

Abstract

Objective: Perform a retrospective analysis to compare postoperative outcomes in children with developmental delay (DD) and without DD following tonsillectomy using the TriNetX datasets, to determine if DD is a risk factor for increased postoperative complications and to inform future preoperative decision-making and treatment plans.

Setting: The study was conducted using data from the TriNetX EHR database from 2014-2023.

Methods: A retrospective analysis using TriNetX datasets from 2014 to present compared the outcomes of two cohorts: Cohort 1 (1,020 patients) named Tonsillectomy with Developmental Delay < 18 and Cohort 2 (6,480 patients) named Tonsillectomy without Developmental Delay < 18. The populations were matched for demographics, leaving 990 patients in each cohort. The following outcomes were measured: fever (T 101.00 F), elevated WBCs (12.00 10³/uL), need for antibiotics, need for opioids, surgical complications, ER visit, and dehydration.

Results: Results are presented as odds ratios with 95% confidence interval (OR [95%CI]). The preliminary analyses show Cohort 1 is at an increased risk for being prescribed an antibiotic within POD 1-7 (OR:1.250, [1.081, 1.445]), and significance in return visits to the ER risk (OR):1.155, [0.828, 1.613]). There was no significance in incidence of fever, opioids, surgical complications, or dehydration between the two cohorts.

Conclusion: Our analyses indicate that children with DD following tonsillectomy were both at an increased risk of requiring antibiotics postoperatively and requiring return to the ER post operatively. Given the negative outcomes that were established, there is need for additional prospective studies to further evaluate these variables in DD children to establish better preoperative decision making and treatment plans.

Introduction

- DD refers to a child's failure to achieve developmental milestones at a rate comparable to peers from the same population. Delays can involve various areas, including gross and fine motor skills, speech and language, cognitive and performance capabilities, social interactions, psychological development, sexual maturation, and activities of daily living (ADL).
- DD imposes an increase in risk for sleep disorders in children; the most common types are difficulties initiating or maintaining sleep and sleep disordered breathing (SDB).
- SDB lies on a spectrum of severity ranging from snoring to obstructive sleep apnea (OSA), defined by an apnea/hypopnea index (AHI) ≥ 1 in pediatric patients.
- Children with Down Syndrome (DS) have a significantly higher prevalence of obstructive sleep apnea, ranging from 40% to 80%, compared to the prevalence of 1% to 4% in children without DS.
- Adenotonsillectomy (T&A) is the primary intervention for SDB/OSA in children, showing substantial improvements in social communication, sleep quality, attention, and repetitive behaviors based on standardized assessments.
- The primary aim of this study is to evaluate the impact of DD on postoperative outcomes in children undergoing T&A.

Methods and Materials

- Pediatric tonsillectomy cohort of 144,969 cases with sub-cohorts based on the presence or absence of DD identified using CPT and ICD-10 codes.
- Patient demographics and clinical parameters were extracted from the TriNetX EHR database.
- Propensity scoring was utilized to balance demographic factors and comorbidities between cohorts for equal comparison as shown in Table 1.
- Postoperative outcomes of interest were those occurring Day 1-7. Outcomes assessed were fever ($\geq 101.00^{\circ}\text{F}$), elevated WBCs ($\geq 12.00 \text{ } 10^3/\text{uL}$), prescribed antibiotics, prescribed opioids, ER visits, surgical complications, and dehydration.
- Postoperative outcomes were analyzed by odds ratio with 95% confidence intervals (OR [95%CI]) and p-values
- Kaplan-Meier analysis was utilized to compare survivability post T&A.

	Unmatched		Matched		Total
	Children with DD	Children without DD	Children with DD	Children without DD	
Age (mean year)	4.0	6.5	4.1	3.9	4
Female	350	3,290	340	330	670
Male	680	3190	660	600	1260
Race					
Black	510	2,660	490	480	970
White	410	3,070	400	420	820
Asian	10	40	10	10	20
Hispanic	70	360	60	60	120
Unknown/Unspecified	110	870	110	100	210
Comorbidity					
Asthma	170	610	160	150	310
GERD	230	360	210	190	400
Coagulation defects*	20	30	20	20	40
Diseases of the blood	120	250	110	110	220

* Purpura and other hemorrhagic conditions

Table 1. Patient Demographics and Comorbidities

Results

- The final cohort consisted of 1,980 patients after propensity score matching.
- Patients with DD had a significantly increased risk of being prescribed antibiotics within POD 1-7 (OR:1.250, [1.081, 1.445]), and significance in return visits to the ER risk (OR):1.155, [0.828, 1.613]). There was no significant difference between the two cohorts in the incidence of fever, opioids, surgical complications, or dehydration. OR [95%CI] and p-values can be seen in Table 2.
- Despite the increased risk of postoperative complications in patients with DD, the overall survivability of tonsillectomy procedures does not appear to be compromised via Kaplan-Meier analysis.

	Children with DD	Children without DD	Odds Ratio	95% CI	P-Value
Fever	20	20	1	(0.535, 1.870)	0.526
Elevated WBC's	40	30	1.347	(0.832, 2.181)	0.101
Transfusion	10	10	1	(0.414, 2.413)	0.988
Antibiotics	300	240	1.250	(1.081, 1.445)	0.001
Opioids	150	150	1	(0.782, 1.279)	0.608
ER visit	80	70	1.155	(0.828, 1.613)	0.348
Dehydration	30	40	0.742	(0.458, 1.202)	0.514
Other	40	50	0.792	(0.517, 1.211)	0.439

Table 2. Postoperative Outcomes Day 1-7

Discussion

- Our findings indicate that patients with DD had an increased risk of requiring antibiotics postoperatively and returning to the ER.
- The increased risk of antibiotic prescribing and ER visits in patients with DD may be attributed to several factors, including differences in the patient population, altered healthcare delivery, or the need for additional support for patients with DD during the postoperative period.
- Our study does not establish causality but demonstrates a significant association between DD and postoperative outcomes.
- Enhancing communication between surgeons and parents of children with DD undergoing tonsillectomy is imperative in delivering optimal patient care and promoting favorable postoperative outcomes.
- Effective information distribution regarding the postoperative care plan is crucial for minimizing complications and maximizing successful outcomes.

Conclusions

- Our study provides important insights into the impact of DD on postoperative outcomes of tonsillectomy in pediatric otolaryngology patients.
- Conducting more prospective studies to understand these risk factors in DD children better and to establish effective preoperative decision-making and treatment plans for this vulnerable population is important.
- Healthcare providers should be aware of the potential differences in outcomes between patients with and without DD and take necessary steps to optimize patient care such as targeted interventions to improve postoperative monitoring, pain management, and antibiotic stewardship in patients with DD.

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