vuopio-Varkila J, Popovic T. Current approaches to the laboratory diagnosis of diphtheria. *J Iinfect Dis* 2000;**181**(Suppl 1):S138–45.
7. Kimura M. A comparative trial of the reactogenicity and immunogenicity of Takeda acellular pertusis vaccine combined with tetanus and diphtheria toxoids. Outcome of 3- to 8-month-old infants, 9- to 23-month-old infants and children, and 24- to 30-month-old children. *Am J Dis Child* 1991;**145**:734-41.
8. Pichichero ME, Barkin RM, Samuelson JS. Pediatric diphtheria and tetanus toxoids-adsorbed vaccine: immune response to the first booster following the diphtheria and tetanus toxoids vaccine primary series. *Pediatr Infect Dis* 1986; 5:428-30.
9. Federal Ministry of Health Nigeria. National Policy on Integrated Disease Surveillance and Response. 2005.