Surgical Antibiotic Prophylaxis Utilization and Necessity in Pediatric Branchial Cleft Cyst Excision

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Introduction

Branchial cleft cysts (BCC) are among the most common congenital neck masses in children, comprising 20-30% of cases.[1] Surgical excision is the only definitive treatment, and in the absence of active infection or communication with the aerodigestive tract, these operations are generally considered clean procedures.[2] However, prophylactic intravenous antibiotics (PIAB) are frequently administered perioperatively.[3] Given the very low baseline rates of surgical site infection following BCC excision, the benefit of PIAB on patient outcomes for this procedure remains unclear.[4] In addition, an increased emphasis on antibiotic stewardship has prompted renewed scrutiny of PIAB practices in clean pediatric surgeries.[5] Clarifying patterns of PIAB use and their association with patient outcomes is necessary to inform evidence-based perioperative guidelines.

Objectives

- Characterize national trends in PIAB administration for pediatric BCC excisions.
- Identify clinical and demographic factors associated with PIAB use.
- Evaluate the impact of PIAB on 30-day patient outcomes, including surgical site infection, unplanned readmission, and reoperation.

Methods

Database: ACS NSQIP-Pediatric Surgical Antibiotic Prophylaxis Database.
Inclusion Criteria: Pediatric patients (<18) who underwent BCC excision (CPT 42810 or 42815) from 2021-2023.
Exclusion Criteria: Patients with active infection, immunodeficiency diagnosis, cardiac history requiring PIAB, received antibiotics prior to the prophylactic window, or had an actively infected BCC treated with antibiotics prior to operation.
Clinicodemographic Factors: PIAB administration, age, sex, race/ethnicity, admission status, specialty of the attending surgeon, ASA/wound classification, CPT code, and ICD-10 description.
Outcomes: Surgical site infection, unplanned readmission, reoperation. All outcomes within 30 days.
Analysis: Chi-squared tests, univariate logistic regression, and multivariate logistic regression.

References

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Patient Demographics

Table I: Patient Characteristics Stratified by PIAB Administration.

Characteristic	No PIAB N = 907 (32.0%)	PIAB N = 1,930 (68.0%)	p-value
Age			**<0.001**
0-2 Years	381 (39.4%)	587 (60.6%)	
2-5 Years	254 (32.8%)	521 (67.2%)	
5-10 Years	161 (27.9%)	416 (72.1%)	
10-18 Years	111 (21.5%)	406 (78.5%)	
Sex			0.411
Female	434 (31.3%)	957 (68.8%)	
Male	473 (32.7%)	973 (67.3%)	
Race			0.344
White	503 (33.1%)	1,015 (66.9%)	
Black	130 (28.8%)	321 (71.2%)	
Asian or Pacific Islander	69 (33.0%)	140 (67.0%)	
Unknown/Other	205 (31.1%)	454 (68.9%)	
Ethnicity			0.058
Non-Hispanic	638 (32.8%)	1,310 (67.2%)	
Hispanic	149 (27.7%)	388 (72.3%)	
Unknown	120 (34.1%)	232 (65.9%)	
Admission Status			**0.009**
Outpatient	855 (32.6%)	1,764 (67.4%)	
Inpatient	52 (23.8%)	166 (76.2%)	
Surgical Specialty			**<0.001**
Otolaryngology	510 (27.2%)	1,362 (72.8%)	
Non-Otolaryngology	397 (41.2%)	568 (58.8%)	
ASA Classification			0.079
ASA 1	551 (32.9%)	1,124 (67.1%)	
ASA 2	341 (30.9%)	762 (69.1%)	
ASA 3	12 (21.8%)	43 (78.2%)	
ASA 4	1 (100.0%)	0 (0.0%)	
ASA NA	2 (66.7%)	1 (33.3%)	
Wound Classification			**<0.001**
Clean	670 (34.7%)	1,260 (65.3%)	
Clean-contaminated	237 (26.1%)	670 (73.9%)	
CPT Code			**<0.001**
42810 (*Confined to skin and soft tissue*)	572 (37.1%)	971 (62.9%)	
42815 (*Subcutaneous or pharyngeal extension*)	335 (25.9%)	959 (74.1%)	
ICD-10 Description			**0.007**
Q18.0 (*Sinus, Fistula, Cyst of Branchial Cleft*)	535 (33.1%)	1,081 (66.9%)	
Q17.0/18.1 (*Accessory Auricle/Preauricular Cyst*)	198 (28.7%)	493 (71.3%)	
R22.1 (*Localized Swelling, Mass and Lump, Neck*)	26 (22.4%)	90 (77.6%)	
Q18.2 (*Other Branchial Cleft Malformations*)	148 (35.7%)	266 (64.3%)	
Surgical Site Infection			0.940
No Infection	887 (97.8%)	1,885 (97.7%)	
Surgical Site Infection	20 (2.2%)	45 (23%)	
Readmission			0.344
Not Readmitted	900 (99.2%)	1,922 (99.6%)	
Readmission	7 (0.8%)	8 (0.4%)	
Reoperation			0.989
No Reoperation	902 (99.4%)	1,921 (99.5%)	
Reoperation	5 (0.6%)	9 (0.5%)	

Complicaton Rates Unchanged By PIAB Administration

Table 2: Univariate Analysis of Outcomes by PIAB Use

Outcome	Univariate OR (95% CI)	p-value	Multivariate OR (95% CI)	p-value
SSI	1.06 (0.63, 1.84)	0.834	0.90 (0.53-1.60)	0.722
Readmission	0.54 (0.19, 1.53)	0.228	0.41 (0.14-1.22)	0.100
Reoperation	0.85 (0.29, 2.76)	0.687	0.67 (0.22-2.26)	0.489

PIAB Use Varied By Age, Specialty, Wound Class, And CPT Code

Table 3: Predictors of PIAB Administration

Factor	Multivariate OR (95% CI)	p-value
Age 0-2 Years	0.54 (0.41-0.69)	**<0.001**
Age 2-5 Years	0.64 (0.49-0.83)	**<0.001**
Hispanic Ethnicity	1.33 (1.06-1.68)	**0.016**
Inpatient Admission	1.44 (1.01-2.07)	**0.046**
Non-Otolaryngologist	0.70 (0.59-0.84)	**<0.001**
Clean-contaminated	1.30 (1.08-1.56)	**0.005**
CPT 42815 (*Deeper*)	1.52 (1.28-1.80)	**<0.001**

Antibiotics Did Not Lower SSI Risk; Infections More Likely With Admission & Aur. Anomalies

Table 4: Predictors of Surgical Site Infection

Factor	Multivariate OR (95% CI)	p-value
PIAB Given	0.90 (0.53-1.60)	0.722
Inpatient Admission	2.62 (1.19-5.40)	**0.012**
Non-Otolaryngologist	0.41 (0.18-0.83)	**0.020**
Q17.0/18.1 (*Auricular*)	2.11 (1.17-3.80)	**0.012**
CPT 42815 (*Deeper*)	1.13 (0.67-1.92)	0.641
Clean-contaminated	1.43 (0.85-2.37)	0.172

Limitations

- Data is retrospective and limited to outcomes listed.
- Patients were only followed for 30 days following surgery.
- While PIAB use was evaluated, concurrent or postoperative oral antibiotic use was not accounted for.
- Utilization of a national, de-identified database does not account for individual surgeons' or institutions' preferences and protocols.

Summary and Conclusions

- Comprehensively evaluated the effect of PIAB administration on postoperative outcomes following BCC excision.
- Among 2,837 pediatric BCC excisions, 68% of patients received PIAB.
- PIAB use was more common in Hispanic patients, those admitted inpatient, clean-contaminated wounds, and deeper lesions.
- Younger children and those treated by non-otolaryngologists were less likely to receive PIAB.
- PIAB conferred **no measurable reduction** in surgical site infection, readmission, or reoperation, and may play no beneficial role for BCC patients.
- Neither CPT nor ICD-10 codes were reliable markers of BCC infection risk, consistent with prior work. Further investigation is essential to determine how to classify BCC by infection risk in a meaningful manner.
- These findings support that BCC excision is a low-risk procedure and that **current guidelines on PIAB use may need to be revisited.**

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