Ambulatory Surgery 1993; **1**: 89–92

Original Papers

Ambulatory tonsillectomy

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While it is generally agreed that the majority of patients can safely undergo ambulatory tonsillectomy, there is considerable debate about the suitability of certain groups of patients for ambulatory tonsillectomy. Patients younger than three years of age, and those with obstructive sleep apnoea or associated medical conditions may not always be appropriate candidates for ambulatory tonsillectomy. This article examines the safety and limitations of ambulatory tonsillectomy, patient selection criteria, medical management and discharge guidelines pertaining to tonsillectomy.

Key words: Ambulatory, tonsillectomy

Perhaps no other surgical procedure has evoked more controversy in the medical as well as the lay press over the past 50 years than tonsillectomy or tonsillectomy and adenoidectomy (T&A). Tonsillectomy has at some time been recommended for almost every childhood disease, including mental retardation and enuresis[1]. The controversy over indications of tonsillectomy still persists, but more recently the focus has shifted to merits of ambulatory tonsillectomy. While almost everyone agrees that outpatient surgery saves money, many believe that ambulatory tonsillectomy may not be safe. However, there is increasing pressure from insurance companies to perform tonsillectomy on an ambulatory basis. Some firms have limited reimbursement for tonsillectomy almost exclusively to cases performed on an ambulatory basis; but they do make exceptions for certain medical conditions[2]. Cost-containment pressure from non-physician groups has set off a heated debate about the advantages and disadvantages as well as the safety of ambulatory tonsillectomy. This article examines the safety and limitations of ambulatory tonsillectomy, and presents guidelines for patient selection, operative management and discharge criteria pertaining to tonsillectomy.

Safety

Mortality after tonsillectomy was generally reported to be 1 : 1800 to 1 : 15 000 in the 1960s. A large series from the Pittsburgh Eye and Ear Infirmary, however, documented no surgical or anaesthetic mortality after 35 000 cases[3]. In 1968, Chiang et al.[4] reported a series of 40 000 tonsillectomies performed on an ambulatory basis without a single death. They attributed their success to careful patient selection, thorough preoperative examination, good anaesthesia, and meticulous surgical technique. Patients suffering from allergic episodes were not operated upon during the pollen season. However, the prevalence of allergies has increased dramatically in the last 20 years. Many patients now have chronic allergic symptoms, regardless of the season. Therefore, it is difficult to apply this exclusion criterion today. Maniglia et al.[5] went one step further when they concluded from their study of 1428 cases that there is little benefit in keeping patients in the hospital for more than a few hours after surgery, if there is no evidence of any serious medical condition requiring postoperative hospitalization. Reiner et al.[6], after reviewing charts of 1000 consecutive patients who underwent tonsillectomy, concluded that surgery of the tonsils can be performed safely as an outpatient procedure, if the patients are carefully selected by surgeons. Thus, there is clear evidence that ambulatory tonsillectomy is a safe procedure in carefully selected patients.

Patient selection

Tonsillectomy may generally be scheduled as an ambulatory procedure unless the following preoperative factors exist[7]:

1. Patient under 3 years of age;
2. History of obstructive sleep apnoea;
3. Co-existing medical condition; or
4. Social limitations (e.g. patient living more than a one

Accepted: March 1993
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0966-6532/93/020089-04

hour's drive from a hospital, inadequate postoperative adult supervision).

Age

Surgeons have traditionally been reluctant to perform even inpatient tonsillectomy on children younger than 3 years of age, due to a smaller margin of error in such children before significant blood loss and upper airway obstruction arise[8]. A study of 190 children younger than 3 years, however, led Berkowitz and Zalzal to conclude that the decision to perform tonsillectomy should be made without regard to the age of the patient, provided that surgery is carried out for appropriate indications and is performed in an appropriate institution[9]. Nevertheless, the suitability of such patients for outpatient tonsillectomy is controversial. Tom et al.[10] who studied postoperative complications of T&A in 223 children younger than 36 months of age recommended that tonsillectomy be planned as an inpatient procedure in this age group. Shott et al.[7] have also stated that patients under 3 years of age are inappropriate candidates for outpatient adenotonsillectomy because of potential postoperative airway complications. In contrast, Segal et al.[11] reported successfully performing ambulatory tonsillectomy in 211 patients between 1 and 5 years of age. Thus, age of the patient remains a debatable criterion for exclusion from ambulatory tonsillectomy.

Obstructive sleep apnoea

Although recurrent infection remains the predominant indication for T&A, obstructive sleep apnoea (OSA) accounts for an increasing percentage of these procedures[12]. Fifteen years ago infection was the sole indication (100% of cases) for T&A, whereas now 81% of T&A are performed due to infection and 19% due to obstruction[13]. We are more likely to encounter OSA in younger patients than older children.

OSA has been defined as at least 30 episodes of apnoea (cessation of airflow for greater than 10 sec duration) during a 7-hour period[14]. Others define it as repetitive episodes of complete inspiratory obstruction during sleep or prolonged partial upper airway obstruction leading to hypoxia or hypoventilation[15]. OSA is a functional upper airway obstruction, specifically induced by sleep. The obstruction occurs when the collapsing force of negative inspiratory pressures exceeds the dilating force of oropharyngeal muscular contraction. Chronic hypoxaemia secondary to obstruction often leads to pulmonary hypertension and may result in right heart failure or cor pulmonale[15].

The diagnosis of OSA is made by clinical examination and a combination of other approaches such as polysomnographic sleep evaluation, video fluoroscopy, or audio tape recording[16]. Polysomnographic analysis is performed by attaching electrodes to the scalp, abdomen, and legs to determine sleep stages, respiratory activity, electrocardiac activity, heart rate, and muscle tone. For the assessment of respiration, sensors are attached to determine air flow and respiratory effort. The flow of air can be measured by CO_2 sensors, thermistors, or thermicouples. Respiratory effort may also be determined by a bellows-type respiratory transducer or by electromyography of intercostal muscle activity.

Table 1. Planned admission following T or T&A

Obstructive sleep apnoea	52
Age	19
Associated medical problems	12
Peritonsillar abscess	7
Social circumstances	3
Distance from hospital	1
Total	94

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Table 2. Scheduled as outpatient procedure but subsequently admitted $n = 421$

Obstructive sleep apnoea	10
Social circumstances	8
Nausea/vomiting	7
Bleeding	4
Associated medical problems	3
Dysphagia	2
Increased temperature	1
Total	35

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Two major categories of children may be predisposed to OSA: (1) patients with decreased airway size due to malformations such as micrognathia, choanal atresia, Pierre Robin syndrome, enlarged tongue, or tonsillar-adenoid hypertrophy[15]; and (2) patients with neurologic or neuromuscular diseases. When enlarged adenoids or tonsils are the cause of OSA, the efficacy of T&A in the relief of OSA is well established[14].

Are patients with OSA suitable candidates for ambulatory tonsillectomy? The evidence is not clear. Shott et al.[10] believed that patients with a diagnosis of OSA were inappropriate candidates for outpatient surgery, because of the increased possibility of postoperative airway obstruction. However, Reiner et al.[6] did not observe any increased risk associated with outpatient tonsillectomy in patients with OSA. Until more data are available, it is essential to observe such patients closely in the post-anaesthesia care unit (PACU) and to hospitalize overnight those who exhibit moderate to severe obstruction. A history of OSA is the most common reason for both planned and unplanned postoperative admissions[7] (Tables 1 & 2). Some patients with severe OSA may even require admission to the intensive care unit postoperatively.

Associated medical conditions

Many complications encountered after adenotonsillar surgery are intrinsic to the patient's disease and overall

medical condition[17]. Richmond et al.[17] noted that 50% of the children with known haematologic disorders suffered postoperative bleeding, and that 80% of airway complications occurred in children with other significant medical problems. Each patient should be carefully evaluated to determine the severity of associated medical diseases before inpatient or outpatient tonsillectomy is performed.

Social factors

Shott et al.[8] believe that special social circumstances such as poor access to follow-up health care, poor parental reliability, or the absence of a car or phone are all valid reasons for postoperative inpatient observation. Patients who live more than a one hour's drive from a hospital have also been thought to be unsuitable for ambulatory tonsillectomy. This arbitrary guideline is established so that patients can get prompt medical attention in the event of postoperative bleeding. There must also be adequate adult supervision at home to ensure that complications are detected early and medical attention is sought.

Operative management

Preoperative sedation may be required for anxious children. Anaesthetic techniques vary; however, a combination of inhalational and narcotic anaesthetic seems to be ideal for patients without obstruction. Recently propofol, in combination with narcotics, N_2O, or muscle relaxants, has also been used. Due to the risk of severe apnoea, only after careful consideration should narcotics be used in patients with OSA. Local infiltration of bupivacaine hydrochloride 0.25% and epinephrine 1 : 200 000 prior to tonsillectomy reduces operative blood loss but does not decrease postoperative pain or analgesic requirements in children[18]. In healthy children without obstruction, the choice of deep *vs.* awake extubation is based on the anaesthesiologist's preference[19]. The trachea of the child with OSA must be extubated only after the patient is fully awake and breathing adequately. Meticulous attention should be paid to all bleeding points.

Postoperative course

The most common complications associated with tonsillectomy are airway obstruction, pain, vomiting, and bleeding. Airway obstruction may become evident following extubation or in the PACU. Patients with OSA may not manifest any signs of obstruction while awake but may exhibit severe obstruction with apnoea while sleeping.

Almost all patients require narcotics to control pain in the postoperative period. Following an initial intravenous narcotic administration, they usually can be managed with 15 mg kg^{-1} acetaminophen. The benefits of nonsteroidal anti-inflammatory agents such as ketorolac in the management of post-tonsillectomy pain in patients with OSA has not been evaluated.

The incidence of vomiting following tonsillectomy is as high as 55%[17]. Although most patients do not require antiemetic medication, protracted vomiting must be treated before discharge from the surgical centre. Metoclopramide 0.15–0.25 mg kg^{-1} up to 10 mg i.v. or droperidol 50–75 μg kg^{-1} i.v. is effective in controlling postoperative vomiting; however, such large doses of droperidol may delay discharge[20]. Patients may not be able to retain fluids up to 24 hours postoperatively, making it imperative to ascertain that they are well hydrated before discharge. All patients must receive a minimum of 6–8 hours of fluid requirement before discharge. A prospective analysis of recovery following tonsillectomy demonstrated that oral fluid intake is similar in both ambulatory and inpatients[21]. The total (oral and intravenous) fluid intake was higher in patients who had been admitted overnight to the hospital, because of the continuous overnight intravenous fluid administration[21]. Hydration status, as judged by the amount of urine output, was similar in both groups of patients. Pain scores were also comparable in both groups of patients, indicating that all patients experienced the same degree of discomfort. Inpatients received less analgesics than ambulatory patients, even though pain scores were comparable in both groups[21].

How long should patients be observed in the surgical facility following tonsillectomy? The overwhelming reason to observe post-tonsillectomy patients after the first 2 hours would be to detect bleeding. The incidence of post-tonsillectomy bleeding ranges from 0.28 to 7%[5,6,11,22,23]. Such bleeding is classified as primary (within 24 hours of surgery) or secondary (24 hours after surgery). Even overnight admission will not detect secondary bleeding, which typically occurs between three and 10 days following surgery. The practical question therefore is: how long should patients be institutionalized following ambulatory tonsillectomy to detect most cases of primary bleeding? Crysdale and Russel[24] reported that 76% of primary haemorrhages occur in the first 6 hours following surgery. Carithers et al.[25] observed that 41% of primary bleeding occurred within 4 hours, 74% within eight hours, and 100% within 11 hours after surgery. Guida and Mattucia[26] observed 1000 patients who had undergone T&A and concluded that the greatest percentage of complications occur within the first 6 hours. They concluded that ambulatory T&A patients should be observed for at least 6 hours before discharge[26]. Carithers et al.[25] studied postoperative complications, including bleeding and emesis in an effort to identify significant predictors of complications. To hold the incidence of subsequent complications below 10%, they concluded that only 19.0% of the patients could be released after 4 hours. Of the remaining patients, 85.9% could be released after 8 hours, and 98.2% could be released 10 hours following surgery.

Conclusion

The decision to perform T&A surgery as an outpatient procedure is a matter of professional judgement. If a

decision is made to perform surgery on an ambulatory basis, the following guidelines are recommended[7,26].

1. Patients must be carefully selected to identify those with underlying medical disorders. Evaluation of the child's social situation and preoperative parental counselling will help ensure postoperative safety.
2. Careful attention should be paid to haemostasis, hydration, and analgesic requirements during the perioperative period.
3. All patients should be monitored in the recovery unit by skilled personnel for a minimum of 4–6 hours.

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