

Does a simple educational exercise influence practice in acute tonsillitis in children?

Shirley Mulvaney, Simon Attard Montalto

Abstract

Aim: To assess the concordance of treatment of children attending with tonsillitis in Paediatric Accident and Emergency with established guidelines, and subsequent review of the management of this condition after a simple educational exercise.

Methods: An audit on children with tonsillitis was carried out amongst doctors working in the Paediatric Accident and Emergency Department during a three month period in 2009. Eleven doctors completed an anonymous questionnaire requesting details on presentation, symptoms, investigations and treatment of children presenting with acute tonsillitis. The results obtained from this questionnaire were compared to NICE guidelines and modified Centor (McIsaac) criteria, and fed back to the participating doctors together with copies of these guidelines via a simple, structured educational exercise. Three months later, a second identical questionnaire was again completed by the same cohort of doctors.

Results: The first questionnaire showed that there was a tendency towards unnecessary prescription of antibiotics and investigations in children with acute tonsillitis, when compared to recommendations in the guidelines. Following educational feedback, the second questionnaire showed a reduction in antibiotic prescriptions by 9% ($p=0.5$) and investigations by 37% ($p=0.1$). Compliance with guidelines had improved significantly with regard to non-prescribing of antibiotics with a fever of $<38^{\circ}\text{C}$ (Phi -0.76 , $p=0.0005$), and with tonsillar pus but no fever (Phi -0.68 , $p=0.002$). Increased compliance was observed when prescribing antibiotics in the presence of pus plus a fever, lymphadenopathy $>1\text{cm}$ and presence of underlying disease although these changes were not statistically significant.

Conclusion: Although doctors were initially only partly compliant with established guidelines for children with acute tonsillitis, compliance improved significantly after a simple educational exercise.

Shirley Mulvaney MD

Simon Attard Montalto MD (L'pool), FRCPCH,
FRCP *

Chairman,
Department of Paediatrics
NPICU
Mater Dei Hospital, Malta.
simon.attard-montalto@gov.mt

*corresponding author

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Introduction

Acute tonsillitis is an acute inflammatory infection of the tonsils caused by several infective agents. Viral causes including adenovirus, rhinovirus, influenza, coronavirus and respiratory syncytial virus, often result in mild symptoms.¹ Coxsackie virus may result in blisters on the tonsils and roof of the mouth that erupt after a few days leaving painful scabs. Children with infectious mononucleosis (EBV) present with an exudative, almost necrotic, tonsillitis and impressive cervical lymphadenopathy. An enlarged spleen is classically described although infrequently found.² Children with bacterial tonsillitis, for example due to Group A beta haemolytic streptococcus (GABHS) are generally toxic with a high fever, swollen, purulent sore throat and halitosis. Other bacterial causes include staphylococcus aureus, streptococcus pneumoniae, mycoplasma pneumoniae, chlamydia pneumoniae, pertussis, fusobacterium, diphtheria, syphilis and gonorrhoea.¹

Tonsillitis most often occurs in children older than 2 years of age. Tonsillitis caused by *Streptococcus* species typically occurs in children aged 5-15 years, while viral tonsillitis is more common in younger children.²

In practice, as listed in Table 1, symptoms in children with acute tonsillitis vary widely and it is impossible to differentiate between viral and bacterial on inspection alone.

Table 1: Signs and symptoms of acute tonsillitis with cause

Symptoms and signs	Viral origin	Bacterial origin
fever	++	+++
cough	++	++
headache	+	+
pain neck, ears	++	++
dysphagia	++	+++
abdominal pain	+	++
lethargy	++	++
vomiting	+	+
red, swollen tonsils	++	++
pus on tonsils	+	+++
Furred tongue	+	++
halitosis	+	++
cervical lymphadenopathy	++	++

Fever, cough, lethargy, headache, swollen red tonsils and lymphadenopathy are common to both viral and bacterial tonsillitis. However, pus on the tonsils with furring of the tongue and halitosis are more

commonly seen in bacterial tonsillitis. A complete blood count (CBC) will usually show a higher white blood cell count (WBC) in bacterial versus viral tonsillitis, as well as a higher shift in granulocytes versus lymphocytes.³ In practice, since patients with viral tonsillitis do not require antibiotics, it is important to differentiate viral from bacterial tonsillitis, and especially to diagnose tonsillitis due to *Strep. Pyogenes* (GABHS).

Unsurprisingly, the management of this condition has tended to fluctuate widely between institutions as well as individual physicians.^{4,5} As a result, recommendations have been drawn up by several authoritative bodies in an attempt to diagnose strep. tonsillitis and standardise treatment that is evidence based. The guidelines focus on specific criteria (summarised in Table 2) that allow for the computation of a 'Strep. Score', that is then used to guide therapy. The Centor Criteria⁶ (with McIsaac modification for children and adjusted for patient age⁷) advise antibiotic prescribing for tonsillitis in the presence of: 1) fever, 2) tonsillar exudates, 3) no cough and 4) tender anterior cervical lymphadenopathy. Studies show that patients with just one or none of these criteria are unlikely to have Group A beta haemolytic streptococci (GABHS), those with two criteria may merit testing whilst antibiotics are indicated in those exhibiting 3 or 4 criteria.²

The National Institute for Health and Clinical Excellence (NICE) lists the following parameters that should lower the threshold for antibiotic prescribing: 1) marked systemic upset, 2) patients with symptoms and signs suggestive of serious illness such as mastoiditis and peritonsillar cellulitis, and 3) children at risk of complications due to pre-existing co-morbidity such as immunosuppression or underlying disease.^{8,9} When indicated, NICE advises that penicillin is the drug of choice, preferably given for ten days (and not less). Macrolides including erythromycin and azithromycin for five days can be used in those with penicillin allergy.⁸

Despite these evidence-based guidelines, variations in the management of acute tonsillitis persist. This study set out to assess the compliance of a cohort of paediatricians with current NICE and modified Centor (McIsaac) guidelines, and explored whether a brief educational programme whereby the same cohort was presented with a refresher of the guidelines, was followed by an improvement in guideline compliance.

Table 2: Basis for the current guidelines in the management of acute tonsillitis

<p>Investigations</p> <p>Throat swabs should not be performed routinely.⁴</p> <p>Swabs may be helpful in high risk groups as or with treatment failure.</p>
<p>Antistreptolysin O (ASO) titre indicates recent infection and may be useful in patients who do not improve or in those who develop complications.⁵</p>
<p>EBV should be considered in adolescents or young adults with a severe sore throat. A Paul Bunnell or equivalent test may be indicated.</p>
<p>Treatment</p> <p>Reassurance and a supportive approach is sufficient management for most patients.</p>
<p>Gargles may be helpful but there is no evidence base to support their use.⁴</p>
<p>Antipyretic analgesics such as paracetamol and NSAID's are of value.⁴</p>
<p>For most patients, antibiotics have little effect on the severity or duration of the condition.</p>

Running title: education in management acute tonsillitis

Methods

All medical personnel working in the Paediatric Accident and Emergency Department for a three month rotation period at Mater Dei Hospital, Malta, were invited to participate in the study carried out between July and September 2009. Participants required at least one year working experience in the Emergency Department, and were asked to anonymously complete a two-part questionnaire on tonsillitis defined as 'Inflammation of the tonsils, manifest by redness and swelling, with or without pus and/or an exudate'. Section A requested demographic details including age, gender, year of graduation, level of training and years of working experience in Paediatric A&E. Section B included questions regarding the number and age of patients with tonsillitis seen per week, their symptoms, investigations carried out and treatment recommended. Questions were included to establish what criteria were being used to prescribe antibiotics and, if so, what antibiotics were given and what was the duration of treatment. For every question, several options were provided and more than one answer box could be ticked, as appropriate. The results obtained from the initial questionnaires were then compared to the NICE

guidelines⁹ and Centor criteria (with McIsaac modification)⁶⁻⁷.

A printed copy of these results together with the current guidelines was returned to the doctors involved in the study. In addition, a list of the guidelines was made available in the paediatric emergency room as a reference point for the doctors during their shifts. At the end of their three month rotation, a second, identical questionnaire was sent to the same cohort of doctors and the results obtained were compared to those of the first questionnaire. Chi squared (with Fisher correction for small numbers) was used to determine any difference in the two sets of results obtained, taking $p \leq 0.05$ to confirm a significant difference.

Results

Eleven (5 male, 6 female) doctors, aged 23-40 years, were employed in the Paediatric A&E Department during the study period and all completed both sets of questionnaires. They included General Practitioner (3) and Paediatric (8) trainees (ranging from BST to Resident Specialist grade), and all had spent more than twelve months covering acute cases in this Department during daytime and night-time 'on call' hours.

Initial Survey

The initial review confirmed that an average of 5 patients, mostly aged 3 – 4 years (31%), presented in the Paediatric Emergency Department with tonsillitis per day. Most presented with fever (77%), decreased appetite (61%), dysphagia (50%), pus on the tonsils (45%), lymphadenopathy (43%) and throat pain (9%). Other less common symptoms included headaches, abdominal pain, ear pain and vomiting. Most (>70%) were self-referred with <30% referred from other medical practitioners.

Seven (63%) of the doctors did not carry out investigations to diagnose tonsillitis, whilst 4 (36%) ordered a throat swab. None opted for an ASOT whilst 2 (18%) tested for EBV antibodies.

Paracetamol was prescribed for pain relief by all doctors, whilst 7 (64%) prescribed non-steroidal therapy. Two (18%) offered reassurance without any treatment and 1 (9%) advised gargles.

All doctors prescribed antibiotics if the child appeared 'toxic'. Eight (73%) of the doctors did so with a fever >38°C, a fever <38°C that persisted for more than 3 days, or with tonsils meeting in the midline. Seven (64%) of the doctors prescribed antibiotics with pus on the tonsils and no fever, whilst 5 (45%) with both pus and fever present. Two (18%) doctors used cervical lymphadenopathy as a criterion for antibiotic prescribing, depending on whether these

were more than 1 cm in diameter. Only 1 doctor (9%) prescribed antibiotics if the child complained of dysphagia with decreased appetite, in patients with underlying chronic conditions such as diabetes, when other antibiotics had been prescribed with no effect and with parental concern. The results obtained from the first questionnaire showed that the criteria used by doctors to prescribe antibiotics differed from established guidelines, leading to a tendency towards unnecessary prescription of antibiotics by a factor of 2.7-fold. Similarly, there was a tendency toward unnecessary investigations such as throat swabs and EBV titres, in children with acute tonsillitis.

Second Survey

Following feedback on the initial survey and an update of current guidelines, there was a reduction from 6 to 2 doctors (37%, $p=0.1$) carrying out unnecessary investigations, and a small reduction from 8 to 7 doctors (9%, $p=0.5$) prescribing antibiotics. Despite there being a very minimal decrease in the number of doctors who prescribed antibiotics, the criteria that were being used now reflected those advised by NICE and modified Centor Guidelines. Hence, the second questionnaire showed that compliance with guidelines had improved significantly with regard to non-prescribing of antibiotics with a fever of $<38^{\circ}\text{C}$ (Phi -0.76, $p=0.0005$), and with tonsillar pus but no fever (Phi -0.68, $p=0.002$). Increased compliance was observed when prescribing antibiotics in the presence of pus plus a fever (from 64 to 73%), lymphadenopathy $>1\text{cm}$ (from 45 to 55%), and presence of underlying disease although these changes were not statistically significant.

Small changes were observed in the type of antibiotic prescribed, with amoxicillin plus clavulanic acid and cephalosporin being the first and second preferences, respectively. In this regard, compliance with guidelines had increased from 55 to 73% between the two surveys. There was a slight increase, by 1 doctor, in a shorter duration of antibiotic treatment averaging 5-7 days compared with 7-10 days and, therefore, less compliance with a prolonged course as suggested in the guidelines. Less doctors asked patients to return for a review.

Discussion

Many controversies in the management of acute tonsillitis focus on the indications for prescribing antibiotics, as well as the type and duration of antibiotics. The effect of antibiotics on symptom reduction is debatable with headaches, sore throat and fever possibly being reduced by up to 50%, but this generally occurs by the third day when natural resolution takes place.¹⁰ A Cochrane review carried

out in 2006 showed that about 90% of both treated and untreated patients were symptom-free by one week. These authors concluded that absolute benefits are modest and antibiotics only confer relative benefits with regard to sore throat, but these would not justify the cost of treating many children with antibiotics.¹¹

It has also been reported that antibiotics shorten the duration of symptoms by a mean of just one day half way through the illness (the time of maximal effect), and by about 16 hours overall.¹⁰ In support of antibiotic use in this condition, the review reported a trend in the protection against acute glomerulonephritis and acute rheumatic fever by antibiotic prescribing in children with acute tonsillitis. Antibiotics have also been shown to reduce the incidence of acute otitis media by about 25%, and acute sinusitis by about 50% compared with placebo, as well as a reduction in the incidence of quinsy.¹⁰

In an elegant study, three groups of children with tonsillitis were given either 10 days of antibiotics, no antibiotics or an 'optional' prescription only to be used if symptoms had not settled by the third day. This study showed no difference in outcome between the three groups and, in the 'optional' group, only 69% used their prescription.¹²

Guidelines, including Centor⁶, McIsaac⁷ and NICE guidelines⁸, have been developed to facilitate clinical decision making and, in particular, the use or otherwise of antibiotics in the context of acute tonsillitis. They do not advocate antibiotics for all patients with acute tonsillitis, but reinforce that these should be prescribed in accordance with the presence of specific clinical criteria and advocate the type and duration of antibiotics. These guidelines have been validated in large population-based studies¹³⁻¹⁴ and allow for the computation of a clinical 'Strep. Score' with a risk assessment for GABHS infection. Hence, in adults, a score of 0-1 does not require antibiotics or a throat culture; 2 is associated with a 15% risk of GABHS and 3 carries a 32% risk. A throat culture should be considered with scores of 2-3 and, if positive, antibiotics started. Scores of 4-5 imply a risk of $\geq 56\%$ and dictate empiric antibiotics.¹³ Similarly, in children, scores of 0, 1, 2, 3 and 4 have been associated with the probability of GABHS infection of 1, 4, 9, 21 and 43%, respectively.¹⁴ When compared with these guidelines, doctors working in Paediatric Emergency in this study were found to be only partly compliant with the guidelines. Encouragingly, this study showed that improvements in compliance, albeit modest, were observed in the second survey after a simple educational brief. This was seen consistently in terms of a reduction in unnecessary investigations (from 64 to 91%), and improvements in antibiotic prescribing in line with the Centor/McIsaac criteria of fever (from 73

to 82%), exudates (64 to 73%), and lymphadenopathy (from 45 to 55%). The reverse, however, was seen for the duration of antibiotic courses prescribed with more doctors prescribing shorter rather than ten day courses, specifically against NICE guidelines.

The results and conclusions from this study must, however, be interpreted in the light of the small study cohort. Similarly, the time frame of three months over which the study was completed was also short. Unfortunately, neither of these two limitations could be circumvented; the absolute small number of participants still represented 100% of possible recruits and the second questionnaire had to be distributed after a maximum three month period in line with doctor rotations within the department. Furthermore, this study was based in Paediatric A&E and not in the community where more cases of tonsillitis are likely to present, and data was collected using a non standardised questionnaire.

The 'gold standard' in the diagnosis of bacterial tonsillitis remains culture testing on appropriate media, but this inherently involves a delay in reporting. In practice, in addition to the use of guidelines, the diagnosis of GABHS can be hastened by the use of rapid antigen testing (RAT) at the bedside.¹⁵ Several commercial kits are available and most achieve specificity in the order of >95% and sensitivity \geq 90%, thereby making them acceptably accurate for bedside diagnosis.¹⁵ Indeed, several guidelines including McIsaac criteria used in this study, combine the Strep. Score with advice to perform rapid antigen testing (e.g. with scores of 2 or 3), and to proceed with antibiotics if this is positive, or formal culture testing if RAT is negative.⁷ Unfortunately, rapid antigen testing was not available in the Paediatric Emergency Department and its impact could therefore not be assessed in this study.

Conclusion

This study has shown that modest improvements in compliance with guidelines can be brought about in the Emergency Department with a limited educational effort, although caution is required in the interpretation of all results in view of the small sample size. It is likely, however, that significant improvements would require repeated reinforcement of the guidelines through an ongoing educational programme. This would need to be repeated for all doctors as they commence their rotation in the Paediatric Emergency Department if effective and long term compliance is to be achieved.

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