

Introduction

Tonsillectomy, with or without adenoidectomy (T&A), is the most common major surgical procedure performed in the United Stated, with estimates of up to >500,000 done yearly in children <15 years of age.^{1,2} Post-tonsillectomy hemorrhage (PTH) is the most common complication after T&A surgery and estimates of frequency are wide ranging; 0.1-5.8% for primary bleeding (within 24 hours of surgery), and 0.2-7.5% for secondary bleeding (after 24 hours).² A number of studies have analyzed the risk of PTH based on technique and post-operative medications, i.e., ibuprofen.³⁻⁸ Less often studied is the rate of and risk factors for two or more episodes of PTH after tonsillectomy. The true rate of 2 or more bleeds may be underappreciated as minor bleeding instances may be underreported by parents and caregivers.

Given the uncertainty of the incidence, risk factors, and management suggestions for those with recurrent PTH, a scoping review of the available literature was performed to analyze these variables. The goal of this review will be to provide insight into the incidence and significance of this occurrence in order to effectively counsel patients and their families about expectations for additional bleeding episodes after an initial PTH.

Methods and Materials

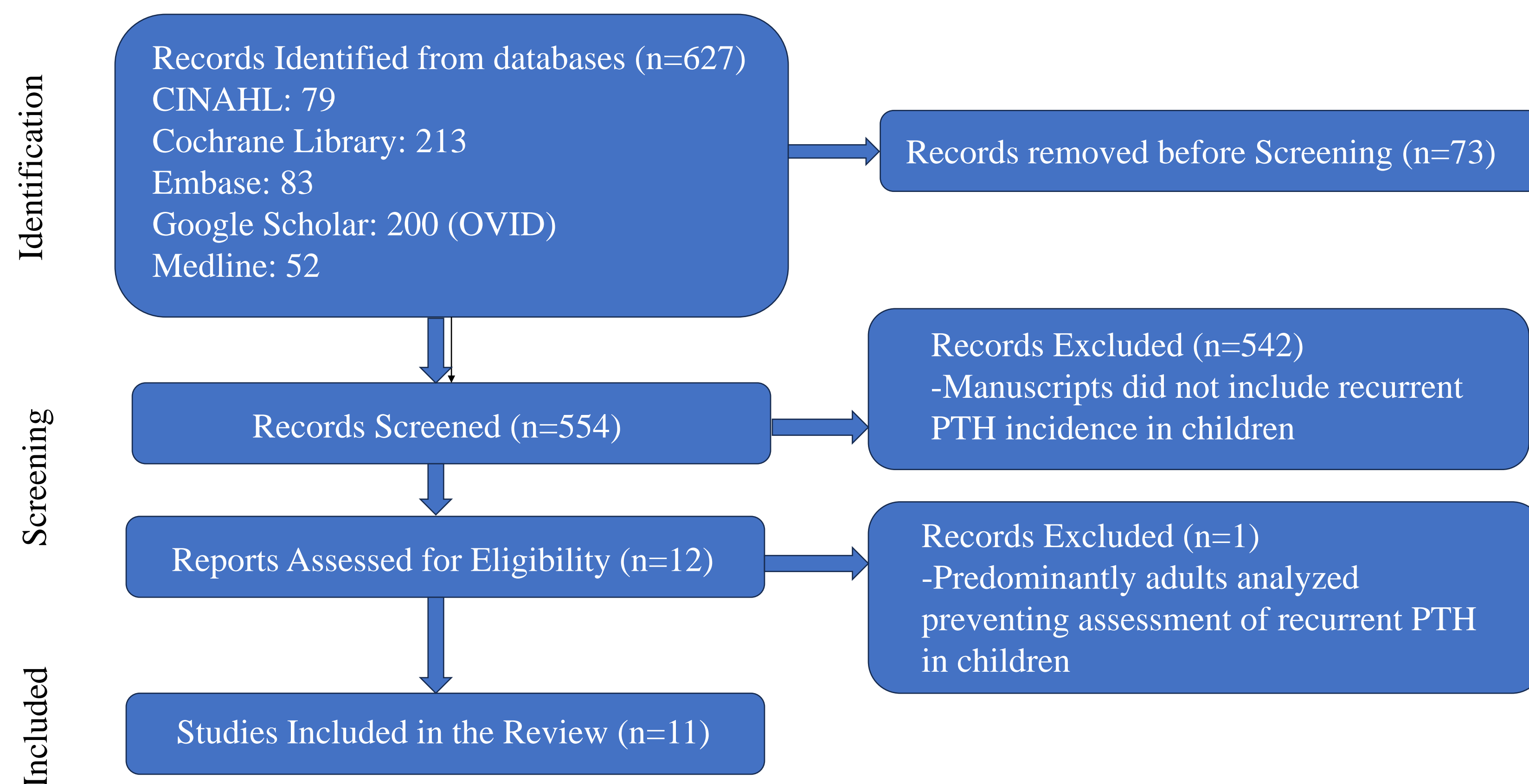
●This review used the JBI Methodology for Scoping Reviews⁹ and adhered to the Preferred Reporting Items for Systematic Review and Meta-Analysis Extension for Scoping Reviews (PRISMA-ScR) Guidelines⁹⁻¹⁰ All databases were searched from 1/1/2004-8/12/2024.

● The authors independently screened and analyzed studies, including those reporting the incidence of PTH and recurrent PTH in children. (**Figure 1**)

● Studies were queried for age of patients, study period, patient sex, total number of tonsillectomy/T&A procedures, number of PTH cases, number of recurrent PTH cases, interventions for initial and recurrent PTH cases, and risk factors analyzed for PTH and recurrent PTH cases (indication for procedure, patient sex, bleeding history, surgical technique, time between initial and recurrent PTH, medications given postoperatively, and presence of clot after the initial PTH).

● Baseline characteristics and clinical factors of the initial PTH and recurrent PTH were summarized as frequency (n) and percentages. Possible risk factors for recurrent PTH were compared with Chi-squared testing. Significance was determined at $p<0.05$. All statistical analyses were performed using Prism GraphPad (741) 9.3.1 (GraphPad Software, San Diego, California USA, www.graphpad.com).

Figure 1: Identification of Included Studies via Database Analysis



Results

Table 1. There were a total of 229 patients (range 3-41 patients per study) reported who experienced a recurrent PTH. The mean age of patients who rebled was 7.2 years, and the recurrent PTH occurred an average 9.3 days after tonsillectomy. Presentation and management of the initial PTH in those with a recurrent PTH are shown, in addition to tonsillectomy technique, indication, and initial PTH type.

Variable Analyzed	Total Patients n (%)	Range	# of Studies Reporting Variable
Recurrent PTH	229	3-41	11
% out of first PTH	7.1%		
% of total Tonsillectomy	0.33%		
Multiple PTH (>2)	8	1-3	5
% out of first PTH	0.25%		
Age of patients (mean, n=53)	7.2	6.2-8.3	4
Gender			4
Male	31 (51.7)	6-16	
Female	29 (48.3)	6-16	
Unknown	169		
Postoperative day (mean, days)	9.3	7.1-10.6	6
Management of recurrent PTH			8
Observation	83 (38.6)	0-37	
Surgical	132 (59.7)	9-36	
IR	7 (3.1)	1-6	
Unknown	7		
Presentation at initial PTH			5
Normal exam	65 (31.6)	2-41	
Bleeding/clot	57 (46.7)	10-18	
Unknown	107		
Management of initial PTH			9
Surgical	65 (31.6)	3-32	
Observation	141 (68.5)	6-29	
Unknown	23		
Tonsillectomy technique			3
Intracapsular	2 (3.6)	0-2	
Extracapsular	53 (96.4)	10-30	
Unknown	174		
Tonsillectomy indication			2
Recurrent tonsillitis	22 (48.9)	10-12	
Other	23 (51.1)	3-20	
Unknown	184		
Initial PTH bleed type			6
Primary	5 (4.5)	0-3	
Secondary	107 (95.5)	10-30	
Unknown	117		

The studies analyzed included 3221 patients who experienced an episode of PTH, with an average age of 7.5 years. Only 6 studies included the total number of tonsillectomies performed in the study period analyzed, but for those that did, the overall PTH rate was 3.8%. The initial bleed occurred 6.3 days (range 4.6-7.5 days) after tonsillectomy.

Recurrent PTH occurred in 7.1% of those who had an initial PTH, and in 0.33% who underwent a tonsillectomy

Table 2. Analysis of possible variables associated with recurrent PTH. The presentation at first PTH, including normal exam or active bleeding/clot in the fossa and management employed (surgery or observation) were not shown to be significant risk factors for recurrent PTH. Tonsillectomy technique, tonsillectomy indication, and first PTH bleed type were not associated with increased risk of recurrent PTH .

Variable Analyzed	n/Total	Percenta ge	P Value
Presentation at First PTH			$p=0.10$
Normal exam	65/926	7.0	
Bleeding/clot Initial Exam	57/606	9.4	
Management of First PTH			$p=0.15$
Surgical	65/935	7.0	
Observation	141/1649	8.6	
Tonsillectomy Technique			$p=0.77$
Intracapsular	2/73	2.7	
Extracapsular	53/1154	4.5	
Tonsillectomy Indication			$p=0.06$
Recurrent Tonsillitis	22/480	4.5	
Other	23/884	2.6	
Initial PTH Bleed Type			$p=0.61$
Primary	5/100	5.0	
Secondary	107/2541	4.2	

Conclusions

A scoping review of the literature found that among children who experienced PTH, the risk of recurrent bleeding was approximately 7.1%. In the overall population of children undergoing tonsillectomy, the risk of recurrent PTH was around 0.33%. Although there was variation in the data collected in all of the studies, there was no overall factor analyzed associated with a greater risk of recurrent bleeding, including findings on initial PTH presentation, initial management, tonsillectomy technique, and tonsillectomy indication.

References

- Mitchell RB, Sanford MA, Ishman SL, Rosenfeld RM, Coles, S, *et al.* Clinical practice Guideline: tonsillectomy in children. *Otolaryngol Head Neck Surg.* 2019;160(5):S1-S42.
- Francis DO, Fonnesbeck C, Sathe N, McPheeters M, Krishnaswami S, *et al.* Postoperative bleeding and associated utilization following tonsillectomy in children: a systematic review and meta-analysis. *Otolaryngol Head Neck Surg.* 2017;156(3):442-455.
- Chang KW. Intracapsular versus subcapsular coblation tonsillectomy. *Otolaryngol Head Neck Surg.* 2008;138:153-157.
- Shapiro NL, Bhattacharyya N. Cold dissection versus coblation-assisted adenotonsillectomy in children. *Laryngoscope.* 2007;117:406-410.
- Derkay CS, Darrow DH, Welch C, *et al.* Post-tonsillectomy morbidity and quality of life in pediatric patients with obstructive tonsils and adenoids: microdebrider vs electrocautery. *Otolaryngol Head Neck Surg.* 2006;134:114-120.
- Mudd PA, Thottathil P, Giordano T, Wetmore RF, Elden L, *et al.* Association between ibuprofen use and severity of surgically managed posttonsillectomy hemorrhage. *JAMA Otolaryngol Head Neck Surg.* 2017;143(7):712-717.
- Lie C, Ulualp SO. Outcomes of an alternating ibuprofen and acetaminophen regimen for pain relief after tonsillectomy in children. *Annal Otol Rhinol Laryngol.* 2015;124(10):777-781.
- Kim DH, Stybayeva G, Hwang SH. Effect and safety of perioperative ibuprofen administration in pediatric tonsillectomy: a systematic review and meta-analysis. *Am J Otolaryngol Head Neck Med Surg.* 2024;45:104461.
- Peters MDJ, Marmie C, Tricco AC, Pollock D, Munn Z, *et al.* Updated methodological guidance for the conduct of scoping reviews. *JBI Evid Implement.* 2021;19(1):3-10.
- Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, *et al.* PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med.* 2018;169(7):467-473. doi: 10.7326/M18-0850

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