

Evaluation of Postoperative Recovery Profile in Relation to Duration of Surgery Under General Anesthesia

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Abstract:

Background: How long a surgery takes really matters. It can shape how well people bounce back afterward, their chances of problems, and their overall outcome.

Aim: The study was set out to see how surgery length impacts recovery for patients having elective procedures under general anesthesia.

Methodology: This research tracked 150 patients over a year at Department of Anaesthesiology, ICARE Institute of Medical Sciences and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India We measured their recovery, checked for complications, and looked at pain scores, comparing different groups based on how long their surgeries lasted, using SPSS version 25.0.

Findings: Procedures taking a longer time were related to late emergence from anesthesia, delayed extubation and opening of eyes, longer postoperative stay in the PACU, higher levels of pain, as well as nausea and vomiting. Other problems that could develop include over sedation.

Conclusion: In conclusion, prolonged surgery makes recovery difficult and increases complications during surgery.

Keywords: Anesthesia, Surgery, Postoperative recovery, PACU, Pain score.

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Introduction

Postoperative recovery really stands out as a key marker in the perioperative phase [1]. A lot of things shape this — like the patient's overall health, the type of anesthesia, and the surgery itself. But when you zero in on early recovery after general anesthesia, the length of the surgery pretty much takes center stage [2]. Longer surgeries mean more time under anesthesia, more stress on the body, slower waking up, longer stays in the PACU, and a higher chance of complications [3]. All this doesn't just affect how comfortable and satisfied patients feel; it drives up healthcare costs, leads to longer hospital stays, and can cause more problems down the line [4].

With all the new technology in anesthesia and surgery, we're seeing more complicated procedures that take longer. That makes it even more crucial to monitor and understand how patients recover after surgery [5]. Some studies have indicated that prolongation in the duration of surgical procedure might influence certain aspects of postoperative recovery such as extubation time, response to verbal commands, postoperative pain intensity,

nausea/vomiting episodes, and depth of sedation [6]. Nevertheless, the strength of this relationship may differ based on patient characteristics, surgical stress, and perioperative care practices [7].

With these concerns in mind, this particular observation study has been undertaken to determine the effect of surgery time duration on the post-surgery recovery period of elective surgery patients under general anesthesia. Various factors relating to post-surgery recovery periods and pain profile have been studied with respect to surgery time duration.

Background of the Study

Here are a few perioperative factors that play a big role in how people recover after surgery with general anesthesia. Out of all of them, the length of the surgery really stands out. Longer procedures usually mean more time under anesthesia, more stress on the body, and a tougher recovery [8]. It just makes everything about the recovery process drag on. [9]. Considering the increasing trend towards conducting many complicated surgeries, it has become essential to study the effect of the duration

of surgery on postoperative recovery profile [10]. Thus, assessment of postoperative recovery parameters depending on the operation's duration will allow doctors to apply effective measures aimed at facilitating recovery of patients and preventing postoperative complications [11].

Effect of Surgical Duration on Postoperative Recovery Profile: The duration of surgery has a critical influence on the pattern of recovery after surgery in patients who have undergone surgery under general anesthesia [12]. Lengthy surgery is often linked to long duration of anesthesia, increased physiological stress, delay in waking up, delayed time of extubation, and increased stay in the post-anesthesia care unit [13]. Long surgical procedures may cause complications in patients such as nausea and vomiting, excessive sedation, delayed recovery process, and high postoperative pain scores. Such issues may negatively impact the recovery process and perioperative outcomes of the patients [14].

Research Objectives

The objectives of the study are:

- To evaluate the effect of duration of surgery on postoperative recovery parameters such as time to extubation, eye opening time, response to verbal commands, and duration of stay in the post-anesthesia care unit (PACU).
- To assess the association between prolonged duration of surgery and the incidence of postoperative complications including nausea and vomiting, excessive sedation, shivering, and delayed recovery.
- To compare postoperative pain scores among patients undergoing surgeries of different durations under general anesthesia.
- To analyze the relationship between duration of surgery and overall postoperative recovery profile in patients undergoing elective surgical procedures under general anesthesia.
- To determine whether prolonged surgical duration significantly affects early postoperative outcomes and recovery quality among surgical patients.

Methodology

The current observational study was done with the objective of assessing the impact of duration of surgery on the recovery profile after surgery for patients who have undergone operations with the help of general anesthesia. The different aspects of recovery from surgery were assessed based on the duration of the operation.

Study Design: The study was designed as a hospital-based prospective observational study.

Study Area: This research was at the Department of Anaesthesiology, ICARE Institute of Medical

Sciences & Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India

Study Duration: The study was conducted over a period of one year.

Study Participants: The total number of patients that participated in the study was 150 subjects that had elective surgeries performed under general anesthesia.

Inclusion Criteria: This study was are looking for subjects in the 18 to 65 age bracket, of either gender. They must have an ASA physical status of I or II and be scheduled for an elective procedure under general anesthesia. Provided they put their consent to participate in the research in writing, they are eligible.

Exclusion Criteria

- People who need to have emergency surgery.
- Anyone with serious health problems affecting their whole body.
- Those with known mental health conditions that would make it difficult to properly evaluate them after an operation.
- Lactating and pregnant patients.
- Those who need ventilatory support right after a surgery.
- Those with previous substance and sedative abuse issues.

Sample Size: The sample size for this study comprised of 150 subjects. The sample size was arrived at after considering the number of eligible patients available and the ability to collect the required data within the set duration.

Procedure: First, after the hospital's ethics committee gave the necessary approval and everyone in the study gave their written consent, patients who met all the required conditions were brought in. Before their operations, each patient was looked at. The following variables were measured on each patient: age and demographics, previous health history, physical examination findings, and laboratory data. All subjects underwent the same protocol for anesthesia according to hospital standards. Physiological parameters in the intraoperative phase were monitored using a standard protocol, measuring vital signs such as heart rate, arterial oxygen saturation, non-invasive blood pressure, electrocardiogram, and end-tidal carbon dioxide. The operation time was defined as the time between the incision and wound closure.

Depending on how long the surgery lasted, patients were divided into groups. This helped us compare how they recovered afterward.

To see how well they recovered, we analyzed several factors: when their breathing tube came out, whether they opened their eyes by themselves, if

they reacted to someone speaking, their pain scores after surgery, if they had episodes of feeling sick or throwing up, how sedated they were, and when they could leave the recovery room. Anesthesiologists then evaluated their recovery using a set of agreed-upon standards.

All data were entered into a specially designed case record form for further analysis.

Statistical Analysis: After we put all the information we collected into a Microsoft Excel spreadsheet, we then used SPSS software, version 25.0, to analyze it. For the data that involved numbers, we showed the average along with its

standard deviation. When it came to data that was more about categories or descriptions, we presented that using counts and percentages.

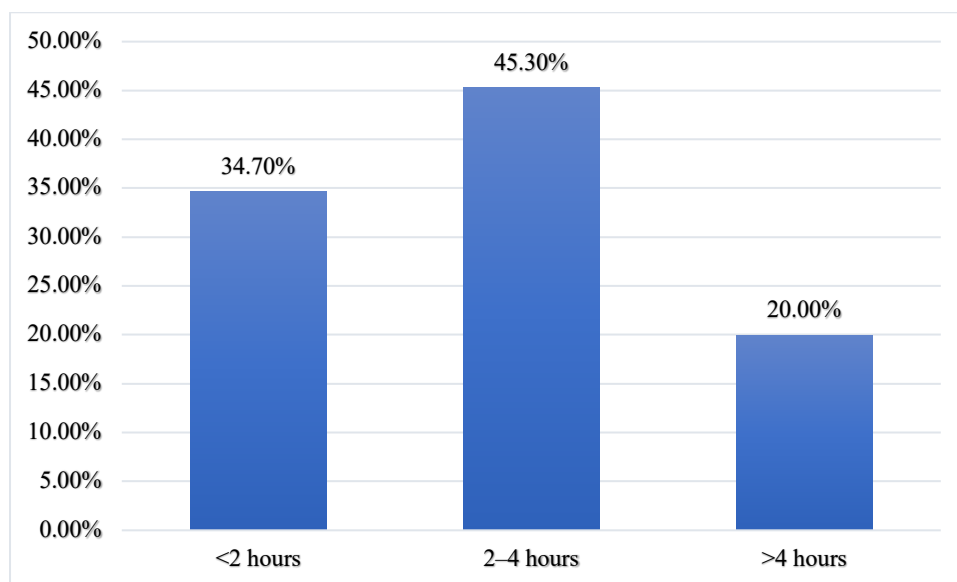
To see how the different study groups compared, this study used a student's t-test or a one-way ANOVA for the numerical data. If the data was qualitative, we relied on the chi-square test. We considered a result to be statistically meaningful if its P-value was less than 0.05.

Results

150 patients undergoing elective surgeries under general anesthesia were taken up for this research.

Table 1: Distribution of Patients According to Duration of Surgery

Duration of Surgery	Number of Patients (n)	Percentage (%)
<2 hours	52	34.7%
2-4 hours	68	45.3%
>4 hours	30	20.0%
Total	150	100%



From the patient distribution, it was evident that many surgical operations took between 2 to 4 hours, totalling up to 68 (45.3%) patients. Operations that lasted less than two hours were conducted in 52 individuals (34.7%), while operations that took

more than four hours were conducted in 30 people (20%). Hence, the information suggests that moderately prolonged operations occurred most often.

Table 2: Demographic Characteristics of Study Participants

Variable	Group I (<2 hrs)	Group II (2-4 hrs)	Group III (>4 hrs)	p-value
Mean Age (years)	39.6 ± 10.2	42.4 ± 11.5	44.1 ± 9.8	0.184
Male, n (%)	30 (57.7%)	39 (57.4%)	18 (60.0%)	0.962
Female, n (%)	22 (42.3%)	29 (42.6%)	12 (40.0%)	
Mean BMI (kg/m ²)	24.3 ± 2.8	25.1 ± 3.1	25.8 ± 3.4	0.271

It is shown in table 2 that the average age went up a little bit as surgeries took longer across the three groups. Group I had an average age of 39.6 ± 10.2, Group II's was 40.3 ± 10.8, and Group III showed

the highest at 44.1 ± 9.8. When looking at gender, there were more men than women in every group. Men made up 57.7% in Group I, 57.4% in Group II, and 60.0% in Group III.

Table 3: Comparison of Postoperative Recovery Parameters Among Study Groups

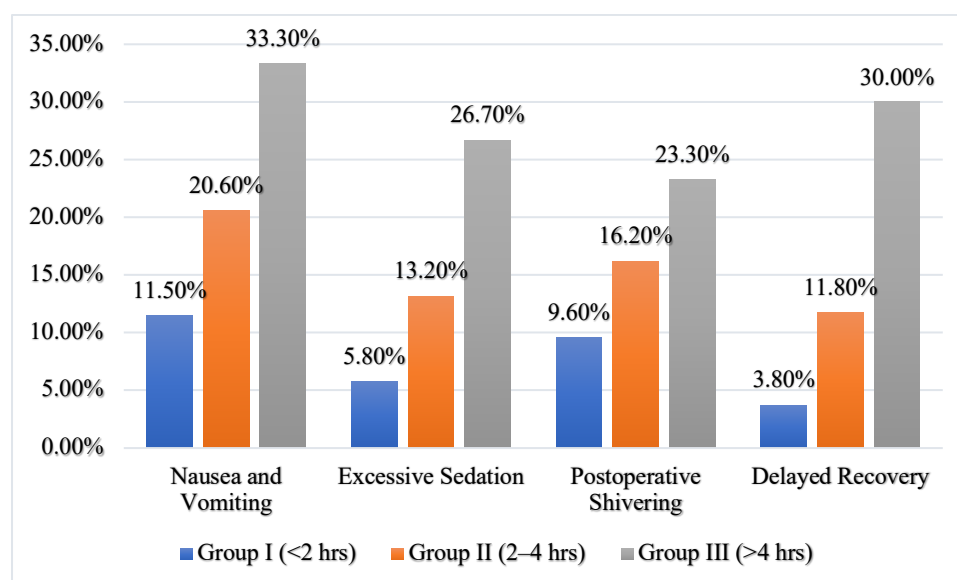
Recovery Parameter	Group I (<2 hrs)	Group II (2–4 hrs)	Group III (>4 hrs)	p-value
Time to Extubation (min)	8.4 ± 2.1	11.2 ± 3.4	15.8 ± 4.2	<0.001
Eye Opening Time (min)	10.6 ± 2.8	14.3 ± 3.9	19.1 ± 5.0	<0.001
Response to Verbal Commands (min)	12.1 ± 3.2	16.8 ± 4.5	22.7 ± 5.6	<0.001
PACU Stay Duration (min)	58.4 ± 10.5	76.2 ± 14.1	98.6 ± 18.7	<0.001

Postoperative recovery criteria exhibited significant delays with an increase in the length of surgery. The time to extubation in patients in Groups I and III increased significantly to 8.4 ± 2.1 minutes and 15.8 ± 4.2 minutes respectively. In a similar fashion, the time taken to react to verbal orders increased from

12.1 ± 3.2 minutes to 22.7 ± 5.6 minutes due to the length of surgery. Length of stay in PACU after surgery was also found to be highly increased for those patients who underwent operations lasting more than four hours (98.6 ± 18.7 minutes).

Table 4: Incidence of Postoperative Complications Among Study Groups

Postoperative Complication	Group I (<2 hrs)	Group II (2–4 hrs)	Group III (>4 hrs)	p-value
Nausea and Vomiting	6 (11.5%)	14 (20.6%)	10 (33.3%)	0.031
Excessive Sedation	3 (5.8%)	9 (13.2%)	8 (26.7%)	0.018
Postoperative Shivering	5 (9.6%)	11 (16.2%)	7 (23.3%)	0.214
Delayed Recovery	2 (3.8%)	8 (11.8%)	9 (30.0%)	0.004

**Figure 2: Visual Representation of Incidence of Postoperative Complications Among Study Groups**

The postoperative complications rose with an increasing duration of surgery. The incidence of postoperative nausea and vomiting in Group I patients was 11.5% while in Group III it was 33.3%. There was an increase in excessive sedation, from 5.8% to 26.7% when surgeries took longer than four

hours. Prolonged recovery was significantly associated with patients who underwent surgeries that lasted for more than four hours, with a prevalence of 30.0%, as opposed to 3.8% in Group I.

Table 5: Postoperative Pain Scores Among Study Groups

Group	Mean VAS Score at 6 Hours	Mean VAS Score at 12 Hours	p-value
Group I (<2 hrs)	3.1 ± 1.0	2.4 ± 0.8	<0.001
Group II (2–4 hrs)	4.0 ± 1.2	3.2 ± 1.1	
Group III (>4 hrs)	5.1 ± 1.4	4.3 ± 1.3	

The pain scores after surgery were also significantly high in those patients who had undergone surgery for an extended time period. For Group I, the average pain score after six hours was about 3.1

(give or take 1.0) on the Visual Analogue Scale. But for Group III, that number was higher, at about 5.1 (give or take 1.4). Even by twelve hours after surgery, the difference in average pain scores

remained pretty clear. Group I's average was then 2.4 (give or take 0.8), while Group III's was 4.3 (give or take 1.3).

Discussion

The current study focused on evaluating the influence of operative duration on postoperative recovery characteristics among patients undergoing surgeries under general anesthesia. As shown by the results, an extended duration of surgery had a negative effect on several recovery parameters, including extubation time, eye opening time, response to verbal commands, and prolonged PACU stay. Moreover, it was observed that patients undergoing surgery with duration above 4 hours exhibited much delayed recovery when compared to their counterparts. Such results have been reported by another prospective observational study conducted by Z Alkandari et al. (2015) [15] and found that both the length and degree of surgical stress had an effect on postoperative recovery duration. Likewise, B Stessel et al. (2021) [16] found that the prolonged duration of surgery and related procedures led to a decreased quality of recovery from the surgery. Thus, the current study confirms the studies showing the detrimental influence of extended time of operations on patient's recovery.

From the findings presented in the current paper, it can be concluded that there is a higher risk of occurrence of complications during the postoperative period in the patients who undergo extended time of surgical intervention, as seen from the increase in the number of patients complaining about nausea and vomiting, sedative effects, and slow recovery time. This rate increases from 3.8% for surgical procedures taking less than two hours to 30.0% for operations lasting over four hours. This outcome is supported by the research conducted by E Kirmeier et al. (2019) [17]. As noted in their article, there is a connection between the prolonged duration of operation and various postoperative complications. According to Z Sun et al. (2015) [18], postoperative complications and adverse events occur relatively often in cases of prolonged duration of surgical procedures.

Among the other findings, an increased score for postoperative pain with the increased duration of surgery has been identified. For example, as shown by the results of the current study, patients in the >4 hours surgery group had much higher VAS scores at both 6 and 12 hours postoperatively. The results correlated with the work conducted by SG Memtsoudis et al. (2020) [19], in which the impact of perioperative factors, such as the surgical duration, was considered. Also, PM Singh et al. (2017) [20] noted that prolonged surgical and anesthetic exposure had a negative effect on postoperative recovery.

Conclusion

From the current observational study, it can be deduced that there was a significant adverse effect on the postoperative recovery pattern when the surgery underwent for a considerable amount of time. Operative patients who underwent surgeries that took more than 4 hours were found to suffer from delay in extubation, time taken for eye opening, delayed verbal response, and increased duration in the post-anesthesia care unit. Other than the above-mentioned consequences, it should be highlighted that the occurrence of post-operative complications like nausea, vomiting, oversedation, delayed recovery, and increased postoperative pain score became common due to the increase in the duration of the operation. From the findings of the study, it can be clearly stated that the duration of the operation was a critical issue that greatly influenced the patient's recovery.

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