

# Recurrent throat infections (tonsillitis)

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## QUESTIONS

What are the effects of tonsillectomy in children and adults with acute recurrent or chronic throat infections? . . . 3

## INTERVENTIONS

### TONSILLECTOMY

⊕⊕ **Beneficial**

Cold steel tonsillectomy compared with diathermy tonsillectomy in children and adults **New** . . . . . 3

⊕⊕ **Trade off between benefits and harms**

Tonsillectomy versus antibiotics in children. . . . . 3

⊕⊕ **Unknown effectiveness**

Tonsillectomy versus antibiotics in adults. . . . . 5

**To be covered in future updates**

Intermittent antibiotics

Long term antibiotics

Prophylactic antibiotics v episodic antibiotics

## Key Points

- Diagnosis of acute tonsillitis is clinical, and it can be difficult to distinguish viral from bacterial infections.
  - Rapid antigen testing has a very low sensitivity in the diagnosis of bacterial tonsillitis, but more accurate tests take longer to deliver results.
  - Bacteria are cultured from few people with tonsillitis. Other causes include infectious mononucleosis from Epstein–Barr virus infection, cytomegalovirus, toxoplasmosis, HIV, hepatitis A, and rubella.
- Acute tonsillitis with group A beta haemolytic streptococci can occasionally cause rheumatic fever and acute glomerulonephritis, which can be prevented by treatment with penicillin.
  - In resource rich countries these complications are so rare that routine aggressive antibiotic use cannot be justified.
- Tonsillectomy, with or without adenoidectomy, is one of the most frequently performed surgical procedures in the UK.
- We don't know if **tonsillectomy** is beneficial in adults with recurrent acute tonsillitis, as we found no studies.
- In children, the effectiveness of **tonsillectomy** has to be judged against the potential harms. Tonsillectomy is more beneficial in people with severe symptoms while, in populations with a low incidence of tonsillitis, the modest benefit may be outweighed by the morbidity associated with the surgery .
- The use of **diathermy** in tonsillectomy is associated with reduced rates of primary bleeding, but increased rates of secondary and overall bleeding. Adequate training in the appropriate use of diathermy during tonsillectomy is important.
- Adequate training in the appropriate use of diathermy during tonsillectomy is important. In deciding which method to apply, the surgeon should consider the underlying characteristics of patients, as well as the relative importance of secondary compared with primary bleeding, and intraoperative blood loss compared with postoperative pain. Overall, cold steel dissection tonsillectomy seems to have the lowest rates of postoperative haemorrhage and postoperative pain, although it is associated with slightly increased intraoperative bleeding. The use of diathermy in tonsillectomy must be weighted against its potential harms.

## DEFINITION

The definition of severe recurrent throat infections is arbitrary, but recent criteria have defined severe tonsillitis as five or more episodes of true tonsillitis a year, symptoms for at least a year, and episodes that are disabling and prevent normal functioning.<sup>[1]</sup> However, in most cases, the severity of recurrent throat infections depends on many factors, and cannot be judged solely on the basis of its incidence. This definition does not include tonsillitis caused by infectious mononucleosis, which usually occurs as a single episode. However, acute tonsillitis in this situation may be followed by recurrent tonsillitis in some people. Tonsillitis may occur in isolation or as part of a generalised pharyngitis. The clinical distinction between tonsillitis and pharyngitis is unclear in the literature, and the condition is often referred to simply as “acute sore throat”. A sore throat lasting for 24–48 hours as part of the prodrome of minor upper respiratory tract infection is excluded from this definition. Diagnosis of acute tonsillitis is primarily clinical, with the main interest being in whether the illness is viral or bacterial — this being of relevance if antibiotics are being considered. Studies

# Recurrent throat infections (tonsillitis)

have attempted to distinguish viral from bacterial sore throat on clinical grounds, but the results are conflicting, suggesting a lack of reliable diagnostic criteria. Investigations to assist with this distinction include throat swabs and serological tests, including the rapid antigen test and the anti-streptolysin O titre. Rapid antigen testing is convenient and popular in North America, but has doubtful sensitivity (61–95%), at least when measured against throat swab results, although specificity is higher (88–100%).<sup>[1]</sup> However, the inevitable delay in reporting of both swabs and the antistreptolysin O titre reduce their value in the routine clinical situation.

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**INCIDENCE/  
PREVALENCE** Recurrent sore throat has an incidence in general practice in the UK of 100 per 1000 population a year.<sup>[2]</sup> Acute tonsillitis is more common in childhood.

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**AETIOLOGY/  
RISK FACTORS** Common bacterial pathogens include beta haemolytic and other streptococci. Bacteria are cultured only from a minority of people with tonsillitis. The role of viruses is uncertain. In tonsillitis associated with infectious mononucleosis, the most common infective agent is the Epstein–Barr virus (present in 50% of children and 90% of adults with the condition). Cytomegalovirus infection may also result in the clinical picture of infectious mononucleosis, and the differential diagnosis also includes toxoplasmosis, HIV, hepatitis A, and rubella.<sup>[3]</sup>

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**PROGNOSIS** We found no good data on the natural history of tonsillitis or recurrent sore throat in children or adults. People in RCTs randomised to medical treatment (courses of antibiotics as required) have shown a tendency towards improvement over time.<sup>[4] [5] [6] [7] [8]</sup> Recurrent severe tonsillitis results in considerable morbidity,<sup>[9]</sup> including time lost from school or work. The most common complication of acute tonsillitis is peritonsillar abscess, but we found no good evidence on its incidence. Rheumatic fever and acute glomerulonephritis are recognised complications of acute tonsillitis associated with group A beta haemolytic streptococci. These diseases are rare in resource rich countries, but do occasionally occur. They are still a common problem in certain populations, notably Australian aboriginals, and may be effectively prevented in closed communities by the use of penicillin. A recently updated systematic review found that antibiotics reduced the incidence of these diseases.<sup>[10]</sup> However, in resource rich countries, these diseases are so rare that routine aggressive antibiotic use is not justified. The review also found that antibiotics shorten the duration of illness by about 16 hours overall.<sup>[10]</sup>

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**AIMS OF  
INTERVENTION** To abolish tonsillitis; to reduce the frequency and severity of recurrent throat infections; to improve general wellbeing, behaviour, and educational achievement, with minimal adverse effects.

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**OUTCOMES** Number and severity of episodes of tonsillitis or sore throat; requirement for antibiotics and analgesics; time off work or school; behaviour; school performance; general wellbeing; morbidity and mortality of surgery; and adverse effects of drugs.

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**METHODS** *BMJ Clinical Evidence* search and appraisal November 2006. RCTs in people with recurrent acute or chronic tonsillitis and systematic reviews are included in this review. The following databases were used to identify studies for this systematic review: Medline 1966 to November 2006, Embase 1980 to November 2006, and The Cochrane Library and Cochrane Central Register of Controlled Clinical Trials Issue 4, 2006. Additional searches were carried out using these websites: NHS Centre for Reviews and Dissemination (CRD) — for Database of Abstracts of Reviews of Effects (DARE) and Health Technology Assessment (HTA), Turning Research into Practice (TRIP), and National Institute for Health and Clinical Excellence (NICE). Abstracts of the studies retrieved from the initial search were assessed by an information specialist. Selected studies were then sent to the author for additional assessment, using predetermined criteria to identify relevant studies. Study design criteria for inclusion in this review were: published systematic reviews and RCTs in any language; RCTs could be open or blinded containing 20 or more individuals, of whom 80% or more were followed up. Minimum length of follow up was 1 year, with the exclusion of studies of cold steel compared with diathermy tonsillectomy, where any follow up greater than 10 days was acceptable. In addition we used a regular surveillance protocol to capture harms alerts from organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA). For assessment of harms of different forms of tonsillectomy we used data from systematic reviews that included prospective non-randomised trials and patient registers.

**QUESTION** What are the effects of tonsillectomy in children and adults with acute recurrent or chronic throat infections?

**OPTION** **COLD STEEL TONSILLECTOMY COMPARED WITH DIATHERMY TONSILLECTOMY** New

Two systematic reviews in children and adults found that diathermy tonsillectomy reduced the rate of intraoperative bleeding, but increased postoperative pain compared with cold steel tonsillectomy. The reviews found no significant difference in rates of postoperative bleeding between the two groups. However, a third review found that diathermy tonsillectomy is associated with higher secondary rates of bleeding, including haemorrhage requiring return to theatre, compared with cold steel tonsillectomy with haemostasis with ties or packs. The review found that cold steel tonsillectomy with haemostasis using bipolar diathermy was associated with the lowest rates of postoperative bleeding requiring return to theatre, and that cold steel tonsillectomy with haemostasis using packs/ties was associated with the lowest rates of postoperative bleeding overall compared with diathermy.

**Benefits:** **Cold steel tonsillectomy compared with diathermy tonsillectomy:**  
 We found two systematic reviews comparing diathermy tonsillectomy with cold steel tonsillectomy.<sup>[11] [12]</sup> The first systematic review (search date 2003, 2 RCTs, 250 people having tonsillectomy, adenotonsillectomy by dissection, or diathermy techniques) found that diathermy significantly reduced intraoperative bleeding compared with dissection (WMD 22 mL, 95% CI 16 mL to 27 mL).<sup>[11]</sup> The review also found a small but significant increase in analgesic dose required in the first 12 days after surgery with diathermy compared with dissection (WMD 7.50, 95% CI 1.05 to 13.95). There were no cases of primary bleeding in either group, and no significant difference in the rates of secondary bleeding was found (OR 0.56, 95% CI 0.19 to 1.63), although the power of both studies to detect such a difference was insufficient.<sup>[11]</sup> The second systematic review (search date 2001, 6 RCTs, 4 of which were paired, 444 people) found that diathermy tonsillectomy was associated with decreased intraoperative bleeding compared with steel tonsillectomy (mean blood loss: 15.1 mL with diathermy v 33.7 mL with steel; significance not reported).<sup>[12]</sup> The review also found that diathermy tonsillectomy reduced operative time (mean time per tonsil: 2.5 minutes with diathermy v 6.0 minutes with steel; significance not reported), but also significantly increased pain in the postoperative period (paired study pooled data: 148/293 [51%] with diathermy v 33/293 [11%] with steel; P = 0.001). No significant differences in postoperative bleeding rates were found (no further data reported).<sup>[12]</sup>

**Harms:** **Cold steel tonsillectomy compared with diathermy tonsillectomy:**  
 The two reviews gave no information on adverse events.<sup>[11] [12]</sup> One systematic review (50 studies consisting of 10 RCTs, 15 non-randomised comparative studies, 14 case series, and 11 within-patient studies, as well as the population based registry reports, from the Wales Single-use Instrument Surveillance Programme [3690 people] and the England and Northern Ireland National Prospective Tonsillectomy Audit [33 921 people]) evaluated the evidence for electrosurgery (diathermy or coblation) for tonsillectomy in children and adults, particularly in respect of rates of haemorrhage.<sup>[13]</sup> The review found that electrosurgery (coblation or diathermy dissection and haemostasis) was associated with higher rates of secondary bleeding, including haemorrhage requiring return to theatre, compared with cold steel dissection with haemostasis with ties or packs. Cold steel dissection was associated with higher rates of primary bleeding including return to theatre. Cold steel dissection using ties/packs for haemostasis was associated with the lowest overall rate of postoperative bleeding (1.7–2.0%); cold steel dissection with bipolar diathermy haemostasis was associated with the lowest rate of haemorrhage requiring return to theatre (0–0.7%).

**Comment:** **Clinical guide:**  
 Adequate training in the appropriate use of diathermy during tonsillectomy is important. In deciding which method to apply, the surgeon should consider the underlying characteristics of patients, as well as the relative importance of secondary compared with primary bleeding, and intraoperative blood loss compared with postoperative pain. Overall, cold steel dissection tonsillectomy seems to have the lowest rates of postoperative haemorrhage and postoperative pain, although it is associated with slightly increased intraoperative bleeding. The use of diathermy in tonsillectomy must be weighted against its potential harms.

**OPTION** **TONSILLECTOMY VERSUS ANTIBIOTICS IN CHILDREN**

Three systematic reviews that included six RCTs in children concluded that there was insufficient evidence to compare tonsillectomy versus antibiotics. However, it is suggested that the effectiveness of tonsillectomy has to be weighted against its potential harms. Tonsillectomy is more beneficial in people with severe symptoms while, in populations with a low incidence of tonsillitis, the modest benefit may be outweighed by the morbidity associated with the surgery.

### Benefits:

#### Tonsillectomy versus antibiotics in children:

We found three systematic reviews.<sup>[14] [15] [16]</sup> The first review (search date 1998, 5 RCTs, 1618 children with tonsillitis) found that tonsillectomy resulted in 2.3 fewer episodes of severe sore throat in the first 2 years, and concluded that the benefits of this operation must be weighted against its harms (no significance assessment or CI reported).<sup>[14]</sup> This review included the same two RCTs as the further systematic reviews,<sup>[4] [5]</sup> (abstract only) but also included three additional RCTs.<sup>[7] [8] [17]</sup> However, the review acknowledged their high potential for bias. Inclusion criteria in some of these older trials were not strictly defined, and encompassed upper respiratory tract infections, cervical adenitis, or “children who would normally be placed in waiting list for adenotonsillectomy”.<sup>[14]</sup> The second systematic review (search date 1999, 2 RCTs<sup>[4] [5]</sup> abstract only, 375 children with tonsillitis)<sup>[15]</sup> concluded that it was not possible to determine the effectiveness of tonsillectomy from these RCTs because of the significant baseline differences between the people assigned to surgical and non-surgical treatment, and the impossibility of eliminating any effect from the adenoidectomy additionally carried out on some of the included children.<sup>[15]</sup> The third systematic review (search date 2003, 6 RCTs [2 RCTs included in previous 2 systematic reviews,<sup>[4] [5]</sup> the second RCT<sup>[5]</sup> now in its complete form,<sup>[6]</sup> and 7 controlled non-randomised studies, 1436 children with tonsillitis) found a significant beneficial effect of surgery in reducing sore throats and number of days off school (reduction of sore throats, 2438 person years analysed: 1.2 episodes a year, 95% CI 1.1 episodes a year to 1.3 episodes a year; number of days off school, 1669 person years analysed: -2.8 days a year, CI not reported).<sup>[16]</sup> The benign natural course of recurrent tonsillitis in children is evidenced in that all the children in the control group had fewer episodes of sore throats during the follow up period than before study entry (no absolute figures or significance assessment reported). However, in all studies the most severely affected children either opted for surgery or (in the earlier studies) were allocated to surgery, resulting in underestimation of treatment effect. It must also be pointed out that the intervention assessed was adenotonsillectomy, rather than tonsillectomy alone, and that all randomised and non-randomised trials had significant methodological limitations. Taking the above into account, the authors conclude that surgery provides an additional but small reduction in sore throat episodes and sore throat-associated school absence compared with no surgery.<sup>[16]</sup> The smaller RCT identified by all three reviews included 91 children who fulfilled criteria for “severe tonsillitis” (7 episodes in the preceding year, 5 episodes/year in the preceding 2 years, or 3 episodes/year in the preceding 3 years).<sup>[4]</sup> It compared three treatments: tonsillectomy alone (27 children); adenotonsillectomy (16 children); or intermittent courses of antibiotics as needed (48 children). Sixteen children were withdrawn from the non-surgical group by their parents and had surgery, and children who developed infections after surgery received antibiotics as necessary for each episode of infection. Secondary outcome measures, such as time off school, were also considered. The RCT found that children with tonsillectomy experienced significantly fewer throat infections than those with antibiotics, amounting to an average of three fewer throat infections in the first 2 years (episodes/person: 1.24 with tonsillectomy v 3.09 with antibiotics;  $P = 0.001$ ; year 2 episodes/person: 1.61 with tonsillectomy v 2.66 with antibiotics;  $P = 0.001$ ). However, by the third year the difference was no longer significant (year 3 episodes/person: 1.77 with tonsillectomy v 2.20 with antibiotics;  $P > 0.05$ ). Regarding the more severely affected children, there was a fourfold reduction in the proportion of surgical subjects who had three or more episodes of any type (5/38 [13%] with surgery v 19/35 [54%] without surgery;  $P < 0.001$ ) and a 14-fold reduction in the mean number of episodes rated clinically as moderate or severe (3 episodes in 38 surgical subjects v 41 episodes in 35 control subjects;  $P < 0.001$ ). The larger RCT (246 “less severely affected” children than in the smaller RCT<sup>[4]</sup>) was published at the time of these reviews only in abstract form.<sup>[5]</sup> However, it has been published in complete form;<sup>[6]</sup> and has been included in the third, most recent systematic review.<sup>[16]</sup> The RCT (328 children with a history of less severe recurrent episodes of throat infection) consisted of two parallel trials. The first trial randomised children with no apparent indication for adenoidectomy (recurrent or persistent otitis media or obstructing adenoids) to either tonsillectomy, adenotonsillectomy, or medical treatment (3 way trial).<sup>[6]</sup> The second trial randomised children with any apparent indication for adenoidectomy to adenotonsillectomy or medical treatment (2 way trial).<sup>[6]</sup> The RCT found no difference in rates of surgery for tonsillectomy compared with adenotonsillectomy at 90 days (79% with tonsillectomy v 79% with adenotonsillectomy; no absolute figures reported). The RCT also found that, in both populations, outcomes were significantly better with surgery compared with medical treatment (children with no apparent indication for adenoidectomy, mean number of moderate or severe episodes/year during 3 years’ follow up: 0.09 with tonsillectomy v 0.08 with adenotonsillectomy v 0.33 with medical treatment; tonsillectomy v medical treatment,  $P = 0.002$ ; adenotonsillectomy v medical treatment,  $P = 0.003$ ; children with any indication for adenoidectomy, mean number of moderate or severe episodes/year during 3 years’ follow up: 0.07 with adenotonsillectomy v 0.28 with medical treatment;  $P < 0.001$ ).<sup>[6]</sup>

### Harms:

#### Tonsillectomy:

The risks of tonsillectomy include those associated with general anaesthesia, and those specific to the procedure (bleeding, pain, otalgia, and, extremely rarely, nasopharyngeal stenosis). The

systematic reviews gave no information on adverse effects.<sup>[14] [15] [16]</sup> The subsequent RCT found that 16/203 (8%) children who had surgery suffered complications.<sup>[6]</sup> One suffered anaesthetic induction trismus and possible incipient malignant hyperthermia; three children had intraoperative haemorrhage with one of them needing reintervention under anaesthesia; and one child required a posterior nasopharyngeal pack and admission to intensive care. Seven children (3.4%) developed postoperative haemorrhage, and five of these were readmitted to hospital, one requiring transfusion. The mean duration of postoperative sore throat was 6.3 days (range 0–21 days).<sup>[6]</sup> The overall complication rate in the smaller RCT<sup>[4]</sup> identified by the reviews<sup>[14] [15]</sup> (91 children) was 14% (all were “readily managed or self limiting”) compared with 2–8% in one Scottish tonsillectomy audit.<sup>[18]</sup> Haemorrhage, either primary (in the immediate postoperative period) or secondary, occurred in 4% of children studied in the larger RCT identified by the reviews,<sup>[5]</sup> and less than 1% of children in the Scottish tonsillectomy audit.<sup>[18]</sup>

## Antibiotics:

The systematic reviews gave no information on adverse effects.<sup>[14] [15]</sup> In the smaller RCT<sup>[4]</sup> identified by the reviews<sup>[14] [15]</sup> (91 children), erythematous rashes occurred in 4% of children in the non-surgical group while taking penicillin. Other adverse effects of antibiotics included allergic reactions, and the promotion of resistant bacteria. One RCT found that, for people with milder episodes of sore throat, the prescribing of antibiotics compared with no initial prescription significantly increased the proportion of people who returned to see their physician in the short term because of sore throat (716 people with sore throat and an abnormal physical sign; return rate: 38% with initial antibiotics v 27% without initial antibiotics; adjusted HR for return 1.39, 95% CI 1.03 to 1.89).<sup>[19]</sup> The subsequent RCT found that rates of erythematous rash were similar in children from the surgical and control groups (4/190 [2%] with surgery v 3/138 [2%] with control).<sup>[6]</sup>

## Comment:

### Background:

Tonsillectomy is one of the most frequently performed surgical procedures in the UK, particularly in children, and accounts for about 20% of all operations performed by otolaryngologists.<sup>[20]</sup> Adenoidectomy is now performed with tonsillectomy in the UK only when there is a specific indication to remove the adenoids as well as the tonsils (32% of cases), although it remains common practice in both Europe and the North America to combine the operations (Netherlands 90% of cases, USA 84% of cases, and Canada 75% of cases).

### Quality of the evidence:

In the smaller RCT (91 children)<sup>[4]</sup> included in the reviews,<sup>[14] [15]</sup> there were significant baseline differences between groups before treatment, and the authors pooled the results of tonsillectomy and adenotonsillectomy, making it impossible to assess the effectiveness of tonsillectomy alone. The systematic reviews came to broadly the same conclusions, but the weighting of the evidence was different. The earlier review did not quantify the evidence for the adverse effects mentioned, although it concluded that its benefits must be weighted against its harms.<sup>[14]</sup> The principal author of the original RCT<sup>[4]</sup> defends its conclusions in the Comments and Criticisms section of the *Cochrane Review*.<sup>[15]</sup> He argues that the baseline differences between cases in the control and treatment groups that were not accounted for in the randomisation are irrelevant to the outcome. Furthermore, he contends that the effect of adenoidectomy in some members of the treatment group could not have accounted for the difference in outcome in that group. The subsequent RCT in less severely affected children<sup>[6]</sup> was designed and run at the same time as the other RCTs discussed,<sup>[4]</sup> but the authors did study tonsillectomy separately from adenoidectomy, and the conclusions are more robust.

### Gaps in the evidence:

We found no RCT that found improved general wellbeing, development, or behaviour, despite suggestions that these are influenced by tonsillectomy.<sup>[18]</sup> We found no RCTs addressing long term effects of tonsillectomy.

### Clinical guide:

Decades of experience of using tonsillectomy for recurrent/severe throat infections in children have led to consensus that it is effective. However, it is suggested that the effectiveness of tonsillectomy has to be weighted against its potential harms. Tonsillectomy is more beneficial in people with severe symptoms while, in populations with a low incidence of tonsillitis, the modest benefit may be outweighed by the morbidity associated with the surgery.

## OPTION

## TONSILLECTOMY VERSUS ANTIBIOTICS IN ADULTS

**We found no systematic review or RCTs evaluating tonsillectomy in adults.**

- Benefits:** **Tonsillectomy versus antibiotics in adults:**  
We found no systematic review or RCTs that evaluated tonsillectomy in adults with recurrent tonsillitis or sore throats.
- Harms:** **Tonsillectomy versus antibiotics in adults:**  
We found no RCTs.
- Comment:** **Clinical guide:**  
Most otolaryngologists believe that tonsillectomy is an effective treatment for adults with severe recurrent sore throat, and feel that it should be offered to patients unless there are contraindications, despite the absence of strong evidence from RCTs.

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