Acute-phase reactants in children with recurrent tonsillitis treated by tonsillectomy versus long-acting penicillin

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Introduction
Tonsillitis is widespread among children and has serious poststreptococcal complications, and both the patients and the otolaryngology surgeon have to face the question on what is the role and benefit of using long-acting penicillin and whether it is an alternative method of treatment to surgery? This study was carried out to evaluate the effectiveness of tonsillectomy compared with long-acting penicillin in the treatment of recurrent tonsillitis, comparing their effects on the levels of the antistreptolysin O titer (ASOT) and erythrocyte sedimentation rate (ESR).

Patients and methods
A total of 200 patients aged 4–15 years with recurrent tonsillitis and signs of chronic tonsillitis, after exclusion of patients with bleeding diathesis, anemia, chronic illness, and criteria of rheumatic fever, who were attending the Ismailia General Hospital were included in this study; they were divided to two groups comprising 100 patients each. The first group was treated by tonsillectomy, whereas the second group was treated using long-acting penicillin monthly for 6 months. They were clinically evaluated; ESR and ASOT levels were recorded for all patients before management, after 3 months, and after 6 months.

Results
The mean ESR readings before management, after 3 months, and after 6 months for the first group treated by tonsillectomy were 45.28, 22.36, and 7.4 ml/h, respectively (P-value < 0.0021); for the second group treated with penicillin, they were 45.39, 14.98, and 6.48 ml/h, respectively (P-value < 0.020). The mean ASOT readings for the tonsillectomy group were 518.29, 253.28, and 117.13 IU/ml, respectively (P-value < 0.004), whereas for the penicillin group, they were 526.70, 413.39, and 262.98 IU/ml, respectively (P-value < 0.072).

Conclusion
This study demonstrates that the first line of treatment of recurrent chronic tonsillitis is tonsillectomy, as it is both clinically effective and cost-effective for children and that the second line of treatment is long-acting penicillin with a long-term follow-up, and in patients, have contraindications for surgery such as bleeding diathesis.

Keywords:
antistreptolysin O titer, long acting penicillin, tonsillitis

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Introduction

Chronic tonsillitis refers to the condition in which there is enlargement of the tonsils accompanied by repeated attacks of infection. Although tonsillitis can occur at any age, it is most common in children between the age of 5 and 10 years. The inflamed tonsils harbor numerous types of bacteria, alone or in combination [1,2]. Tonsillectomy is the most frequently performed otolaryngological procedure, especially in young children; it is effective in reducing the number and duration of episodes of sore throat in children, the gain being more marked in those most severely affected [3,4]. Tonsillectomy is the most frequently performed procedure because it is widespread among children and the poststreptococcal complications (rheumatic fever and glomerulonephritis) are a serious concern. However, pediatricians prefer to treat children with tonsillitis with long-acting penicillin. The recommended dose of benzathine penicillin G is 600 000 U intramuscularly for patients weighing 27 kg (60 lb) or less, and 1 200 000 U for patients weighing more than 27 kg [5]. Therefore, this study was carried out to evaluate the effectiveness of tonsillectomy compared with long-acting penicillin in the treatment of recurrent tonsillitis, comparing their effects on the levels of the antistreptolysin O titer (ASOT) and erythrocyte sedimentation rate (ESR).

Patients and methods

Study design

This study was carried out as a prospective study.

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Target population

Children suffering from recurrent tonsillitis who were attending the otolaryngology clinic in Ismailia General Hospital were included in the study. A total of 200 patients were selected on the basis of following criteria.

Inclusion criteria

(1) Age of 4–15 years.
(2) Children suffering from recurrent tonsillitis with signs of chronic tonsillitis: inequality in the size of the tonsils, enlarged cervical lymph nodes, and pus in the tonsillar crypts [6].
(3) Severe attacks of tonsillitis: seven times in 1 year or five times in each of 2 years, or three times in each of 3 years.
(4) According to the guidelines of the American Academy of Otolaryngology – Head and Neck Surgery [7], tonsillectomy is indicated if:
    (a) The patient contracts three or more attacks of sore throat per year, despite adequate medical therapy.
    (b) The attack of tonsillitis is severe enough to cause an abscess, or an area of pus and swelling, behind the tonsils.
    (c) The tonsillitis did not improve by antibiotics.
    (d) The child's swollen tonsils and adenoids impair normal breathing [7–9].
(5) An ASOT of greater than 400 IU/ml and an ESR of greater than 30 ml/1 at 1/2 h [10,11].

Exclusion criteria

(1) The child has bleeding diathesis, cardiac disease, anemia, acute infection, poor anesthetic risk, or an uncontrolled medical illness that prevents tonsillectomy [12].
(2) Presence of criteria for rheumatic heart disease and rheumatic fever [13].

Data collection

The field work for this study was carried out by the researcher. The study population was subjected to:

(1) History taking.
(2) Clinical examination.
(3) Collection of specimens.

The study population was divided into two groups:

Group A: the patients who underwent tonsillectomy.

Group B: the patients who were treated with long-acting penicillin.

The two groups were formed randomly using a simple random technique; the tests were performed before tonsillectomy and before starting the long-acting penicillin treatment and were repeated 3 and 6 months after the tonsillectomy and long-acting penicillin treatment.

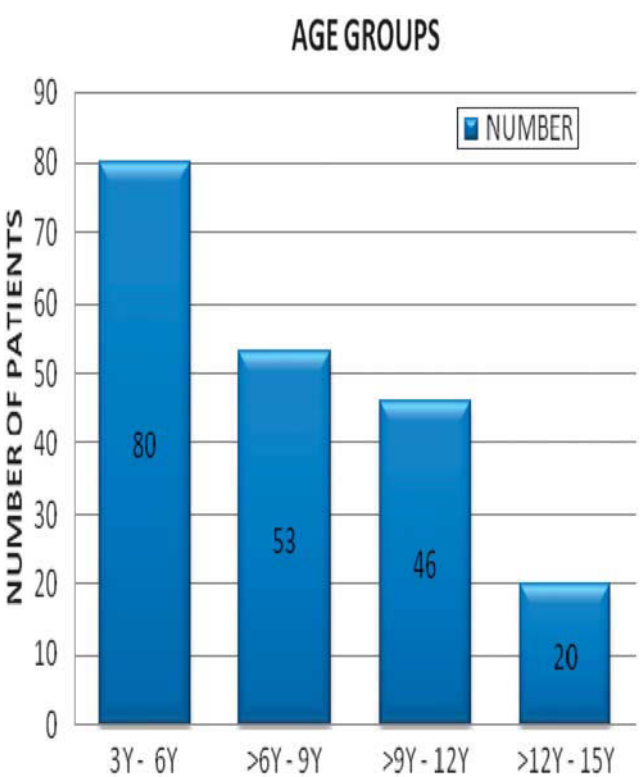
(1) ASOT: the patient should be fasting for 6 h before the test. The enzyme-linked immunosorbent assay technique was used to determine the serum ASOT.
(2) ESR: the patient should be fasting for 6 h before the test.

Results

This study included 200 patients, of which 48% were girls and 52% were boys. The distribution of the studied population according to the age group was as follows: 80 patients were between 3 and 6 years of age, 53 were older than 6–9 years, 46 were older than 9–12 years, and 20 were older than 12–15 years. The mean age was 8 years (SD = 3.04) (Fig. 1).

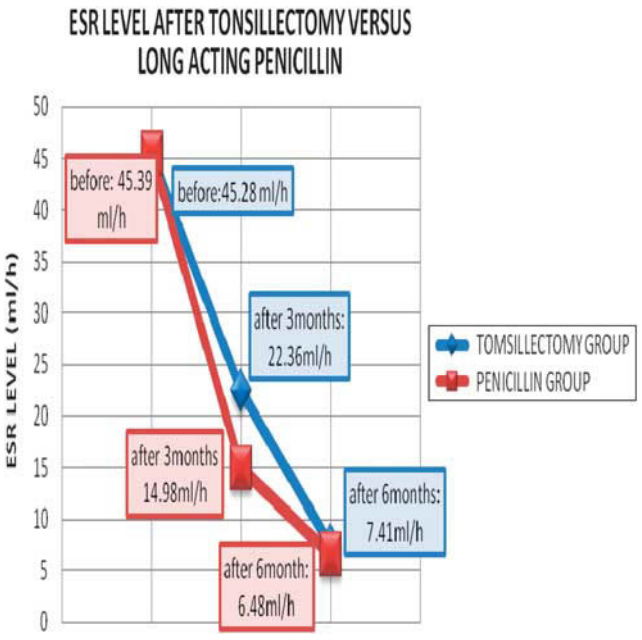
The frequencies of occurrence of fever, cough, obstructive sleep apnea, unequal tonsil size, and pus in the tonsillar crypts were 85.5, 58.5, 6.5, 52.5, and 50%, respectively. The mean ESR levels after 3 months were found to be higher in patients treated by tonsillectomy than in those who were treated with long-acting penicillin; however, the difference between both the groups was found to be statistically nonsignificant (P-value = 0.084) (Fig. 2). In the current study, the preintervention ESR and ASOT were determined for all the patients (N = 200). As regards ESR, the minimum reading was 30 mm/h, whereas the maximum reading was 70 mm/h (mean = 45.3350 mm/h). As regards ASOT,

Figure 1



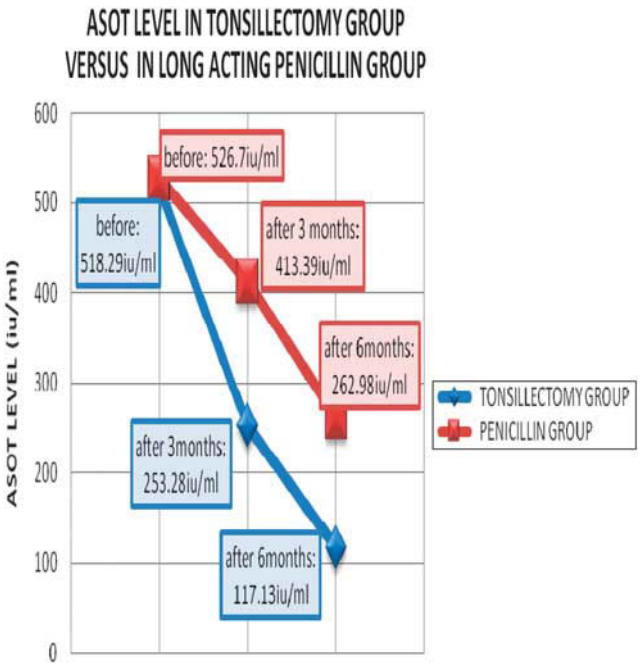
Age distribution in the patient population.

Figure 2



Erythrocyte sedimentation rate (ESR) levels after tonsillectomy and long-acting penicillin treatment.

Figure 3



Antistreptolysin O titer (ASOT) levels in the tonsillectomy and long-acting penicillin groups.

the minimum reading was 406.00, whereas the maximum reading was 663.00 (mean = 522.4950).

The mean ESR levels after 6 months were found to be higher in patients treated by tonsillectomy than in those who were treated with long-acting penicillin; however, the difference between both the groups was found to be statistically nonsignificant (*P*-value = 0.122) (Fig. 2).

By comparing the effect of tonsillectomy versus the effect of long-acting penicillin on ASOT, we found that the levels after 3 months were lower in patients who were treated by tonsillectomy than in those who were treated with long-acting penicillin; the difference between both the groups was found to be statistically significant (*P*-value = 0.012). The ASOT levels after 6 months were found to be lower in patients treated by tonsillectomy than in those who were treated with long-acting penicillin; the difference between both the groups was found to be statistically significant (*P*-value = 0.023). As shown in Fig. 3 the distribution of ASOT level among both group shows that the tonsillectomy group. In the tonsillectomy group, the ASOT was 200 IU/ml or less in 85 patients (85%), greater than 200–400 IU/ml in eight patients (8%), and greater than 400 IU/ml in seven patients (7%). In contrast, in the penicillin-treated group, the ASOT was 200 IU/ml or less in 31 patients (31%), greater than 200–400 IU/ml in 45 patients (45%), and greater than 400 IU/ml in 24 patients (24%). The ASOT levels after 6 months were found to be lower in the patients treated by tonsillectomy compared with those who were treated with long-acting penicillin; the difference between both the groups was found to be statistically significant (*P*-value = 0.023) (Fig. 4).

Figure 4

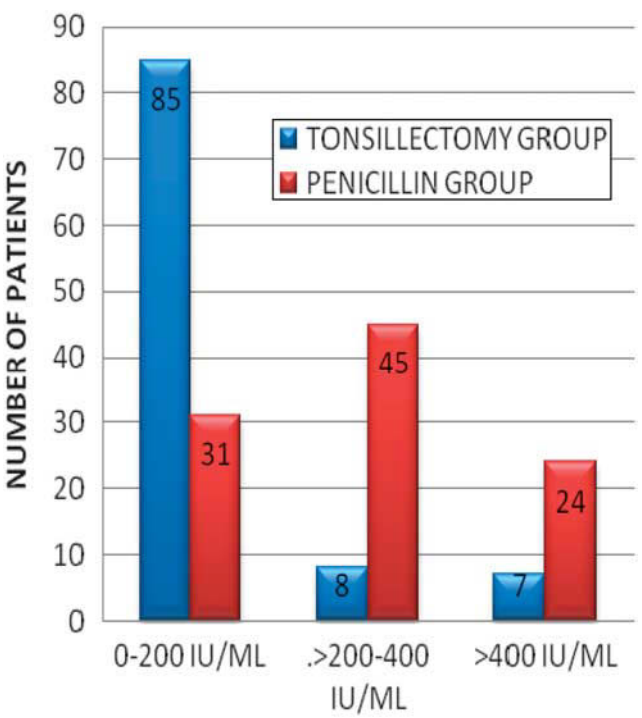
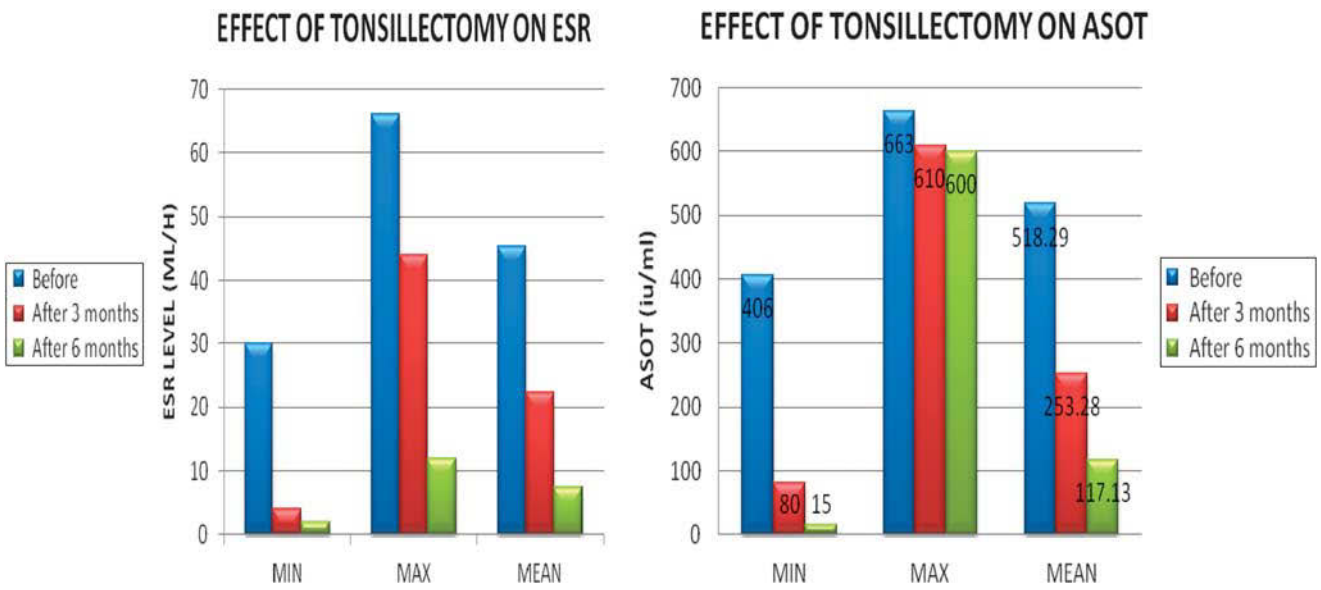


Illustration comparing between the tonsillectomy and penicillin groups according to the antistreptolysin O titer readings after 6 months.

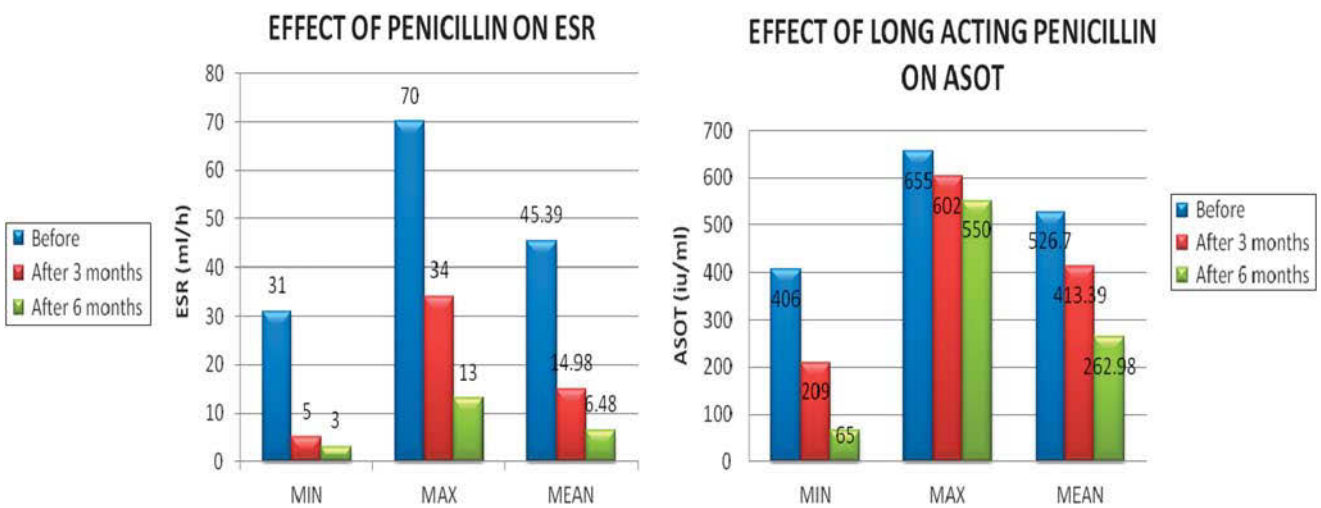
The effect of the treatment either with tonsillectomy or long-acting penicillin on the minimum and maximum readings of both ESR and ASOT (Figs 5 and 6) illustrate that ESR rapidly decreases before the ASOT response.

Figure 5



The effect of tonsillectomy on the range of erythrocyte sedimentation rate (ESR) and antistreptolysin O titer (ASOT) readings levels, before, after 3 months, and after 6 months of tonsillectomy.

Figure 6



The effect of long-acting penicillin on the range of erythrocyte sedimentation rate (ESR) and antistreptolysin O titer (ASOT) levels, before, after 3 months, and after 6 months of monthly long-acting penicillin.

Discussion

Tonsillectomy is the most frequently performed otolaryngological procedure, especially in young children. The most common indication for tonsillectomy is recurrent bacterial tonsillitis. The effectiveness of tonsillectomy has been questioned in a 2009 systematic review of 7765 papers that were published in the journal of *Otolaryngology – Head and Neck Surgery*. The study showed that it was most likely not effective all the time, but rather was modestly effective, and not a single paper reported that tonsillectomy is invariably effective in eliminating sore throats. In this study, 200 patients with recurrent tonsillitis were included; 52% were boys, whereas 48% were girls; 52.5% are living in urban areas, whereas 47.5% are living in rural areas. The ages of the patients ranged between 4 and 15 years.

In the group treated by tonsillectomy, we observed that the mean readings of ESR progressively declined from 45.28 mm/h before management to 22.36 mm/h after 3 months and then to 7.41 mm/h after 6 months; in the other group treated with long-acting penicillin, the mean readings of ESR progressively declined from 45.39 mm/h before management to 14.98 mm/h

after 3 months and then to 6.48 mm/h after 6 months; there is no significant difference between both the groups (P-value = 0.122). In the group treated by tonsillectomy, the mean readings of ASOT declined from 518.29 IU/ml before management to 253.28 IU/ml after 3 months and then to 117.13 IU/ml after 6 months. We estimate that after 6 months of tonsillectomy, 93% of patients who underwent the procedure become normal. In the other group treated with long-acting penicillin, the mean readings of ASOT declined from 526.70 IU/ml before management to 413.39 IU/ml after 3 months and then to 262.98 IU/ml after 6 months. We estimate that 24% of patients did not reach the normal range after 6 months of treatment with long-acting penicillin.

The ASOT levels after 6 months of treatment were found to be lower in patients treated by tonsillectomy than in those who were treated with long-acting penicillin; the difference between both the groups was found to be statistically significant (P-value = 0.023). On comparison with other studies, we found that, Motta *et al*. [14] estimated that ASOT levels become normal in 69.8% of patients, 2 years after tonsillectomy. The difference is statistically significant ($P < 0.05$) and may be due to the short-term follow-up (6 months) for patients after tonsillectomy in our study compared with the long-term follow-up (2 years) for patients in the study by Motta *et al*. [14]. Badr-El-Din [15] estimated that ASOT levels were found to be normal in 36 patients (72%) and high in 14 (28%); accordingly, the ESR levels were found to be normal in 18 patients (36%) and high in 32 (64%), 2 years after tonsillectomy. The difference is statistically significant ($P < 0.05$) and may be due to the short-term follow-up (6 months) for patients after tonsillectomy in our study compared with the long-term follow-up (2 years) for patients in the study by Badr-El-Din. The main problem we faced was that the parents exhibited strong preferences for surgical management of recurrent tonsillitis; some patients from the penicillin group were shifted to surgery, leading to loss of time in selecting new patients to compensate for the dropouts from the penicillin group; however, this predilection of some parents to tonsillectomy did not affect the number of patients that were selected in the long-acting penicillin group, it just increased the study time to include more patients. Some patients in the long-acting penicillin group complained of severe pain during injections and others had a hypersensitivity reaction to penicillin. Another problem is the paucity of literature resources for the studies on long-acting penicillin and its efficacy on acute-phase reactants in recurrent tonsillitis.

Conclusion

This study demonstrates that the first line of treatment of recurrent chronic tonsillitis is tonsillectomy, as it is both clinically effective and cost-effective for children and that the second line of treatment is long-acting penicillin with long-term follow-up, and in patients, have contraindications for surgery such as bleeding diathesis.

Recommendations

Additional long-term follow-up studies of more than 6 months are needed to compare between tonsillectomy and long-acting penicillin for treatment and improvement of the outcome of recurrent tonsillitis in children.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

References

1 Brook I, Gober AE. Increased recovery of *Moraxella catarrhalis* and *Haemophilus influenzae* in association with group a β-haemolytic streptococci in healthy children and those with pharyngotonsillitis. J Med Microbiol 2006; 55:989–992.

2 Hammouda M, Abdel-Khalek Z, Awad S, Abdel-Aziz M, Fathy M. Chronic tonsillitis bacteriology in Egyptian children including antimicrobial susceptibility. Aust J Basic Appl Sci 2009; 3:1948–1953.

3 Burton MJ, Glasziou PP. Tonsillectomy or adenotonsillectomy versus non-surgical treatment for chronic/recurrent acute tonsillitis. Cochrane Database Syst Rev 2009; CD001802.

4 Awad Z, Al-Yaghchi C, Anwar M, Georgalas C, Narula A. Does tonsillectomy help children with recurrent tonsillitis? Otolaryngol Head Neck Surg 2010; 143 (Suppl): 113–116.

5 Dajani A, Taubert K, Ferrieri P, Peter G, Shulman S, Bayer A, *et al*. Treatment of acute streptococcal pharyngitis and prevention of rheumatic fever: a statement for health professionals. Pediatrics 1995; 96 (Pt I): 758–764.

6 Drake AF. Tonsillectomy, WebMD Health's professional. 2009. Available at: *http://www.Medscape.com*.

7 American Academy of Otolaryngology – Head and Neck Surgery. *Clinical indicators: tonsillectomy, adenoidectomy, adenotonsillectomy*. Alexandria, VA: American Academy of Otolaryngology – Head and Neck Surgery; 2000.

8 Kharodawala MZ, Ryan MW. The modern tonsillectomy. Grand Rounds Presentation; 2005; Galveston: University of Texas Medical Branch, Department of Otolaryngology. pp. 1–60.

9 Andraševic AT, Baudoin T, Vukelić D, Matanović SM, Bejuk D, Puževski D, *et al*. Iskra guidelines on sore throat: diagnostic and therapeutic approach – Croatian national guidelines. Lijec Vjesn 2009; 131:181–191.

10 Wiatrak BJ, Woolley AL. Pharyngitis and adenotonsillar disease. In: Cummings CW, Fredrickson JM, Harker LA, *et al*, editors. *Otolaryngology head and neck surgery*. 3rd ed London: Mosby; 1998. pp. 188–215.

11 Grevers G. Anatomy, physiology and immunology of pharynx and oesophagus. Basic Otolaryngol 2006; 102–119.

12 Chin TK. Rheumatic heart disease, WebMD Health's professional 2006. pp. 1–18. Available at: *http://www.medscape.com* [Accessed November 2011].

13 Shamboul K, Yousif YM. Tonsillectomy and adenotonsillectomy in Sudanese patients. East Afr Med J 2000; 78:405–407.

14 Motta G, Esposito E, Motta S, Mansi N, Cappello V, Cassiano B, Motta G Jr. The treatment of acute recurrent pharyngotonsillitis. Acta Otorhinolaryngol Ital 2006; 26 (Suppl 84): 5–29.

15 Badr-El-Din MM. Evaluation of some serum acute phase reactants and anti-streptolysin O titre in streptococcal and non streptococcal chronic tonsillitis: cross section descriptive study. Univ Alex Lib 1988; 73–80.