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Trends and Practices in Tonsil Surgery—A National Survey for Otorhinolaryngologists

Tapani Uusitalo[1] | Anniina Sakki[2] | Aleksi Laajala[3] | Jussi Jero[4] | Johanna Nokso-Koivisto[2] | Jaakko Piitulainen[1]

[1]Department of Otorhinolaryngology, Turku University Hospital and University of Turku, Turku, Finland | [2]Department of Otorhinolaryngology, Helsinki University Hospital and University of Helsinki, Helsinki, Finland | [3]Otorhinolaryngology, Faculty of Medicine, University of Oulu, Oulu, Finland | [4]University of Helsinki, Helsinki, Finland

Correspondence: Tapani Uusitalo (tapani.uusitalo@utu.fi)

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ABSTRACT

Objectives: To study the changes in tonsil surgery practice over a 10-year period and to survey opinions about its current use and future practice among Finnish otorhinolaryngologists.

Methods: An online survey was distributed between January and March of 2021 to otorhinolaryngologists in Finland.

Results: Altogether, 203 surveys were available for the analysis. Partial tonsil surgery has become the main surgical method, based on 75% of responders, for tonsillar hypertrophy in children over a 10-year period. A similar change did not exist in adults and for infectious indications, but the attitudes support change. The most common surgical technique was monopolar electrocautery and cold-steel dissection for extracapsular tonsillectomy and monopolar electrocautery and coblation for tonsillotomy. In choosing the method for tonsil surgery, the most important factors were the efficiency of symptom relief, familiarity, and avoidance of complications. In surgical practice, influencing a surgeon's choice the most was their residency experience, colleagues, and personal experience. A rather high percentage of opioid prescription (23%) after partial tonsil surgery was noted.

Conclusion: Here, in children, we report a paradigm shift toward partial tonsil surgery occurring within 10 years in the treatment of tonsillar hypertrophy. We also show that opinions support that this change may be used for adults and for infectious indications. A wide variety in tonsil surgery instruments ranging from newer techniques (e.g., coblation) to cold steel existed. Local practice strongly influenced the surgeon's choice.

Level of Evidence: N/A.

1 | Introduction

Extracapsular tonsillectomy (ECTE) is one of the most common surgical procedures used by otorhinolaryngologists. In the European Union, the incidence of ECTE in 2019 varied from 47 (Italy) to 428 (Iceland) per 100,000 inhabitants, with 214 in Finland [1]. Among different countries, national guidelines are consistent for the indications of palatine tonsil surgery, being recurrent acute or chronic tonsillitis or obstruction caused by tonsillar hypertrophy [2–4]. However, often by surgeons, guidelines and regional instructions are not followed, and attitudes, habits, and biases affect individual choices that are made on the indications, techniques, devices, and postoperative medications.

Various surgical instruments are used for tonsil surgery. Instruments for ECTE include, “cold-steel” instruments, “hot”

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instruments using high-temperature monopolar or bipolar electrocautery, and more recently, temperature-controlled applications. Instruments for partial tonsil surgery include the previously mentioned, in addition to microdebriders [5, 6]. Previous studies in tonsil surgery show that availability and preferences may affect the instrument choice [7]. Furthermore, surveys report an increased use of "hot" instruments [8–10], although an increased incidence of the late postoperative hemorrhage rate was reported with "hot" instruments compared to cold dissection and cold hemostasis alone in a large register study [11].

In children, partial tonsil surgery is effective in the treatment of tonsillar hypertrophy [12–16] having less morbidity compared to ECTE [17–19]. The nomenclature and definition of different partial tonsil surgery methods are not fully established. The partial tonsil surgery concept of tonsillotomy (TT) was reintroduced by Linder and Hultcrantz et al. in 1999 [17, 20], and the intracapsular tonsillectomy (ICTE) concept was described by Koltai in 2002 [6]. In 2013, Windfuhr further defined the relation between them. In "Class 1," only the protruding parts of the tonsil medial to the faucial pillars are removed, and reduction is stopped at a Brodsky size of 1 [21]. In "Class 2," approximately 90% of the tonsil tissue is removed with preservation of a rim of tonsillar tissue as a protective layer along the inner surface of the capsule [22]. In this study, the classification by Windfuhr was adopted, and "Class 1" is later referred to as TT and "Class 2" as ICTE.

We hypothesized that tonsil surgery practice has changed. The aim of this study was, by surveying otorhinolaryngologists, to report these changes over a 10-year period and related opinions and to predict related trends in future practice.

2 | Materials and Methods

An invitation including a link to an internally pre-tested survey form regarding tonsil surgery practice was sent to otorhinolaryngology residents and specialists by email via the chief physicians or contact persons of almost all of the Departments of Otorhinolaryngology in Finland, nationwide. The departments included five university hospitals, 16 central hospitals, and three of the largest private sector companies. The target group was the estimated practicing otorhinolaryngologists in Finland totaling 336 in the year 2021 [23]. An open link to the survey was active between January and March 2021. Answers were collected anonymously. Two reminders were sent after the initial invitation. Survey data were collected using Research Electronic Data Capture (REDCap, version 10.6.92021 Vanderbilt University, Nashville, Tennessee, USA) hosted at the University of Turku, Turku, Finland. Survey forms with a less than 90% question completion rate were excluded.

The survey contained sections about (1) demographics, (2) opinions on tonsil surgery indications and methods, (3) current instrumentation period, (4) perioperative medication, and (5) tonsil surgery methods for different indications over a 10-year period. In the survey, different tonsil surgery techniques (ECTE, ICTE and TT) were explained, and thereafter, each of these was an option in questions regarding surgery techniques. The questionnaire is available as electronic (Questionnaire).

TABLE 1 | Background data of the respondents of the tonsil surgery questionnaire survey.

		n	% of Responders
Age (years)	Below 30	9	4.5
	30–44	95	47.8
	45–59	64	32.2
	60 and above	31	15.6
Sex	Male	111	54.7
	Female	91	44.8
Education	Specialist	161	79.3
	Resident	42	20.7
Work experience (years)	< 10	75	36.9
	10–20	62	30.5
	Over 20	66	32.5
Hospital environment	University	85	42.1
	Central	69	34.2
	Private	40	19.8
	Regional	8	4.0
Working with age groups	Pediatric and adult	167	82.7
	Adult	26	12.9
	Pediatric	9	4.5
Tonsil surgeries per year	None	2	1.0
	1–10	47	23.2
	11–30	92	45.3
	Over 30	62	30.5

2.1 | Statistical Analysis

Data capture and electronic case report form (eCRF) design was done using REDCap (REDCap, version 10.6.92021). Descriptive statistical analyses were performed using SPSS software (version 27.0, IBM Corp. Armonk, NY, US), REDCap (REDCap, version 10.6.92021 Vanderbilt University, Nashville, Tennessee, USA) and Microsoft Excel (version 16.69.1. Microsoft Corporation. Redmond, WA, US). Results were presented as sums, mean averages, frequencies or percentages. Selected questions from survey Section 3 were subjected to statistical analysis. Levels of significance and adjustments for confounders were performed by a statistician using R version 4.2.3 or newer (R Development Core Team. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org. ISBN 3-90005107-0). Graphical illustrations were drawn with Microsoft Excel. Respondents who did not perform tonsil surgery at a requested timepoint were excluded from the question data where applicable. Comparisons between groups

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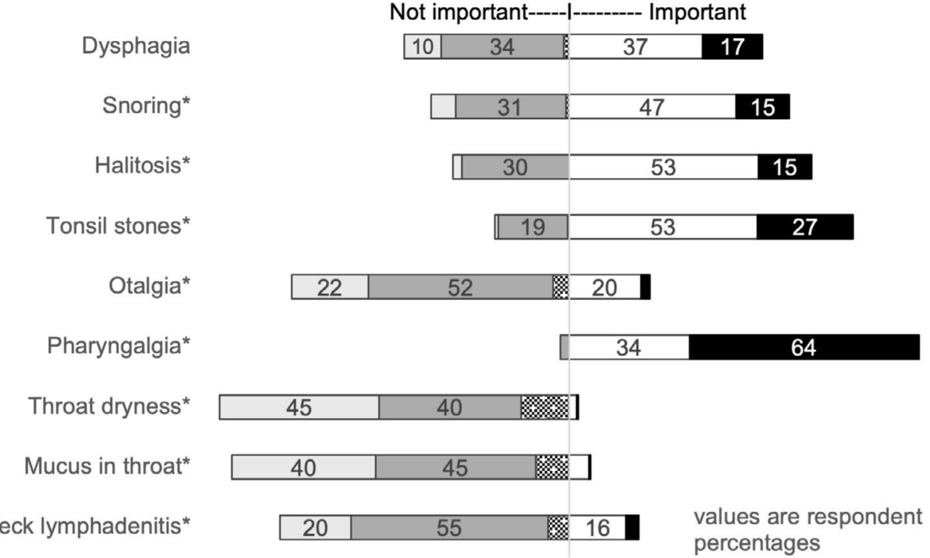

FIGURE 1 | Importance of symptoms in surgical decision-making for chronic tonsillitis. Asterisk (*) indicates statistical significance in testing for a 1:1 ratio.

were performed using a Pearson's Chi-squared test, Fisher's exact test or Wilcoxon rank sum test with continuity correction. Pairwise comparisons testing were performed with a Wilcoxon rank sum test with continuity correction or Welch Two Sample *t*-test. Pearson's Chi-squared test was used in testing for a 1:1 ratio. Testing for confounders was performed with the background variable "Work experience in years" for selected questions (Cochran–Mantel–Haenszel, Wilcoxon rank sum test with continuity correction or Welch Two Sample *t*-test). Statistically significant differences ($p < 0.05$) with clinical relevance were reported. For multiple comparisons, Benjamini-Hochberg corrections were used.

3 | Results

3.1 | Background of Respondents

A total of 254 questionnaires were disseminated. The 203 questionnaires were included in the data set, representing approximately 60% of the estimated workforce in Finland. The background data were comparable with a previous survey [23] and were deemed representative of the available working age otorhinolaryngologists in Finland (Table 1). Most of the respondents were specialists in otorhinolaryngology. The ages of the respondents ranged from under 25 to over 70 years old. The ages were separated into 4 groups, and the majority of the respondents were 30 to 44 years old.

3.2 | Factors Influencing Tonsil Surgery

Respondents ranked factors affecting their choice in choosing the method for tonsil surgery on a six-point visual (VAS) scale from 1 (not at all important) to 6 (very important). The highest ranked factors were the efficiency of symptom relief (mean [SD], 5.55 [0.85]), familiarity (5.51 [0.83]) and avoidance of complications (5.50 [0.74]). The pairwise comparisons showed that these three highest ranked factors had a statistically significant difference and likely more impact on clinical decisions compared to the lowest ranked factors: hemostasis during surgery, speed, and the price of equipment (5.19 [0.88], 4.51 [1.09], 4.40 [1.19], respectively).

When asked on a five-point VAS scale from 1 (not at all important) to 5 (very important) which factors had influenced their practice of tonsil surgery the most, the highest ranked factors were residency (mean [SD], 4.37 [0.85]), personal experience (4.26 [0.73]) and evaluation and decision-making by colleagues (4.19 [0.87]). The pairwise comparisons showed the highest two factors having a statistically significant difference and, likely, more impact on clinical decisions compared to the lowest ranked factors being literature, including publications and conference presentations (3.48 [0.95] and 3.12 [1.06], respectively).

3.3 | Indications for Surgery

For recurrent tonsillitis, surgery was most often recommended after three (mean [SD], 3.09 [0.52]) acute tonsillitis episodes over 6 months or four (mean [SD], 4.11 [0.72]) episodes over 12 months, with a significant difference in the pairwise comparison. Half of the respondents (54.7%) required one or more confirmations of acute tonsillitis caused by *Streptococcus pyogenes* before recommending surgery. For chronic tonsillitis, on a scale of 1 (not important at all) to 5 (very important), symptoms of the highest mean (SD) importance were pharyngalgia (4.62 [0.54]), tonsil stones (4.04 [0.74]) and halitosis (3.80 [0.71]). Distribution and significance of responses are shown in Figure 1. Respondents < 20 years in practice deemed pharyngalgia more important and lymphadenopathy less important compared to

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> 20 years in practice, reaching statistical significance. Reaching a consensus about how long symptoms of chronic tonsillitis should persist before recommending tonsil surgery was limited, but one third (35.1%) recommended 6–9 months. For peritonsillar abscess, surgery was recommended after the second episode (83.7%).

3.4 | Recognition and Acceptance of Surgical Methods

TT and ICTE were recognized as two separate surgical methods of partial tonsil surgery by 72.9% of respondents.

When asked on a five-point VAS scale from 1 (completely disagree) to 5 (completely agree), whether partial tonsil surgery was an effective treatment, the mean (SD) score was 4.76 (0.56) for tonsillar hypertrophy-related symptoms in children with 96.5% in agreement, and 2.22 (1.23) for tonsillitis in children with 18.8% in agreement. In adults, the mean (SD) score was 3.56 (1.28) for tonsillar hypertrophy with 55.6% in agreement and 1.71 (1.06) for tonsillitis with 9.4% in agreement. The pairwise comparisons showed statistically significant differences (Figure 2).

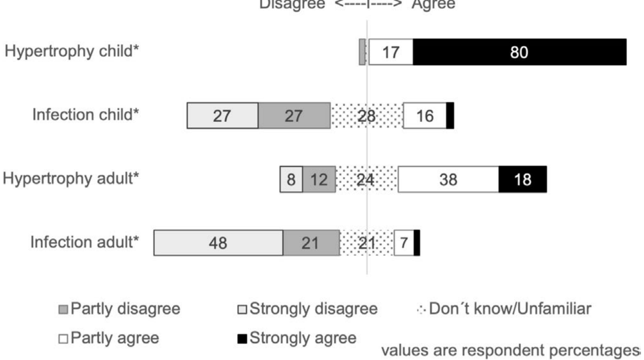

FIGURE 2 | Effectiveness of partial tonsil surgery for different surgical indications. Infection = recurrent acute tonsillitis or chronic tonsillitis, and hypertrophy = obstructive symptoms caused by tonsillar hypertrophy. Asterisk (*) indicates significance in pairwise comparison.

3.5 | Preferred Surgical Instruments

For ECTE, monopolar electrocautery (ME) was the preferred surgical instrument by 41% of the respondents, followed by cold steel (30%) and bipolar scissors/forceps (26%). For TT, ME was preferred (40%), followed by coblation (21%) and the radiofrequency device (21%). For ICTE, ME was preferred (37%) followed by coblation (34%). Comparison between groups showed significant differences (Table 2). Adjustment for work experience showed a statistical significance indicating ME to be more frequently used (47%) in ECTE with less work experience (< 20 years) and cold steel a more frequently used (38%) instrument with more work experience (> 20 years).

3.6 | Peri- and Postoperative Medication

The use of peritonsillar infiltration anesthetic was reported by 10.8% in ECTE and by 7.4% in partial tonsil surgery. The use of intratonsillar infiltration anesthetic was reported by 1.5% in TE and by 20.7% in partial tonsil surgery. Topical anesthesia or antibiotics were rarely used. Postoperatively after ECTE, paracetamol was prescribed by 91.5%, non-steroidal anti-inflammatory drugs (NSAIDs) by 98.0%, and opioids by 82.8% of the respondents. Combination therapy was mostly used (98.5%). After partial tonsil surgery, paracetamol was prescribed by 96.4%, NSAIDs by 94.1%, and opioids by 22.7%. For children under 12 years of age, after ECTE or partial tonsil surgery, opioids were always or almost always prescribed by 23.2%, and tramadol-based options were favored (72.4%). For adults, after ECTE or partial tonsil surgery, opioids were always or almost always prescribed by 84.7%, and codeine-paracetamol was favored (90.6%).

3.7 | Choice of Surgical Methods

The respondents were asked how their choice of tonsil surgery methods had changed from 10 years ago to the present, and what method they expect to use in the future. In the comparisons between groups, a statistically significant change had occurred in the treatment of tonsillar hypertrophy in children from ECTE "10 years ago" to predominantly TT Today. ECTE was preferred for infectious indications at all time points and patient groups.

TABLE 2 | Currently preferred instruments for different palatine tonsil surgery methods.

Surgical technique	ECTE = *N* (%)	TT = *N* (%)	ICTE = *N* (%)
Preferred instrument			
Monopolar electrocautery	82 (41%)	76 (40%)	27 (37%)
"Cold steel"	60 (30%)	4 (2.1%)	3 (4.1%)
Bipolar scissors/forceps	53 (26%)	30 (16%)	8 (11%)
Coblation	5 (2.5%)	41 (21%)	25 (34%)
Other	2 (1.0%)	1 (0.5%)	0 (0%)
Radiofrequency device (RF)	0 (0%)	40 (21%)	7 (9.6%)
Microdebrider	0 (0%)	0 (0%)	3 (4.1%)
Not available	1	11	130

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TABLE 3 | Preferred tonsil surgery method for different time points and indications.

Characteristic	10 years ago *N* (%)	Today *N* (%)	*p*[a]	Future expectation *N* (%)	*p*[b]
Tonsillar hypertrophy, children			< 0.001		< 0.001
ECTE	118 (77%)	36 (18%)		20 (10%)	
ICTE	8 (5.2%)	15 (7.5%)		38 (19%)	
TT	27 (18%)	150 (75%)		141 (71%)	
NA	50	2		4	
Recurrent tonsillitis, children			0.039		< 0.001
ECTE	146 (95%)	181 (90%)		116 (60%)	
ICTE	7 (4.6%)	13 (6.5%)		64 (33%)	
TT	0 (0%)	7 (3.5%)		13 (6.7%)	
NA	50	2		10	
Chronic tonsillitis, children			0.2		< 0.001
ECTE	141 (93%)	174 (87%)		109 (56%)	
ICTE	7 (4.6%)	14 (7.0%)		67 (35%)	
TT	1 (0.7%)	7 (3.5%)		13 (6.7%)	
Not an indication for surgery	2 (1.3%)	4 (2.0%)		5 (2.6%)	
NA	52	4		9	
Tonsillar hypertrophy, adults			< 0.001		< 0.001
ECTE	135 (89%)	144 (72%)		60 (31%)	
ICTE	5 (3.3%)	14 (7.0%)		65 (33%)	
TT	5 (3.3%)	28 (14%)		60 (31%)	
Not an indication for surgery	7 (4.6%)	13 (6.5%)		11 (5.6%)	
NA	51	4		7	
Recurrent tonsillitis, adults			0.3		< 0.001
ECTE	146 (96%)	186 (93%)		149 (78%)	
ICTE	6 (3.9%)	13 (6.5%)		38 (20%)	
TT	0 (0%)	0 (0%)		4 (2.1%)	
NA	51	4		12	
Chronic tonsillitis, adults			0.3		< 0.001
ECTE	144 (97%)	186 (94%)		133 (69%)	
ICTE	5 (3.4%)	12 (6.1%)		53 (28%)	
TT	0 (0%)	0 (0%)		6 (3.1%)	
NA	54	5		11	

Abbreviations: ECTE, extracapsular tonsillectomy; ICTE, intracapsular tonsillectomy; NA, not available; Tonsillar hypertrophy, obstructive symptoms caused by tonsillar hypertrophy; Tonsillar infection, recurrent acute tonsillitis or chronic tonsillitis; TT, tonsillotomy.
[a]Comparisons between groups 10 years ago versus today.
[b]Today versus Future expectation.

Furthermore, a statistically significant change in attitudes toward partial tonsil surgery methods was recorded in today vs. future expectations across all indications (Table 3). Adjustment for work experience (< 20 years) showed a non-significant change ($p = 0.085$) in past vs. present treatment patterns of tonsillar hypertrophy in adults.

4 | Discussion

In this study, we analyzed the present and possible future practices in tonsil surgery among otorhinolaryngologists in Finland. In children, this study describes a fundamental change that has occurred in the surgical treatment of tonsillar hypertrophy. Partial tonsil

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surgery is now the method of choice over ECTE. This finding concurs with the finding of a Finnish, single hospital, cohort study [19] and further establishes a paradigm shift in the treatment of tonsillar hypertrophy in children among otorhinolaryngologists. A similar paradigm shift in Sweden was reported a decade ago [18]. Partial tonsil surgery is effective in pediatric patients with tonsillar hypertrophy, including less postoperative morbidity [12, 13, 17, 24]. Since future considerations of treating adult tonsillar hypertrophy with partial tonsil surgery were the most popular, in the future, it could be a trend. The efficacy of partial tonsil surgery and ECTE in adults is equal according to the current literature base; however, well-designed randomized trials are called for to bridge the knowledge gap to clinically decide between adult ECTE and partial tonsil surgery [25, 26].

ECTE was the currently preferred method for infectious indications for all ages. For choosing the surgical method, for respondents, the most important factor was "efficiency of symptom relief" in addition to "avoidance of complications." ECTE is an effective and clearly defined method in the treatment of recurrent infections in children and adults [27–30]. However, ECTE can lead to intense postoperative pain that lasts days postoperatively, and there is a significant risk of postoperative hemorrhage, dehydration and low nutrition [28].

Considering the alternative for ECTE, the role of partial tonsil surgery remains controversial in the treatment of recurrent tonsillar infections. A meta-analysis of 14 pediatric trials and one adult trial concluded that ICTE reduced postoperative morbidity compared to ECTE with no increase of later recurrent infections [31]. A similar tendency was observed in a systematic review of adult patients [26]. A trial with youths suffering from both obstructive and infectious symptoms found fewer postoperative complications in the TT group compared with the ECTE group and with low infection rates in both groups during the 1-year follow-up [14]. The role of ICTE is not yet established in the treatment of recurrent or chronic tonsillar infections, especially in adults, and more research is needed to justify partial tonsil surgery for infectious indications.

In this study, ME was the most frequently used instrument in ECTE, followed by cold steel. This is in line with earlier surveys concerning tonsil surgery, where an increased use of "hot" instruments is reported [7–9]. Surveys of the members of the American Society of Pediatric Otolaryngologists concluded that instrument choices in total and partial tonsil surgery have shifted away from cold steel toward ME and coblation between 2005 and 2015 [7, 8]. Also, Australian otorhinolaryngologists favored ME over other techniques for dissection and hemostasis in ECTE [9]. On the contrary, national register data from Sweden and Norway reveal that cold steel was the most used dissection technique in these Nordic countries [32]. Especially, an increase in the cold-dissection/cold-hemostasis technique was noted in Sweden [33]. The authors hypothesized that the observed increase was an effect of quality improvement programs aiming to reduce secondary bleedings, which were found to be the lowest with the cold-steel technique in a study published a few years earlier [11].

The superiority of one instrument over another remains controversial. Temperature-controlled instruments (e.g., coblation) are reported to reduce postoperative pain but not postoperative hemorrhage [34]. A systematic review comparing coblation to other techniques was inconclusive in terms of postoperative morbidity [35]. A meta-analysis indicated vessel-sealing systems (VSSs) as having a significant benefit in all studied outcomes compared to electrocautery and coblation [36]. The use of VSS, as already seen used in other areas of Head and Neck surgery, may have a role in future tonsil surgery practice. For ECTE, in this study, these instruments were rarely used. A clinical practice recommendation encourages the use of locally established technologies that are comfortable for the surgeon [37].

In this study, respondents almost uniformly prescribed a combination of NSAID and paracetamol and an opioid. Thus, clinicians seem to have adapted a multimodal pain treatment approach as recommended in the PROSPECT guideline. The PROSPECT guideline recommends a multimodal pain treatment approach for all ages combining NSAID and paracetamol as the basic analgesics after ECTE and opioids only for rescue analgesics [38]. However, 22.7% of respondents prescribed opioids after partial tonsil surgery. This can be considered a rather high number, as the need for rescue analgesic seems low [39]. Also, the risk of oxygen desaturation associated with obstructive sleep apnea in children should be considered [38]. The use of infiltration or topical local anesthetics was uncommon. A Cochrane systematic review found no evidence suggesting the use of local anesthetics [40]. However, a more recent meta-analysis claimed that the use of perioperative local anesthesia, either infiltrated or topical, could reduce postoperative pain scores for up to 7 days [41]. Postoperative antibiotics were rarely prescribed. This is in conjunction with a systematic review, which did not find any significant benefits from antibiotics in the postoperative phase [42].

The strength of this study was the large coverage of professionals that included approximately 60% of the active otorhinolaryngological workforce in Finland. This workforce percentage had a coverage and volume comparable with similar survey results [7–9]. Surveying current and possible future considerations gives valuable perspectives for trends and developments in tonsil surgery practice. However, as the study was partly an opinion survey, opinions are always subject to change as new trends emerge.

5 | Conclusions

This study sought to survey trends in tonsil surgery practice among Finnish otorhinolaryngologists. Currently, extracapsular tonsillectomy is preferred for infectious indications in both adults and children. For obstructive indications in children, a paradigm shift toward partial tonsil surgery has occurred within the past 10 years. Partial tonsil surgery was accepted as a treatment method for tonsillar hypertrophy in adults, although it has not yet been implemented in practice. Future considerations of tonsil surgery are shifting toward the partial surgery method. Monopolar electrocautery was the most frequently used instrument in all methods of surgery.

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Ethics Statement

Approval of this study plan was obtained from the Health Care Division of the Ethics Committee for Human Sciences at the University of Turku. The study was conducted in compliance with the principles of the Declaration of Helsinki. We confirm that this manuscript has not been published elsewhere and is not under consideration by another journal. All authors have approved the manuscript and agree with its submission to *The Laryngoscope Investigative Otolaryngology*. All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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