Auris Nasus Larynx 39 (2012) 407–410

Contents lists available at SciVerse ScienceDirect

Auris Nasus Larynx

journal homepage: www.elsevier.com/locate/anl

Comparing postoperative quality of life in children after microdebrider intracapsular tonsillotomy and tonsillectomy

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ARTICLE INFO

Article history:
Received 23 February 2011
Accepted 24 October 2011
Available online 25 November 2011

Keywords:
Tonsillotomy
Tonsillectomy
Microdebrider
Postoperative quality of life

ABSTRACT

Objective: To evaluate postoperative quality of life in patients undergoing microdebrider intracapsular tonsillotomy and adenoidectomy (PITA) in comparison with traditional adenotonsillectomy (AT) and to assess PITA's efficacy in solving upper-airway obstructive symptoms.
Methods: 29 children with adenotonsillar hyperplasia referred for AT were included. Patients were divided into two groups: Group 1 (underwent PITA) included 14 children (age 5.1 ± 1.8 years) affected by night-time airway obstruction without a relevant history of recurrent tonsillitis; Group 2 (underwent AT) included 15 children (age 5.2 ± 1.7 years) with a history of upper-airway obstruction during sleep and recurrent acute tonsillitis. Outcomes measures included the number of administered pain medications, time before returning to a full diet, Obstructive Sleep Apnea survey (OSA-18), parent's postoperative pain measure questionnaire (PPPM) and Wong–Baker Faces Pain Rating Scale (WBFPRS).
Results: Postoperative pain was significantly lower in the PITA group, as demonstrated by PPPM and WBFPRS scores and by a lower number of pain medications used. PITA group also resumed a regular diet earlier ($P < 0.001$). OSA-18 scores proved that both PITA and AT were equally effective in curing upper-airway obstructive symptoms.
Conclusion: PITA reduces post-tonsil ablation morbidity and can be a valid alternative to AT for treating upper-airway obstruction due to adenotonsillar hyperplasia.

1. Introduction

Adenotonsillectomy (AT) is one of the most common surgical procedures for children, especially before school age. It is performed either for recurrent unresponsive episodes of tonsillitis or for sleep-related airway obstruction due to adenotonsillar mass effect, and both clinical conditions often coexist in the same patient. When obstruction is severe, hypertrophy of the adenoids and tonsils may cause daytime sleepiness, failure to thrive and even dysphagia. In its most severe form, such hypertrophy causes obstructive sleep apnea syndrome (OSAS). For otherwise healthy children diagnosed with OSAS, adenotonsillectomy is the initial treatment of choice [1].

Tonsillectomy is a well-established technique with significant postoperative morbidity; it exposes patients to a postoperative hemorrhagic risk estimated at between 2% and 7% [2]. Furthermore, oropharyngeal pain is usually severe post-tonsillectomy and often leads to poor oral intake and dehydration.

Recently, the reintroduction of subtotal tonsil removal in otolaryngological practice has been proposed to minimize perioperative morbidity [3]. Several techniques have been used to remove the bulk of the tonsils, including radiofrequency [4], bipolar cautery, coblation [5], harmonic scalpel [6], CO_2 laser [7], and the microdebrider, described for the first time by Koltai et al. in 2002 [8]. Microdebrider technique was defined as powered intracapsular tonsillectomy and adenoidectomy (PITA) [9] and was subsequently adopted by several authors [3,10–16].

The purpose of subtotal tonsillectomy, also known as tonsillotomy, is to reduce the tonsillar mass, eliminating the causes of obstruction while leaving a thin slide of tissue to protect the vessels and sensitive nerve fibers passing through the capsule. This technique thus reduces postoperative morbidity, especially concerning pain and potential bleeding. The tonsillotomy is usually only recommended for children who are not affected by recurrent episodes of tonsillitis, because of the theoretical possibility of reinfections of the residual tissue [17]. Despite the potential advantages of subtotal tonsil ablation, tonsillotomy is not widely applied in the current clinical practice, at least in our country.

The aim of this study was to evaluate postoperative quality of life in patients undergoing PITA in comparison with those

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doi:10.1016/j.anl.2011.10.012

undergoing traditional AT and to assess PITA's efficacy in resolving upper-airway obstructive symptoms.

2. Methods

2.1. Patients

This prospective clinical trial included 29 children with adenotonsillar hypertrophia who were referred for AT between January and June 2010, divided into two groups based on their clinical history. The main inclusion criteria for this study were: tonsillar hypertrophy (grades 3–4 according to Brodsky [18]) and respiratory obstruction during sleep. The 2 groups were not statistically different for both criteria. Group 1 consisted of 14 children (age range: 3.5–9.1 years, mean 5.1 ± 1.8) affected by night-time airway obstruction with no relevant history of recurrent tonsillitis. Group 2 included 15 children (3.5–9.4 years old, mean 5.2 ± 1.7) with a history of upper-airway obstruction during sleep and recurrent acute tonsillitis (5–8 episodes in the 12 months preceding surgery). Children in Group 1 underwent PITA, while standard AT was performed for children in Group 2. The choice of tonsillotomy vs tonsillectomy was influenced by the number of episodes of acute tonsillitis during the previous year, nevertheless the degree of obstruction was comparable in the 2 groups.

Exclusion criteria included prior adenotonsillar surgery, craniofacial syndrome, obesity (BMI $>$ 95th percentile), and neurological impairment.

A signed consent was obtained from the parents of all children. The study was approved by the institutional review board of Fondazione Ca' Granda Ospedale Maggiore Policlinico.

All children underwent nocturnal polysomnography using an Embletta PDS portable diagnostic system (PDS, Medcare; Reykjavik, Iceland). The Embletta PDS is a digital multichannel recording device that measures airflow through a nasal cannula connected to a pressure transducer, oxygen saturation through an oximeter with finger probe, and both respiratory and abdominal movements via built-in effort and body position sensors. Polysomnography was performed prior to surgery and was repeated 6 months after operation. An apnea–hypopnea index (AHI) was determined based on recording time.

2.2. Surgical technique

All children underwent adenotonsillar surgery under general anesthesia in Rose position, with the mouth held open with a mouth gag. PITA was performed in Group 1 patients using a Gyrus microdebrider (GYRUS ACMI, Southborough, MA, U.S.A.) with an angled 4-mm-diameter blade at a speed of 1.500–2.000 rpm for intracapsular tonsil removal. Careful attention was paid to avoid trauma to the pharyngeal pillars, tonsillar capsule and pharyngeal constrictor muscle. Dissection was performed, leaving a slim, concave rim of tonsil tissue to better preserve the capsule and protect vessels, and terminal nerves. Hemostasis was achieved using bipolar cautery as needed.

Children in Group 2 underwent traditional AT. Blunt dissection was performed in the plane separating the tonsillar capsule from the pharyngeal muscle, and bleeding was controlled via bipolar cautery.

In both groups, adenoidectomy was performed under endoscopic direct vision with a rigid 70° 4-mm endoscope. The soft palate was retracted with two catheters via curette and was completed by microdebrider, if needed.

Intraoperative antibiotic treatment was administered (Ceftriaxone at a dose of 50 mg/kg with a maximum of 1200 mg). Antibiotic therapy was continued for 6 days postoperatively (Cefixima at a single daily dose of 8 mg/kg with a maximum of 400 mg).

All patients received a codeine/paracetamol suppository intraoperatively at a dosage of 5/200 mg. The pain control medication prescribed for the postoperative days was codeine/paracetamol syrup at a dosage of 1 ml/kg (1.5/25 mg) every 6 h with a maximum of 4 administrations per/day, to be given if the VAS pain score was $\geq$3.

All operations (both PITA and AT) were performed in a University Hospital (Fondazione Ca' Granda Ospedale Maggiore Policlinico) in Milan by two of the authors (18 operations by G.C. and 11 by L.P.) with 20 years' experience in otolaryngological surgery.

2.3. Quality of life assessment

Postoperative quality of life was evaluated as follows:

- Parents were instructed to complete a daily diary for 21 days after surgery, indicating the number of dosages of pain medicines administered to the child and the type of diet consumed.
- The Obstructive Sleep Apnea questionnaire OSA-18 [19] was administered to the parents prior to surgery and 4 weeks after the operation to assess the impact of upper-airway obstruction on the children's quality of life. This questionnaire consists of 18 questions divided into 5 domains: sleep disturbance, physical symptoms, emotional distress, daytime functions and caregiver concerns. Each question is scored on a 7-point ordinal scale. It is a validated health-related quality of life measure of pediatric sleep-disordered breathing and changes over time. The OSA-18 questionnaire has been shown to correlate with the number of apneas and hypopneas per hour of sleep [20].
- The parents' postoperative pain measure questionnaire (PPPM) [21] was administered to the children's parents at postoperative days 1, 7 and 15, at the time of the children's postoperative follow-up examinations. This instrument measures pain-related behavior. It was validated in Canada by Chambers et al. and highly corresponds to postoperative pain [22]. The parents completed a behavioral checklist by circling "yes" or "no" responses. Scores were calculated by counting the number of "yes" responses to the 29 items.
- The Wong–Baker Faces Pain Rating Scale (WBFPRS) [23,24] was used to better analyze postoperative pain with a visual analog scale (VAS) of 1–10. This instrument was used in the first 7 postoperative days by the patients and by caregivers when the patient was too young to comply.

2.4. Statistical analysis

Because of the small number of subjects in each group, nonparametric tests were used. The Friedman and Wilcoxon tests allowed us to compare repeated measures in each group, while the Mann–Whitney test was used to evaluate between-group differences.

To estimate whether the two surgical techniques had a different impact on postoperative quality of life over time, we applied a general linear model (GLM) for the variables "PPM", "WBFPRS", and "OSA-18" separately, with "time elapsed from surgery" as a within-subject factor, "type of surgical technique" and "gender" as between-subjects factors and "age" as the covariate. A $P < 0.05$ was considered statistically significant. These data were statistically analyzed using the SPSS program release 17.0 (SPSS Inc., Chicago, IL, USA).

3. Results

Both groups of children were similar for age and gender (P = ns). Polysomnography data were not different in the two groups, confirming that the entire cohort was homogeneous in its degree of