Ambulatory Powered Intracapsular Tonsillectomy and Adenoidectomy in Children Younger Than 3 Years

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Objectives: (1) To assess the safety and efficacy of outpatient intracapsular tonsillectomy, which has been recently described as a less invasive means of treating obstructive tonsillar hypertrophy, in children younger than 3 years; and (2) to challenge the standard dictum that children younger than 3 years should be admitted to the hospital after tonsil and adenoid surgery.

Design: Retrospective cohort study via medical chart review and telephone interview.

Setting: Pediatric otolaryngology group practice with academic affiliation.

Patients: Children with symptomatic tonsillar and adenoid hypertrophy (n=226) who underwent microdebrider-assisted intracapsular tonsillectomy between September 1, 2000, and October 1, 2002.

Methods: Comparison of study group (children <3 years old, n=38; mean age, 30.3 months; 20 boys and 18 girls) with control group (children ≥3 years, n=188), measuring pain, oral intake, analgesic requirements, complications, need for readmission, and relief of symptoms.

Results: There were no statistically significant differences in pain, oral intake, or analgesic requirements. All children, regardless of age, were discharged home within 4 hours of surgery. No child in either group required re-admission, and there were no complications related to the time of discharge. Younger children experience equivalent symptomatic improvement.

Conclusion: Children younger than 3 years may undergo intracapsular tonsillectomy as outpatients without sacrificing safety or efficacy.

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Several studies in the early 1990s established that most pediatric adenotonsillectomies could be safely and routinely performed on an outpatient basis. However, additional studies identified children younger than 36 months as high-risk patients in need of overnight hospitalization. The authors cited increased rates of dehydration and airway complications in these younger children. In reaction to these investigations, the American Academy of Otolaryngology–Head and Neck Surgery Pediatric Otolaryngology Committee recommended in 1996 that all children 3 years or younger undergo adenotonsillectomy in an appropriate overnight hospital setting. Despite these cautions, outpatient adenotonsillectomy gained greater acceptance, and some otolaryngologists reported success with outpatient adenotonsillectomy in carefully selected children younger than 3 years. However, reflecting an ongoing ambivalence to this issue, 2 recent reports continue to advocate overnight inpatient observation for all children younger than 36 months.

The intracapsular tonsillectomy (IT), as described by Koltai et al, involves surgical removal of the majority of the tonsillar tissue without violating the capsule, leaving a protective coating of lymphoid tissue over the pharyngeal muscular, vascular, and neurologic structures. Simultaneously, the microdebrider can be used to remove the adenoid, also described by Koltai and coworkers. This translates into less postoperative pain, dehydration, and hemorrhage. At present, IT is primarily indicated for tonsil and adenoid hypertrophy; to our knowledge, no data have been published regarding its efficacy for tonsillar infection. Since as many as 96% of children younger than 36 months qualify for tonsillectomy based on

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tonsillar hypertrophy, rather than infection, \textsuperscript{11} IT is particularly appropriate for this group. Intracapsular tonsillectomy offers a particularly attractive alternative to formal tonsillectomy for very young children, since it may reduce or eliminate the problems that have been the basis for postoperative overnight hospitalization (Figure). This study reviews retrospectively a series of patients who underwent IT to compare its efficacy and safety between children younger and older than 36 months.

METHODS

We retrospectively studied symptomatic pediatric tonsillar and adenoid hypertrophy in all patients treated via IT performed by 3 attending surgeons (J.P.B., M.M.A., or R.F.W.) between September 1, 2000, and October 1, 2002. The diagnosis of tonsil and adenoid hypertrophy and the decision to proceed with surgery were based on patient symptoms and physical examination, supplemented in some instances by sleep studies, sleep audiowhen, or sleep videotapes. Exclusion criteria were a history of more than 3 episodes of tonsillitis per year, craniofacial dysmorphism, previous adenoidectomy, or bleeding disorder. A total of 336 children who underwent IT were eligible for study. Seventy-eight patients who were a subject of a previous report were excluded. The first 7 IT patients younger than 3 years were admitted as a precaution, and therefore were also excluded from this study. Five additional patients (2 younger than 3 years, 3 older than 3 years), who were scheduled overnight admissions because a markedly positive sleep study suggested an increased risk of postoperative complications were also excluded. Of the remaining 246 children, 226 (91.9%) were contacted with a minimum follow-up of 2 weeks. The study group consisted of 38 patients younger than 36 months (mean [SD] age, 30.3 [4.6] months; median age, 31 months; minimum age, 17 months; 20 boys and 18 girls), which was compared with a control group of 188 children aged between 3 and 18 years (mean [SD] age, 59.8 [20.6] months; median age, 55 months; 115 boys and 73 girls). Outcome measures were relief of obstructive symptoms, maximum pain (0-10 scale), analgesic requirements, days until first normal meal, days until first return to normal activity, halitosis, and persistent voice change. Data were collected by chart review and follow-up telephone interviews that were conducted at 4 weeks to 1 year following the procedure by gathering information from each child’s primary caregiver.

All patients underwent IT performed by or under the direct supervision of 1 of the 3 aforementioned surgeons. The procedure commenced by placing the patient in a standard Rose position. A Hurd retractor was used to medialize the tonsil while protecting the adjacent mucosa of the tonsillar pillars and the tongue base. Tonsils were shaved to a concave shape using a Medtronic XPS system with a Radenoid blade (Medtronic, Jacksonville, Fla), in oscillation mode at 1500 rpm. Care was taken to avoid penetrating the tonsillar capsule. Hemostasis was achieved by applying suction electrocautery to the cut tonsillar surfaces. All patients received a single intraoperative intravenous dose of dexamethasone and antibiotics, as well as a 7-day course of postoperative amoxicillin or an equivalent drug in penicillin-allergic patients. Patients were advised to administer either acetaminophen or acetaminophen with codeine for analgesia. Children were discharged to home within 4 hours of surgery according to a protocol that requires adequate adult supervision, residence within 30 minutes of an acute care facility, no evidence of airway compromise in the operating or recovery rooms, and no intractable vomiting. Each patient was seen for a routine postoperative visit at 2 to 3 weeks.

RESULTS

The Table describes results comparing outcomes in terms of the parameters previously described. Pooled t test analysis revealed no statistically significant difference (defined as P value <.05) in maximum pain, days till first normal activity, or analgesic requirement with or without codeine. There was a borderline statistically significant difference seen in days until first normal meal, with
patients younger than 3 years obtaining a quicker return to first normal meal.

Since the number of patients who were younger than 3 years (n=38) was relatively small, we assessed study power. Statistical analysis of β error revealed 33 patients, sufficient to confirm, with 99% certainty, a difference of 1 SD, given a preset single-sided α error of 0.05. Therefore, the 38 patients reported herein satisfy these statistical requirements.

All 226 patients experienced relief of symptoms, irrespective of age. No children in this series were readmitted for pain, dehydration, or bleeding. Two children, both older than 3 years, had self-limiting postoperative bleeding events.

**COMMENT**

Berkowitz and Zalzal\(^\text{15}\) established the feasibility of tonsillectomy in very young children in their review of 190 patients (mean age, 2 years 4 months). That these children face increased risk from formal tonsillectomy compared with an older cohort of children is beyond doubt. The need to hospitalize all very young children undergoing surgery for tonsillar and adenoid hypertrophy remains controversial. It has been established that children with Down syndrome are more likely to experience postoperative complications.\(^\text{19}\) We have also noted similar risks among children with such conditions as severe asthma, cyanotic heart disease, mental retardation, cerebral palsy, and developmental delay. These conditions often predispose to airway obstruction, prompting these children to undergo tonsil surgery at a relatively young age, often before their third birthday. The studies in the literature supporting inpatient tonsillectomy in children younger than 3 years all come from tertiary care institutions that attract these children with complex medical conditions. We agree with Mitchell et al\(^\text{10}\) that otherwise healthy children younger than 36 months can undergo tonsillectomy without significantly increased risks.

The IT adds an additional margin of safety. The diminished pain reduces the risk of dehydration, as well as nausea, often seen with analgesic use. Furthermore, by not exposing the larger extracapsular vasculature, children with smaller blood volumes are protected against the potential lethal risk of postoperative hemorrhage. Although this report does not contain a comparison group of traditional tonsillectomy patients, the 0% incidence of significant postoperative IT-related hemorrhage in these 226 children compares favorably with the 0.5% to 4% rates cited in our literature for traditional tonsillectomy. Furthermore, Koltai et al’s most recent publication\(^\text{17}\) on this topic noted a lower rate of postoperative hemorrhage in IT patients compared with tonsillectomy patients (1.7% vs 4.7%), although the difference did not achieve statistical significance (P=.11, n=348). The rapid recovery was immediately apparent with the first 7 children younger than 3 years on whom we performed IT (all preadmitted and therefore excluded from this study). Those children did so well that we have not admitted a child after IT based on their young age since September 2000. Although the outcome measures (Table) showed no statistically significant difference between our study and control group, the younger cohort actually had a more favorable outcome in every category except days of acetaminophen with codeine use. In regard to first normal meal, the better response in the younger cohort borders on statistical significance (P=.054). This demonstrates the resiliency of younger children as well as their suitability for outpatient IT. Additionally, the psychological benefits of early discharge for young children prone to “white coat” anxiety are immeasurable. One should also note the importance of single-dose intraoperative steroid dosage (1 mg/kg up to 16 mg) in decreasing postoperative tissue edema and nausea.\(^\text{18}\)

Shapiro et al\(^\text{9}\) noted that although very young children may tolerate outpatient tonsillectomy, the prolonged recovery room phase (mean of 350 minutes for children younger than 36 months) offset any economic advantage of outpatient surgery. As we have gained experience with IT, the recovery room time has decreased, from an initial requirement of 4 hours mandatory observation to as little as 90 minutes. Although the economic advantages of IT have not been addressed in this article, this procedure obviously offers tremendous potential for saving health care dollars.

This study, by virtue of its retrospective design, contains flaws. Dissatisfied parents would be less likely to follow-up or return telephone calls. Parents who were contacted many months after surgery may have faulty recollection of their child’s experience. Also, more extended follow-up may have revealed long-term complications we have not yet recognized. We do accept that a small but unknown percentage of IT patients will experience symptomatic rehypertrophy. Very young children, whose tonsillar tissue has not yet reached maximal size, are probably at greater risk of rehypertrophy than older children.

In conclusion, children younger than 3 years may undergo IT as outpatients without sacrificing safety or efficacy.

**Results of Intracapsular Tonsillectomy in Children Aged Younger Than and Older Than 36 Months**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Aged &lt; 36 mo (n = 36)</th>
<th>Aged &gt; 36 mo (n = 166)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pain (0-10 scale)</td>
<td>2.21 (2.4)</td>
<td>2.36 (1.7)</td>
<td>.32</td>
</tr>
<tr>
<td>Days until first normal meal</td>
<td>1.18 (1.0)</td>
<td>1.46 (1.0)</td>
<td>.05</td>
</tr>
<tr>
<td>Days until first normal activity</td>
<td>1.91 (1.6)</td>
<td>2.21 (1.3)</td>
<td>.17</td>
</tr>
<tr>
<td>Days requiring codeine</td>
<td>1.05 (1.9)</td>
<td>0.82 (1.1)</td>
<td>.16</td>
</tr>
<tr>
<td>Days requiring acetaminophen</td>
<td>1.95 (2.3)</td>
<td>2.12 (1.5)</td>
<td>.27</td>
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</tbody>
</table>

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