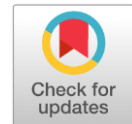


Physio-Anatomical Complications in Short and Long Surgical Procedures with General Anesthesia. A Comparative Cross-Sectional Study

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ABSTRACT

Background: The complication intensity of short- and long-term anesthesia during different surgeries depends upon the age, medical history and general lifestyle of a patient.

Aims and objectives: The aims and objectives of present study were to evaluate the risks associated with general anesthesia during various surgical procedures.

Methodology: Current comparative cross-sectional study was conducted in ICU, general surgery and gynecology units of Ghurki Trust and Teaching Hospital from July 2023 to January 2024. Total 100 patients of appendectomy and hysterectomy were selected as study subjects and divided into two groups. In Group-A (short surgery group) 65 patients with appendectomy and in Group-B (Long surgery group) 35 women patients with hysterectomy were included. All of the clinical and demographic data were recorded on MS Excel and SPSS version 2024 were used to process, analyze, and distribute the data as needed and graph pad prism was used to plot graphical data representation.

Results: The study identified a significant association between anesthesia duration and increased postoperative complications, notably in patients aged 51-55 years. Enhanced risks included postoperative pain, nausea, and respiratory distress, emphasizing the need for tailored anesthesia strategies based on surgical length and patient demographics.

Conclusion: General anesthesia is largely safe but linked to some complications, necessitating innovative improvements and further research with larger sample sizes for enhanced safety.

Keywords: Anesthesia, Complications, Appendectomy, Hysterectomy, Morbidity, Pharmacology, Monitoring, Neurology.



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INTRODUCTION

A medication called general anesthesia is given intravenously (IV), via a tube, or through a mask. An anesthesiologist or nurse anesthetist, a medical professional with specialized training, administers the procedure and keeps an eye on the patient's breathing and vital signs throughout[1]. A medication or other agent that causes a total or partial loss of feeling is called an

anesthetic. Anesthetics come in three varieties: local, regional, and general. A general anesthetic causes a patient to lose sensation and go unconscious. Although it is extremely uncommon, awareness during general anesthesia appears to be one of the main worries for patients[2]. One or two people out of every 1000 receiving a general anesthetic may momentarily become conscious of their surroundings, but they typically do not experience

pain[3]. According to a study, pulmonary, brain damage, delirium, nerve injury, cardiovascular collapse, circulatory, and neurologic complications are the most common side effects of general anesthesia. Other uncommon side effects include nerve injury[4].

Although the use of general anesthesia is generally safe, there are some risks and potential side effects. In order for the patient to undergo general anesthesia and use a ventilator during the procedure, a breathing tube must be inserted[5]. Any nausea, vomiting, or retching that occurs in the first 24-48 hours after surgery is referred to as post-operative nausea and vomiting, one of the most frequent adverse effects of anesthesia, accounting for up to 40% of all post-operative cases, it is also the main reason why patients are unhappy following anesthesia[6]. One's capacity to maintain their airway is compromised while under general anesthesia. This implies that the reflexes that close off the airway to prevent vomitus from entering the lungs might not be completely functional if a patient regurgitates stomach contents while under anesthesia[7]. This is due to the fact that general anesthesia drugs paralyze all of the body's muscles, including those that contract the lungs, in addition to rendering the patient unconscious and unable to feel the pain of surgery[8]. These complications can include both minor and major postoperative complications, as well as immediate perioperative problems like anesthetic anaphylaxis. Minor complications such as sore throat, hoarseness, cold feeling, sleeplessness, chills, headache, breathing issue, muscle soreness, post-operative nausea and vomiting, and dental damage are frequently experienced. It is the most typical complaint during the recovery phase. Although the incidence is roughly 33% in all patients, in high-risk patients it rises to 72%. Patients who experience postoperative nausea and vomiting (PONV) may experience morbidity from suture tightening or rupture, aspiration pneumonia, obstruction, and dehydration of the airways[9]. The majority of healthy individuals have no trouble with general anesthesia. When side effects or complications do occur, they usually manifest as mild, temporary symptoms that are easily treated. PONV may be severe enough to require additional hospital stays following surgery. It usually starts in the initial hours following your surgery. The risk of PONV is approximately 10%; however, it increases if you have experienced PONV in the past, are motion sick, or are taking opioid medication either prior to or during the procedure[10]. There is a chance that any anesthetic technique, whether general or regional, could cause issues. After surgery, nausea and vomiting are frequent side effects of general anesthesia. In rare cases, breathing tubes and airway devices can cause damage to teeth, lips, gums, or vocal cords, and some people may also experience sore throats[11]. The purpose of this study is to assess the physiological and anatomical problems of short and lengthy surgical operations performed under general

anaesthesia. The objectives include determining complication incidence and demographic variables. The goal is to produce data that will help improve anaesthesia management and patient outcomes by examining the influence of anaesthetic duration.

MATERIALS AND METHODS

The complication intensity of short- and long-term anesthesia during different surgeries depends upon the age, medical history and general lifestyle of a patient. Present study was conducted in ICU, Ghurki Trust and Teaching Hospital from July 2023 to January 2024. The Current research was a comparative cross-sectional study in which total 100 patients of appendectomy and hysterectomy were selected as study subjects and divided into two groups. 65 patients were placed in short surgery group. Stratified random sampling was utilized, which includes splitting the population into smaller groups known as strata that are separate and do not overlap. 65 patients were placed in Group-A and their surgical procedure was appendectomy in which short term anesthesia was given them. While 35 women patients were listed in long surgery group i.e. Group-B and their surgical procedure was hysterectomy. And long-term anesthesia were given them during procedure. In inclusion criteria Patients receiving general anesthesia during short and lengthy surgical procedures. Short duration of anesthesia was 2 hours while lengthy duration of anesthesia was 4 hours respectively. Patients with incomplete anesthesia data or those with incomplete medical records were excluded. All required treatment-oriented and demographic data was gathered from the participants using a pre-designed questioner. Professional surgeons, anesthesiologists, nurses, and other staff members oversaw, supervised, and monitored every step of the treatment process, including the administration of anesthesia. The Ethical considerations were followed whole intervention was conducted in accordance with the principles of human research specified in the Helsinki Declaration and every data was recorded with the consent of patients. A pre-designed questioner was used for collecting all the necessary demographic and treatment-oriented data from the participants. The Ethical Approval Clearance Certificate Ref no.2023/4A was granted by Ethical review committee, Faculty of Biological Sciences, Lahore University of Biological & Applied Sciences (UBAS). Whereas all of the clinical and demographic raw data was recorded on MS Excel and SPSS version 2020 were used to process, analyze, and distribute the data as needed. All significant analysis was considered a 95% confidence interval or $P < 0.05$. The Graph pad prism was used to plot graphical data representation and R package of Bioconductor was also used for graphical visualization. A chi-square test was used to compare categorical variables.

RESULTS

Out of the 100 participants in present study, 65 percent of them were men and the remaining 35 percent were women. Therefore, men were dominating in number and male to female ratio was 2:1. Pain in surgical site, mouth dryness, Sore throat, Headache, vomiting and nausea, Pain and weakness in the muscles, issues with urination and breathing issue were the parameters which were measured in each patient after appendectomy and hysterectomy. The table-1 summarizes the demographic and clinical characteristics of research participants, such as age, gender, type of surgery, and medical history, to provide a baseline understanding of the population's health variety.

The Fig-1 graph shows the occurrence of postoperative problems such as discomfort, nausea, and respiratory distress according on anaesthetic duration (short vs. long). Long-duration procedures are associated

with greater complication rates, particularly among the elderly.

Metrics: (A) Gender prevalence among patients, with males represented in red and females in blue. (B) Frequency of surgical interventions, distinguishing between standard and complicated appendectomies and hysterectomies. (C) Anesthesia durations categorized into four intervals, showcasing the most common time spans. (D) Age distribution of patients, segmented into six ranges, highlighting the highest concentration in the 51-55 years cohort

The Table-2 shows a detailed comparison of postoperative outcomes between patients who had short and extensive procedures. Outcomes include the incidence of particular problems such as sore throat, muscular weakness, and surgery site discomfort, which are statistically significant.

Table 1: Characteristics of the participant (N=100)

Characteristics	Participants number (n)	Percentage (%)
Gender		
Man	65	65%
Women	35	35%
Surgical procedures		
Appendectomy normal	42	64.61%
Appendectomy complicated	23	35.38%
Hysterectomy normal	24	68.57%
Hysterectomy complicated	11	31.42%
Duration of Anesthesia		
70 min	49	49%
60-120 min	20	20%
120-190 min	11	11%
190-250min	20	20%
Age levels		
25 years	5	5 %
26-30 years	10	10%
31-35years	15	15%
36-40years	19	19%
41-50years	21	21%
51-55years	30	30%

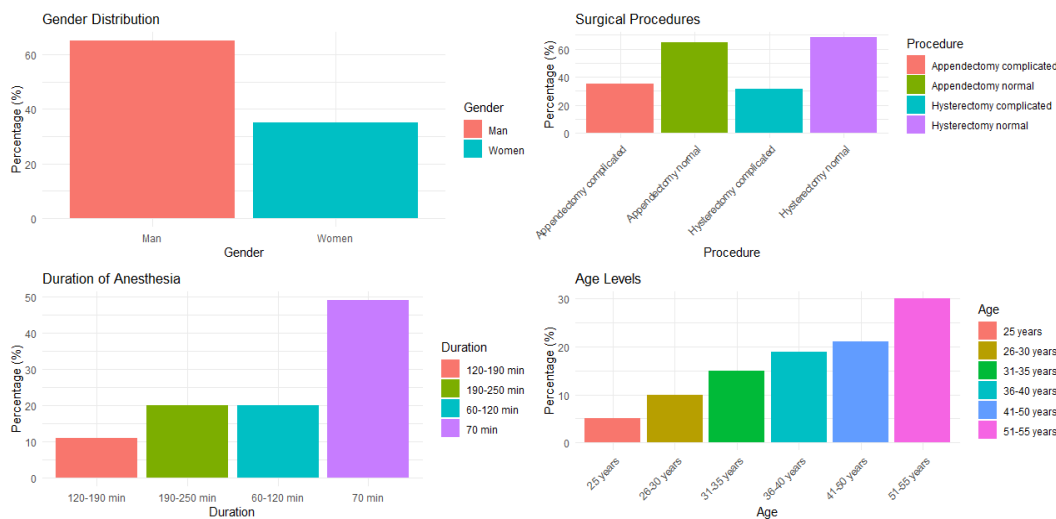


Figure 1: Comparative Bar Graphs Depicting Patient Demographics and Clinical Procedure

Table 2: Different Medical Complications with general anesthesia in various age groups (N=100)

Medical Complications	25 years		26-30 years		31-35years		36-40years		41-50years		51-55years	
	(n=5)		(n=10)		(n=15)		(n=19)		(n=21)		(n=30)	
	n	%	n	%	n	%	n	%	n	%	n	%
Pain in surgical site	0	0	4	40	4	26.66	6	31.51	4	19.0	15	50.00
mouth dryness	1	50	2	20	3	20.0	5	26.31	10	47.61	13	43.33
Sore throat	1	50	1	10	1	6.66	4	21.05	5	23.80	11	36.66
Headache	0	0	2	20	3	20.0	3	15.78	7	33.33	10	33.33
vomiting and nausea	3	60	5	50	5	33.33	7	36.84	6	28.57	12	40.00
Issues with urination	2	40	2	20	3	20.0	3	15.78	5	23.80	15	50.00
Breathing issue	3	60	3	30	4	26.66	4	21.05	16	76.19	17	56.66
Pain and weakness in the muscles	4	80	5	50	6	40.0	14	73.68	20	95.23	28	93.33

Fig-2: Different Medical Complications with general anesthesia in various age groups (N=100)

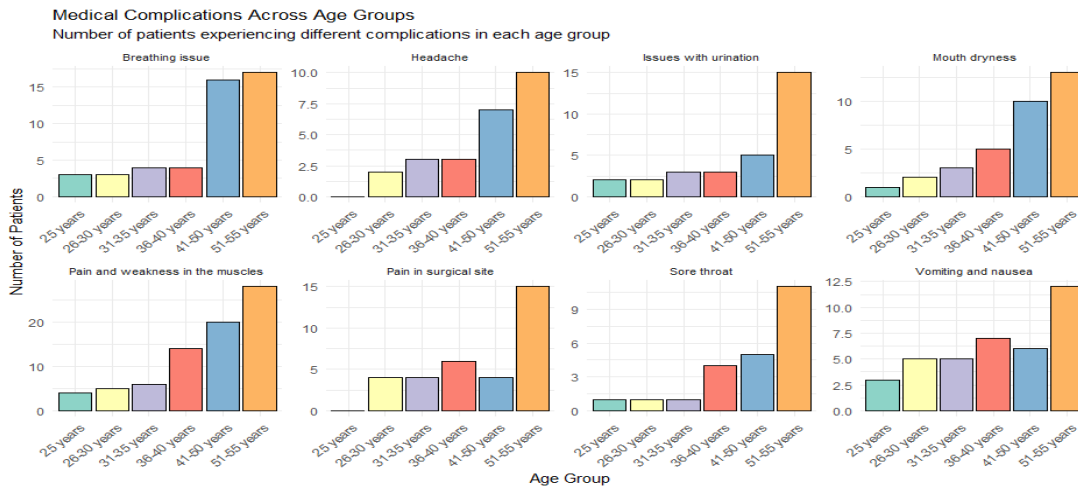


Figure 2: Distribution of Postoperative Complications by Age Group

Table-3: Length of anesthesia in individuals of Group-A

Surgical procedures	(n)	Duration of Anesthesia	Percentage Of physiological complications	Percentage Of Anatomical complications
Appendectomy normal	42	60-120 min	19%	60%
Appendectomy complicated	23	120-190 min	32%	78%
Hysterectomy normal	24	120-190 min	21%	67%
Hysterectomy complicated	11	190-250min	72%	93%

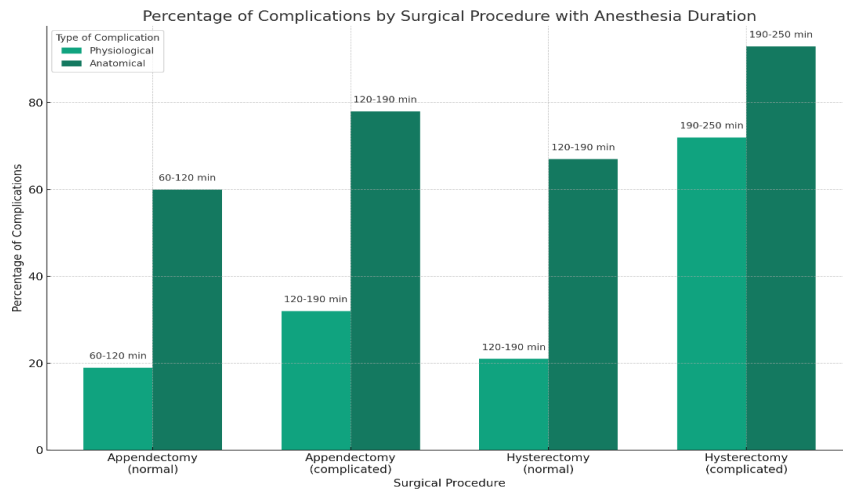


Figure 3: Prevalence of Physiological and Anatomical Complications by Surgical Procedure and Anesthesia Duration

Fig-2 shows detailed comparison of postoperative outcomes between patients who had short and extensive procedures. Outcomes include the incidence of particular problems such as sore throat, muscular weakness, and surgery site discomfort, which are statistically significant.

This figure illustrates the number of patients experiencing specific postoperative complications following general anesthesia, categorized by age group. The bar graphs distinctly showcase that with advancing age, particularly in the 51–55-year cohort, there is a notable upsurge in the incidence of complications such as breathing issues, headache, muscle pain, and nausea. The pattern suggests an age-related vulnerability to certain anesthesia-induced adverse effects, with the most significant occurrences of mouth dryness and pain at the surgical site being prevalent in the oldest age group examined.

The table-3 shows Results of multivariate logistic regression examining risk variables for complications after controlling for confounders such as age, gender, and pre-existing conditions. This research shows significant factors of poor post-anaesthesia outcomes.

In this intervention different surgical procedures such as normal Appendectomy, complicated appendectomy, normal hysterectomy and complicated hysterectomy considered the (60-120 min, 120-190 min, 120-190 min, 190-250min) quantity of anesthesia were used, (19%, 32%,21%,72%) percentage of physiological complications and anatomical complications (60%,78%,67%,93%) were noted respectively. Similarly, Pain in surgical site, mouth dryness, Sore throat, Headache, vomiting and nausea, Pain and weakness in the muscles, issues with urination and breathing issue were measured among several age groups. Remarkable physiological and anatomical complications (50.00%, 43.33%, 36.66%, 33.33%, 40.00%, 50.00%, 56.66%, 93.33%) were seen in aged i.e. (51-55years) as compared to other age groups. The fig-3-line graph depicts trends in the incidence and severity of anesthesia-related problems across the research period. Trends differ by kind of operation, indicating a possible rise in problems with greater anaesthetic duration.

The bar graph displays a comparison of the proportion of physiological and anatomical problems seen in patients having various surgical operations at varied anaesthetic durations. The length of anesthesia is correlated with a higher percentage of anatomical difficulties for both routine and complex appendectomies. The frequency of postoperative complications is directly correlated with the difficulty and duration of surgery, as demonstrated by the significant rise in anatomical problems observed in both complicated and normal hysterectomies with prolonged anaesthetic durations.

DISCUSSION

The aims and objectives of present study were to find out the physiological and anatomical complications with general anesthesia in short term and long term surgeries. The patients after appendectomy and hysterectomy procedures were selected, 42 male patients operated with normal appendectomy procedure and (60-120 min) dose of general anesthesia was given to them similarly in case of complicated appendectomy (120-190 min) dose was given to 23 patients. While in the cases of normal hysterectomy and complicated hysterectomy (120-190 min), (190-250min) doses were given to female patients respectively. The highest number i.e. (n=30) in this study patients were 51-55 years old while other age groups were 25 years,26-30 years,31-35 years and 36-40 years which was very noticeable point[18]. The findings of this study regarding physiological and anatomical complications such as Pain in surgical site, mouth dryness, Sore throat, Headache, vomiting and nausea, issues with urination, breathing issue, Pain and weakness in the muscles (50.00%, 43.33%, 36.66%, 33.33%, 40.00%, 50.00%, 56.66%, 93.33%) were higher than other all age groups. Despite advancements in our knowledge of the processes underlying the development of pain and the development of contemporary, secure analgesics and anesthesia strategies, there is insufficient post-operative pain relief. According to a study, multidimensional control is necessary for effective general anesthesia administration. It is primarily the nurse's responsibility to provide appropriate care for pain management following surgery [19].

In another study stated that side effects of general anesthesia, we observed that somnolence, "dry mouth/increased thirst," and pain in the operated area occurred in more than 52% of cases, accounting for 63%, 69%, and 72% of cases, respectively. Nevertheless, it was noteworthy that in 35-51% of the cases, the following symptoms were identified separately: sore throat/hoarseness (35%), headache (33%) nausea and vomiting (34%), weakness and pain in the muscles (38%), and disorder of consciousness (35%). Reducing pain effectively lowers the chance of developing additional issues such as anxiety, thromboembolic processes, nausea and vomiting, or elevated blood pressure[20]. The findings of present study were very similar to the conclusion of a previous study in which patients reported the complaint of cold and chill in recovery room. In another study where the situation was same occurrence of hypothermia among patients were noted. Whereas in different studies researchers claims that most of the female most vulnerable to nausea and vomiting following normal hysterectomy and complicated hysterectomy. All of this study's findings could be useful in future research of a similar nature.

Limitation of the Study: In present study Small sample sizes were used in this single-centered investigation. In addition, the study was completed in a remarkably brief

amount of time. Because of this, the results of this study might not accurately represent the situation across the entire nation of Pakistan.

CONCLUSION

General anesthesia is generally a safe method of guaranteeing the patient's safety and comfort during surgery, it has been linked to certain complications up until this point that need to be identified and addressed. To lower unintended complications, controversial developments in the general anesthesia procedure are required. To obtain more precise data, we suggest carrying out additional research with a larger sample size.

Future Directions: In order to improve the generalizability of the results, future research should strive to increase the sample size and incorporate multi-centered investigations. Further research on the effects of various anesthetic methods and patient-specific factors on postoperative results may yield more insights into reducing general Anesthesia-related problems.

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Author Contributions

MT: conduction of study work, literature search

TQ: Manuscript editing, data collection, literature search.

AAB: Concept clearing, manuscript editing.

RK: manuscript editing

MS: Conduction of the study work, correspondence, manuscript editing, supervision.

MNS: Manuscript editing, conduction of study work, statistical analysis, Permissions for Research work.

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Abbreviations:

GA: General Anesthesia

PONV: Post-Operative Nausea and Vomiting

HRQoL: Health-Related Quality of Life

IV: Intravenous

BMI: Body Mass Index

PCR: Polymerase Chain Reaction

RPM: Revolutions Per Minute

mmHg: Millimeters of Mercury

ECG: Electrocardiogram

MRI: Magnetic Resonance Imaging

CT: Computed Tomography

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