

Retrospective cohort analysis of pediatric daycare anesthesia in dentistry: An assessment of postoperative complications

Seher Orbay Yaşlı, Dilek Günay Canpolat, Ebru Baydan

Department of Oral and Maxillofacial Surgery,
Erciyes University, Turkey, Kayseri, Turkey

ORCID ID of the author(s)

SOY: 0000-0001-5163-3893
DGC: 0000-0002-8985-6918
EB: 0000-0001-5902-0039

Corresponding Author

Seher Orbay Yaşlı
Erciyes University Faculty of Dentistry, Kayseri,
Turkey
E-mail: sehersin81@hotmail.com

Ethics Committee Approval

The study was approved by Ethics Committee of
Erciyes University Faculty of Medicine with
approval number 2018/315.

All procedures in this study involving human
participants were performed in accordance with
the 1964 Helsinki Declaration and its later
amendments.

Conflict of Interest

No conflict of interest was declared by the
authors.

Financial Disclosure

The authors declared that this study has received
no financial support.

Previous Presentation

The authors presented their research at the Erciyes
University Faculty of Dentistry International
Congress, known as ERDIŞ 2020, which took
place in Kayseri, Turkey, from February 26th to
29th, 2020.

Published

2023 August 23

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Published by JOSAM

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Abstract

Background/Aim: In pediatric populations, the frequent challenges of patient cooperation often necessitate treatments to be performed under general anesthesia. Since these procedures do not fall under the category of major surgery, daycare anesthesia has become a prevalent approach in this field. The advantages of daycare anesthesia, such as reduced hospital stay durations and costs, make it a preferred method. It is well-recognized that daycare anesthesia, when applied across various surgical fields, has unique postoperative complications, which can sometimes be linked to the surgical procedure itself. Dental treatments represent a specific surgical domain, and elucidating potential postoperative complications in this area draws attention to preventive measures and is vital for enhancing postoperative patient comfort. The primary objective of this study was to evaluate and identify the most prevalent postoperative symptoms and complications associated with pediatric dentistry.

Methods: This retrospective cohort study was conducted at the Erciyes University Faculty of Dentistry between January 15 and April 15, 2019. We analyzed records of 245 pediatric patients aged 3 to 13 who underwent day-case dental procedures. The inclusion criteria encompassed all patients who underwent dental procedures under general anesthesia and were classified as ASA 1-2. Variables such as demographic data, procedure duration, comorbidities, and postoperative complications were extracted and analyzed for the current study.

Results: Out of the 245 pediatric patients, the median age was 6.0 years, ranging from 3.0 to 13.0 years. Females comprised 52.7% of the cohort. Most patients (62.9%) were classified under ASA class one. 27.8% of the patients reported postoperative complications such as sore throat, hoarseness, cough, or nausea/vomiting. The most prevalent postoperative complications were hoarseness (11.4%) and sore throat (9.8%). Demographic and clinical characteristics of patients with and without postoperative complications were compared. Gender significantly influences the occurrence of postoperative complications. Males had a rate of 11.0% (27 out of 245), while females had a rate of 16.7% (41 out of 245), with females experiencing complications at a higher rate than males ($P=0.01$). Age also played a role in complications: the mean age for patients with complications was 6.0 years, compared to 5.0 years for those without complications ($P=0.02$).

Conclusion: Pediatric daycare anesthesia, especially for dental procedures, has proven effective and safe. However, each child presents a unique set of challenges, and it's crucial to recognize and mitigate potential risks. By understanding common postoperative symptoms and tailoring anesthesia techniques accordingly, healthcare professionals can optimize outcomes and enhance the quality of pediatric patient care.

Keywords: ambulatory surgical procedures, day surgery, pediatric dentistry

Introduction

Day surgery, entailing the discharge of patients on the same day as their surgical procedure, offers numerous advantages, including cost savings, shorter hospital stays, and diminished postoperative complications [1]. The adoption of day surgery and anesthesia, particularly in pediatric care, has been steadily increasing, driven by enhanced patient and family comfort, cost reduction, and a decreased reliance on bed availability. Day surgeries now account for 51% to 65% of all surgical procedures, a percentage that continues to rise incrementally [2].

The inception of day surgery and anesthesia for children can be attributed to Nicoll in 1909. Generally, children are deemed optimal candidates for day surgery anesthesia due to their overall good health and their procedures' predictable, brief nature. Although complications stemming from outpatient anesthesia in children are infrequent, when they do arise, they predominantly manifest as nausea, vomiting, respiratory challenges, or cardiovascular issues [3].

Numerous studies have emphasized pediatric day surgeries' advantages and potential considerations. For example, in a 30-year hospital experience, Postuma et al. [4] illuminated pediatric daycare surgery's changing patterns and safety aspects. In a parallel vein, during a five-year investigation, Letts and coauthors [2] assessed the effectiveness of pediatric day surgery and identified its numerous benefits, including cost-effectiveness, abbreviated hospital stays, and diminished postoperative complications. Lerman [5] also delivered a comprehensive overview of pediatric ambulatory anesthesia, highlighting contemporary optimal practices and field-related challenges.

The objective of this study was to conduct a retrospective assessment of the outcomes and complications linked to day surgery and anesthesia for pediatric dental procedures conducted at our hospital from January to April 2019.

This study aimed to assess the safety and effectiveness of day surgery and anesthesia procedures in pediatric dentistry. Additionally, the study aimed to identify prevalent complications stemming from these procedures and provide recommendations for optimal practices and opportunities for enhancement to elevate patient care standards and mitigate complications.

Materials and methods

Study design and patient selection

This retrospective study was undertaken with the endorsement of the Ethics Committee of Erciyes University Faculty of Medicine, under the approval number 2018/315. Throughout this study, the authors strictly adhered to the ethical standards outlined in the principles of the Helsinki Declaration. The analysis encompassed the medical records of pediatric patients, aged between 3 and 13, who underwent day-case dental procedures at the Erciyes University Faculty of Dentistry from January 15 to April 15, 2019. A comprehensive evaluation of 245 patient medical records was conducted. Patients who underwent procedures under sedation and those subjected to general anesthesia with laryngeal mask airway were deliberately excluded from the study.

Postoperative complications were determined based on observation sheets meticulously filled out by nurses in both the recovery room and ward areas. These uniform observation sheets were utilized to maintain a standardized and impartial evaluation across all patients. The criteria and protocols governing nurse observations were established beforehand, ensuring all patients underwent assessment under equivalent conditions.

Study variables

In pursuit of the study's objectives, we thoroughly reviewed and extracted diverse data elements from the patient records. This encompassed demographic particulars, such as age, gender, and body mass index (BMI). Furthermore, we examined the procedural duration, concurrent comorbidities, the distinct categories and occurrences of postoperative complications noted, and the comprehensive prevalence of postoperative complications. Each of these variables underwent a methodical analysis to glean significant insights concerning the outcomes of the day-case dental procedures.

Statistical analysis

The collected data were analyzed using SPSS 22.0 (Statistical Package for the Social Sciences). For categorical variables, frequencies and percentages were computed, while for continuous variables, metrics such as mean, standard deviation, minimum, and maximum values were calculated. To ascertain distinctions between groups, the Chi-square test was employed. A *P*-value of <0.05 was deemed as indicating statistical significance.

Results

The demographic and clinical characteristics of the study group, consisting of 245 patients, are described below. The median age of the participants was 6.0 years, ranging from 3.0 to 13.0 years. The cohort exhibited an almost equal distribution between genders, with females comprising 52.7% and males accounting for the remaining 47.4%.

Regarding the ASA classification, the majority (62.9%) belonged to ASA class 1, while the remaining individuals (37.1%) fell under ASA class 2. The group's average BMI was 15.39 kg/m², and the typical duration of operations averaged around 71.11 minutes.

Most participants (74.9%) reported no additional health issues when investigating comorbidities. The remaining patients presented with various conditions: asthma (7.3%), epilepsy (3.2%), autism (0.8%), and other miscellaneous health concerns (13.1%). Regarding postoperative complications, the majority (72.2%) reported none. However, some individuals did encounter problems such as hoarseness (11.4%), sore throat (9.8%), cough (3.3%), and nausea or vomiting (3.3%) (Table 1).

Table 2 presents a comparative analysis of demographic and clinical characteristics among patients with and without postoperative complications. In our study involving 245 pediatric patients, 68 experienced postoperative complications, while 177 did not encounter such issues. The median age for patients with complications was 6.0 years (range: 4.0-13.0), in contrast to a median age of 5.0 years (range: 3.0-13.0) for those who remained complication-free. A statistically significant age difference was observed between the two groups (*P*=0.02). Regarding gender distribution, among the 68 patients with

complications, 27 were male (11.0%), and 41 were female (16.7%). Conversely, among the 177 patients without complications, 102 were male (41.6%), and 75 were female (30.6%). Gender was found to exert a statistically significant influence on the occurrence of postoperative complications ($P=0.01$).

Table 1: Demographic and clinical characteristics of the study group.

	Overall (n=245)
Age (year) §	6.0 [3.0-13.0]
Sex ‡	
Female	129 (52.7)
Male	116 (47.4)
ASA class ‡	
1	154 (62.9)
2	91 (37.1)
BMI (kg/m ²) †	15.39 (3.1)
Operation time†	71.11 (28.5)
Comorbidities ‡	
No additional problems	185 (74.9)
Asthma	18 (7.3)
Epilepsy	8 (3.2)
Autism	2 (0.8)
Others	32 (13.1)
Postoperative complication‡	
No complications	177 (72.2)
Hoarseness	28 (11.4)
Sore Throat	24 (9.8)
Cough	8 (3.3)
Nause or vomiting	8 (3.3)

‡: n (%), †: mean (standard deviation), §: median [min-max], ASA: the American Society of Anesthesiologists, BMI: body mass index

Table 2: Comparison of the patients with and without postoperative complications in terms of the demographic and clinical characteristics.

	Post-op complications		P-value
	Yes (n=68)	No (n=177)	
Age (year) §	6.0 [4.0-13.0]	5.0 [3.0-13.0]	0.02***
Sex ‡			0.01**
Male	27 (11.0)	102 (41.6)	
Female	41.0 (16.7)	75.0 (30.6)	
ASA class ‡			0.08**
1	46 (18.8)	140 (57.1)	
2	22 (8.9)	37 (15.1)	
BMI (kg/m ²) †	14.91 (2.6)	15.58 (3.3)	0.09 ***
Operation time†	71.38 (25.9)	71.00 (28.6)	0.92***
Comorbidities ‡			0.1 **
No Additional Problems	46 (18.7)	139 (56.7)	
Asthma	9 (3.7)	9 (3.7)	
Epilepsy	3 (1.2)	5 (2.0)	
Autism	1 (0.4)	1 (0.4)	
Others	9 (3.7)	23 (9.4)	

‡: n (%), †: mean (standard deviation), §: median [min-max], ASA: the American Society of Anesthesiologists, BMI: body mass index, * Mann-Whitney U test, ** Pearson Chi-Square, or Fisher's exact test, *** Independent samples t-test.

Discussion

Pediatric daycare anesthesia in dentistry is gaining prominence due to its numerous benefits compared to traditional inpatient procedures. A significant global shift is occurring towards adopting day-case anesthesia, driven by cost-effectiveness, enhanced patient and guardian satisfaction, shorter hospital stays, and reduced risks of hospital-acquired infections. The swift return to a familiar environment often contributes to a faster recovery for pediatric patients, thereby diminishing the psychological distress associated with prolonged hospitalization [6]. The frequency of pediatric ambulatory surgery has recently surged, resulting in 80-90% of pediatric surgeries being performed as ambulatory procedures [5].

The safety and effectiveness of outpatient surgical procedures in pediatric patients remain a significant concern among healthcare professionals. In a 5-year study, Letts and colleagues [2] investigated 4900 pediatric patients who underwent outpatient anesthesia for procedures such as myringotomy, tonsillectomy, adenoidectomy, dental procedures, and inguinal hernia repair. They identified several advantages of

this approach, including cost savings, abbreviated hospital stays, and decreased postoperative complications.

In our study, which observed a relatively high rate of postoperative complications, we compared the incidence of these complications with the demographic and clinical data of the patients. Our analysis revealed that age and gender exerted statistically significant influences on the occurrence of postoperative complications. In line with our findings, a study conducted by Chao et al. [7] on pediatric patients undergoing dental treatments under general anesthesia as daycare procedures also noted a significant correlation between postoperative complications, operation time, and age.

Lerman [5] has extensively reviewed pediatric daycare anesthesia procedures, using adenotonsillectomy as a primary example. This review delves deeply into preoperative and postoperative events within this field, providing a comprehensive understanding of pediatric daycare anesthesia on a broader scale. In contrast, our study concentrates on a more specific procedure, an area with limited representation in the current literature. Consequently, our contribution offers a valuable addition to the existing body of knowledge.

Pediatric populations undergoing day-case anesthesia frequently report procedure-specific postoperative symptoms, such as nausea or bleeding [2,8]. However, our pediatric cohort, which specifically focused on dental procedures, exhibited a distinct profile, with complications like hoarseness and sore throat being more prevalent. This disparity highlights children's distinctive postoperative challenges, a viewpoint also shared by Kain et al. [9] in their study, which delved into behavioral outcomes in children following surgery.

According to our findings, 245 patients underwent dental treatments under general anesthesia and underwent retrospective review. The rates of postoperative complications were as follows: hoarseness in 28 patients, sore throat in 24 patients, cough in eight patients, and nausea or vomiting in eight patients, resulting in an overall complication rate of 27.76%. The otolaryngology service has been among the most frequent users of day surgery. Existing literature reports complication rates associated with tonsillectomy procedures ranging from 2.2% to 20% [2].

In a study examining postoperative complications among children undergoing dental treatments with general anesthesia as a day surgery procedure, a postoperative complication rate of 61.9% was identified. The most frequently reported complications were drowsiness, pain, and difficulty eating [10]. In contrast, our study revealed that hoarseness and sore throat were the most common postoperative complications. Our postoperative complication rate stood at around 30%. This lower rate in our study may be attributed to a combination of improved preoperative assessment, the proficiency of our surgical and anesthetic team, and rigorous postoperative care protocols.

In dental practices, procedures conducted under general anesthesia inherently carry a risk for postoperative complications such as sore throats and hoarseness. Considering that these procedures are performed within the oral cavity and involve the utilization of general anesthesia equipment, the occurrence of such complications can be foreseen. Our study highlights the

necessity for supplementary measures to improve postoperative comfort within this context. These measures might involve a more cautious approach to intraoral instrument and device usage, particularly selecting softer throat tampons for use during general anesthesia.

The importance of multidisciplinary collaboration in modern healthcare cannot be emphasized enough. This is especially crucial in the realm of pediatric anesthesia. Incorporating perspectives from pediatricians, anesthesiologists, and dentists can lead to a more comprehensive care approach [11]. Additionally, existing literature underscores the pivotal role of preoperative counseling and postoperative support systems in improving outcomes [12].

Limitations

Despite our meticulous methodology, this study has its limitations. The findings might not be universally applicable due to the region-specific nature of our sample. Furthermore, our postoperative evaluation may not comprehensively capture potential long-term complications.

Conclusion

In conclusion, pediatric daycare anesthesia in dentistry demands specialized skills, interdisciplinary teamwork, and a profound comprehension of the distinctive challenges pediatric patients pose. We found that patients undergoing dental treatments under general anesthesia as daycare procedures most frequently encountered postoperative sore throat and hoarseness. Given our findings, it is imperative to implement targeted measures, such as utilizing softer tampon materials within the oral cavity, ensuring cautious manipulation of intraoral instruments to prevent trauma, and the anesthesiologist's selection of appropriate tube size, to mitigate these complications. Such approaches hold the potential to significantly heighten postoperative patient comfort and satisfaction.

Given the procedure-specific nature of our sample, future studies might contemplate incorporating a more diverse and expansive population to amplify the external validity of the results. Furthermore, extended postoperative follow-ups could prove pivotal in comprehensively understanding potential long-term complications.

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