

Throat swabs in acute tonsillitis and their response to commonly used antibiotics

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Abstract

A descriptive study is conducted on 100 children with age range between 6 months to 5 years with acute tonsillitis attending Tikrit teaching hospital during the period from 1st of July to the last of December 2007. The cases were collected from the pediatrics and the Ear, Nose and Throat (ENT) departments. From each patient, throat swab was taken for bacteriological examination by culture and then sensitivity test done on each pathogenic growth detected. Bacterial pathogens were detected in 54 cases (54%) in surface swab culture. Twenty cases revealed commensal micro-organism (20%). *Staphylococcus aureus* was the most commonly grown organism on the surface culture of the tonsil (42 patients out of 54 (77.7%). Group A, beta hemolytic streptococci was isolated from 10 patients (18.5%). *Klebsiella pneumoniae* was detected in only two cases (3.7%). Regarding antibiotic sensitivity, commonly used antibiotics revealed unsatisfactory results for isolated pathogens. In conclusion, the problem of bacterial resistance to the commonly used antibiotics is apparent but further studies on larger scales are needed to determine the magnitude of the problem.

Key words: Acute tonsillitis, throat swab, bacteriological examination, antibiotic sensitivity

Introduction

Tonsillitis is a viral or bacterial infection in the throat that causes inflammation of the tonsils, which are small glands on either side of the throat. In the first six months of life they provide a useful defence against infections. (1). Tonsillitis is one of the most common ailments in pre-school children, but can occur at any age. Children are most often affected from around the age of three or four, when they start nursery or school and come into contact with many new infections. A child may have tonsillitis if he/she has a sore throat, a fever and is off food. Only children whose tonsillitis is recurrent and severe are referred to an ENT surgeon to be considered for a tonsillectomy (2).

Tonsillitis is caused by a variety of contagious viral and bacterial infections. It is spread by close contact with other individuals and occurs more during winter periods (3). The most common bacterium causing tonsillitis is streptococcus, so you may hear tonsillitis being called 'strep throat.' If a child has tonsillitis, he or she may also get some swelling in the glands in the neck,

especially the ones just beneath the angle of the jaw. That is because these glands in the neck are part of the body's defenses, fighting off the infection.

There are many causes of infections in the throat (2). The following are the most common infectious agents (1): Viruses: Adenovirus, Influenza virus, Epstein-Barr virus and Herpes simplex virus. Bacteria: Group A β -hemolytic streptococci (GABHS), *Neisseria gonorrhea*, *Haemophilus influenzae* Type B and *Mycoplasma*, fungal infections & Parasitic infections.

Tonsillitis can be mild and just cause a sore throat. But it can also come on suddenly making the child feel unwell. The symptoms can vary depending largely on the cause of the infection and the person affected. If a child is very young you may not immediately suspect tonsillitis (2). Children up to the age of five will rarely complain of a sore or inflamed throat because they have difficulties detecting where the pain is coming from. Instead they might complain of a tummy ache (1). A child with tonsillitis will always have sore throat or some evidence that the throat is causing

pain on swallowing, fever, red, and swollen tonsils. These may also have some white or yellow discharge on them. Some patients have loss of appetite (3).

A child with tonsillitis may sometimes also have headache, abdominal pain, enlarged tender glands in the neck and occasionally vomiting. If a child gets many episodes of tonsillitis he/she may appear thin, pale and lacking in energy (3). In most cases, it is hard to distinguish between a viral sore throat and a strep throat based on physical examination. It is important, though, to know if the sore throat is caused by GABHS, as this requires antibiotic treatment to help prevent the complications associated with these bacteria (4).

As a result, when most children have these symptoms, they will receive a strep test and throat culture to determine if it is an infection caused by GABHS. This usually involves a throat swab (called quick tests or rapid strep tests) in the physician's office (5).

This may immediately become positive for GABHS and antibiotics will be started. If it is negative, part of the throat swab will be kept for a throat culture. This will further identify, in two to three days, if there is any GABHS present. Your child's physician will decide the treatment plan based on the findings (6).

Generally, episodes of tonsillitis settle without antibiotics. All that is required is to keep the child cool. Also use paracetamol to lower the fever and relieve the pain. Since most episodes of tonsillitis are caused by viruses, antibiotics (which only kill bacteria) will not be helpful for most children. If the tonsillitis is not settling, or your child is particularly unwell, your doctor may feel antibiotics are needed (2). Complications of tonsillitis are rare. There is no evidence that tonsillitis leads to ear infections, as is often suggested (7).

The aim of the study is to determine the microbiological distribution of the cases with acute tonsillitis and to assess whether still bacterial tonsillitis responding to some commonly used antibiotics or not.

Patients and Method

A descriptive study was conducted on 54 children aged 6 months to 5 years (28 female and 26 males) suffering from acute tonsillitis attending the Pediatrics and the ENT departments in Tikrit Teaching Hospital during the period from the 1st of July to the last of December 2007. The patient considered to have acute tonsillitis if he / she has sore throat with tonsillar enlargement with follicles with or without lymph node enlargement (7). All patients who had pretreatments with systemic antibiotics are excluded from the study. From all the patients included in this study, tonsillar surface swab were taken after positioning the baby and pushing the tongue downward using a spatula, the surface of the tonsil were swabbed and the swabs were collected in sterile tubes. Culture of the tonsillar surface were done on the following medias:

- Sheep blood agar : to show the hemolytic properties of the micro-organism.
- MacConkey s agar for isolation of enterobacteriaceae.
- Chocolate agar, containing 0.5 unit/ml penicillin as a selective media for inhibiting growth of Streptococci, Neisseriae diphtheroid bacilli and coagulase negative Staphylococci and allow growth of Hemophilus influenzae.

The cultured samples on these three medias were then incubated over night aerobically at 37°C. The organisms were identified according to Collee (8).

Antibiotic sensitivity test were carried for pathogenic isolates by disc diffusion technique according to the recommendations of National Committee of clinical laboratory standard (9). Antibiotic discs used: oxacillin, ampicillin, amoxycillin, amoxacilin-clavulanic acid , erythromycin, cephalixin, cefotaxim and trimethoprim-sulphamethoxazole.

Reading the plate was done according to the WHO (2002) by measuring the size of inhibition zone in mm (10).

Statistical analysis of the results were carried out by using Chi-square test, sensitivity and specificity using the standardized formula. Level of significance is considered <0.05 .

Results

The total number of cases was 100 cases. Only 54 cases revealed pathogenic bacterial growth on culture of throat swabs. Twenty cases showed growth of commensals micro-organisms. The rest cultures revealed no growth. Table (1) shows the distribution of pathogenic and non pathogenic bacteria revealed after culture of throat swabs. *Staph aureus* was the commonest pathogenic bacteria recovered, 42 cases (77.8%), followed by the group A,B hemolytic streptococci, 10 cases (18.5%). *Streptococcus viridans* was the commonest commensal micro-organism recovered, 12 cases (60%), followed by *Neisseria catarrhalis*, 8 cases (40%).

Table (2) shows the antibiotic sensitivity results of isolated strains of pathogenic bacteria. Regarding *staph aureus* 28 cases out of 42 (66.6%) were sensitive to oxacillin, while most of the cases are resistant to ampicillin, 36 cases (85.7%).

Regarding the group A,B hemolytic streptococci, all the cases were resistant to ampicillin, 10 cases (100%) and to the erythromycin, amoxycillin, cephalixin 8 cases for each (80%). It is sensitive only for Amoxacillin-clavulanic acid, Cephalixin and Trimethoprim – sulphamethoxazole, 4 cases for each (40%).

In regard to *Klebsiella pneumoniae*, is sensitive only to Amoxacillin-clavulanic acid and Trimethoprim – sulphamethoxazole, two cases for each (100%), while it is resistant both ampicillin and amoxycillin, two case for each (100%).

Discussion

Acute tonsillitis is a common disease in children specially under 5 years age. This study is conducted to evaluate the presence of bacterial growth on the tonsillar surface in patients with acute tonsillitis whether it is

pathogenic or commensals and then to evaluate the antibiotic sensitivities of the pathogenic strains recovered (1).

Out of 100 cases included in the study, only 45 cases revealed pathogenic bacterial growth. This is goes with Almadori study which revealed pathogenic bacterial growth in only 55% of cases (3). This may be due to the fact that most cases of acute tonsillitis were due to viral infection especially in cold whether which a special need instrument like electron microscopy to recover the virus or part of the virus.

Twenty cases revealed commensal micro-organism. This goes with Brook I and Kiran study which revealed that 30% of cases with acute tonsillitis revealed non pathogenic bacteria (2). This may be due to that the growth of commensals micro-organism on the surface of tonsils may be due to the disruption of the tonsillar surface by the initial viral infection which enhance the growth of secondary bacterial infections.

Regarding the pathogenic bacteria, *staph aureus* was the commonest pathogen isolated. This is in agreement with finding of Surow et al (11), and Abbas et al (1). Mitchelmore et al (12) noted that *staph aureus* could be the direct or the indirect pathogens by releasing B-lactemase protecting susceptible pathogens from the effect of B-lactum antibiotics.

Group A beta hemolytic streptococci was the second most frequent organism encountered in the current study. This is in agreement with Surow et al (11). Abbas et al (1) stated that the incidence of beta hemolytic streptococci the organism for acute tonsillitis is steadily decreasing over years, whereas that of *Staph. aureus* is on gradual increase.

However several studies noted that Group A beta hemolytic streptococci was the commonest organism isolated from the tonsils (5).

Klebsiella species were isolated in low percent in the current study. Several studies isolated enterobacteriaceae from the surface of the tonsils (1, 5).

Regarding the antibiotic sensitivities of the pathogenic strains isolated, the problem of bacterial resistance to commonly used antibiotics was apparent in gram positive group in the current study.

The problem of bacterial resistance to commonly used antibiotic is world wide . This may be due to the over use or non judicious use of antibiotics which increases the rate of resistance. These two problems could be solved by the judicious use of antibiotics as suggested by Farid and Saffar (13) who noted that decreased resistance rate to antibiotics could be achieved through the judicious antibiotic use.

Other approaches to decrease the antibiotic resistance is the use of combination of drugs from different classes (14). Out of 42 cases of staph. aureus isolates in the current study, 14 were oxacillin resistant. Community acquired methicillin resistant staph. aureus (MRSA) were reported in many studies (15). This may be due to the presence of risk factors for MRSA. Risk factors for community acquired MRSA infections include age more than 1 year and prior antimicrobial therapy (16).

It is also clearly that the resistance of Staph. aureus to ampicillin, amoxycillin is due to the fact staph. aureus is a beta lactamase producing enzyme which is responsible for destroying the beta lactam chain which is present in the ampicillin and amoxycillin group.

The less resistance of staph. aureus to the other groups of drugs is due to that these drugs are resistant to the beta lactamase enzyme.

Most of the GABH streptococcal growth were resistant to commonly used antibiotics (Table 2). This goes with Mitchelmore IJ, Reilly PG, Hay AJ, and Tabaqchali study which shows the results that most cases with streptococcal growth were resistant to most of the drugs commonly used (12). This may be due to the fact that non judicious and over use of antibiotics leads to emergence of resistant strains of bacteria.

Regarding the gram negative isolates, the problem of drug resistance cannot be appreciated because only one bacterial isolate strains although similar studies shows quietly similar results (15) in that it is resistant to the commonly used antibiotics in tonsillitis (ampicillin and amoxicillin).

The present study concludes that non bacterial infection is common in cases of acute tonsillitis, Staph. aureus is commonest

pathogenic bacteria isolated and most of the gram positive isolates are resistant to the common antibiotic used.

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Table (1): The distribution of pathogenic and non pathogenic bacteria revealed after culture of throat swabs.

Organism	Strains	No.	%
Pathogenic	Staph aureus	42	77.8
	Group A,B hemolytic strep	10	18.5
	Klebsiella pneumoniae	2	3.7
	Total	54	100
Commensals	Neisseria catarrhalis	8	40
	Strept. Viridans	12	60
	Total	20	100

Table (2): The antibiotic sensitivity results of isolated strains of pathogenic bacteria.

	Staph aureus N= 42			G.A,B hemoly. Strept. N=10			Gram negative bacilli N=2		
	S	I	R	S	I	R	S	I	R
Oxacillin	24	4	14	-	-	-	-	-	-
Ampicillin	2	4	36	-	-	10	-	-	2
Erythromycin	4	34	4	-	2	8	-	-	-
Amoxycillin	8	4	30	-	2	8	-	-	2
Amoxicillin-clavulanic acid	8		34	2	2	6	2	-	-
Cephalexin	8		30	2	2	6	-	-	-
Trimethoprim - sulphamethoxazole	14	2	26	-	4	6	2	-	-

S= Sensitive I= intermediate R= Resistant