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Adenoidectomy: Selection Criteria for Surgical Cases of Otitis Media

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***Objective:* Nasopharyngeal adenoids may serve as a mechanical obstruction to the eustachian tube and contribute to the pathophysiology of otitis media (OM). The purpose of this study was to determine whether abutment of adenoids laterally against the torus tubaris affects the outcome of patients requiring pressure equalization tubes (PET) for OM. *Study Design:* Randomized, controlled, prospective clinical trial. *Method:* Patients requiring PET for recurrent acute OM or OM with persistent effusion were randomized into two groups: 1) PET placement and 2) PET placement and adenoidectomy, regardless of whether the adenoids were abutting or not abutting the torus tubaris. Patients were followed for a minimum of 1 year to determine rate of treatment failure, defined as recurrence of acute OM (>3 times/year), OM with effusion, or reinsertion of PET. *Results:* Of the 34 patients in the abutting group, 16 patients underwent only PET insertion, of whom 8 (50%) failed, whereas 18 patients had combined PET placement and adenoidectomy, of whom 3 (17%) failed. There was a statistical difference between these two groups ($P < .05$). Of the 29 patients in the nonabutting group, 24 patients underwent only PET insertion, of whom 9 (37.5%) failed, whereas 5 patients underwent combined PET placement and adenoidectomy, of whom 2 (40%) failed. There was no statistical difference between these two groups ($P = .92$). *Conclusion:* This study demonstrates that the position of hypertrophied adenoids may alter the final otologic outcome of patients requiring PET insertion for OM. Patients with adenoids abutting the torus tubaris may benefit most from an adjuvant adenoidectomy. *Key Words:* Adenoidectomy, torus tubaris, pressure equalization tubes, otitis media.**

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INTRODUCTION

Otitis media (OM) is a major pediatric health care issue. An estimated 90% of children will have had at least one episode of acute OM by the age of 7.[1] OM is both the most common childhood disease for which medical attention is sought and the most common indication for surgery, resulting in annual cost in the billions of dollars. Myringotomy and insertion of pressure equalization tubes (PET) is the most frequently used surgical treatment option.

Adenoid hypertrophy is believed to play a dual role in the etiology of OM. First, it may serve as mechanical obstruction to the orifice of the eustachian tube (ET) in the nasopharynx, thereby limiting the drainage of the middle ear.[2,3] Second, they may serve as a reservoir for infection, providing a bacterial source for OM.[4] Adenoidectomy, as adjuvant surgical therapy, may improve the outcome of OM by either removing this bacterial focus or by improving the function of the ET. Despite the fact that current guidelines recommend adjuvant adenoidectomy in the surgical treatment of OM with effusion,[5] there remains some controversy regarding the specific selection criteria.[6]

To our knowledge, there has not been a study examining the effect of lateral position of hypertrophic adenoids on OM. The purpose of this study was to determine whether adenoidectomy and the abutment of adenoids against the torus tubaris affects the otologic outcome of patients requiring PET insertion tubes for OM. Our hypothesis is that the lateral position of the hypertrophic adenoids interferes with the function of the ET and that adenoidectomy in such cases would result in less recurrences of OM after PET insertion. This could allow for the refinement of the selection criteria for adenoidectomy in children with OM and perhaps improve our understanding of the obstructive mechanism of OM.

MATERIALS AND METHODS

This randomized, controlled, prospective clinical trial was carried out over a 60-month period from January 1998 to January 2003. The study was undertaken exclusively at the Montreal Children's Hospital, a tertiary care pediatric hospital affiliated with McGill University (Montreal, Canada). Children (aged between 18 months and 18 years) who required PET insertion as their first surgical treatment of OM were eligible for the study. Demographic data included patient age and sex.

The indications for surgery were 1) recurrent OM with more than three episodes during the preceding 6-month period or more than four during the preceding 12 month period; 2) OM with effusion persisting for more than 3 months or producing a conductive hearing loss (HL) greater than 30 dB with a type B tympanogram; or 3) both. The exclusion criteria were presence of 1) previous PET insertion; 2) Down syndrome; 3) craniofacial anomalies such as cleft palate; 4) immune deficiency; 5) bleeding disorders; 6) ciliary dyskinesia; and 7) a follow-up period of less than 6 months.

After receiving consent from the family of patients, patients were randomized to two groups. The control group received the standardized treatment of PET (Reuter-Bobbin without holes) insertion. The experimental group had both PET insertion and adenoidectomy. The adenoids were removed using the previously described technique of systematic cautery liquefaction and suction ablation under clear vision.[7]

Intraoperatively, the adenoid tissue was examined with a laryngeal mirror. The lateral extension of the adenoids as well as the adenoid size were assessed. Adenoid tissue, seen to be abutting the torus tubaris and compressing the ET orifice, was classified as "abutting" the ET orifice (Fig. 1). Adenoid tissue not abutting and compressing the ET orifice was classified as "not abutting" on the ET orifice, regardless of the size and height of the adenoid pad that might be obstructing the nasal choanal area (Fig. 2). Again, the randomization of surgical treatments was taken preoperatively regardless of abutting status of adenoid tissue. For ethical reasons, patients found to have adenoids completely obstructing their nasopharynx (adenoid hypertrophy 80–100%) underwent adenoidectomy, despite their initial randomization.

All procedures were performed as outpatient day surgery. All patients undergoing adenoidectomy routinely received 10 days of postoperative amoxicillin (azithromycin if penicillin allergic).

Patients were followed at month 1 postoperatively and then at maximum intervals of 6 months thereafter. Patients filled out a questionnaire, which they brought back on each subsequent visit regarding OM occurrences and their treatments. Clinical assessment by the otolaryngology staff was carried out to determine the rate of treatment failure, defined as 1) recurrence of acute OM more than three times per year or more than two times per 6 months; 2) OM with persistent effusion for more than 3 months or causing greater than 30 dB HL; and 3) eventual reinsertion of PET. Incidences of OM related to patient noncompliance with water-protection (i.e., swimming-related) were excluded from the final analysis. All cases of OM of any type were treated with a course of oral antibiotics.

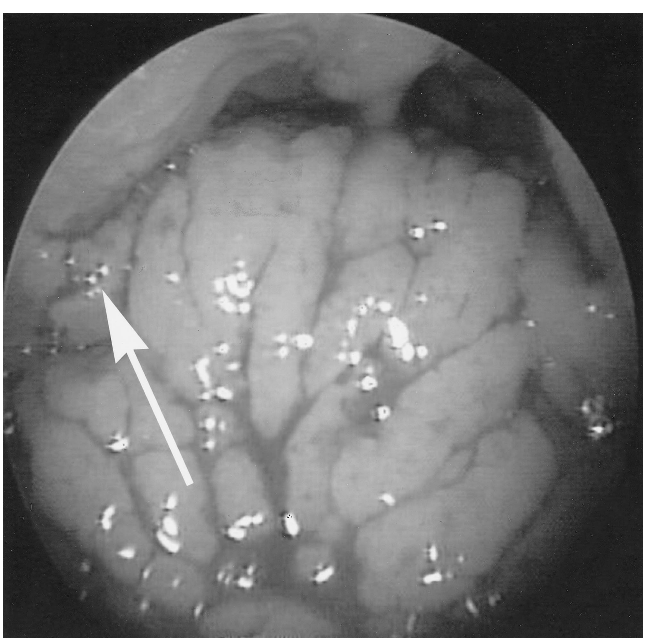

Fig. 1. Abutting adenoids. Hypertrophic adenoids encroaching onto the torus tubaris (arrow).

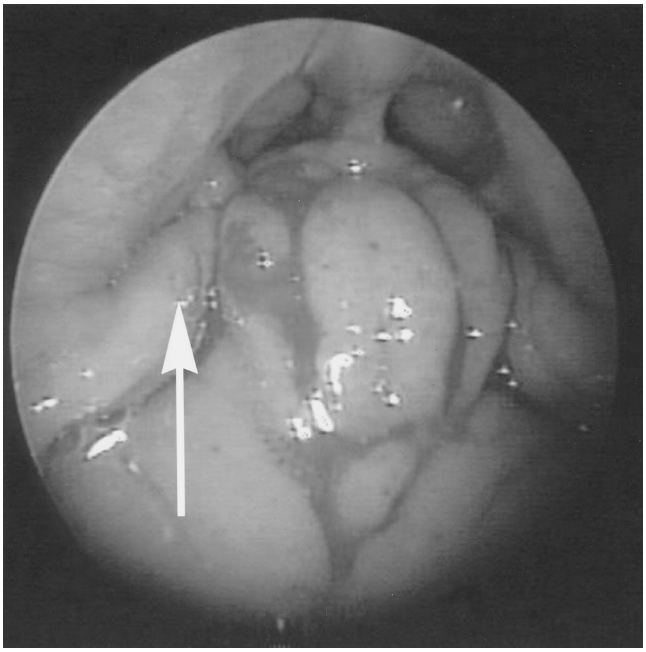

Fig. 2. Nonabutting adenoids. Hypertrophic adenoids not encroaching onto the torus tubaris (arrow).

All preoperative, intraoperative, and postoperative assessments were either carried out or supervised by the study-team otolaryngologist. Statistical analysis was carried out using the chi-square test, with statistical difference defined as $P < .05$.

RESULTS

A total of 72 eligible patients were enrolled in the study. Two patients were not included in the final analysis because their adenoids were found to be completely obstructing their nasopharynx and subsequently underwent adenoidectomy. Seven patients did not complete the study because of inadequate follow-up of less than 12 months. Of these seven patients, 5 (71%) were randomized to the experimental group.

Therefore, 63 patients were randomized to the control and experimental groups. Selected demographic and clinical characteristics for patients in each subgroup are summarized in Table I. There were no statistical differences in these characteristics between the different subgroups. In the study population, 15 (24%) patients underwent surgery for the indication of recurrent OM, 32 (51%) patients for OM with effusion, and 16 (25%) patients for both recurrent OM and OM with effusion.

A total of 40 (63%) patients underwent only PET placement, and there were 17 (42.5%) failures. Twenty-three (37%) patients had both PET insertion and adenoidectomy, with 5 (21.7%) failures. Although there was no statistical difference in the final otologic outcome between the two groups ($P = .096$), there is a trend toward significance (Fig. 3).

TABLE I.
Demographic and Clinical Characteristics.

	Control Group (PET insertion)	Experimental Group (PET + Adenoidectomy)
All comers		
Mean age, years (range)	3.4 (1.5–6.5)	4.5 (1.5–9.5)
Sex (% male)	60	57
Degree of adenoid hypertrophy (%)	35	50
Abutting group		
Mean age, years (range)	3.7 (2.0–6.5)	4.5 (1.5–9.0)
Sex	62	62
Degree of adenoid hypertrophy (%)	45	55
Nonabutting group		
Mean age, years (range)	3.1 (1.5–6.5)	4.6 (2.0–9.5)
Sex (% male)	58	40
Degree of adenoid hypertrophy (%)	25	35

PET = pressure equalization tube.

With regards to the adenoids, 34 (54%) patients were categorized as having abutment on the torus tubaris, whereas 29 (46%) patients had nonabutting adenoids. Of the 34 patients in the abutting group, 16 patients underwent PET placement, of whom 8 (50%) failed, whereas 18 patients had PET insertion and adenoidectomy, of whom 3 (16.7%) failed. There was a statistical difference between these two groups ($P < .05$) (Fig. 4).

Of the 29 patients in the nonabutting group, 24 patients underwent PET placement, of whom 9 (37.5%) failed, whereas 5 patients underwent PET insertion and adenoidectomy, of whom 2 (40%) failed. There was no statistical difference between these two groups ($P = .92$) (Fig. 5).

DISCUSSION

Adenoidectomy and adenotonsillectomy are the second most common pediatric surgical procedures performed in North America after PET insertion. Multiple studies have addressed the issue of adjuvant adenoidectomy and adenotonsillectomy in their effectiveness in preventing and altering the outcome of OM. In the treatment of chronic OM with effusion, Gates et al.[8] revealed the effectiveness of adjuvant adenoidectomy, whereas Maw[2] found a significant benefit with adjuvant adenotonsillectomy. In a subsequent study by Maw and Bawden,[9] the authors demonstrated that adenoidectomy could reduce the need for retreatment with PET insertion. In randomized clinical trials, Paradise et al.[10] showed limited short efficacy of both adenoidectomy and adenotonsillectomy. Coyte et al.[11] showed that adjuvant adenoidectomy or adenotonsillectomy substantially reduced the likelihood of additional hospitalizations and operations related to OM.

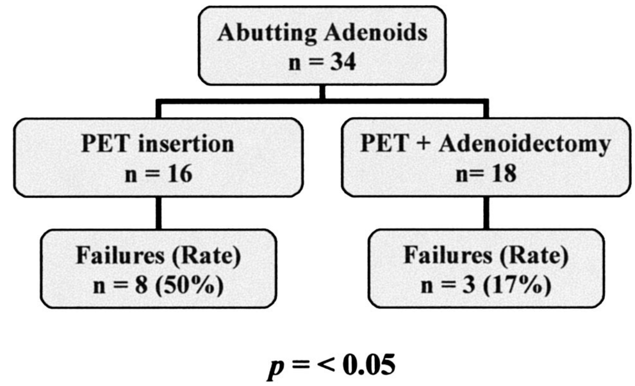

Fig. 4. Failure rates in patients with “abutting adenoids.”

However, adenoidectomy is not without potential complications. The risks associated with adenoidectomy include velopharyngeal incompetence, nasopharyngeal stenosis, and, most commonly, postoperative bleeding. The clinician must weight the risks, morbidity, and cost of adjuvant adenoidectomy in deciding which children would benefit from these procedures.

In our previous study, we examined all patients booked for elective adenoidectomy, regardless of concurrent PET insertion.[12] After assessing for abutment, we found that only 22% of cases booked for adenoidectomy alone had abutment against the torus tubaris. In contrast, 60% of patients requiring both adenoidectomy and PET insertion had abutment against the ET orifice. Presumably, abutting adenoids altered the function of the ET and had a higher incidence of OM requiring PET insertion. With this study, we address the issue of the role of the lateral position of adenoids and the role of adenoidectomy in the otologic outcome in patients undergoing PET insertion for OM.

We measured otologic outcome in terms of recurrent episodes of acute OM, OM with persistent effusion, and

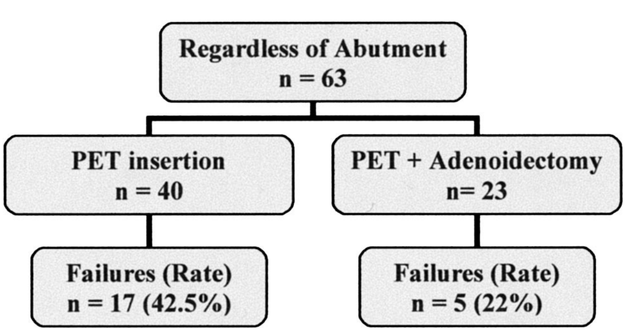

Fig. 3. Failure rates in all-comers, regardless of adenoid abutment.

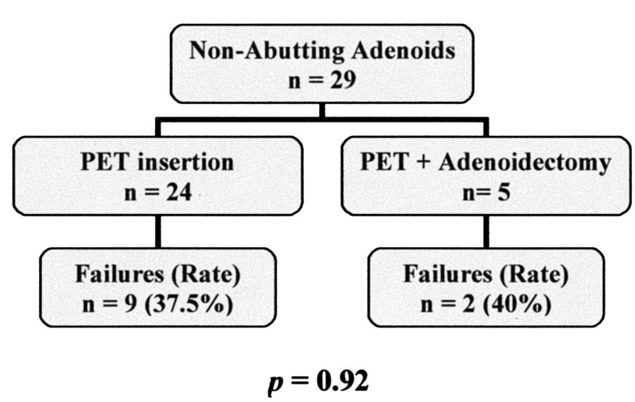

Fig. 5. Failure rates in patients with “non-abutting adenoids.”

ultimately the need for retreatment with PET insertion. Although the literature defines indications for surgery as more than three episodes of OM within 6 months or more than four episodes within 12 months, we wanted to be more stringent and purposely defined failure as recurrent OM of more than two episodes within 6 months or more than three episodes within 12 months.

When comparing failure rates among all patients undergoing PET insertion versus PET insertion with adenoidectomy, regardless of abutment of the adenoids, there was a trend toward statistical reduction of OM recurrences. In the subgroup of patients with no abutment of the adenoids, there was also no statistical difference in outcome between the two surgical groups (Fig. 4). Indeed, there was only one subgroup of patients that did benefit from adjuvant adenoidectomy. The group of patients with abutting adenoids showed that adenoidectomy statistically improved their otologic outcome (Fig. 3).

These findings raise a few issues. First, adjuvant adenoidectomy does not appear to benefit all patients ($P = .096$). It may therefore be prudent not to consider adenoidectomy as a first surgical intervention in children with OM. However, there is a trend toward significance, suggesting that, if we were able to refine the selection criteria, we may potentially avoid thousands of unnecessary surgeries each year and their attendant risks. We suggest reserving adenoidectomy for treatment of OM in patients where examination of the nasopharynx reveals abutting adenoids. This decision for adenoidectomy may be made preoperatively using a direct laryngoscope or intraoperatively at the time of PET insertion.

Second, this finding suggests that adenoids do not contribute to the etiology of OM solely through its role as a bacterial reservoir. Had this been the case, all groups should have shown improvement after adenoidectomy, regardless of their abutment status. Because only the abutting group showed improvement, our data supports the hypothesis that the lateral position of the adenoid tissue may exert an obstructive influence on the ET lumen and may play a role in the pathophysiology of OM. This is in keeping with previous reports that adenoidectomy can relieve manometrically proven ET obstruction.[13]

Last, the size of the adenoids did not correlate with the failure rates, suggesting that the lateral position of the adenoids played more of a role than the overall degree of hypertrophy. Of note, because the mean average follow-up time was 29 months, the proposed benefits of adenoidectomy cannot be proposed on a long-term basis.

There are limitations to the study. First, there is the possibility of observer bias. In between visits to the otolaryngologist, the diagnosis of OM was made by the patient's pediatrician or primary care physician. In these situations, diagnosis was based on otoscopic examination and not confirmed by tympanometry. In addition, seven patients were excluded because of inadequate follow-up, with a disproportionately higher number of patients randomized to the experimental group. This may also lead to bias. Last, certain factors were not taken into account, namely the duration and severity of each episode of OM and the presence of confounders such as allergies and attendance at day care.

CONCLUSION

To our knowledge, this is the only study demonstrating that the lateral position of the hypertrophied adenoids, with abutment on the ET orifice, is a contributing factor in the final otologic outcome of patients requiring PET insertion for OM. Furthermore, our data supports the hypothesis that adenoid tissue plays a significant role in the pathophysiology of OM. In addition to being a bacterial reservoir, hypertrophic adenoid serves as a mechanical barrier to the ET lumen, causing middle ear underpressures and subsequent effusion formation.

Finally, we may be able to refine the selection criteria for adenoidectomy in patients undergoing PET insertion for OM. We have identified a subgroup of patients with an adenoid pad that is found intraoperatively to be abutting and compressing the orifice of the ET that benefits most from an adjuvant adenoidectomy.

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