Corynebacterium amycolatum as a cause of acute pharyngitis in a 2 years old child: a case report

Sinan B. Issa, Samah H. Khalil**, Ashwaq Y. Noori***, Khalid O. M. Ali**
** Dept. of Medical Microbiology, College of Medicine, Tikrit University*
*** Dept. of Microbiology, Al-door Technical institute*
**** Central laboratory department, Salahaddin Health Directorate*

Abstract

Acute pharyngitis is an inflammatory syndrome of the pharynx and/or tonsils caused by several different groups of microorganisms. Pharyngitis can be part of a generalized upper respiratory tract infection or a specific infection localized in the pharynx. A two years old child presented with low grade fever (37.8 °C), rainy nose, congested pharynx, and loss of appetite in Al-Door city at October 2007. Primarily diagnosed as a pharyngitis case of viral origin, He was given antipyretics and antihistamines and kept under observation. After 3 days, a sudden increase of fever (39.2 °C) with vomiting began, and a grayish membrane appeared over the tonsils and uvula together with malar thrush over the gums, with deteriorated general condition. A swab was taken from the pharynx and sent for gram stained smear. The result of the stained smear was gram positive bacilli arranged in Chinese letter appearance (no metachromatic granules were noticed) giving the possibility of diphtheria as a diagnosis. The child was giving Procaine Penicillin (0.6 MIU) i.m. as a single daily dose with antifungal gel (miconazole gel) as a treatment in addition to the previous therapy. No diphtheria antitoxin was available in the governorate hospitals to be given to the child. After isolation and identification with conventional methods, the resulted bacterium was surprisingly *C. amycolatum* rather than *C. diphtheria*, and sensitivity tests suggest that this bacterium was sensitive only to ceftriaxone and tobramycin. The child was then given ceftriaxone vial injection (0.5 gm) as a single i.m. daily dose instead of the penicillin (after 4 days of non response on treatment) and continued for 7 days. On day 4 of ceftriaxone regimen, the child started to get better and healed by the end of therapy.

Key words: *Corynebacterium amycolatum*, Pharyngitis.

Case Report

A two years old child presented with low grade fever (37.8 °C), rainy nose, congested pharynx, and loss of appetite in Al-Door city at October 2007. Primarily diagnosed as an upper respiratory tract infection case of viral origin, He was given antipyretics and antihistamines and kept under observation. After 3 days, a sudden increase of fever (39.2 °C) with vomiting began, and a grayish membrane appeared over the tonsils and uvula together with malar thrush over the gums, hoarseness of voice that fairly can be heard, with deteriorated general condition. Complete loss of appetite occurred and the child was only drinking water and juice.

A swab was taken from the pharynx and sent for gram stained smear. The result of the stained smear was merely the presence of gram positive bacilli arranged in Chinese letter appearance (no metachromatic granules were noticed) giving the possibility of diphtheria as a diagnosis. The child was giving Procaine Penicillin (0.6 MIU) i.m. as a single daily dose with antifungal gel (miconazole gel) as treatment in addition to the previous therapy. No "diphtheria antitoxin" was available in the governorate hospitals to be given to the child.

The swab was sent for Albert's stain and culture both on blood agar and also selective media (Tinsdale medium and Cystine-Tellurite medium), the result of stained smear showed gram positive rods with short clubs without volutin, with no other microorganisms seen. The result of the culture on blood agar showed small well edged grayish colonies with α- hemolysis, while the selective medium revealed "no growth" after 48 hours which suggest a negative result for diphtheria.

Further biochemical tests were done: Catalase test was positive, urease and starch hydrolysis tests were negative. Sugar

fermentation was positive for glucose, sucrose and maltose.

After isolation and identification with conventional methods, the resulted bacterium was surprisingly *C. amycolatum* rather than *C. diphtheria*, and sensitivity tests suggest that this bacterium was sensitive only to ceftriaxone and tobramycin.

The child was then given ceftriaxone vial injection (0.5 gm) as a single i.m. daily dose instead of penicillin (after 4 days of no response on treatment) and continued for 7 days. On day 4 of ceftriaxone regimen, the child started to get better and healed by the end of therapy.

Discussion

Corynebacterium (from the Greek koryne, club) are small and pleomorphic. The genus Corynebacterium includes many species of aerobic and facultative gram positive rods. The cells tend to have clubbed ends, and often remain attached after division, forming "Chinese letter" or palisade arrangement. Spores are not formed. Growth is generally best under aerobic conditions on media enriched with blood or other animal products, but many strains will grow anaerobically. Colonies on blood agar are typically small (1-2 mm) and most are non hemolytic. Catalase is produced, and many strains form acid "usually lactic acid" through carbohydrate fermentation (1).

Corynebacterium diphtheria is the major pathogen of this group, causing a disease called "Diphtheria". The nondiphtheriae corynebacteria (i.e. diphtheroids), major components of the normal flora of human skin and mucous membranes, are also commonly isolated from clinical specimens (2).

Nondiphtheric corynebacteria are of growing importance as opportunistic pathogens, especially in nosocomial settings. *Corynebacterium amycolatum* is one of the diphtheroids most often isolated from clinical samples (2, 3).

The microbiologic classification of this group of organisms and their role in clinical disease are being more clearly defined (2). In particular, *Corynebacterium amycolatum*, which was first described in 1988 (4), is becoming widely recognized as an important pathogen, although it has been underreported in part because of its misidentification as *C. xerosis*, which is an established human pathogen. (5, 6)

Acute pharyngitis is an inflammatory syndrome of the pharynx and/or tonsils caused by several different groups of microorganisms. Pharyngitis can be part of a generalized upper respiratory tract infection or a specific infection localized in the pharynx. Most cases are caused by viruses and occur as part of common colds and influenzal syndromes (7).

In our case, the initial diagnosis is based on these facts, as the symptoms and signs of acute pharyngitis were noticed, thus, traditional management was held. The sudden increase of fever with malar thrush indicate the necessity for further laboratory investigations to diagnose bacterial pharyngitis, especially when the grayish membrane appeared together with hoarseness of voice, which are of the clinical signs of diphtheria.

Diphtheria is a disease caused by *C. diphtheriae*. Although, studies indicate that signs and symptoms of a diphtheria-like illness may caused by some strains of *C. ulcerans* that produce potent diphtheria toxin (DT) and may cause severe symptoms similar to those caused by *C. diphtheriae* (8). The production of DT has both local and systemic effects. Locally, its action on epithelial cells leads to necrosis and inflammation, forming a pseudomembrane composed of a coagulum of fibrin, leukocytes, and cellular debris (1).

In our case, the diphtheria like illness and pseudomembrane formed was due to invasion of other Corynebacterium rather than *C. diphtheria* or *C. ulcerans*. The possibility of the production of diphtheria toxin by these strains of *C. amycolatum* can not be excluded- especially when hoarseness of voice appeared together with the formation of pseudomembrane, that may be due to the local paralytic effect of DT on the muscles of the pharynx, unfortunately, it can not be proved also due to the lack of facilities for detecting the presence of diphtheria toxin.

The diagnosis of diphtheria could be once be made clinically and confirmed with great confidence (1). In our case, the suspicion of diphtheria was high due to the appearance of predominant gram positive bacilli of Chinese letter appearance in the

gram stained smear, but excluded when selective media revealed negative results- as *C. diphtheriae* are differentiated from other corynebacteria by the appearance of colonies on the selective media (Tinsdale medium) used for its isolation. The biochemical tests were satisfactory to confirm *C. amycolatum* identification as the only pathogen found.

Within the last few years, there has been a massive increase in the number of publications related to all aspects of Corynebacteria clinical microbiology (2). In the last decade, many researchers like Efstratiou A and George RC (9) discuss the role of toxin producing *C. ulcerans* strains in producing DT rather than *C. diphtheriae*. Few years ago, Hatanaka A. et al (10) proved the role of *C. ulcerans* in producing a diphtheria- like disease in Japan.

Many cases were reported that incriminate *C. amycolatum* in many diseases (11, 12). In our case, *C. amycolatum* reported to be the cause of a diphtheria-like disease. It, perhaps, could be an emergence of a toxigenic *C. amycolatum* strain that must be putted in mind in the future researches regarding diphtheria.

References

1. Ryan K J, Ray C G. Sherris medical microbiology. 4th edition. McGraw – Hill. New York. 2004.
2. Funke, G., A. von Graevenitz, J. E. Clarridge III, and K. A. Bernard. 1997. Clinical microbiology of coryneform bacteria. Clin. Microbiol. Rev. 10:125-159
3. Riegel, G. P., R. Ruimy, R. Christen, and H. Monteil. 1996. Species identities and antimicrobial susceptibilities of corynebacteria isolated from various clinical sources. Eur. J. Clin. Microbiol. Infect. Dis. 15:657-662
4. Collins MD, Burton RA, Jones D. *Corynebacterium amycolatum* sp. nov., a new mycolic acid-less *Corynebacterium* species from human skin. FEMS Microbiol Lett 1988; 49:349-52.
5. Wayters SG, Van Bosterhaut B, Janssens M, Verhaegen J. Identification of Corynebacterium amycolatum and Other Nonlipophilic Fermentative Corynebacteria of Human Origin. Journal of Clinical Microbiology, May 1998, p. 1430-1432, Vol. 36, No. 5
6. Funke G, Lawson PA, Bernard KA, Collins MD. Most Corynebacterium xerosis strains identified in routine clinical laboratory correspond to Corynebacterium amycolatum. J Clin Microbiol 1996; 34:1124-8.
7. Bisno AL. Acute pharyngitis. N Engl J Med. Jan 18 2001;344(3):205-11. (Medline)
8. Kisely SR, Price S, Ward T. "Corynebacterium ulcerans": a potential cause of diphtheria. Commun Dis Rep CDR Rev 1994; 4:R63–4.
9. Efstratiou A, George RC. Microbiology and epidemiology of diphtheria. Rev Med Microbiol 1996; 7: 31-42.
10. 10. Hatanaka A, Tsunoda A, Okamoto M, Ooe K, Nakamura A, Miyakoshi M, et al. Corynebacterium ulcerans diphtheria in Japan. Emerg Infect Dis [serial online] 2003 Jun [date cited]. Available from URL: http:// www.cdc.gov / ncidod /EID / vol9no6/02-645.htm
11. Karen L. Knox* and Alison H. Holmes. Nosocomial Endocarditis Caused by Corynebacterium amycolatum and Other Nondiphtheriae Corynebacteria. Em Inf Dis,Vol 8(1) January 2002.
12. Berner R, Pelz K, Wilhelm C, Funke A, Leititis J U, and Brandis M. Fatal sepsis caused by Corynebacterium amycolatum in a premature infant. J Clin Microbiol. 1997 April; 35 (4): 1011–1012.