

Diphtheria: experience in a general hospital

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Summary

A review of patients with diphtheria seen in the Paediatric Unit, Alor Star General Hospital, from January 1985 – March 1987 is reported. Their clinical presentation, diagnosis, treatment and outcome were analysed and discussed. Clinical awareness regarding the diagnosis of diphtheria is emphasised.

Key words: Diphtheria, clinical awareness, *Corynebacterium diphtheriae*, immunisation.

Introduction

Routine immunisation and improvement in health and living conditions have resulted in a drastic decline in the incidence of diphtheria in Malaysia. In 1975 there were 250 notified cases of diphtheria¹ whereas in 1985, only 40 cases of diphtheria were reported.² The low incidence of diphtheria has unfortunately caused doctors to forget to consider diphtheria in the differential diagnosis of respiratory tract infections. Indeed there were no notified cases of diphtheria in Kedah from 1980–1984. However from 1985 – March 1987, nine cases of diphtheria were encountered in the Alor Star General Hospital (ASGH). This article attempts to review seven of the nine cases seen in the Hospital. It is intended to highlight certain clinical situations in which diphtheria should be considered.

Materials and method

Records of seven out of nine cases admitted to the Paediatric Unit ASGH from January 1985 – March 1987 with a diagnosis of diphtheria on discharge were retrieved and analysed retrospectively. Of these seven patients, four were confirmed bacteriologically. All patients were seen and managed by the paediatricians [in the Paediatric Unit], some with the help of anaesthetic and surgical colleagues.

Throat swabs were taken from the areas where the membranes were noted. They were cultured on the following media: Loeffler's, Tellurite agar and blood agar plate. Toxinogenicity was tested by agar gel precipitation method.

Results

The seven patients came from various districts in Kedah, namely Kota Star, Yan, Padang Terap and Baling. There was also a case from Kroh, Perak. There were four children aged two years or less, one three years old and two four years old. Of the seven patients six were Malays and one Orang Asli. There were five boys and two girls. Their immunisation history revealed that the boys were not immunised at all and the two girls had been given three doses of diphtheria, pertussis and tetanus (D.P.T.) vaccine.

Signs and symptoms: All patients either complained of fever or were noted to be febrile on

admission. All patient complained of cough with breathlessness but only five complained of noisy breathing. Two patients had sore throat and three were said to have dysphagia.

On admission five patients were noted to have stridor with obvious respiratory distress, one was initially thought to be wheezing but subsequently noted to have stridor. In the examination of the throat, membranes were definitely noted in the tonsillar region and larynx in two patients, while in four others, the membranes were recorded to be in the tonsillar area or pharyngeal wall. However it is strongly suspected that these four patients had laryngeal involvement in view of the obvious stridor and the clinical severity of their illness. The seventh patient had only tonsillar and pharyngeal involvement.

The duration of symptoms prior to admission varied between one to four days with the majority of patients having had symptoms for three or more days.

Diagnosis

a) **Clinical:** In three of the seven patients, a provisional diagnosis of diphtheria was made by either the referring doctor or casualty doctor. In the others, the diagnosis of diphtheria was missed. Three of these cases were admitted with the provisional diagnosis of bronchopneumonia and one was admitted with a provisional diagnosis of bronchial asthma. In three of these patients the diagnosis of diphtheria was also missed by the house officers clerking the patients on admission to the ward. Of these, one patient was diagnosed to have bronchopneumonia and the other two were diagnosed to have bronchial asthma.

b) **Laboratory results:** Direct smears from throat swabs examined (Neisser's stain) showed that only one patient had evidence of *Klebs Loefflers* bacilli with metachromatic granules. In four out of the seven patients, isolation of *Corynebacterium diphtheriae* was successful. All the four isolates of *Corynebacterium diphtheriae* were found to be toxinogenic. Three of these colonies were noted to be of biotype mitis and the biotype of the fourth was not reported. *Klebsiella pneumoniae* was isolated from one of the three remaining throat swabs, *Klebsiella* species in another and no culture result was available for the third patient. (These three patients were diagnosed clinically as diphtheria).

Treatment: All patients were treated with intravenous Penicillin. Anti-diphtheric serum (anti-toxin) was given intravenously with doses ranging from 20,000–80,000 units following skin test for sensitivity. This was diluted 1:20 in isotonic sodium chloride solution and administered at a rate that does not exceed one ml per minute. Tracheostomy was performed subsequently on two of six patients who were intubated.

Outcome: Of the seven patients, three survived and were well on discharge. The remaining four patients died. Bilateral pneumothorax which developed as a complication of resuscitation caused one death; two patients died within four hours of intubation due to the effects of severe anoxia secondary to respiratory obstruction and the fourth patient died of cardiac arrhythmia secondary to myocarditis after six days of hospitalisation. The electrocardiogram before death of the fourth patient showed evidence of **bifascicular** heart block.

Prevention: All patients were notified to the Medical Officer in charge of the relevant health district. Visits to all the patients' home and their contacts were done. History regarding symptoms, past immunisations and examination of the contacts were carried out. Swabs from

the throat and nose were obtained. No positive findings or cultures in the contacts were noted. No passive immunisation was given but they were kept under close observation for one week.

Discussion

As clinical suspicion of a disease is usually influenced by its incidence in the community, diphtheria, because it is now relatively uncommon in Malaysia, is easily missed. Thus an awareness of clinical situations where diphtheria should be considered is essential. It can be said that an unimmunised child with a history of cough, breathlessness, sore throat or dysphagia and with membrane in the throat or stridor should have diphtheria considered in the differential diagnosis. Although the mere presence of a membrane is not diagnostic of diphtheria, there are certain features which are highly suggestive of the diagnosis. The membrane of diphtheria tends to be darker, grayer and more fibrinous. It is more firmly attached to the underlying mucosa and when pulled away, bleeding is more likely to occur. It usually begins on the tonsils, spreading towards the uvula.³

Direct smear from the lesion is unreliable for diagnosis. Definitive diagnosis depends on isolation of *Corynebacterium diphtheriae* from the material taken from beneath the membrane or a portion of the membrane itself. In a study in Malaya, 98% of the *Corynebacterium diphtheriae* cultured belonged to the mitis group.⁴ However the recovery of beta-haemolytic streptococci from a culture does not rule out the diagnosis of diphtheria for these bacteria are found in about 30% of cases with diphtheria.³ In the epidemic in San Antonio, *Corynebacterium diphtheriae* was not isolated in 40 out of the 148 patients; 37 of these patients had received antibiotic therapy before culture was taken.⁵

Treatment is usually based on clinical diagnosis as direct smear is not helpful. Moreover any delay in therapy poses a serious risk to the patient. The main factors that influence the outcome of the disease are: the age of the patient i.e. the younger the patient the poorer the prognosis especially below four years old;⁶ the location and extent of the membrane and the promptness with which the antitoxin is administered.³ It may appear that the mortality in this review is high but all the patients were below four years old with severe laryngeal diphtheria and two of the patients presented late. In the Nepal series, 33 out of 317 patients died and 50% of the deaths were related to laryngeal involvement; five died before tracheostomy could be done, eight occurred after tracheostomy as they succumbed to the complications of severe hypoxia 12 hours after admission, and four deaths were the result of complications of tracheostomy.⁷ Nevertheless tracheostomy appear to be the method of choice for the relief of respiratory obstruction. In ASGH patients two of them with tracheostomy survived.

It is hoped that this review will not only increase awareness of this deadly disease but also motivate all who are involved in child health care to persuade parents to immunise their children adequately against diphtheria. This is because it has been shown that a significant increase in antitoxin concentration usually occurs only after the second, third and fourth injections. The percentage of protection after immunisation is as follows: Less than three doses — only 16%, three doses — 74% and four or more doses — 84%.⁸

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