Review

Outpatient tonsilloadenoidectomy: avoiding complications

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Especially during the last decade, tonsillectomy and adenoidectomy (T&A) have been performed increasingly in outpatient surgery facilities. Although complications following T&A are infrequent, they can be serious and have a precipitous onset. Hemorrhage and acute airway obstruction are among the most feared sequelae, and certain patterns have emerged depicting the circumstances under which these complications are more likely to happen. Other postoperative problems include fever, recurrent emesis, and poor oral fluid intake. To avoid unanticipated postoperative admissions, patients should be carefully selected and then observed for a minimum of 6 h following surgery. An individual with a history of obstructive sleep apnea is an inappropriate candidate for outpatient T&A. In addition, children younger than 3 yr are more likely to require postoperative hospitalization owing to such problems as respiratory distress and dehydration than older children.

Key words: Outpatient, ambulatory, tonsilloadenoidectomy, complications

Introduction

With each passing year, the list of surgical operations designated as 'outpatient' continues to grow. These mandated decisions by insurers tend, not surprisingly, to emphasize a rigid, procedure-oriented approach rather than to consider the extenuating or modifying aspects of an individual patient's medical condition. Especially during the last decade, tonsillectomy and adenoidectomy (T&A) have been performed increasingly in the outpatient arena, owing in no small part to economic pressures. Indeed, by the mid 1980s, 10 states mandated outpatient surgery for tonsillectomy, although medical exemptions to this policy were available in every state.

Fortunately, complications following T&A are infrequent. Nonetheless, they tend to be serious and have a precipitous onset. Hemorrhage and acute airway obstruction are among the most dreaded sequelae, and certain patterns have emerged describing the settings in which these complications are more likely to occur. Other postoperative problems include fever, recurrent emesis, and poor oral fluid intake (Table 1). This brief overview will present some salient features concerning patient selection and clinical management, including

Table 1. Percentage of complications following T&A

Complication	1st 6 postop. hrs	6–24 postop. hrs
Significant hemorrhage	0.7	0.4
Fever	0.7	0.7
Protracted emesis	0.7	0.6
Total	2.1	1.7

Reprinted with permission from Guida RA, Mattucci KF. Tonsillectomy and adenoidectomy: an inpatient or outpatient procedure? *Laryngoscope* 1990; **100**: 491–3

duration of postoperative observation, that are designed to enhance the perioperative course of children undergoing T&A.

Postoperative hemorrhage

Tonsillectomy, with or without adenoidectomy, is one of the most frequently performed procedures in the United States, accounting for approximately 340 000 operations annually[1]. One of the most serious complications of T&A is hemorrhage, which may lead to compromise of the airway and cardiovascular collapse. The documented incidence of hemorrhage ranges from 0.006% in a review by Chaing[2] to 8.1% as reported by Kerr[3]. To a certain extent, inconsistencies in data collection account for some of the variations noted. Allen[4], for example, reported only those cases (0.1%) that were returned to
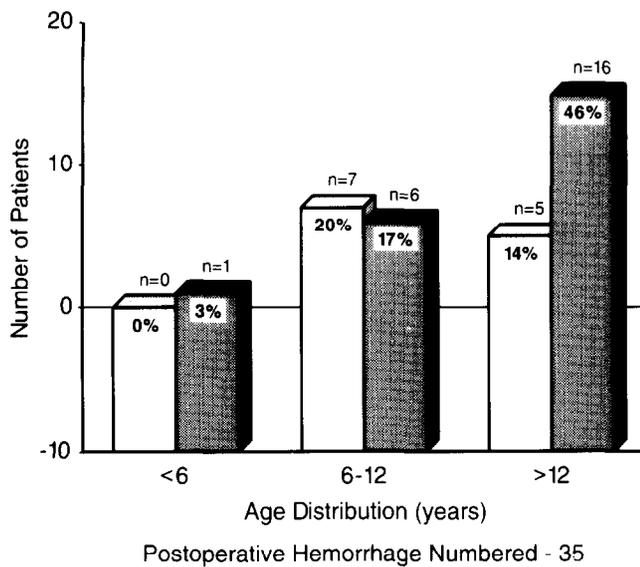
Figure 1. Distribution of postoperative hemorrhage by age. □ Requiring surgery (cautery under anesthesia; ▓ handled without surgery. Reprinted with permission from Haberman RS, Shattuck TG, Dion NM. Is outpatient suction cautery tonsillectomy safe in a community hospital setting? *Laryngoscope* 1990; **100**: 511–15.

Figure 2. Incidence of primary tonsillar hemorrhage occurring within 24 h postoperatively. Reprinted with permission from Carithers JS, Gebhart DE, Williams JA. Postoperative risk of pediatric tonsilloadenoidectomy. *Laryngoscope* 1987; **97**: 422–9.

the operating room for control of bleeding, whereas Kerr included patients whose hemorrhage was controlled by such local means as clot removal and gargles. Interestingly, there appears to be no clear relationship between bleeding complications and the surgical technique chosen for removal of tonsils and adenoids.

Hemorrhage following tonsillectomy may be either primary (occurring in the first 24 h after surgery) or secondary (bleeding occurring after 24 h). Crysdale and Russel[5] reported an incidence of primary hemorrhage of 2.15% (76% of the hemorrhages occurred in the first 6 h following surgery). Of these patients experiencing primary hemorrhage, only 3% (or 0.06% of all the patients) required a second general anesthetic for hemostasis. Patients under 4 yr in this study had a lower relative frequency of bleeding; however, the incidence of fever, inadequate oral intake, and airway distress was higher in this age group.

Haberman and others[6], reporting on suction cautery tonsillectomy in a community hospital setting, documented that primary hemorrhage was rare (0.6%). Consistent with Crysdale's data, Haberman[6] also observed a lower incidence of postoperative hemorrhage in children less than 6 yr (Figure 1). Secondary hemorrhage was much more frequent with an incidence of 6.4% and occurred most commonly on the sixth postoperative day. Their postoperative bleed rate requiring surgical intervention was 2.4%[6], similar to others. Lee[7] reported 3000 T&As performed over a 4-yr period, with a primary hemorrhage rate of 0.7% and a readmission rate for secondary hemorrhage of 1.5%. Carithers and colleagues[8] reported an incidence of primary tonsillar hemorrhage of 1.2%, with 41% of bleeding episodes occurring within the first 4 h (Figure 2). The incidence of primary
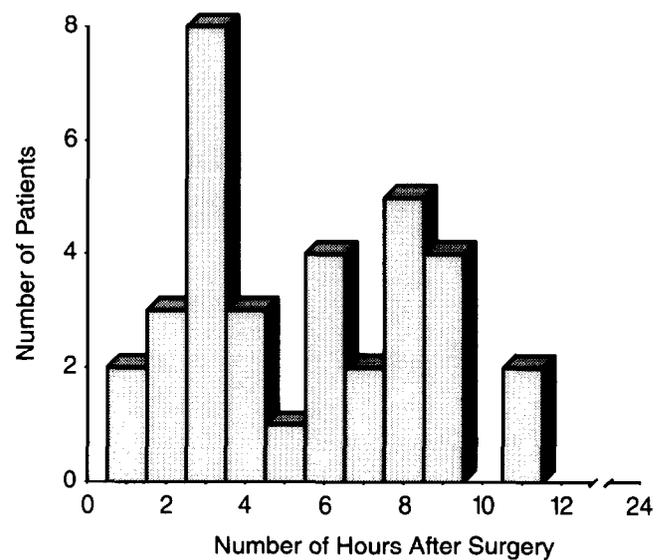
adenoidal hemorrhage was 3.2%; 95% of the episodes occurred in the first 4 h. Neither group of patients with primary bleeding required reoperation for hemostasis. Secondary hemorrhage of either the tonsillar fossae or adenoid bed occurred in 1.6% of patients.

In a prospective study published in 1990, Guida and Mattucci[9] reported an overall complication rate of 3.8% within the first 24 postoperative hours. These investigators had a 1.1% incidence of primary tonsillar hemorrhage, with 63% of bleeding occurring in the first 6 h. These and other studies have led to the recommendation that outpatient T&A surgery should be followed by at least 6 h of postoperative observation before discharge. Indeed, Carithers[8] suggests keeping T&A patients at least 8 h and possibly 10 h after surgery to minimize the risk of complications after discharge.

Patient selection

Areas of special concern in patient selection for outpatient T&A are a history of obstructive sleep apnea (OSA) and age under 3 yr. Indeed, the overwhelming consensus is that patients with OSA should be admitted overnight for careful postoperative monitoring. The disposition of patients less than 3 yr is more controversial.

OSA should be suspected in children with adenotonsillar hypertrophy who exhibit habitual snoring, restless sleep, and other typical symptoms such as difficulty in swallowing that impairs nutrition and growth, and daytime drowsiness. The diagnosis of sleep apnea syndrome is made with polysomnography which graphically records respiratory activity during natural sleep. The two most frequent sites of obstruction during sleep are at the soft palate and base of the tongue[10]. Occasionally, extreme lymphoid hyperplasia causes upper airway

obstruction resulting in hypoxemia and hypercarbia and, eventually, pulmonary hypertension and cor pulmonale. Patients with cor pulmonale have ECG and echocardiographic evidence of right ventricular hypertrophy, and approximately one-third have chest radiographs consistent with cardiomegaly[11]. In many cases, digitalization and surgical removal of the tonsils and adenoids can reverse these progressive cardiovascular changes[12]. Children with trisomy 21 are particularly vulnerable to severe upper airway obstruction from lymphoid hyperplasia, as are those with mucopolysaccharidoses. Children with craniofacial abnormalities, especially those associated with midface hypoplasia, are also at increased risk[13].

Nearly half of patients with OSA have neurological dysfunction. Brainstem regions controlling upper airway musculature may be affected, resulting in occlusion of the oropharynx when the collapsing force of negative inspiratory pressure exceeds the dilating force of pharyngeal muscular contraction. Objectives of surgical treatment include relief of airway obstruction and increasing the cross-sectional area of the pharynx[14]. In some patients with sleep apnea, however, other factors predispose them to the development of cor pulmonale, and they will remain insensitive to hypercarbia despite hypoxemia even after surgical relief of airway obstruction. These patients will continue to have persistent hypercarbia on a central basis. This situation may eventually deteriorate to a respiratory failure, possibly owing to a hyperreactive pulmonary vascular bed[15].

Postoperative airway compromise has been reported as a complication following T&A but happens infrequently in the general pediatric population. The risk ranges from 0–1.3% in a large series of pediatric patients undergoing adenotonsillectomy for a variety of indications[5,8,16]. However, in their 1992 study of respiratory compromise after adenotonsillectomy in children with OSA, McColley and colleagues[13] reported a 23% incidence of severe respiratory compromise, defined as intermittent or continuous oxygen saturation of 70% or less, and/or hypercapnia, requiring intervention. Moreover, the incidence of respiratory compromise in children with OSA below 3 yr of age was 52% in their series.

Children with OSA may be at risk for postoperative respiratory compromise for several reasons. Anesthetic agents, including inhalational anesthetics and narcotics, lead to upper airway collapse by decreasing the activity of pharyngeal dilator muscles[17]. This occurs even with subanesthetic doses[18] and, therefore, may persist once other effects of anesthesia have abated. Pulmonary edema may complicate adenotonsillectomy[19], possibly through the mechanism that produces pulmonary edema following relief of acute upper airway obstruction[20]. In addition, children with OSA may have impaired ventilatory responses to carbon dioxide, and the cardiopulmonary sequelae of OSA may render these children more vulnerable to postoperative complications. McColley and colleagues[13] emphasize that children with OSA are at risk for respiratory compromise following adenotonsillectomy. Young age (less than 3 yr) and severe sleep-related upper airway obstruction (i.e., an obstructive

event index > 10 h^{-1} of sleep during polysomnography) significantly increase this risk. Therefore, inhospital postoperative monitoring for children undergoing adenotonsillectomy for OSA is clearly indicated.

The literature regarding tonsillectomy in young children is conflicting. Reiner and colleagues[21] reviewed 1000 patients undergoing tonsillectomy or adenoidectomy and concluded that these procedures can be performed safely as outpatients regardless of age or indication. Their study, however, did include patients in whom only adenoidectomies were performed, and this procedure has less potential for complications than the combined procedure or tonsillectomy alone. In contrast, Carithers and associates[8] reported that patients less than 3 yr were at higher risk for immediate postoperative complications, including emesis and poor oral intake, leading to dehydration. Crysdale and Russel[5] noted a higher incidence of fever, inadequate oral intake, and airway distress in patients under 4 yr, while Shott and colleagues[22] believed that children less than 3 yr were inappropriate candidates for outpatient adenotonsillectomy because of potential airway complications. A 1992 publication by Tom and colleagues[23] retrospectively studied the records of 223 children, 36 months and younger, who underwent tonsillectomy. Although there were no mortalities and no cases of primary postoperative hemorrhage, 60.1% of children required more than routine postoperative care and benefitted from hospitalization; 51% of patients developed airway problems, and 14.8% of those youngsters with respiratory complications were admitted to an Intensive Care Unit. Tom's group concluded: "Although a recommendation based solely on age may be criticized, a planned hospitalization for children under 3 years undergoing tonsillectomy is recommended. After a period of assessment, the surgeon and family may decide to manage the child as an outpatient."[23]

Conclusions

The decision to perform T&A as an outpatient procedure is a matter of professional judgment for the operating surgeon and the anesthesiologist. To assist with this decision the following observations and recommendations[9] are offered:

1. There must be meticulous attention to patient selection, and patients with certain conditions are inappropriate candidates. Disorders such as coagulopathies, immunosuppression, and OSA syndrome are contraindications to outpatient tonsil and adenoid surgery. Moreover, children younger than 3 yr are more apt to require postoperative hospitalization because of such complications as respiratory distress and dehydration than are older children.

2. In the pediatric patient, evaluation of the family's social situation and knowledge of the distance from home to surgical facility are extremely important. Preoperative parental education and detailed instruction will help ensure patient postoperative safety.

3. Meticulous attention to intraoperative hemostasis is essential.
4. Recovery room observation by skilled personnel for a minimum of 6 hr should help minimize complications following discharge.

Acknowledgements

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