

## Introduction

- Trisomy 21 (Down Syndrome) is one of the most common genetic disorders, affecting 1 in 700 births [1].
- Down Syndrome (DS) patients are predisposed to a variety of otolaryngologic problems, including chronic ear infections and chronic middle ear effusions associated with hearing loss, airway obstruction, and sleep apnea [2].
- Tonsillectomy is a common procedure performed within the DS population for Obstructive Sleep Apnea (OSA) or recurrent tonsillitis.
- This procedure can result in a variety of complications such as bleeding, infection, pain, or decreased oral intake.
- The goal of the present study is to evaluate the relative risk of these complications among those with Down Syndrome compared to those without Down Syndrome

## Methods and Materials

### Study Design:

- This study is a retrospective cohort study.

### Ethics Approval:

- Ethical approval was granted by the Institutional Review Board at The University of Tennessee Health and Science Center (UTHSC), under protocol number 23-09356-NHSR.

### TriNetx:

- Uses Electronic Health Records (EHR) to provide clinical data and analytical tools to generate real-world evidence localized to UTHSC
- Data extraction predominately relies on ICD10 and CPT coding
- All queries are federated, and only aggregated results are visible on the TriNetX platform.

### Inclusion Criteria:

- Age  $\leq$  18 years old
- Underwent tonsillectomy and/or adenoidectomy
- Cohort 1 Inclusion Criteria:
  - Presence of trisomy 21
- Cohort 2 Inclusion Criteria:
  - Absence of trisomy 21

### Outcome Measures:

- Fever (T  $>$ 101.00 F)
- Elevated WBCs ( $>$ 12.00  $10^3/10^9/L$ )
- Need for antibiotics
- Need for opioids
- Surgical complications
- ER visit
- Dehydration

### Data Collection and Analysis:

- All data were extracted from eHRs in the TriNetX Database.
- All outcomes were measured between post-op day 1 and day 7 surgery.
- Risk Ratios were used to compare outcomes between the two groups.
- Significance was identified using 95% Confidence Intervals (CIs).

**Table 1**

	Tonsillectomy with Trisomy 21 (110)	Tonsillectomy without Trisomy 21 (7,390)	Risk Ratio	95% Confidence Interval
Fever	10 (9.8%)	60 (.8%)	11.197	[5.890, 21.287]**
Elevated WBC	10 (9.1%)	150 (2.0%)	4.479	[2.429, 8.258]**
Need for Antibiotics	40 (36.4%)	1,440 (19.5%)	1.866	[1.451, 2.400]**
Need for Opioids	30 (27.3%)	1,040 (14.1%)	2.687	[1.421, 2.643]**
Surgical Complications	10 (9.1%)	250 (3.4%)	2.687	[1.470, 4.913]**
ER Visit	10 (9.1%)	430 (5.8%)	1.562	[0.859, 2.841]
Dehydration	10 (9.1%)	180 (2.4%)	3.732	2.031, 6.858**

\*\* indicates statistical significance

## Results

- The Tonsillectomy with Trisomy 21 included 110 patients
- The Tonsillectomy without Trisomy 21 included 7,390 patients.
- Results presented as risk ratios with 95% confidence interval (RR [95%CI]).
- We found that individuals with Trisomy were at increased risk for:
  - Fever
  - Elevated WBC
  - a prescription of antibiotics
  - need for opioids
  - surgical complications
  - Dehydration
- There was no significant difference in return to the ER between the two groups.

## Discussion

- Our study indicated that individuals with Down Syndrome (DS) are at an increased risk of several post-tonsillectomy complications, including fever, elevated WBC, a need for antibiotics and opioids, surgical complications, and dehydration.
- These findings support and add additional context to the existing literature.
  - One study found that DS patients experience higher bleeding rates and longer hospital stays, but without a proportionate increase in respiratory complications [3].
  - Our findings support this observation, especially the data showing that surgical complications (including post-operative bleeding) are prevalent within this cohort.
  - Another study, demonstrated increased time before adequate post-surgical oral intake is reached compared to a non-DS population [4].
  - Our research indicates that the risk of dehydration is higher in DS patients, which aligns with the understanding that many individuals with DS face oral aversion challenges.
- Given these insights, many experts recommend admitting DS patients to the hospital after a tonsillectomy, to ensure that they receive close clinical monitoring post-operatively.
- Overall, our results suggest that we should pay special attention to their post-operative course.
- These findings are particularly important, given the elevated rates of Obstructive Sleep Apnea (OSA) in the DS population, which range from 40-80%, and the fact that tonsillectomy is the primary treatment for OSA in pediatric patients [5-6].
- Limitations
  - While our study employs a robust database and thorough analysis, it is not without its limitations. These include its focus on a single organization, potential misclassification bias, and reliance on ICD codes.

## Conclusions

We found that individuals with Down syndrome were at increased risk with 6 out of the 7 outcomes that were observed post-tonsillectomy, which indicates that Down Syndrome is a significant risk factor when performing tonsillectomy. Further research should include prospective studies to confirm these findings and investigate methods of decreasing the negative outcomes discussed, particularly complications requiring surgical intervention.

## References

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