

# Otolaryngologists' perceptions of the indications for tympanostomy tube insertion in children

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## Abstract

**Background:** Bilateral myringotomy with insertion of tympanostomy tubes is the most common operation that children in Canada undergo. Area variations in surgical rates for this procedure have raised questions about indications used to decide about surgery. The objective of this study was to describe the factors that influence otolaryngologists to recommend tympanostomy tube insertion in children with otitis media and their level of agreement about indications for surgery.

**Methods:** A survey was sent to all 227 otolaryngologists in Ontario in the fall of 1996. The influence of 17 clinical and social factors on recommendations to insert tympanostomy tubes were assessed. Case vignettes were used to determine the effect of multiple factors in decisions about the need for surgical management.

**Results:** Surveys were returned by 138 (68.3%) of the 202 eligible otolaryngologists. There was agreement (more than 90% of respondents) about 6 indications for surgery: persistent effusion, a lack of improvement after 3 months of antibiotic therapy, a history of persistent effusion for 3 or more months per episode of otitis media, more than 7 episodes of otitis media in 6 months, a bilateral conductive hearing loss of 20 dB or more and a persistently abnormal tympanic membrane. Some respondents were more likely to recommend tube insertion if there were parental concerns about hearing problems or the frequency or severity of episodes of otitis media. Otolaryngologists agreed about the role of tympanostomy tubes in 1 of 4 case vignettes but disagreed about whether adenoidectomy should also be performed in that instance. Most viewed tympanostomy tube insertion as beneficial, with few adverse effects.

**Interpretation:** There is a lack of consensus among practising otolaryngologists in Ontario as to which children with recurrent otitis media or persistent effusion should undergo bilateral myringotomy with tympanostomy tube insertion. These findings suggest the need to revisit clinical guidelines for this procedure.

**M**yringotomy with insertion of tympanostomy tubes is the most common type of surgery that children in North America and Europe undergo.<sup>1-8</sup> An estimated 1 million operations are performed in Canada and the United States annually, usually as an ambulatory procedure.<sup>7,8</sup> The main indications for tympanostomy tube insertion are recurrent episodes of acute otitis media and otitis media with persistent effusion.<sup>2,9-12</sup> These conditions may be accompanied by hearing loss, which raises concerns about possible negative consequences for speech development, language acquisition and learning.<sup>13,14</sup> Questions have been raised, however, about the effectiveness of tympanostomy tube surgery,<sup>15</sup> the appropriate management of children with recurrent episodes of acute otitis media and otitis media with persistent effusion,<sup>11,16</sup> the economic cost<sup>17-19</sup> and the numbers of procedures performed.<sup>20</sup>

There have been only 2 published surveys, neither of them Canadian, of the opinions of otolaryngologists concerning indications for inserting tympanostomy tubes. A US survey<sup>21</sup> was completed before the current guidelines were released,<sup>10-12</sup> and a UK survey was based on responses from 65 otolaryngologists to 8 questions.<sup>22</sup> In addition, guidelines in this area were last published in 1994.<sup>10,12</sup> We therefore carried out a survey among practising otolaryngologists in Ontario to determine their

## Research

## Recherche

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views about indications for tympanostomy tube insertion, their level of agreement about these indications and their perceptions of the benefits and adverse effects of surgery.

### Methods

In the fall of 1996 we sent a survey to all 227 otolaryngologists in Ontario. The survey instrument included a list of 17 potential indications for surgery and other factors. These were compiled from criteria developed by an expert panel examining indications for tympanostomy tube insertion,<sup>11</sup> a guideline for the management of otitis media with persistent effusion<sup>10</sup> and a study among otolaryngologists in the United States.<sup>21</sup> An expert advisory panel composed of pediatricians, otolaryngologists and audiologists reviewed the selected factors. Further modifications were made after the questionnaire was pilot tested with a small group of otolaryngologists.

The surgeons were asked whether they had treated children (less than 10 years old) who had recurrent episodes of acute otitis media or otitis media with persistent effusion in the previous year and to rate the influence of the 17 factors on their decision to recommend tympanostomy tube insertion. A response scale ranging from 1 (“much less likely to insert tympanostomy tubes”) to 5 (“much more likely to insert tympanostomy tubes”) was used. Case vignettes describing 4 hypothetical children with otitis media were developed by the advisory panel to reflect commonly faced situations, but with varying levels of clinical ambiguity. Each scenario included information about the child’s history, physical findings, audiologic evaluation and prior nonsurgical management. The surgeons were asked to indicate for each scenario how often (never, rarely, sometimes, often or always) they would choose from 7 different medical or surgical treatment options.

They were also asked about their perceptions of the outcomes of surgery and their use of continuous antibiotic therapy.

A copy of the survey and extended tables of the results are available from us on request.

### Results

Of the 227 otolaryngologists surveyed, 25 were retired, did not treat children or were untraceable. A questionnaire was returned by 138 of the remaining 202 eligible surgeons, for a response rate of 68.3%. Of the 138, 121 (87.7%) indicated that they had seen children who had recurrent episodes of acute otitis media or otitis media with persistent effusion in their regular practice in the past month. These 121 otolaryngologists were asked to answer the questions regarding indications for inserting tympanostomy tubes. With concordance of greater than 90% as a definition of clinical agreement,<sup>23,24</sup> otolaryngologists agreed about 6 of the 17 factors (Table 1).

Insertion of tympanostomy tubes was more likely to be recommended when there was persistent effusion, a lack of improvement after 3 months of antibiotic therapy, a history of persistent effusion for 3 or more months per episode, more than 7 episodes of acute otitis media in 6 months, a bilateral conductive hearing loss of 20 dB or more and a persistently abnormal tympanic membrane. Most of the respondents (88.3%) would not recommend tube insertion with fewer than 3 episodes of otitis media in 6 months. There was less agreement about other factors, such as

**Table 1: Influence of clinical and parental factors on decisions by Ontario otolaryngologists to insert tympanostomy tubes in children with recurrent acute otitis media or otitis media with persistent effusion**

Factor	Decision; no. (and %) of respondents (n = 121)*		
	Less likely to insert tubes	Does not affect my decision	More likely to insert tubes
Persistent effusion	0	0	119 (100.0)
Lack of response to > 3 mo of antibiotic therapy	2 (1.7)	3 (2.5)	116 (95.9)
Persistent effusion for ≥ 3 mo per episode	6 (5.1)	0	112 (94.9)
> 7 episodes of otitis media in 6 mo	1 (0.8)	7 (5.9)	111 (93.3)
Bilateral conductive hearing loss of ≥ 20 dB	2 (1.7)	6 (5.1)	110 (93.2)
Persistent abnormal tympanic membrane	4 (3.3)	5 (4.2)	111 (92.5)
< 3 episodes of otitis media in 6 mo	106 (88.3)	12 (10.0)	2 (1.7)
Child’s age < 3 yr	14 (11.7)	80 (66.7)	26 (21.7)
Sensorineural hearing loss with conductive overlay	4 (3.4)	15 (12.8)	98 (83.8)
Concerns about allergies to multiple antibiotics	3 (2.6)	22 (18.8)	92 (78.6)
Parental report of speech or language delay	0	27 (23.3)	89 (76.7)
Bilateral ear disease	1 (0.8)	29 (24.2)	90 (75.0)
Abnormal impedance findings	6 (5.1)	30 (25.6)	81 (69.2)
Parental concerns about frequency and severity of otitis media	1 (0.9)	52 (44.4)	64 (54.7)
Obstruction of nose, nasopharynx or oropharynx (e.g., adenoid facies)	11 (9.2)	54 (45.0)	55 (45.8)

\*Some rows total less than 121 owing to missing responses.

whether age was an important consideration.<sup>10</sup> Although an adenoid facies would not affect the recommendations of 45.0% of the respondents, another 45.8% reported that they would be more likely to insert tubes with this factor. Over 50% stated that they would be more likely to insert tubes if there were parental concerns about hearing or about the frequency and severity of episodes of otitis media, whereas 44.4% said that this factor would not affect their decision.

There was general agreement among the respondents about management in only 1 of the 4 case vignettes. In the case of a 6-year-old child with recurrent episodes of acute otitis media, persistent effusion despite 4 months of antimicrobial prophylaxis and a bilateral hearing loss of 30 dB, 89.0% of the respondents stated that they would recommend bilateral myringotomy with insertion of tympanostomy tubes. However, 37.7% would also recommend adenoidectomy, whereas 43.0% would sometimes and 19.3% would rarely or never recommend adenoidectomy. In the 3 other vignettes, the physicians agreed more about what they would not do and less about what they would do. An example is the hypothetical case of a 2½-year-old child with more than 10 episodes of otitis media, no hearing loss or otorrhea, and normal-looking tympanic membranes (Table 2). Most of the respondents who completed this section of the questionnaire reported that they would not recommend myringotomy or adenoidectomy alone. Over half (52.3%) would often or always observe this child for a few months. The next most frequent choice was tympanostomy tube insertion, which would be recommended often or always by 29.7% of the respondents, sometimes by 29.7%, but rarely or never by 40.5%.

The physicians felt that most children experience significant benefits after tympanostomy tube insertion, with few adverse effects. The median estimate for the proportion of children expected to experience a reduction in episodes of acute otitis media, spend less time with middle ear effusion

or have fewer visits to referring physicians after tympanostomy tube insertion was 90% for each outcome. Serious adverse anesthetic events were considered rare (0.01%), scarring of the tympanic membrane was expected in 10% of cases, and persistent otorrhea or retraction was expected in 5% of cases. One-quarter of children were expected to require reinsertion of tubes within 2 years. The physicians reported that they would be comfortable prescribing continuous antibiotic therapy for a median of 6 weeks.

### Interpretation

The recommendations by otolaryngologists to insert tympanostomy tubes in children with recurrent episodes of acute otitis media or otitis media with persistent effusion are influenced by a complex set of clinical, audiologic and social factors. The physicians who responded to our survey felt that surgery was indicated for persistent effusion, lack of response to antibiotic therapy, frequent episodes of acute otitis media and bilateral hearing loss. These findings are similar to the views of US otolaryngologists<sup>21</sup> and suggest a consensus about a core set of surgical indications. However, when case vignettes were presented that incorporated additional clinical and social factors, the respondents agreed about the need for tympanostomy tubes in only 1 of the 4 cases. Even in the case in which there was agreement about the need for tympanostomy tubes, there was disagreement about whether adenoidectomy was also indicated.

We chose an arbitrary level of concordance of 90% to denote consensus, similar to other studies of clinical agreement.<sup>23,24</sup> However, 75% of our respondents chose at least 1 of the management approaches either “often or always” or “sometimes” in each vignette. Thus, it could be argued that there was reasonable clinical agreement. Some physicians may have been able to only cautiously endorse a given management option by choosing “sometimes,” given the hypothetical nature of the cases. Consequently, the survey may

**Table 2: Otolaryngologists’ recommendations for initial management of a hypothetical case of recurrent acute otitis media\***

Management option	Response; no. (and %) of respondents†		
	Never or rarely	Sometimes	Often or always
Observe 2–3 mo; consider tubes if episodes of otitis media confirmed, fluid not clearing or infection worse	23 (20.7)	30 (27.0)	58 (52.3)
Low-dose antibiotic therapy for 1 mo	57 (52.3)	25 (22.9)	27 (24.8)
Low-dose antibiotic therapy for 4–6 mo	73 (65.8)	14 (12.6)	24 (21.6)
Bilateral myringotomy alone	104 (94.5)	5 (4.5)	1 (0.9)
Adenoidectomy	85 (78.7)	20 (18.5)	3 (2.8)
Bilateral myringotomy and tube insertion	45 (40.5)	33 (29.7)	33 (29.7)
Bilateral myringotomy, tube insertion and adenoidectomy	71 (64.5)	32 (29.1)	7 (6.4)

\*Case vignette 4: A child aged 2½ years is referred to your office following multiple episodes of otitis media (more than 10 in recent months). The child has no hearing loss, no otorrhea and a normal-looking tympanic membrane.

†Rows total less than 121 owing to missing responses.

have overestimated variability because the physicians were unable to ascertain additional information from direct questioning or examination, as they would in a real clinical situation. Nonetheless, responses to case vignettes have been found to reflect actual clinical behaviour in some instances.<sup>25</sup>

As has been reported in other countries,<sup>5,6,20,26-28</sup> rates for bilateral myringotomy with tympanostomy tube insertion vary widely in Canada.<sup>7</sup> Differences in clinical opinions may contribute to variations in the use of health care services,<sup>29,30</sup> particularly if these differences relate to indications for surgery,<sup>21</sup> the use of alternative therapies<sup>14,31</sup> or perceptions of the effectiveness of treatment.<sup>21,22</sup> Our results show that otolaryngologists in Ontario have different opinions about when to insert tympanostomy tubes or perform adjuvant procedures, such as adenoidectomy. It may be timely to revisit guidelines for the management of children with recurrent episodes of acute otitis media or otitis media with persistent effusion.<sup>10-12,32</sup> In addition, recent research suggests a limited benefit of early tympanostomy tube insertion on long-term language development<sup>33</sup> and limited effectiveness of adenoidectomy or adenotonsillectomy in children with recurrent episodes of acute otitis media.<sup>34</sup> Although guidelines may not be sufficient to ensure that children similarly affected with otitis media are treated comparably, they are a necessary first step toward developing a consensus about which children should undergo surgery.

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