Microdissection Needle Tonsillectomy and Postoperative Pain

A Pilot Study

Jonathan Perkins, DO; Ravinder Dahiya, MD

Objective: To determine whether microdissection needle cautery for tonsillectomy results in decreased postoperative pain when compared with standard electrocautery.

Design and Setting: A randomized prospective study of 2 groups of young children in an academic pediatric otolaryngology practice.

Subjects: Forty-two healthy children between the ages of 4 and 12 years.

Intervention: The 42 children were randomly assigned to 2 groups: in group A, the tonsillectomy was performed with standard monopolar electrocautery tip at 20 W; in group B, the microdissection needle was used at 8 W. The same surgeon performed each tonsillectomy. Other aspects of the procedure were constant, including patient positioning, intraoperative injection of 0.25% bupivacaine hydrochloride (Marcaine), a weight-appropriate dose of steroids, and the use of postoperative antibiotics.

Outcome Measures: The subjective measure of postoperative pain was a questionnaire based on a standard visual analog scale ranging from 0 to 10. More objective measures included the doses of pain medications consumed and the tolerance of oral intake.

Results: There was no statistical significant difference in the amount of intraoperative hemorrhage between groups (P > .01). Operative time was on average 3.2 minutes longer in group B (11 minutes vs 7.8 minutes). The postoperative pain as measured by the visual analog scale was significantly different on days 3, 4, and 5 in group B (P < .05). This difference in pain correlated to differences in the number of doses of pain medications used on the same days. There was no statistically significant difference between the 2 groups concerning the amount of fluids tolerated (P > .01).

Conclusions: Without any increase in complications, subjective and objective measurement showed that the use of the microdissection needle resulted in significantly less postoperative pain by day 3.


Despite the decline in the number of tonsillectomies performed over the past few decades, the procedure continues to be one of the most commonly performed operations in this country. Although tonsillectomy is considered routine and is performed in the ambulatory setting, it is not without significant morbidity. Some of the associated complications and morbidity have changed over the years as the technique of tonsillectomy has changed. Perhaps the most significant change in technique has been the use of electrocautery, which has steadily gained popularity. Prior to the use of electrocautery (the “hot” method), tonsillectomies were performed with scissors, a Fischer blade, and/or a snare (the “cold” method). The main reason for the change in methodology is the decrease in operative time and intraoperative hemorrhage with the use of electrocautery. Intraoperative and postoperative bleeding are the more common and feared complications of tonsillectomy as they can be life threatening. Thus, any reduction of intraoperative hemorrhage is an advance toward making the procedure safer. Unfortunately, the rate of postoperative hemorrhage is not improved with the use of cautery dissection; the rates, in fact, are the same. Furthermore, some surgeons continue to prefer the use of the cold technique because the electrocautery method is thought to result in increased postoperative pain.

Postoperative pain can be especially detrimental in tonsillectomies because it interferes with appropriate oral intake. Children are especially prone to dehydration because they lack the understanding...
The indication for surgery in both groups was recurrent tonsilitis or tonsillar hypertrophy. Assignment to the groups followed the decision to perform surgery. The patients were randomly assigned to the 2 groups, which were matched for age and sex. Patients were excluded if they had an identified chromosomal or craniofacial syndrome or developmental delay of the craniofacial skeleton or the neuromuscular apparatus of the pharynx. Children with any underlying mental retardation were also excluded. A total of 42 children were included in the study.

The same surgeon (J.P.) performed all procedures, which were standardized except for the use of the dissecting instrument. In one group, the dissection was performed with the standard monopolar electrocautery tip (Suction Coagulator; Valley Lab, Boulder, Colo) at 20 W (group A). In the other group, the microdissection needle (Colorado Tip; Colorado Biomedical Corp, Evergreen, Colo) was used at 6 W during cutting, at 8 W during coagulation, and at blend 3, which is a melding of the 2 currents (group B). The other aspects of the procedure, including patient positioning, preoperative injection of 0.2% bupivacaine hydrochloride (Marcaine), intraoperative injection of dexamethasone sodium phosphate (Decadron) (0.5 mg/kg per dose up to 10 mg), and postoperative administration of antibiotics, remained constant.

After surgery, pain was assessed with a questionnaire based on a visual analog scale ranging from 0 to 10, which was filled out every day for 7 days. Parents were asked to record the doses of pain medication given to their children, as well as their children's tolerance of oral intake as a third indication of the amount of pain experienced. The statistics were analyzed using a standard 1-tailed t test.

There was no statistical significant difference in ages between the groups (6.52±2.16 [mean ±SD] years in group A and 6.76±2.07 years in group B; P=.72). There were also no significant differences in the amount of intraoperative hemorrhage (6.76±4.5 mL in group A and 8.91±5.2 mL in group B; P=.72). None of the patients in the study had a postoperative hemorrhage. The outcome measure of cups of fluid tolerated in the postoperative period also was not significantly different between the 2 groups (P>.05). The differences between the 2 groups in the visual analog scale pain scores on days 3, 4, and 5 were statistically significant (7.05, 5.19, and 4.71, respectively, in group A, and 5.33, 3.86, and 3.48, respectively, in group B; P=.01). The differences between the 2 groups in the visual analog scale pain scores on days 3, 4, and 5 were statistically significant (7.05, 5.19, and 4.71, respectively, in group A, and 5.33, 3.86, and 3.48, respectively, in group B; P=.05 in all cases) (Figure 1). The differences between the groups in doses of pain medications consumed on days 3, 4, and 5 were statistically significant (3.59, 2.00, 1.90, respectively, in group A, and 2.29, 1.38, 1.29, respectively, in group B; P<.05) (Figure 2). Over the 7-day period, group A consumed on average 18 doses of narcotic medication, while group B only averaged 14 doses. The difference in operative time was also found to vary significantly, with an average time of 11 minutes in group B and 7.8 minutes in group A (P=.05).

The results of this study are encouraging. Each postoperative day, there was an obvious difference between the 2 groups both in the subjective measures of pain
and in the objective measurement of analgesic doses consumed. These differences reached statistical significance by postoperative day 3 \((P<.05)\). In fact, the objective measurement of analgesic dosing was 30% to 40% lower on days 3, 4, and 5. Over the entire period, the microdissection tip group used 20% less narcotic medication. Moreover, on the first 2 postoperative days, the subjective pain scores in the microdissection group were 15% to 20% lower than those of the standard cautery group, even though this finding was not statistically significant \((P>.02)\). These results support our hypothesis and the findings of the Farnworth and colleagues' that less thermal injury results in less pain. Perhaps just as important is that there was no increase in morbidity associated with the use of the microdissection needle tip; ie, there was no difference in intraoperative or postoperative hemorrhage.

On the days that statistical significance was reached for both pain scores and doses of narcotics, the \(P\) values were well below the conventionally accepted .05 \((\text{range, } .002 \text{ to } <.001)\). Considering the relatively small sample size in our study, the strength of this difference is impressive. Perhaps with a larger group, the trends we have established could have been further substantiated on earlier postoperative days. Another strength of our study is the limited age range of the patients. Many of the studies in the literature compare mixed populations, ie, adults and children, thus possibly introducing a confounding variable. We chose to limit our population to patients between the ages of 4 and 12 years, because in this age group children are not so young that they cannot verbally express their pain yet they are not quite old enough to self-report. The age restrictions may have provided more uniformity between treatment groups than other tonsillectomy studies have offered.

One criticism that can be made is that there was a difference in the operative time, with the use of microdissection tip taking approximately 3 minutes longer. Some of this difference may be attributed to surgeon experience. The use of the needle tip does require a more meticulous dissection, as controlling a bleeding vessel is more difficult than with a standard bovie tip because there is a narrower field of cauterization with the needle tip. To control bleeding with the microdissection tip, the blood vessel must be visualized—magnification is unnecessary—and cauterized for several millimeters before the surgeon cuts across the vessel. The decreased energy used for dissection does not allow control of brisk bleeding. In this situation, standard suction cautery or direct pressure is necessary. It is certainly reasonable to assume that a surgeon may decrease operative time with further experience. Although even if the 3 minutes of increased operative time does not change, in our opinion this increase is more than offset by the decrease in postoperative pain that was experienced by the patients in our study.

Our clinical results are supported by previous studies in which the histologic appearance of tissue that was subjected to the microdissection needle tip was compared with that of tissue that was subjected to the standard electrocautery method.\(^7\) These studies have shown a decrease in the thermal injury incurred by the tissues that were subjected to the needle tip, which is believed to be attributable to the diminished power requirement of the more focused needle.

Reducing posttonsillectomy pain and morbidity, while maintaining the speed of the surgery, has been a long-standing challenge. Over the past few years, a number of new devices that reduce thermal injury have been used for tonsillectomy.\(^8\) Despite these advances in equipment, electrocautery is widely used for tonsillectomies because of the ease and speed with which it can be used.\(^9\) Harmonic scalpel techniques have been used for tonsillectomy, without conclusive evidence that they reduce postoperative pain.\(^10\) Coblation tonsillectomy has been shown to reduce thermal injury to the operative site, but the postoperative recovery was not improved and operative time was longer than with electrocautery.\(^12\) In retrospective analyses, microdebrider intracapsular tonsillectomy has been reported to decrease postoperative pain because there is no pharyngeal muscle trauma involved.\(^13\) Currently, to our knowledge, there are no published reports of prospective randomized tonsillectomy trials with this device, nor do we know how many patients treated with tonsillectomy will ultimately require tonsillectomy. The microdissection needle is inexpensive (approximately $40), and its use at low energy settings in experienced hands reduces postoperative pain, but the operative time is slightly longer than that of standard electrocautery tonsillectomy.

Preliminary conclusions in our study demonstrate that with no increase in morbidity the use of the microdissection needle does result in a significant decrease in posttonsillectomy pain in pediatric patients as measured by 2 outcome measures.

Submitted for publication May 14, 2002; final revision received March 12, 2003; accepted April 24, 2003.

The microdissection needle tips used in this study were provided by Colorado Biomedical Corporation, Evergreen, which provided no other financial benefits during the study. Also, there is, and will be, no financial relationship between the authors and Colorado Biomedical Corporation.

This study was presented orally at the 16th Annual Meeting of the American Society of Pediatric Otolaryngology; May 11, 2001; Scottsdale, Ariz.
Corresponding author and reprints: Jonathan Perkins, DO, Childrens Hospital Regional Medical Center MS 6E-1, Division of Pediatric Otolaryngology, 4800 Sand Point Way NE, PO Box 5371, Seattle, WA 98105-0371 (e-mail: jonathan.perkins@seattlechildrens.org).

REFERENCES


Call for Photographs

ARCHIVES OF OTOLARYNGOLOGY–HEAD & NECK SURGERY Covers

Do you have a scenic photograph you have taken that you think would make a great cover shot? We’d love to see it! Submissions should be from our readers, reviewers, authors, or anyone affiliated with the journal, and MUST be formatted horizontally. They can be black and white or color and at least 3.5 × 5 in but no larger than 8 × 10 in. If you wish to submit a digital photograph, please see our digital art submission guidelines located on our Web site: www.archoto.com. Due to legal concerns, no recognizable people should appear in the picture, and please include details about where the picture was taken, how you happened to be there, and anything else you think is interesting about the image. We need the photographer’s complete name, highest academic degree, city and state of residence, and a statement explaining how he or she is affiliated with the journal. Send submissions to ARCHIVES OF OTOLARYNGOLOGY, 1440 Clifton Rd NE, Suite 400, Atlanta, GA 30322. If you would like your photo returned, please enclose a self-addressed, stamped envelope. Cover photos will be chosen at the discretion of the ARCHIVES editorial staff.

Michael M. E. Johns, MD
Editor