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Trends in the management of secondary post-tonsillectomy hemorrhage in children

Christine M. Clark[a], Jane R. Schubart[b,c], Michele M. Carr[d,*]

[a] Department of Otolaryngology-Head and Neck Surgery, Georgetown University, Washington DC, USA
[b] Department of Surgery, The Pennsylvania State University College of Medicine, Hershey, PA, USA
[c] Department of Public Health Sciences, The Pennsylvania State University College of Medicine, Hershey, PA, USA
[d] Department of Otolaryngology-Head and Neck Surgery, West Virginia University, Morgantown, WV 26501, USA

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ABSTRACT

Objective: To define current practices in management of secondary post-tonsillectomy hemorrhage (PTH) in children by pediatric and general otolaryngologists.
Introduction: Bleeding after tonsillectomy is common. Our goal was to describe management methods across the U.S.
Methods: Questions regarding perioperative management and treatment in response to three hypothetical cases featuring secondary post-tonsillectomy bleeding were posed via REDCap survey. Comparisons were made for pediatric otolaryngology fellowship training, regions of residency training and current practice, practice type, and number of years in practice.
Results: A total of 400 surveys were distributed with 104 responses. Fellowship-trained respondents were more likely to have been in practice for less than ten years (41.5% versus 17.8%) and to practice in an academic setting (67.3% versus 13.6%). They were less likely to prescribe antibiotics after tonsillectomy and more likely to prescribe acetaminophen (98.3% versus 80.4%), ibuprofen (79.3% versus 56.5%), and narcotics (74.1% versus 50.0%) compared to general otolaryngologists. When faced with a post-tonsillectomy patient with visible clot but no active bleeding, pediatric otolaryngologists were less likely to remove the clot (31.6% versus 54.3%) and more likely to proceed to the OR (75.9% versus 56.5%) and admit the patient (87.9% versus 68.9%). Few regional differences were encountered; however, factors influencing the decision to pursue operative intervention varied by region.
Conclusion: Pediatric otolaryngologists are more likely to follow American Academy of Otolaryngology guidelines for tonsillectomy perioperative management. They also manage patients with secondary PTH differently than general otolaryngologists. Management trends are similar by region but salient factors considered in the decision-making process vary.

1. Introduction

Bleeding after tonsillectomy can have devastating consequences and has even been described in the popular press [1]. Tonsillectomy is one of the most commonly performed surgeries in the United States involving over 530,000 children under the age of 15 annually. Peak incidence is between the ages of 5 and 7, so postoperative bleeding can be complicated by the issues involved with managing young children [2,3]. In recent years, obstructive sleep apnea has surpassed recurrent tonsillitis as the most common indication for surgery, adding another comorbidity of concern in the management of these patients [4]. Other complications include post-operative pain, dehydration, nausea and vomiting, airway obstruction, sleep disturbances, and pulmonary edema [5], but post-tonsillectomy hemorrhage (PTH) is the most frequently encountered among these, occurring in up to 5% of all patients who undergo surgery [6].

Bleeding after tonsillectomy can be classified as either primary or secondary. Primary hemorrhage occurs within the first 24 h after the procedure and is considered to be a direct consequence of surgery [7]. Secondary bleeding is defined as occurring more than 24 h following surgery [8].

Despite the significant morbidity and potential mortality associated with hemorrhage following tonsillectomy, there is a paucity of data regarding management approaches employed by otolaryngologists

* Corresponding author. Department of Otolaryngology-Head and Neck Surgery, West Virginia University, 1 Medical Center Drive, PO Box 9200, Morgantown WV 26501, USA.
E-mail address: mmc0040@hsc.wvu.edu (M.M. Carr).

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when this complication occurs, and no practice guideline exists. Harounian et al. previously showed that the costs associated with inpatient treatment of PTH varies by US region, with higher costs in the West [9,10]. This suggests that there may be regional differences in the treatment of bleeding as a complication of tonsillectomy.

The aim of this study is to define current practices in management of secondary PTH in children by general and pediatric otolaryngologists.

2. Methods

A survey featuring questions pertaining to general and case-specific management approaches used in secondary PTH in pediatric patients was developed in REDCap (Research Electronic Data Capture) hosted at the Pennsylvania State University [11]. Potential respondents were obtained via the member database maintained through the American Academy of Otolaryngology-Head and Neck Surgery. Members who were American Board of Otolaryngology certified were entered into a random number generator for a final selection of 200 general otolaryngologists and 200 pediatric otolaryngologists. Questions regarding respondent characteristics, general management approaches used following tonsillectomy and in cases of secondary PTH in children, and treatment strategies employed in three case scenarios involving pediatric patients with secondary PTH of variable severity were included in the survey (Appendix I). Case 1 featured a patient with a history of oropharyngeal bleeding on postoperative day 5 but no visible clot or active bleeding on examination. Case 2 involved a patient with oropharyngeal bleeding and a visible clot in the tonsillar fossa on exam. Case 3 featured a patient with active bleeding observed on history and exam. Some questions were only visible if certain responses were selected. For example, if a respondent indicated that he or she would order laboratory studies, an additional question regarding the specific study types would appear. A screening question was also asked to ensure that respondents routinely perform tonsillectomies in pediatric patients as part of their practice.

General and fellowship-trained pediatric otolaryngologists currently practicing within the United States were eligible to complete the survey. An initial e-mail describing the study's purpose and containing a link to the REDCap survey was sent to potential respondents. Four subsequent reminder e-mails were sent at 3- to 5-day intervals in order to encourage participation. Survey completion was voluntary, with no incentives offered for participation. The study protocol was approved by the Institutional Review Board at the Penn State Milton S. Hershey Medical Center.

Survey response data were collected and managed using REDCap. Data were then exported into Microsoft Excel (Redmond, Washington). Respondents' states of current practice were categorized by regional divisions used by the United States Census Bureau. Appendix II contains a complete list of the states comprising each region. Pearson Chi-square statistical analyses were conducted using SPSS 22 (IBM, Armonk, NY).

3. Results

Four hundred surveys were distributed, with a response rate of 26% (n = 104). Respondent characteristics are detailed in Table 1. Respondents' management approaches in the perioperative period and for secondary PTH are described in Tables 2 and 3, respectively. Responses to the three clinical case scenarios are presented in Tables 4–6.

3.1. Region of current practice

No regional variations were encountered for respondent demographics. The factors that were most likely to influence the respondent's decision to proceed to the operating room (OR) for PTH differed by region. Patient age ($P = 0.018$), bleeding duration ($P = 0.029$), and findings on exam ($P = 0.043$) were identified as salient determinants likely to impact the choice to pursue operative intervention.

Table 1
Respondent characteristics.

		Number of Respondents	Percentage of Respondents
Type of medical degree n = 104	MD	99	95.2
	DO	5	4.8
Pediatric otolaryngology fellowship n = 104	Yes[1]	58	55.8
	No	46	44.2
Region of current practice n = 99	Northeast	26	26.3
	South	23	23.2
	Midwest	25	25.2
	West	25	25.2
Region of residency training n = 92	Northeast	24	26.1
	South	23	25.0
	Midwest	30	32.6
	West	14	15.2
	Outside United States	1	1.1
Number of years in practice n = 98	Less than 10	30	30.6
	11 to 25	44	44.9
	Over 25	24	24.5
Practice type n = 99	Academic	43	43.4
	Private practice	56	56.6
Number of secondary PTH cases treated in past 6 months n = 103	0 to 2	57	55.3
	3 to 11[1]	37	35.9
	11 and above	9	8.7
Number of secondary PTH cases taken to OR in past 6 months n = 87	0 to 2	64	73.6
	3 to 11	21	24.1
	11 and above	2	2.3

1 = significant difference by practice type ($P < 0.05$).

Table 2
Routine perioperative management approaches employed before and after tonsillectomy in children.

		Number of respondents	Percentage of respondents
Preoperative laboratory studies ordered n = 104	CBC	5	4.8
	Coagulation studies	5	4.8
	CBC and coagulation studies	6	5.8
	Type and screen	0	0.0
	None	88	84.6
Narcotic for postoperative analgesia n = 104	Yes	66	63.5
	No	38	36.5
Specific narcotic used for postoperative analgesia n = 66	Hydrocodone	17	16.3
	Morphine	1	0.96
	Hydromorphone	4	3.8
	Oxycodone	39	37.5
	Codeine	5	4.8
Other medications administered post-operatively n = 104*	Antibiotics[2]	14	13.5
	Steroids	28	26.9
	Acetaminophen	94	90.4
	Ibuprofen[1,2]	72	69.2

CBC = complete blood count.
*A subset of respondents selected more than one response for this question.
1 = significant difference by region of residency training ($P < 0.05$).
2 = significant difference by practice type ($P < 0.05$).

Respondents in the Northeast (53.8%) and South (60.9%) identified patient age as a significant factor in the decision to proceed to the OR compared to those in the Midwest (36.0%) and West (20.0%). Bleeding duration was more likely to influence the decision to proceed to the OR in the Northeast (57.7%) and Midwest (48.0%) than in the South (30.4%) and West (20.0%). Respondents in the Northeast (96.2%),