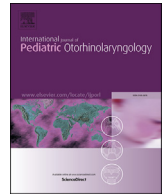




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Utilization and trends in surgical instrument use in pediatric adenotonsillectomy

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ABSTRACT

Objective: Examine trends in surgical instrument usage for pediatric adenotonsillectomy.**Methods:** An online survey asking questions about current and previous surgical instrument use was created by the authors and distributed to 517 members of the American Society of Pediatric Otolaryngology in October 2015. The survey was designed to assess trends in the use of surgical instruments in pediatric adenotonsillectomy by comparing the results of our 2015 survey to data from a previously published 2005 study.**Results:** 133 surveys were returned. The most common instruments for total tonsillectomy in 2015 were monopolar electrocautery (57.0%) and coblation (22.7%). The most common subtotal tonsillectomy instruments in 2015 were microdebrider with monopolar electrocautery (41.3%) and coblation (37.0%). The most common adenoidectomy instruments in 2015 were monopolar electrocautery alone (41.3%), coblation (15.1%), and microdebrider with electrocautery (15.1%).**Conclusion:** As compared to our 2005 study, our 2015 study demonstrates that the instrument choice for total tonsillectomy, sub-total tonsillectomy, and adenoidectomy have shifted away from cold techniques toward monopolar electrocautery and coblation.

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1. Introduction

Adenotonsillectomy is among the most commonly performed ambulatory procedures performed in the pediatric population. Over the past several decades, the indication for adenotonsillectomy has shifted toward obstruction and away from infection in younger children. Recurrent infection, however, becomes an important indication for surgical intervention as children grow older [1]. The most recent demographic studies estimate that 530,000–583,000 tonsillectomies with or without adenoidectomy, and another 132,000 adenoidectomies without tonsillectomy, are performed annually [2,3]. While the procedure is generally considered safe, several complications still exist. More commonly seen complications include sore throat, fever, dehydration, pain, and uvular edema. Less common, but more severe complications include postoperative hemorrhage, anesthetic and airway risks,

aspiration, and pulmonary edema [4]. Postoperative hemorrhage is the most significant and life threatening complication following adenotonsillectomy, but studies show it occurs infrequently in an estimated 0.22–3.5% of cases [5–7]. A multitude of factors affect the rates of complication including patient age, surgical technique, and instrument choice [8]. Several surgical techniques exist today for adenotonsillectomy with an aim to improve upon safety, efficiency, and acceptability, and may be achieved by reducing intraoperative time, blood loss, postoperative complication, and cost [9].

In 2005, our group surveyed members of the American Society of Pediatric Otolaryngology (ASPO) to examine trends of instrument usage in pediatric adenotonsillectomy [10]. The 2005 survey demonstrated that for total tonsillectomy, monopolar electrocautery was the most commonly used technique, and that cold knife dissection use had decreased in total tonsillectomy, while the use of coblation has increased. Microdebrider with electrocautery was found to be the most commonly used approach in subtotal tonsillectomy. For adenoidectomy, monopolar electrocautery was the most commonly use instrument, and while the use of microdebrider and coblation increased, the use of the curettage declined. This 2015 survey aim to provide an update on the most commonly

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used instruments for total tonsillectomy, subtotal tonsillectomy, and adenoidectomy and to identify the trends in instrument use as they continue to evolve.

2. Methods

An online survey asking questions about current and previous surgical instrument use was created by the authors and distributed to 517 members of the American Society of Pediatric Otolaryngology in October 2015 and left open to respondents until February 2016. The survey was designed to assess trends in surgical instruments use in pediatric adenotonsillectomy by comparing the results of our 2015 survey to data in our previously published 2005 study. The 2015 survey contained the same questions as the previous 2005 survey.

Our 2015 survey asked several demographic questions about the ASPO members to assess the physicians' years of practice, number of procedures performed per year, type and location of practice, and insurance of their practice's population. Our survey also assessed instrument choices for total tonsillectomy, subtotal tonsillectomy, and adenoidectomy by asking how often a particular instrument was used in each type of operation in percentages. This data was then used to determine what instrument was used a majority of the time by a particular physician. The survey further looked into factors that affected the physician's choice of instruments including: precision, cost, experience/ease of use, speed of procedure, avoidance of intraoperative hemorrhage, avoidance of postoperative hemorrhage, and avoidance of postoperative pain. These 7 were categories were ranked from 1 (most important) to 7 (least important) as reasons for choosing an instrument in total tonsillectomy, subtotal tonsillectomy, and adenoidectomy. We then reported the percent of physicians that chose a particular category as the most important factor in selecting an instrument.

Instruments used for total tonsillectomy and subtotal tonsillectomy included in the survey were bipolar electrocautery, coblation [ArthroCare Corp, Sunnyvale, CA], cold dissection, cold dissection with touch-up monopolar electrocautery, cold dissection with touch-up bipolar electrocautery, harmonic scalpel [Ethicon Endo-Surgery Inc., Cincinnati, OH], laser, microdebrider [Medtronic Xomed Inc., Jacksonville, FL], microdebrider with touch-up monopolar electrocautery, microdebrider with touch-up bipolar electrocautery, monopolar electrocautery, and other. The instruments included in the survey for adenoidectomy were adenotome, coblation, curettage, curettage with touch-up monopolar electrocautery, microdebrider, microdebrider with touch-up monopolar electrocautery, monopolar electrocautery, and other.

To compare the results of the 2015 and 2005 studies, a two-sided Pearson's chi-squared test was performed, and a Fisher's exact test comparison of proportion was performed when cell sizes were less than 5. Variables were collapsed and combined into "other" as noted for each table to provide at least 5 numbers in each cell in order to perform a chi-square test. "Other" also included techniques not specified by the responding physician. Analysis of variance (ANOVA) was used to determine differences in instrument use among physicians depending on years in practice. A p -value of <0.05 was used to identify statistically significant trends. Data was analyzed using IBM SPSS Statistics [IBM Corp., Armonk, New York]. This study was approved by the Advocate Institutional Review Board [IRB], and was exempt from ongoing IRB oversight.

3. Results

3.1. Demographic data

133 surveys were received from members of ASPO between

October 2015–February 2016, with a return rate of 25.7%. This is in comparison to our 2005 survey that had a return rate of 40% with 120 of 400 ASPO members having returned surveys. Surveys were returned from all regions of the United States: Northern-Atlantic (5.9%; 7/118 respondents), Central-Atlantic (20.3%; 24/118 respondents), Southern-Atlantic (18.6%; 22/118 respondents), Northern-Central (20.83%; 24/118 respondents), Southern-Central (18.6%; 22/118 respondents), Mountain-West (5.1%; 6/118 respondents), and Pacific-West (11.0%; 13/118 respondents). There were no statistically significant differences among the practice regions between the 2005 and 2015 studies as detailed in Table 1. 68.2% (91/133) of the respondents reported working in an academic setting, and 22.0% (29/133) work in a private practice affiliated with an academic center. 6.0% (8/133) of respondents reported working in a private practice only setting, and 2.3% (3/133) reported working as hospitalists. 78.0% (104/133) of respondents reported working in a large urban area $>300,000$ people. 17.4% (23/133) practice in a medium-sized urban setting of 100,000–300,000, and 4.6% (6/133) of respondents practice in areas with a population $<100,000$. In comparison to the 2005 survey respondents, there were no statistically significant differences in practice area population as detailed in Table 1. The experience of respondents was well distributed with 22.0% (29/133) having been in practice for 0–5 years, 15.8% (21/133) for 6–10 years, 16.5% (22/133) for 11–15 years, 11.3% (15/133) for 16–20 years, 17.3% (23/133) for 21–25 years, and 17.3% (23/133) for more than 25 years. There were statistically significant differences in the number of respondents among the groups 0–5 ($p < 0.001$) and 16–20 ($p = 0.003$) years in practice between the 2005 and 2015 studies. There were no other statistically significant differences between years in practice among the 2005 and 2015 survey as detailed in Table 1. Of the survey's respondents, 3.0% (4/132) perform 0–50 tonsillectomies and/or adenoidectomies annually, 38.6% (51/132) perform 51–200, 31.1% (41/132) perform 201–300, and 27.3% (36/132) perform greater than 300 per year.

3.2. Tonsillectomy

The numeric values listed in Table 2 represents the percent of respondents who report using an instrument in the majority ($>50\%$) of that particular physician's total tonsillectomy procedures. In 2015, the most common procedure used for total tonsillectomy was monopolar electrocautery with 57.0% (73/128) of responding physicians reporting its use for the majority of their procedures. Coblation was the second most common at 22.7% (29/128) in 2015, which is a slight increase from the 2005 survey (15.8%; 18/113 respondents). Cold dissection saw a significant decrease in use from 2005 (12.4%; 14/113 respondents) to 2015 (3.13%; 4/128 respondents); $p = 0.006$. In the 2015 study, there were no statistically significant differences in the types of instruments used for total tonsillectomy among respondents in practice for 0–5 years, 6–10 years, 11–15 years, 16–20 years, 21–25 years, and >25 years ($p = 0.605$).

The most important single factor influencing instrument choice for total tonsillectomy were experience/ease of use (28.5%; 35/123 respondents), avoidance of postoperative pain (18.7%; 23/123 respondents), avoidance of intraoperative hemorrhage (13.0%; 16/123 respondents), avoidance of postoperative hemorrhage (11.4%; 14/123 respondents), speed of procedure (11.4%; 14/123 respondents), cost (10.5%; 13/123 respondents), and precision (6.5%; 8/123 respondents).

3.3. Subtotal tonsillectomy

In the 2015 survey, 36.2% (47/130) of the respondents reported performing subtotal tonsillectomy. 56.5% (26/46) of these doctors

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