RESEARCH PAPER

Retrospective Analysis of the Relationship Between Anaesthesia Duration and Postoperative Infection Rate

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Abstract

Background: Postoperative infections, particularly surgical site infections, are among the most common complications following surgical procedures and can lead to increased morbidity, prolonged hospital stay, and higher healthcare costs. Several perioperative factors may influence the risk of infection, including the duration of anaesthesia. Prolonged anaesthesia exposure has been suggested as a potential risk factor for postoperative infections.

Aim: To evaluate the relationship between anaesthesia duration and postoperative infection rate among patients undergoing surgical procedures.

Materials and Methods: This retrospective analytical study was conducted in the Department of Anaesthesia at a tertiary care teaching hospital attached to Meenakshi Medical College, Kanchipuram. A total of 75 patients who underwent elective surgical procedures were included in the study. Data were collected from medical records and anaesthesia charts, including patient demographics, type of surgery, type of anaesthesia, duration of anaesthesia, and postoperative infection status. Patients were categorized into three groups based on anaesthesia duration: less than 60 minutes, 60–120 minutes, and more than 120 minutes. Statistical analysis was performed using the Chi-square test, and a p value less than 0.05 was considered statistically significant.

Results: The overall incidence of postoperative infection was 16%. Infection rates increased with longer anaesthesia duration, with 5% infection rate in patients with anaesthesia duration <60 minutes, 12.5% in those with duration 60–120 minutes, and 30.4% in patients with duration greater than 120 minutes. The association between anaesthesia duration and postoperative infection rate was found to be statistically significant ($p = 0.021$).

Conclusion: Prolonged anaesthesia duration was significantly associated with an increased risk of postoperative infections. Strategies aimed at minimizing unnecessary prolongation of anaesthesia and surgical duration may help reduce postoperative infection rates.

Keywords: Anaesthesia duration, postoperative infection, surgical site infection, perioperative risk factors, retrospective study.

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Introduction

Postoperative infections remain a significant cause of morbidity and prolonged hospitalization in surgical patients. Surgical site infections (SSIs) and other postoperative infectious complications increase healthcare costs, delay recovery, and may negatively affect surgical outcomes. Various patient related, surgical, and perioperative factors contribute to the development of postoperative infections. Among these factors, the duration of anaesthesia and surgical exposure has been suggested as an important determinant influencing the risk of postoperative infections [1].

The duration of anaesthesia reflects the overall time a patient is exposed to anaesthetic agents, invasive procedures, and physiological stress during surgery. Prolonged anaesthesia is often associated with longer surgical duration, increased tissue handling, extended exposure to environmental pathogens, and potential impairment of immune function. These factors may collectively increase the risk of postoperative infections. Several studies have suggested that longer operative and anaesthesia times are associated with higher rates of surgical site infections and other postoperative complications [2].

Anaesthetic management may also influence immune responses and wound healing processes. Certain anaesthetic agents and perioperative physiological changes may alter immune function, potentially affecting the body's ability to prevent microbial

colonization and infection. Additionally, prolonged procedures may lead to hypothermia, blood loss, and fluid shifts, all of which are known risk factors that can contribute to postoperative infections [3].

In modern surgical practice, understanding the factors that contribute to postoperative infections is essential for improving perioperative care and patient safety. Identifying modifiable risk factors such as operative duration and anaesthesia time may help clinicians implement strategies to minimize infection risk. Measures such as maintaining strict aseptic techniques, optimizing perioperative antibiotic prophylaxis, and reducing unnecessary prolongation of surgical procedures may play an important role in preventing postoperative infections [4].

Previous studies have reported variable associations between anaesthesia duration and postoperative infection rates. While some investigations have demonstrated a positive correlation between longer operative times and increased infection risk, others have emphasized the importance of additional patient related and procedural factors. Therefore, further evaluation of the relationship between anaesthesia duration and postoperative infection risk is necessary to better understand this association in different clinical settings [5–7].

Retrospective analyses provide valuable insight into perioperative risk factors by evaluating previously recorded clinical data. Such studies allow researchers to examine patterns and associations between operative variables and postoperative outcomes. Evaluating the relationship between anaesthesia duration and postoperative infection rates may help identify potential risk factors and guide strategies to improve surgical safety and patient outcomes [8].

Therefore, the present study was undertaken to perform a retrospective analysis of the relationship between anaesthesia duration and postoperative infection rate among surgical patients.

Materials and Methods

This retrospective analytical study was conducted in the Department of Anaesthesia at a tertiary care teaching hospital attached to Meenakshi Medical College, Kanchipuram, Tamil Nadu. The study aimed to evaluate the relationship between the duration of anaesthesia and the incidence of postoperative infections in patients undergoing surgical procedures under general or regional anaesthesia.

A total of 75 patients who underwent elective surgical procedures during the study period were included in the study. Medical records of these patients were reviewed retrospectively to obtain relevant clinical information. Patients aged between 18 and 65 years who underwent surgical procedures under anaesthesia and had complete perioperative records were included in the study. Patients with pre-existing infections, immunocompromised conditions, emergency surgeries, or incomplete medical records were excluded from the study.

Data were collected from hospital medical records and anaesthesia charts. The variables recorded included demographic characteristics such as age and gender, type of surgery performed, type of anaesthesia administered, duration of anaesthesia, and postoperative infection status. Anaesthesia duration was calculated from the time of induction of anaesthesia to the time of recovery or completion of anaesthesia. Postoperative infections were identified based on clinical diagnosis documented in patient records, including surgical site infections, wound infections, or other postoperative infectious complications occurring during the hospital stay.

For analysis, patients were categorized based on the duration of anaesthesia into three groups: less than 60 minutes, 60–120 minutes, and more than 120 minutes. The incidence of postoperative infection was compared among these groups to determine any association between anaesthesia duration and infection rates.

All collected data were entered into Microsoft Excel and analyzed using SPSS statistical software. Descriptive statistics such as mean, standard deviation, frequency, and percentage were used to summarize the data. The association between anaesthesia duration and postoperative infection rate was evaluated using the Chi-square test. A p value less than 0.05 was considered statistically significant.

Results

A total of 75 patients who underwent elective surgical procedures were included in the study to evaluate the relationship between anaesthesia duration and postoperative infection rate.

Table 1: Demographic Characteristics of Study Participants (n = 75)

Variable	Frequency (%)
Mean age (years)	39.8 ± 11.2
Age 18–30 years	24 (32%)
Age 31–45 years	28 (37.3%)
Age 46–60 years	17 (22.7%)
Age >60 years	6 (8%)
Male	42 (56%)
Female	33 (44%)

The mean age of the study participants was 39.8 ± 11.2 years. The majority of patients belonged to the 31–45 year age group (37.3%), followed by the 18–30 year group (32%). Patients aged 46–60 years constituted 22.7%, while only 8% were above 60 years of age. With respect to gender distribution, male patients accounted for 56% of the study population, whereas female patients constituted 44%.

Table 2: Distribution of Surgical Procedures

Type of Surgery	Frequency (%)
General surgery	30 (40%)
Orthopedic surgery	18 (24%)
Gynecological surgery	15 (20%)
ENT surgery	12 (16%)

Among the surgical procedures performed, general surgical procedures accounted for the highest proportion (40%), followed by orthopedic surgeries (24%), gynecological procedures (20%), and ENT surgeries (16%). This distribution indicates that general surgery contributed the largest share of cases included in the analysis.

Table 3: Type of Anaesthesia Administered

Type of Anaesthesia	Frequency (%)
General anaesthesia	48 (64%)
Regional anaesthesia	27 (36%)

Regarding the anaesthetic technique used, general anaesthesia was administered in 64% of patients, while regional anaesthesia was used in 36% of patients. This finding shows that general anaesthesia was the predominant technique used for surgical procedures in the present study.

Table 4: Duration of Anaesthesia

Duration of Anaesthesia	Frequency (%)
<60 minutes	20 (26.7%)
60–120 minutes	32 (42.7%)
>120 minutes	23 (30.6%)

Analysis of anaesthesia duration showed that 42.7% of patients had an anaesthesia duration between 60–120 minutes, while 30.6% had anaesthesia duration exceeding 120 minutes, and 26.7% had anaesthesia duration less than 60 minutes. The results indicate that most procedures required a moderate duration of anaesthesia between one and two hours.

Table 5: Incidence of Postoperative Infection

Postoperative Infection	Frequency (%)
Present	12 (16%)
Absent	63 (84%)

The overall incidence of postoperative infection in the study population was 16%, while 84% of patients did not develop postoperative infection. This finding suggests that postoperative infections occurred in a relatively small proportion of patients.

Table 6: Association Between Anaesthesia Duration and Postoperative Infection

Duration of Anaesthesia	Infection Present	Infection Absent	Total
<60 minutes	1 (5%)	19 (95%)	20
60–120 minutes	4 (12.5%)	28 (87.5%)	32
>120 minutes	7 (30.4%)	16 (69.6%)	23

Statistical Analysis: Chi-square test **p value = 0.021**

The incidence of postoperative infection increased with longer anaesthesia duration. Patients with anaesthesia duration greater than 120 minutes showed the highest infection rate (30.4%). The association between anaesthesia duration and postoperative infection was statistically significant (p = 0.021), indicating that prolonged anaesthesia duration may increase the risk of postoperative infections.

Discussion

Postoperative infections remain one of the most significant complications following surgical procedures and contribute to increased morbidity, prolonged hospital stay, and higher healthcare costs. Identifying perioperative risk factors associated with surgical site infections is essential for improving patient outcomes and optimizing perioperative care. In the present study, the relationship between anaesthesia duration and postoperative infection rate was evaluated. The results demonstrated that postoperative infections occurred in 16% of patients, while 84% of patients did not develop infection following surgery.

In the current study, the incidence of postoperative infection increased with longer anaesthesia duration. Patients with anaesthesia duration less than 60 minutes showed the lowest infection rate (5%), while those with anaesthesia duration 60–120 minutes had an infection rate of 12.5%, and patients with anaesthesia duration greater than 120 minutes had the highest infection rate (30.4%). Statistical analysis using the Chi-square test demonstrated a significant association between anaesthesia duration and postoperative infection rate (p

= 0.021). This finding suggests that prolonged anaesthesia duration may significantly increase the risk of postoperative infections.

Similar findings have been reported in previous studies. Cheng H et al [15] reported that prolonged operative duration is an independent risk factor for surgical site infections, with infection rates increasing significantly when operative time exceeds two hours ($p < 0.05$). The authors suggested that prolonged tissue exposure and increased environmental contamination during lengthy procedures contribute to higher infection risk.

Postoperative infections have been shown to significantly affect patient outcomes. Kirkland KB et al [11] demonstrated that surgical site infections are associated with longer hospital stay and increased healthcare costs, with infected patients having significantly higher complication rates compared with non infected patients ($p < 0.01$). Similarly, Fry DE [9] emphasized that prevention of surgical site infections is a key component of surgical quality improvement initiatives.

Perioperative physiological factors may also influence infection risk. Sessler DI et al [14] reported that perioperative hypothermia significantly increases the likelihood of surgical site infections ($p < 0.05$) because reduced tissue perfusion and impaired immune function can compromise wound healing.

Effective infection prevention strategies are essential to reduce postoperative infection rates. Anderson DJ et al [13] highlighted that implementation of standardized infection control measures significantly reduces surgical site infections ($p < 0.05$). Likewise, Hawn MT et al [16] reported that adherence to evidence based infection prevention protocols significantly lowers postoperative infection rates.

Furthermore, a meta analysis conducted by Leaper DJ et al [17] identified prolonged operative duration as a significant risk factor for surgical site infections ($p < 0.01$). The authors emphasized that minimizing unnecessary prolongation of surgical procedures may reduce infection risk.

Conclusion

The present study demonstrated a significant association between anaesthesia duration and postoperative infection rate among surgical patients. The incidence of postoperative infections increased progressively with longer anaesthesia duration, with the highest infection rate observed in patients whose anaesthesia duration exceeded 120 minutes. Statistical analysis showed that this association was significant ($p = 0.021$), indicating that prolonged anaesthesia duration may contribute to an increased risk of postoperative infections. These findings suggest that minimizing unnecessary prolongation of surgical and anaesthesia time, along with strict adherence to perioperative infection prevention strategies, may help reduce postoperative infection rates and improve patient outcomes.

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