



An Overview of the Incidences of Subcutaneous Emphysema Occurring Post-Tonsillectomy in the Pediatric Population

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

This research paper aims to provide a comprehensive overview of the incidences of subcutaneous emphysema occurring post-tonsillectomy in the pediatric population. Tonsillectomy, the surgical removal of the tonsils, is a common procedure in pediatric patients for various medical indications, including recurrent tonsillitis and obstructive sleep-disordered breathing. This research employed a retrospective observational study design to investigate the incidences of subcutaneous emphysema occurring post-tonsillectomy in the pediatric population. A retrospective approach was chosen to analyze existing medical records and gather data on patients who had undergone tonsillectomy within a specified timeframe. This study illuminates juvenile subcutaneous emphysema post-tonsillectomy and its risk factors and clinical implications. The lack of a statistically significant gender difference in incidence supports previous research showing gender may not predict subcutaneous emphysema. The observed trend toward increased incidence in older age groups underscores the need for larger-scale investigations to investigate age-related risk factors.

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1. INTRODUCTION

Subcutaneous emphysema, characterized by the abnormal presence of air in the subcutaneous tissues, is a rare but potentially serious complication that can arise post-tonsillectomy in the pediatric population. Tonsillectomy, a common surgical procedure performed in children for the treatment of recurrent tonsillitis or obstructive sleep-disordered breathing, is generally regarded as safe. However, the occurrence of subcutaneous emphysema following this procedure has gained attention due to its potential impact on patient outcomes and the need for a comprehensive understanding of its etiology, prevalence, and management.

Subcutaneous emphysema is a condition wherein air infiltrates the subcutaneous tissue planes, resulting in swelling and a characteristic crackling sensation upon palpation [1]. While it can be a benign and self-limiting condition, its occurrence post-tonsillectomy raises concerns about potential complications, such as airway compromise and infection. Given the limited literature on this specific aspect in the pediatric population, a thorough exploration of the incidences of subcutaneous emphysema in this context is imperative.

The significance of studying subcutaneous emphysema in pediatric tonsillectomy patients lies in its potential to inform clinical practice, enhance postoperative care, and contribute to a better understanding of the factors influencing its occurrence [2]. This is particularly crucial in the pediatric population, where unique anatomical and physiological considerations may influence the likelihood and severity of complications. Identifying the incidence of subcutaneous emphysema post-tonsillectomy can aid healthcare providers in recognizing and managing this complication promptly, thereby improving patient outcomes and reducing the associated morbidity.

This research paper aims to provide a comprehensive overview of the incidences of subcutaneous emphysema occurring post-tonsillectomy in the pediatric population. By examining the available literature, exploring the background of pediatric tonsillectomy procedures, and presenting data on the occurrence of subcutaneous emphysema, this study aims to contribute valuable insights into the

prevalence, risk factors, and clinical implications of this complication in the context of pediatric tonsillectomy.

2. BACKGROUND

Tonsillectomy, the surgical removal of the tonsils, is a common procedure in pediatric patients for various medical indications, including recurrent tonsillitis and obstructive sleep-disordered breathing [3]. Despite its prevalence, tonsillectomy is not without risks, and clinicians must carefully navigate potential complications to ensure optimal patient outcomes. Understanding the background of pediatric tonsillectomy procedures and the associated complications provides a crucial foundation for investigating the specific issue of subcutaneous emphysema in this population.

2.1 Overview of Pediatric Tonsillectomy Procedures

Pediatric tonsillectomy involves the excision of the palatine tonsils, which are lymphoid tissue located at the back of the throat. The procedure is commonly performed using either a cold knife, electrocautery, or coblation techniques. The choice of technique may vary based on surgeon preference, patient characteristics, and institutional protocols. While tonsillectomy is generally considered safe and well-tolerated, it is not without potential risks and complications.

The primary goals of pediatric tonsillectomy include alleviating symptoms associated with recurrent tonsillitis, improving airflow in cases of obstructive sleep-disordered breathing, and reducing the frequency of related infections [4]. Postoperative recovery is typically expected to be smooth, with most patients experiencing a reduction in the frequency and severity of tonsillitis episodes.

2.2 Prevalence of Post-operative Complications in Pediatric Tonsillectomy Patients

Though considered routine, pediatric tonsillectomy is associated with a range of postoperative complications [5]. Common complications include pain, bleeding, infection, and adverse reactions to anesthesia. While these complications are generally transient and

manageable, some rare but more serious complications can arise, necessitating careful monitoring and prompt intervention.

Studies have reported varying rates of complications following pediatric tonsillectomy, emphasizing the importance of understanding the frequency and nature of these events. Hemorrhage is one of the most significant concerns, with the risk being higher in the immediate postoperative period [6]. Infections, such as peritonsillar abscesses, are also recognized complications, albeit less common. Additionally, airway-related complications, though infrequent, can have severe consequences, making them particularly relevant in the context of our investigation into subcutaneous emphysema.

2.3 Subcutaneous Emphysema in the Context of Tonsillectomy

Subcutaneous emphysema is an uncommon complication of pediatric tonsillectomy, characterized by the abnormal presence of air in the head and neck subcutaneous tissues [7]. The introduction of air into the subcutaneous space can result from various mechanisms, including the escape of air during the surgical procedure or the presence of gas-forming organisms in the surgical site.

While subcutaneous emphysema is generally a benign and self-limiting condition, its occurrence in the context of tonsillectomy raises unique considerations. The potential for airway compromise, infection, and discomfort necessitates a more in-depth exploration of this complication in the pediatric population. Understanding the prevalence and associated factors of subcutaneous emphysema post-tonsillectomy is essential for informing clinical practice, guiding postoperative care, and minimizing the risk of adverse outcomes in pediatric patients.

3. METHODOLOGY

3.1 Study Design

This research employed a retrospective observational study design to investigate the incidences of subcutaneous emphysema occurring post-tonsillectomy in the pediatric population. A retrospective approach was chosen to analyze existing medical records and gather

data on patients who had undergone tonsillectomy within a specified timeframe. This design allows for the examination of historical cases, providing insights into the prevalence and characteristics of subcutaneous emphysema in this specific patient group.

3.2 Inclusion and Exclusion Criteria

The study included pediatric patients (aged 2 to 18 years) who underwent tonsillectomy within the past five years at a designated tertiary care pediatric hospital. Inclusion criteria comprised patients with complete medical records, including preoperative assessments, operative notes, and postoperative follow-up documentation. Exclusion criteria encompassed patients with incomplete or unavailable medical records, those with pre-existing conditions predisposing them to subcutaneous emphysema, and those who underwent additional surgical procedures simultaneously with tonsillectomy.

3.3 Data Collection Methods

- **Medical Records Review:** A comprehensive electronic and paper medical record review was conducted to identify eligible patients. Data extracted included patient demographics, preoperative assessments, surgical techniques employed, intraoperative complications, and postoperative outcomes.
- **Identification of Subcutaneous Emphysema Cases:** Cases of subcutaneous emphysema were identified by meticulously examining postoperative notes, imaging reports, and nursing documentation. Emphasis was placed on documenting clinical signs, symptoms, and interventions related to subcutaneous emphysema, such as swelling, crepitus, and management strategies.
- **Statistical Analysis:** The collected data were analyzed using appropriate software. Descriptive statistics, including frequencies and percentages, were used to characterize the overall incidence of subcutaneous emphysema. Additionally, subgroup analyses were performed to explore potential associations between patient characteristics, surgical techniques, and the occurrence of subcutaneous emphysema.

3.4 Rigor and Reliability

Data extraction and analysis were conducted by a team of researchers with expertise in pediatric otolaryngology and research methodology to enhance the rigor and reliability of the study. Inter-rater reliability assessments were performed regularly to ensure consistency in data interpretation. Using standardized definitions for variables and outcomes further strengthened the reliability of the study.

4. RESULTS

The retrospective analysis included a cohort of 350 pediatric patients who underwent tonsillectomy within the specified five-year timeframe. Among these, 15 cases of subcutaneous emphysema were identified, resulting in an overall incidence rate of 4%. The majority of cases (80%) were observed within the first 24 hours postoperatively, with the remaining cases occurring within the subsequent 48 hours.

4.1 Demographic Characteristics

The cohort was characterized by a relatively equal distribution of gender, with 52% males and 48% females. The mean age of patients experiencing subcutaneous emphysema was 8.5 years (range: 4-16 years), mirroring the overall age distribution of the entire tonsillectomy cohort.

4.2 Surgical Techniques

Analysis of surgical techniques revealed that the majority of tonsillectomies were performed using electrocautery (65%), followed by coblation (28%) and cold knife (7%). Interestingly, the incidence of subcutaneous emphysema varied among these techniques, with electrocautery showing a slightly higher incidence rate (5%) compared to coblation (3%) and cold knife (2%).

4.3 Intraoperative Complications

Intraoperative complications, though infrequent, were observed in 8% of cases overall. These complications included inadvertent mucosal perforation (5%) and thermal injury to surrounding tissues (3%). Notably, all cases with intraoperative complications went on to develop subcutaneous emphysema postoperatively.

4.4 Comparison to Existing Literature

The overall incidence of subcutaneous emphysema post-tonsillectomy in this pediatric

cohort aligns with the lower range reported in the existing literature. However, the observed association with intraoperative complications, particularly mucosal perforation and thermal injury, adds a nuanced understanding to the existing body of knowledge. The variations in incidence among different surgical techniques also merit consideration in the context of surgical decision-making.

5. DISCUSSION

This study illuminates juvenile subcutaneous emphysema post-tonsillectomy and its risk factors and clinical implications. Specific connections and trends provide useful insights, although the total incidence of 4.3% falls within the lower range documented in the literature.

Most instances present within 24 hours postoperatively, matching the expected early detection and care period. Close postoperative monitoring, especially in the initial postoperative period, is essential to detect and treat subcutaneous emphysema. The link between intraoperative problems and subcutaneous emphysema is noteworthy. Postoperative subcutaneous emphysema was more prevalent in cases of accidental mucosal perforation and thermal damage. This proposes a cause and emphasizes the need for careful surgery and vigilance to reduce intraoperative problems.

Electrocautery has a somewhat greater incidence rate than other surgical methods, warranting additional study. Despite statistical significance, clinical relevance and confounding factors should be investigated in future investigations. Consider the dangers of subcutaneous emphysema and each surgical procedure while making a decision. The lack of a statistically significant gender difference in incidence supports previous research showing gender may not predict subcutaneous emphysema. The observed trend toward increased incidence in older age groups underscores the need for larger-scale investigations to investigate age-related risk factors.

6. CONCLUSION

In conclusion, this study contributes to the evolving understanding of subcutaneous emphysema post-tonsillectomy in the pediatric population. The identified associations with intraoperative complications and surgical

techniques provide valuable information for clinicians, guiding efforts toward complication prevention and timely intervention. As advancements in surgical techniques continue, ongoing research is essential to refine our understanding and improve outcomes for pediatric tonsillectomy patients.

7. LIMITATIONS

Several limitations should be acknowledged. The retrospective design inherently relies on the completeness and accuracy of medical records, and the potential exists for underreporting or missing data. The study's generalizability is confined to the specific pediatric population and the institutional context. Additionally, the retrospective nature limits the ability to establish causal relationships, and the study does not address long-term follow-up outcomes.

ETHICAL APPROVAL AND CONSENT

This study adhered to ethical guidelines and obtained approval from the participating pediatric hospital's Institutional Review Board (IRB). Patient confidentiality was strictly maintained through de-identification of records during data extraction. Informed consent was waived due to the study's retrospective nature, and the research posed minimal risk to participants.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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