

ASSESSMENT OF PERIOPERATIVE COMPLICATIONS AMONG PATIENTS
UNDERGOING DENTAL AND ORAL SURGICAL PROCEDURES UNDER
GENERAL ANESTHESIA

A Hospital-Based Descriptive Observational Study at Khyber College of
Dentistry Hospital, Peshawar

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Abstract

Background: General anesthesia is frequently used for extensive dental and oral surgical procedures when conventional behavioral management, local anesthesia, or conscious sedation is inadequate. Although general anesthesia provides controlled operating conditions, patients may experience postoperative complications including pain, nausea, vomiting, sore throat, cough,

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bleeding, drowsiness, and difficulty eating. This study assessed the frequency and pattern of perioperative complications among patients undergoing dental and oral surgical procedures under general anesthesia and examined selected demographic, anesthetic, and procedural factors associated with postoperative complications.

Methods: A hospital-based descriptive observational study was conducted at Khyber College of Dentistry Hospital, Peshawar, from January 2025 to June 2025. A total of 150 patients who underwent elective dental and oral surgical procedures under general anesthesia were included. Demographic characteristics, American Society of Anesthesiologists (ASA) physical status, procedure type, duration of surgery, duration of anesthesia, and postoperative complications were recorded. Patients were assessed in the recovery area and at 24 and 72 hours after surgery. Data were analyzed using IBM SPSS Statistics. **Results:** Of the 150 patients, 86 (57.3%) experienced at least one postoperative complication. Postoperative pain was the most frequently reported complication, occurring in 52 (34.7%) patients, followed by nausea/vomiting in 29 (19.3%), sore throat in 24 (16.0%), drowsiness in 22 (14.7%), postoperative bleeding in 18 (12.0%), and cough or respiratory symptoms in 15 (10.0%). Transient oxygen desaturation occurred in 7 (4.7%) patients and hypotension in 5 (3.3%). Complications were significantly more frequent with longer anesthesia duration ($p = 0.004$), and anesthesia duration >120 minutes (adjusted OR 2.81; 95% CI 1.35–5.85) and surgery duration >120 minutes (adjusted OR 2.47; 95% CI 1.18–5.17) were independent predictors. Complications were numerically more frequent among ASA II/III patients (68.9% vs. 52.4%), but the difference was not statistically significant ($p = 0.061$). **Conclusion:** Minor postoperative complications were common after dental and oral surgical procedures under general anesthesia at this center, whereas serious complications were uncommon. Longer anesthesia and surgical duration were associated with a higher risk of complications. Appropriate preoperative assessment, intraoperative monitoring, effective postoperative analgesia, prevention and treatment of nausea and vomiting, and adequate recovery-room observation remain important for patient safety.

Keywords: General anesthesia; Dental surgery; Oral surgery; Perioperative complications; Postoperative pain; Nausea and vomiting; Patient safety; Anesthesia.

1. Introduction

Dental and oral surgical procedures are increasingly performed under general anesthesia in patients who are unable to tolerate conventional dental treatment because of young age, severe dental anxiety, limited cooperation, extensive treatment requirements, disability, or the complexity of the planned procedure. General anesthesia allows complete control of the airway, patient movement, pain, and surgical conditions and therefore facilitates comprehensive dental treatment in selected patients.

Despite its advantages, general anesthesia is associated with perioperative risks. Patients undergoing dental procedures may experience complications related to both the anesthetic and the dental or surgical procedure. Common postoperative problems include pain, nausea, vomiting, sore throat, coughing, drowsiness, difficulty eating, bleeding, fever, and behavioral changes. Previous studies have demonstrated substantial variation in reported complication rates, partly because of differences in patient age, type and extent of dental treatment, anesthesia technique, follow-up period, and methods of assessing complications.

A prospective observational study of 133 pediatric patients reported that 69.9% experienced at least one postoperative complaint within 24 hours of dental treatment under general anesthesia. Coughing and dental pain were each reported in 27.1% of patients, while inability to eat occurred in 24.8% and sore throat in 21.1%. The frequency and severity of complications decreased significantly by 72 hours. Similarly, a study of 90 children undergoing dental treatment under general anesthesia reported that 99% had at least one complaint on the first postoperative day, with most complaints decreasing considerably by the third postoperative day. A larger cross-sectional study of 369 healthy Chinese children reported that approximately 94.86% experienced one or more postoperative complications after dental general anesthesia, with postoperative pain being the most prevalent.

Post-discharge complications have also been investigated in day-care dental settings, where drowsiness and pain were among the most frequent problems, most cases were managed conservatively at home, and readmission was uncommon. Nausea and vomiting are particularly relevant in oral and maxillofacial surgery: a retrospective study of 372 patients examined risk factors including age, sex, BMI, smoking status, previous postoperative nausea or motion sickness, anesthesia duration, blood loss, nasogastric tube use, and postoperative opioid use, and a more recent study of 148 patients undergoing minor oral and maxillofacial surgery found that postoperative nausea and vomiting occurred mainly early and was associated with greater pain at two hours.

Airway-related symptoms are another important concern. A comparison of laryngeal mask airway with nasal endotracheal intubation in pediatric dental surgery reported lower rates of sore throat and postoperative nausea and vomiting with the laryngeal mask airway, and a 2025 randomized clinical trial in children with special healthcare needs showed that throat-pack use reduced postoperative nausea and vomiting but increased postoperative sore throat.

Although previous studies provided important information regarding individual complications, the overall pattern of perioperative complications across dental and oral surgical procedures remains clinically important, particularly in local settings where published data are limited. Assessment of these complications can help dental and anesthesia teams improve preoperative risk assessment, intraoperative monitoring, postoperative pain management, and discharge counseling.

Study Objective

The objective of this study was to assess the frequency and pattern of perioperative complications among patients undergoing dental and oral surgical procedures under general anesthesia at Khyber College of Dentistry Hospital, Peshawar, and to examine the relationship between selected demographic, anesthetic, and procedural characteristics and postoperative complications.

Research Questions

- What were the most frequently observed perioperative complications among patients undergoing dental and oral surgical procedures under general anesthesia?
- What proportion of patients experienced at least one postoperative complication?
- Were postoperative complications associated with duration of anesthesia, duration of surgery, procedure type, or ASA physical status?
- How did the frequency of complications change during the postoperative period?

2. Materials and Methods

2.1 Study Design

A hospital-based descriptive observational study was conducted to assess perioperative complications among patients undergoing dental and oral surgical procedures under general anesthesia.

2.2 Study Setting and Duration

The study was carried out at Khyber College of Dentistry Hospital, Peshawar, Khyber Pakhtunkhwa, Pakistan, over a period from January 2025 to June 2025. General anesthesia was administered by qualified anesthesia personnel in the hospital operating room, and patients were monitored in a postoperative recovery area.

2.3 Study Population

The study population consisted of patients who underwent elective dental and oral surgical procedures under general anesthesia during the study period.

2.4 Sample Size

A total of 150 patients who met the eligibility criteria were included in the study.

2.5 Inclusion Criteria

- Patients who underwent dental or oral surgical treatment under general anesthesia;
- Patients scheduled for elective treatment;
- Patients with complete perioperative records;
- Patients who received postoperative monitoring in the recovery area; and
- Patients who provided informed consent, or for whom consent was provided by a parent/guardian when appropriate.

2.6 Exclusion Criteria

- Patients who underwent emergency oral surgery;
- Patients with incomplete anesthesia or postoperative records;
- Patients with a pre-existing condition that independently explained the postoperative symptom being assessed;
- Patients who required prolonged postoperative intensive care unrelated to the dental procedure; and
- Patients lost to postoperative follow-up.

2.7 Study Variables

Demographic variables: age and sex. **Clinical variables:** ASA physical status and relevant medical history. **Procedure-related variables:** type of dental/oral surgery, duration of surgery, and number/type of procedures. **Anesthesia-related variables:** duration of anesthesia, airway technique, intraoperative complications, and recovery time. **Postoperative variables:** pain, nausea, vomiting, sore throat, cough, drowsiness, bleeding, fever, oxygen desaturation, hypotension, delayed recovery, need for additional treatment, and unplanned admission/readmission.

2.8 Data Collection

Data were recorded using a structured data collection form. Demographic and clinical information was obtained from patient records. Intraoperative complications were recorded by the anesthesia and surgical teams. Postoperative complications were assessed in the recovery area and during follow-up at 24 and 72 hours. This approach was consistent with previous observational studies in which postoperative dental morbidity was assessed at defined postoperative intervals.

2.9 Definition of Postoperative Complication

A postoperative complication was defined as any new symptom, clinical finding, or adverse event occurring after completion of anesthesia or surgery that required observation, symptomatic treatment, or additional clinical management.

2.10 Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics. Categorical variables were presented as frequencies and percentages, and continuous variables as means and standard deviations. The Chi-square test or Fisher's exact test was used to compare categorical variables, and changes between the 24-hour and 72-hour assessments were compared using McNemar's test. Binary logistic regression was performed to identify independent factors associated with the development of at least one postoperative complication, and adjusted odds ratios (OR) with 95% confidence intervals (CI) were reported. A p-value of <0.05 was considered statistically significant. Results were presented as tables and figures (bar charts, histograms, and pie charts).

2.11 Ethical Considerations

Ethical approval was obtained from the institutional ethics/research committee of Khyber College of Dentistry, Peshawar December 24th Ref No 2198/2024. before commencement of the study. Written informed consent was obtained from adult participants and from parents or legal guardians of pediatric participants. Patient confidentiality and anonymity were maintained throughout.

3. Results

3.1 Demographic Characteristics

A total of 150 patients were included in the study. The mean age was 28.7 ± 17.4 years. Males constituted 84 (56.0%) and females 66 (44.0%) of the sample. Most patients (105; 70.0%) were classified as ASA I (Table 1; Figures 1–3).

Table 1. Demographic Characteristics of Participants (N = 150)

Variable	Frequency (n)	Percentage (%)
Age group		
≤10 years	38	25.3
11–20 years	27	18.0
21–40 years	48	32.0
>40 years	37	24.7
Sex		

Male	84	56.0
Female	66	44.0
ASA status		
ASA I	105	70.0
ASA II	39	26.0
ASA III	6	4.0

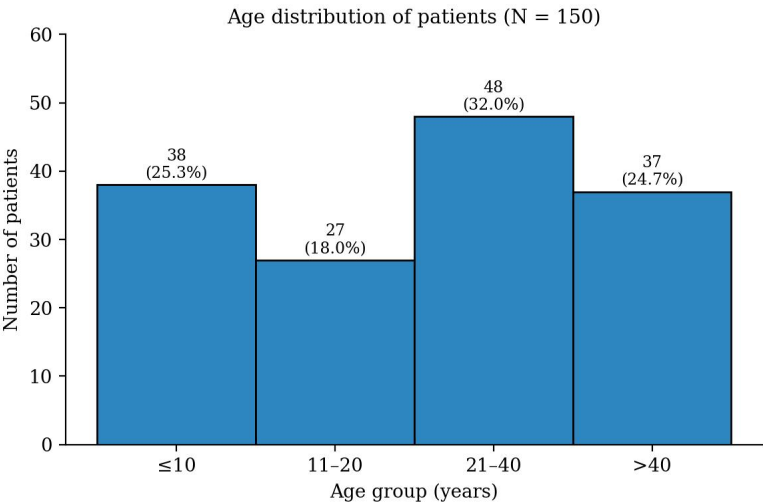


Figure 1. Histogram of age distribution of patients

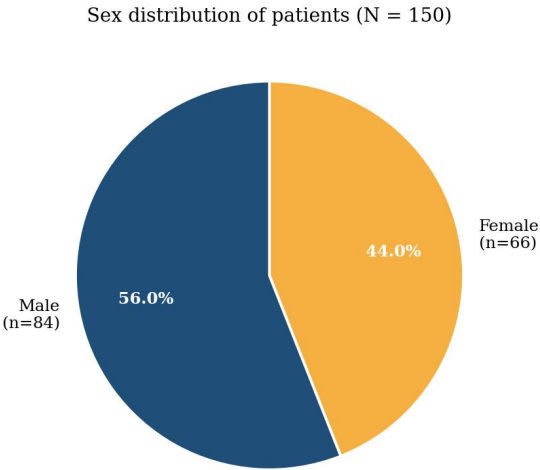


Figure 2. Pie chart showing sex distribution of patients

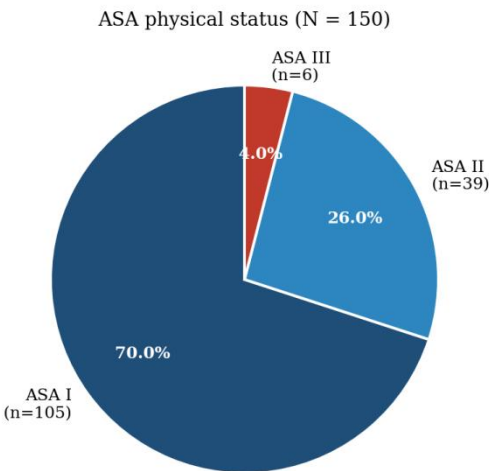


Figure 3. Pie chart showing ASA physical status of patients

3.2 Surgical Characteristics

Dental restoration (26.0%) and multiple dental procedures (24.0%) represented the largest proportions of procedures, followed by dental extraction (20.7%). The mean duration of surgery was 78.4 ± 31.6 minutes, while the mean duration of anesthesia was 96.2 ± 35.8 minutes (Table 2; Figures 4–6).

Table 2. Clinical and Procedural Characteristics (N = 150)

Variable	n	%
Type of procedure		
Dental restoration	39	26.0
Dental extraction	31	20.7
Multiple dental procedures	36	24.0
Oral/maxillofacial surgery	28	18.7
Other oral surgical procedures	16	10.7
Duration of surgery		
<60 minutes	55	36.7
60–120 minutes	69	46.0
>120 minutes	26	17.3

Duration of anesthesia

<90 minutes	52	34.7
90–120 minutes	65	43.3
> 120 minutes	33	22.0

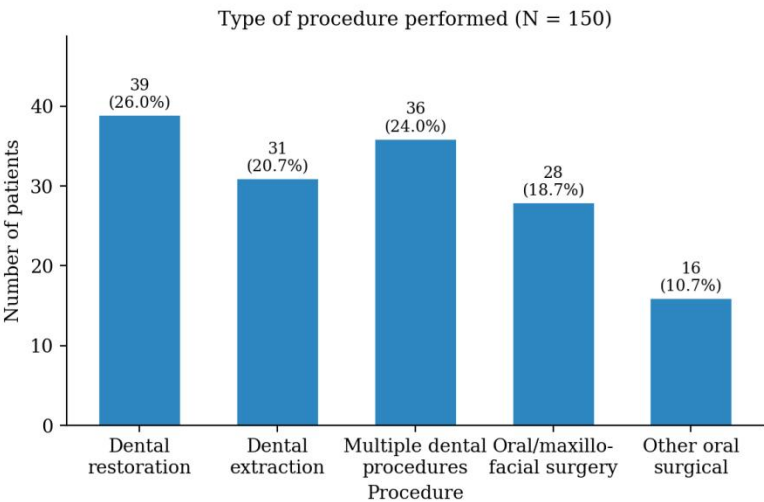


Figure 4. Bar chart of type of procedure performed

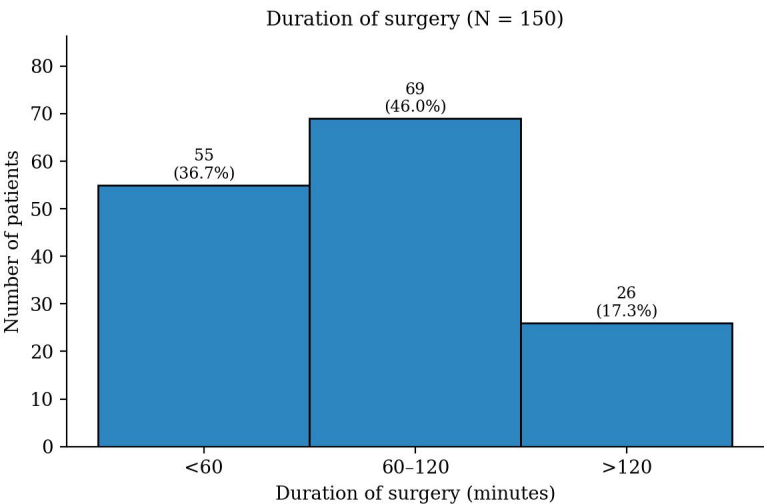


Figure 5. Histogram of duration of surgery

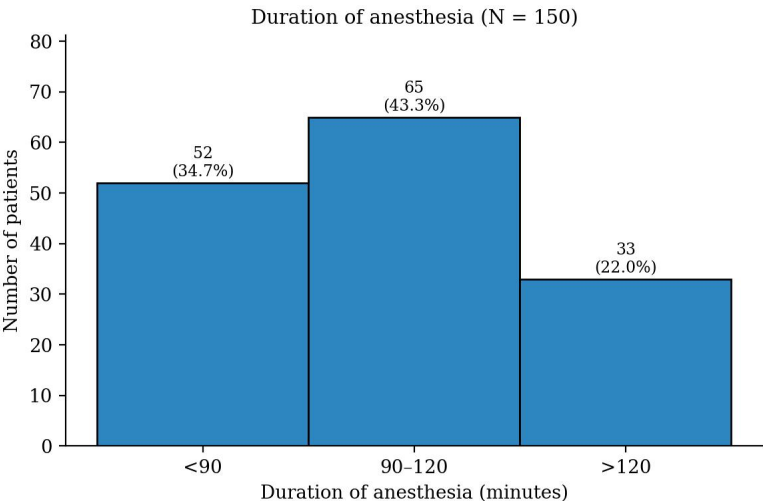


Figure 6. Histogram of duration of anesthesia

3.3 Frequency of Postoperative Complications

At least one postoperative complication occurred in 86 (57.3%) patients (Figure 7). Pain was the most frequently reported complication, followed by nausea/vomiting, sore throat, drowsiness, bleeding, and cough (Table 3; Figure 8). Serious complications such as oxygen desaturation, hypotension, delayed recovery, and unplanned admission were uncommon.

Table 3. Frequency of Postoperative Complications (N = 150)

Complication	n	%
Postoperative pain	52	34.7
Nausea/vomiting	29	19.3
Sore throat	24	16.0
Drowsiness	22	14.7
Postoperative bleeding	18	12.0
Cough/respiratory symptoms	15	10.0
Difficulty eating	14	9.3
Fever	9	6.0
Oxygen desaturation	7	4.7
Hypotension	5	3.3
Delayed recovery	5	3.3

Unplanned admission	3	2.0
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Patients could have more than one complication; percentages do not sum to 100%.

Overall occurrence of postoperative complications

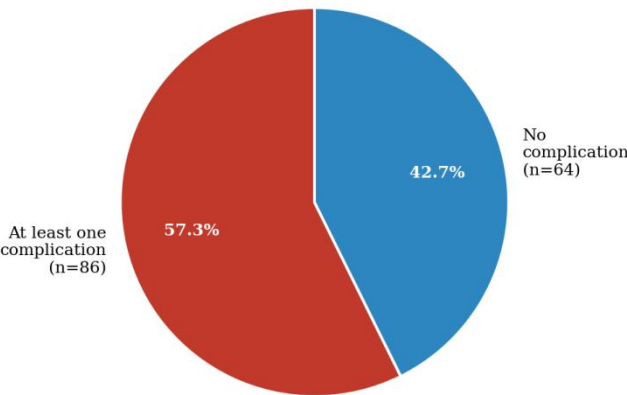


Figure 7. Pie chart showing overall occurrence of postoperative complications

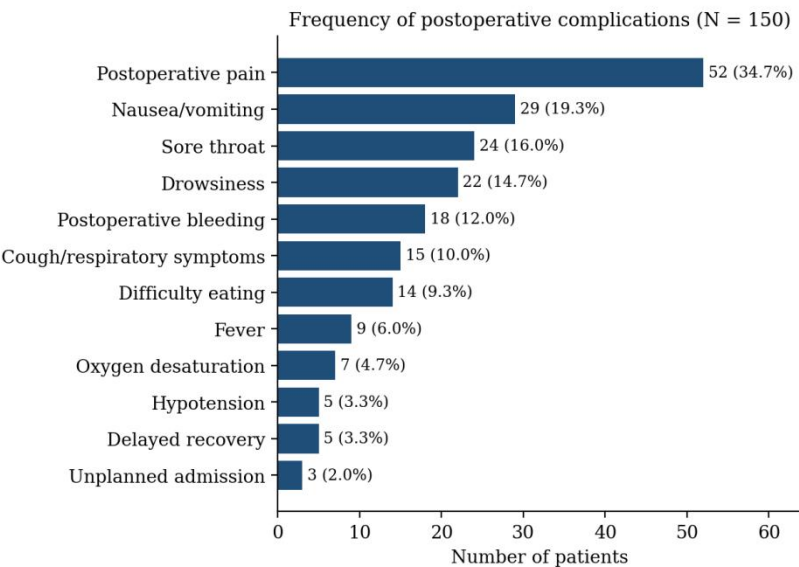


Figure 8. Bar chart showing frequency of individual postoperative complications

3.4 Timing of Complications

The frequency of complications was greater during the first 24 hours than at 72 hours. The reductions in pain, nausea/vomiting, sore throat, drowsiness, bleeding, and difficulty eating were statistically significant, whereas the reductions in cough and fever were not (Table 4; Figure 9).

Table 4. Postoperative Complications According to Follow-Up Time

Complication	At 24 hours n (%)	At 72 hours n (%)	p-value
Pain	52 (34.7)	16 (10.7)	<0.001
Nausea/vomiting	29 (19.3)	7 (4.7)	<0.001
Sore throat	24 (16.0)	8 (5.3)	0.003
Drowsiness	22 (14.7)	5 (3.3)	0.002
Bleeding	18 (12.0)	6 (4.0)	0.014
Cough	15 (10.0)	7 (4.7)	0.082
Difficulty eating	14 (9.3)	5 (3.3)	0.031
Fever	9 (6.0)	3 (2.0)	0.081

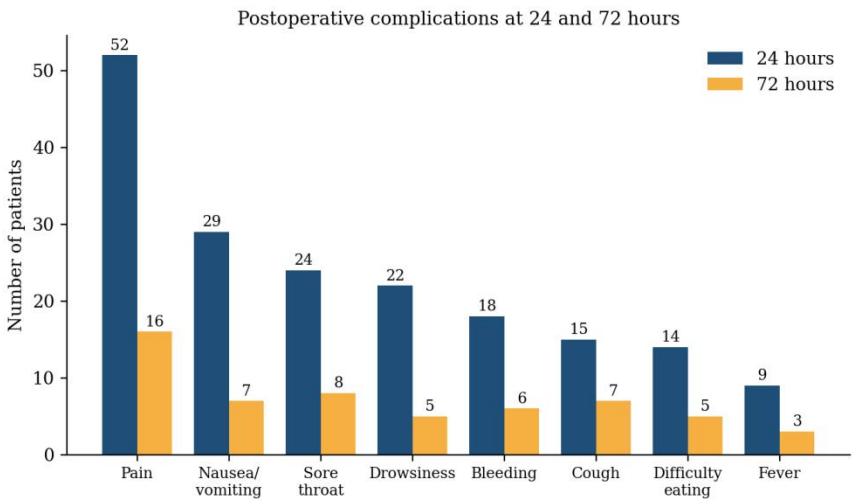


Figure 9. Grouped bar chart comparing complications at 24 and 72 hours

3.5 Association Between ASA Status and Complications

Complications were numerically more frequent among ASA II/III patients (68.9%) than among ASA I patients (52.4%). However, this difference did not reach conventional statistical significance ($\chi^2 = 3.51$, $p = 0.061$) (Table 5; Figure 10).

Table 5. Association Between ASA Status and Any Postoperative Complication

ASA Status	Complication Present n (%)	No Complication n (%)	Total
ASA I	55 (52.4)	50 (47.6)	105
ASA II/III	31 (68.9)	14 (31.1)	45

Total	86 (57.3)	64 (42.7)	150
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Chi-square test: $\chi^2 = 3.51$, df = 1, p = 0.061.

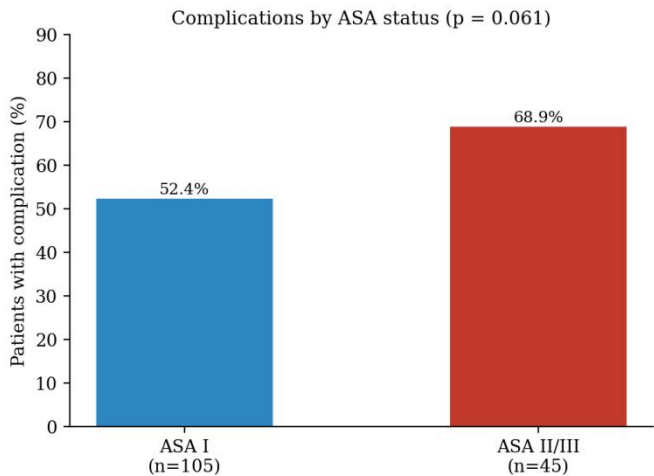


Figure 10. Bar chart showing complications by ASA status

3.6 Duration of Anesthesia and Complications

The proportion of patients with at least one complication increased progressively with duration of anesthesia, from 42.3% for <90 minutes to 78.8% for >120 minutes. This association was statistically significant ($\chi^2 = 11.04$, df = 2, p = 0.004) (Table 6; Figure 11).

Table 6. Association Between Anesthesia Duration and Postoperative Complications

Duration of anesthesia	Complication Present n (%)	No Complication n (%)
<90 min	22 (42.3)	30 (57.7)
90–120 min	38 (58.5)	27 (41.5)
>120 min	26 (78.8)	7 (21.2)
Total	86 (57.3)	64 (42.7)

Chi-square test: $\chi^2 = 11.04$, df = 2, p = 0.004.

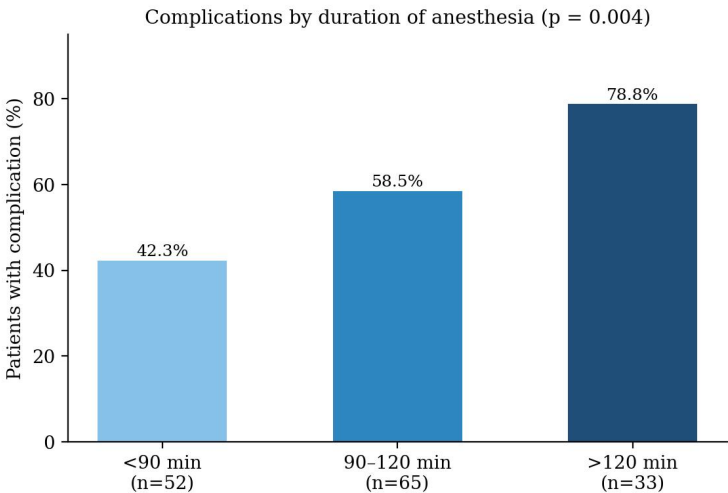


Figure 11. Bar chart showing complications by duration of anesthesia

3.7 Multivariable Analysis

In the logistic regression model, anesthesia duration >120 minutes (adjusted OR 2.81; 95% CI 1.35–5.85; p = 0.006) and surgery duration >120 minutes (adjusted OR 2.47; 95% CI 1.18–5.17; p = 0.016) were independently associated with postoperative complications. Age >40 years, female sex, ASA II/III status, and oral/maxillofacial surgery were not significant predictors (Table 7; Figure 12).

Table 7. Logistic Regression for Predictors of Postoperative Complications

Predictor	Adjusted OR	95% CI	p-value
Age >40 years	1.42	0.72–2.79	0.309
Female sex	1.31	0.72–2.38	0.371
ASA II/III	1.68	0.86–3.29	0.128
Surgery > 120 min	2.47	1.18–5.17	0.016
Anesthesia >120 min	2.81	1.35–5.85	0.006
Oral/maxillofacial surgery	1.74	0.82–3.69	0.147

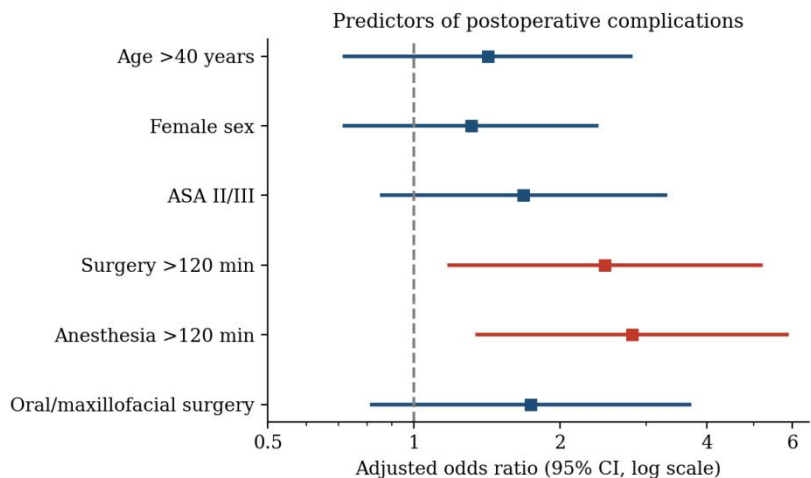


Figure 12. Forest plot of adjusted odds ratios for postoperative complications

4. Discussion

This study assessed the pattern of perioperative complications associated with dental and oral surgical procedures performed under general anesthesia at Khyber College of Dentistry Hospital, Peshawar. More than half of the patients (57.3%) experienced at least one postoperative complication. Pain was the most frequently reported complication, followed by nausea/vomiting, sore throat, drowsiness, bleeding, and cough.

The frequency of postoperative symptoms observed in this study was consistent with the general pattern reported in the literature, although the overall rate was lower than that in several pediatric series. A prospective study of 133 pediatric dental patients found that 69.9% experienced at least one postoperative complaint within 24 hours, with coughing and dental pain each reported by 27.1%, and inability to eat and sore throat by 24.8% and 21.1%, respectively; the frequency of complaints declined to 35.3% at 72 hours. A Saudi Arabian study of 90 children reported that 99% had at least one complaint on the first postoperative day, with most symptoms decreasing considerably by the third day. The lower overall rate in the present study may reflect its inclusion of adults and older patients, differences in procedures, and differences in how complications were defined and assessed.

Pain was the most frequent complication in the present study, which was compatible with previous research. In a study of 56 pediatric patients undergoing dental treatment under general anesthesia, postoperative dental pain was reported in 82% and bleeding in 23%, both decreasing during follow-up, and pain was associated with the number of teeth treated. Another observational study of 72 children reported dental

pain in 59.7% on the first postoperative day and 47.2% on the second, with difficulty eating also common.

The relatively frequent occurrence of nausea and vomiting was clinically relevant. General anesthesia, opioid administration, duration of anesthesia, and surgical factors may contribute to postoperative nausea and vomiting (PONV). A study of 372 patients undergoing oral and maxillofacial surgery examined several demographic, anesthetic, and surgical risk factors, and among 148 patients undergoing minor oral and maxillofacial surgery, PONV occurred mainly in the early postoperative period and was associated with higher pain scores at two hours.

Sore throat and coughing were also important postoperative symptoms. These complications may be related to airway instrumentation, endotracheal tube placement, airway manipulation, and throat-pack use. A 2025 randomized clinical trial in children with special healthcare needs found that throat packs reduced PONV but increased postoperative sore throat, illustrating that an intervention designed to reduce one complication may influence another.

Complications were significantly more frequent with longer anesthesia duration, and both anesthesia and surgery duration >120 minutes remained independent predictors in the multivariable model. This finding was clinically plausible because longer procedures involve greater tissue manipulation, prolonged airway instrumentation, greater exposure to anesthetic agents, and increased analgesic requirements. Although complications were numerically more frequent among ASA II/III patients, this difference was not statistically significant, and the small number of ASA III patients (n = 6) limited further analysis of this factor.

Most complications in this study were minor, and the frequency of symptoms fell significantly between 24 and 72 hours for pain, nausea/vomiting, sore throat, drowsiness, bleeding, and difficulty eating. This suggested that many postoperative complaints were transient and could be managed with appropriate analgesia, antiemetic treatment, hydration, observation, and patient/caregiver education. In a day-care dental study, most post-discharge complications were managed conservatively by caregivers, and readmission was uncommon, supporting the importance of clear discharge instructions.

Clinical Implications

- Careful preoperative assessment should be performed before general anesthesia.
- Patients should be evaluated for factors that increase PONV risk.
- Appropriate airway management and monitoring should be maintained.
- Effective multimodal analgesia should be considered for postoperative pain.

- Patients and caregivers should receive clear instructions regarding bleeding, vomiting, pain, fever, and respiratory symptoms.
- Patients undergoing lengthy procedures should receive extended postoperative observation.
- Early identification of oxygen desaturation, hypotension, excessive bleeding, and delayed recovery should remain a priority.

Strengths

The study evaluated both anesthesia-related and dental/surgical complications rather than a single postoperative outcome, used multiple postoperative assessment points, and considered demographic, clinical, and procedural variables in both univariate and multivariable analyses.

Limitations

The study was conducted at a single center over a limited period, which restricted generalizability. The sample size was modest, and the small number of ASA III patients limited subgroup analysis. Follow-up was limited to 72 hours, so later complications may have been missed. Complications such as pain and drowsiness relied partly on patient or caregiver report. In addition, the population included both children and adults, and previous studies varied in age group, dental procedure, anesthesia technique, and definitions of complications, limiting direct comparison. Future research should use larger multicenter samples, standardized definitions of perioperative complications, and separate evaluation of pediatric and adult populations.

5. Conclusion

Perioperative and postoperative complications were common among patients undergoing dental and oral surgical procedures under general anesthesia at Khyber College of Dentistry Hospital, Peshawar, although most were mild and transient. Pain, nausea/vomiting, sore throat, drowsiness, and postoperative bleeding were the most important clinical outcomes, and their frequency decreased substantially within 72 hours. Longer anesthesia and surgical duration were significantly associated with postoperative morbidity, while appropriate airway management, monitoring, analgesia, antiemetic therapy, and postoperative observation remain important components of patient safety.

6. Recommendations

- Standardized perioperative complication-monitoring forms should be used for dental procedures performed under general anesthesia.
- Postoperative pain should be assessed systematically and treated using appropriate analgesic protocols.
- Patients at increased risk of PONV should be identified before anesthesia.

- Airway-related complications should be monitored carefully during recovery.
- Patients undergoing prolonged dental or oral surgical procedures should receive extended postoperative observation.
- Caregivers should receive written instructions regarding expected postoperative symptoms and emergency warning signs.
- Larger prospective multicenter studies should be conducted to identify independent predictors of perioperative complications.
- Future studies should separately evaluate pediatric and adult populations.

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