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Factors associated with the complication of anesthesia among patients undergo

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Abstract
Advancement in the medical field has led to the introduction of different types and techniques of anesthesia for limiting the complications posed by anesthesia for patients undergoing major surgical procedures. Nevertheless, general factors such as nausea, vomiting, headache, cardiac complications, and respiratory diseases are hard to avoid after a prolonged surgical process. A cross-sectional study design conducted on 87 participants of varying ages, gender, and physical status was conducted in this study. Statistical testing using the chi-square technique indicated that the factors were not independent of the complications of anesthesia. The findings indicated that general and respiratory complications were more common than cardiac problems. These factors, on the other hand, are also dependent on the type of anesthesia, duration, and co-existing patient conditions. Moreover, results confirmed the proportion of complications in the male patients more than the female (52.2%, 47.8%), especially at the age (24-35 years; 29.9%), among smokers (20.9%), patients with hypertension (20.9%), obesity (13.4%), drug allergy (14.9%), having general type of anesthesia (67.2%), with a duration above 30 minutes (65.7%). However, most of the relationships are found statistically insignificant. Complications are in the form of vomiting, nausea, headache, obstruction of the airway, respiratory spasm, Apnea, hypotension, Cardiac arrhythmia, type of anesthesia. Overall, the study concluded that risk factors are directly proportional to the underlying complications.

Keywords: anesthesia, techniques, surgery, complications

Introduction
The continuous improvement in the anesthesia techniques has increased the rate of ambulatory surgery. There are consistent changes in the methods used for anesthesia, for example in the 1990s the concept of quicker recovery from anesthesia was introduced that result in rapid discharge from hospital and resumption towards the daily activities [1]. Major morbidity and mortality are directly linked with the ambulatory surgery when it is compared to the inpatient surgeries [2, 3]. There are several advantages of ambulatory surgery when it is compared to the inpatient surgeries for instance hospital costs, the lower rate of cancellations, less waiting times, and low risk of nosocomial infection. For the successful ambulatory surgery, it is necessary to have the appropriate procedure of ambulatory anesthesia. In this way, the primary concern is the ultimate health of the patient and potential side effects [4, 6].
The selection of anesthesia technique is based on the type of operation, patient age and possible health complications. Due to the appropriate selection of the anesthesia conditions, it is possible to improve the conditions of the patient [7]. The effective evaluation for the selection technique can speed up the process and can save the time of patient and surgeon.

Techniques of Anesthesia
There are different techniques of anesthesia and choice of anesthetic method is based on the patient factors, operation, possible complications, and anticipated degree of pain. Different anesthetic techniques include general, spinal, epidural, regional, caudal, total intravenous, inhalation, nerve blocks, and hypotensive [8]. The description of these techniques is listed below,

1. Central neuraxial blocks include caudal, spinal and epidural anesthesia that is regional anesthesia. It is performed in the surgical procedure and provides excellent pain control.
2. Epidural technique is used for multi model postoperative pain control.
3. Hypotensive epidural anesthesia is used to decrease blood loss in hip surgeries.
4. Caudal anesthesia is used to perform pediatric patient, postoperative analgesia, and surgery.
5. Regional anesthesia provides excellent pain control, decrease side effect, increase pulmonary function, reduce hospital stay, and prevent chronic pain.
6. Total intravenous anesthesia (TIVA) is used in surgeries [9].

Complications in Surgery
In order to reduce the possibility of complications in surgery surgeons must discuss the use of anesthesia with the anesthetist. The important complications of general anesthesia include pain, nausea, vomiting, damage to teeth, sore throat, respiratory depression, anaphylaxis to anesthetic agents, cardiovascular collapse, hypoxic brain damage, embolism, headache, aspiration pneumonitis, iatrogenic and hypothermia [10].

1. **Anaphylaxis:** Anaphylaxis can occur due to anesthetic agent and the reactions include rash, hypotension, bronchospasm, vomiting, urticaria, and angioedema [11].
2. **Aspiration pneumonitis:** The complication occurs in case of the unprotected airway and if the patient vomits there is a possibility to come back to the lungs. The pH of gastric content can damage the lungs.
3. **Peripheral nerve damage:** This occurs due to anesthesia and nerve compression. The common cause is exaggerated positioning and a long period of time. The surgeons must be aware of potential complications such

as injury of nerves. The extreme postures during surgery must be considered [12].

4. **Embolism:** The potentially fatal issue in anesthetic complications is embolism that occurs during pelvic operations and neurosurgical procedures. The issue becomes severe in pre-operative and low molecular weight heparin (LMWH) and thromboembolic deterrents (TEDS) [13].

Materials and methods

The cross-sectional study design was selected for this research that facilitated in conducting a prospective observational study at a tertiary care hospital setting. Unlike other research methods, the cross-sectional research design enables the researcher to calculate the outcomes in addition to the exposures of the study participants in a given time on the basis of the inclusion and exclusion criteria [14]. Inclusion criteria for this research included patients undergoing major surgery that had been informed of the study through a written consent and had shown a willingness and complete support to participate in the study. The exclusion criteria, on the other hand, included mentally ill patients, pregnant women, substance abuse patients who influenced the central nervous system, mental impairment, and patients with a psychiatric history.

A total of 87 patients were included in a total of which 46 were males and 41 were females belonging to different age groups. The clinical and the demographic data were collected for every patient which was entered in a highly secured electronic database. Eight variables were explored in this study which included gender, age, smoking, hypertension, obesity, drug allergy, types of anesthesia, and duration of the anesthesia. In addition, the distribution of the risk factors associated with anesthesia in prolonged surgery was measured; these included general complications like nausea, headache, and vomiting, respiratory complications, cardiovascular problems, sedation quality, and drug allergies.

Results

In this study, a total of 87 respondents were enrolled. The clinical and the demographic data have been summarized in Table 1 and 2 while Table 3 has presented the relationship between the risk factors and the existence of any complication through a chi-square test.

Table 1 indicates the distribution of the selected variables. It has been found that the sample composed of 52.9% males while the rest of them were females. In regards to age, most of the participants were between the ages of 25-34 (27.6%) while others aged in between 35 to 44 years (20.7%), 45 to 54 years (23.0%), 18 to 24 years (14.9%) and above 55 years (13.8%). Moreover, it has been found that 19.5% were smokers, 21.8% had hypertension, 11.5% had obesity while 14.9% indicated to have a drug allergy. In addition to this, 33.3% received local anesthesia while others were having general. Moreover, 66.7% remained in anesthesia for more than 30 minutes while others had anesthesia under 30 minutes.

Table 1: Characteristics of the study sample

Variable	N (%)
Gender	
Male	46(52.9%)
Female	41(47.1%)
Age	
18-24	13(14.9%)
25-34	24(27.6%)
35-44	18(20.7%)
45-54	20(23.0%)
55+	12(13.8%)
Smoking	
Yes	17(19.5%)
No	70(80.5%)
Hypertension	
Yes	19(21.8%)
No	68(78.2%)
Obesity	
Yes	10(11.5%)
No	77(88.5)
Drug allergy	
Yes	13 (14.9%)
No	74(85.1%)
Type of anesthesia	
Local	29 (33.3%)
General	58 (66.7%)
Duration of anesthesia	
<= 30 minutes	29 (33.3%)
>30 minutes	58 (66.7%)

Majority of the respondents were having respiratory and general complications, which include airway obstruction (21.84%), apnea (11.49%), headache (17.24%) and vomiting (9.2%).

Table 2: Distribution of complications

Complication	N
General	
Nausea	6 (6.9%)
Vomiting	8 (9.2%)
Headache	15 (17.24%)
Respiratory complication	
Airway obstruction	19 (21.84%)
Apnea	10 (11.49%)
Desaturation	3 (3.45%)
Laryngospasm	2 (2.3%)
Cardiovascular complications	
Hypotension	2 (2.3%)
Cardiac arrhythmia	2 (2.3%)
Quality of sedation	
Prolonged sedation	3 (3.45%)
Drug allergy	
	1 (1.15%)
No Complication	16 (18.39%)

Moreover, table 3 observed that most of the factors have an insignificant association between risk factors and the existence of complication (yes/no). Only smoking has a significant association at 0.1 level with complication. However, a complication with its different types has a significant link with the risk factors combined at 0.01 level, χ^2 (1, N = 87) = 96.079, p < 0.01.

Table 3: Factors associated with an anesthesia complication

Risk factor	Complication		P-value
	No	Yes	
Gender: Male	55%	52.20%	0.828
Female	45%	47.80%	
Smoking: No	85%	79.10%	0.069
Yes	15%	20.90%	
Hypertension: No	75%	79.10%	0.697
Yes	25%	20.90%	
Obesity: No	95%	86.60%	0.299
Yes	5%	13.40%	
Drug Allergy: No	85%	85.10%	0.993
Yes	15%	14.90%	
Type of Anesthesia: Local	35%	32.8%	0.857
General	65%	67.2%	
Duration: <= 30 minutes	30%	34.3%	0.719
>30 minutes	70%	65.7%	
Age: 18-24	5%	17.9%	0.328
25-34	20%	29.9%	
35-44	20%	20.9%	
45-54	35%	19.4%	
55+	20%	11.9%	

Discussion

The prospects of this research are indicating a direct relationship between the risk factors and the complications since the values of the chi-square testing are demonstrating the dependence of risk factors on the anesthesia complications in major surgery. Management of the anesthesia may be a contributing factor to poor outcomes. Nevertheless, demographic variations, presence of co-existing conditions, and drug allergies should also be considered which could have a modifiable impact of the research outcomes. Furthermore, the duration and type of anesthesia are equally important factors to consider when analyzing and factors contributing to anesthetic complications in this study.

Surgical complications are always a major concern for the physicians and the healthcare system as a whole. Nausea/vomiting, incisional pain, headache, drowsiness, fever, and dizziness are some of the most common complications associated with the use, type, and duration of anesthesia in major surgeries [15, 16]. Among these, the type of surgery has a direct relationship with the complications. Vomiting and headaches are highest in patients undergoing general surgery. Nevertheless, surgical complications and risk factors are also dependent on the type of surgery, duration of general anesthesia, and demographic characteristics of the patients [17]. Since intra-operative mechanical ventilation is required in major surgeries therefore there is a high risk of respiratory complications during anesthesia [18]. Upper respiratory tract infections and smoking increase the risk of postoperative complications due to deterioration of the airways and chest congestions [19, 21]. Also, induction of anesthesia in patients with a history of cardiac diseases and complications may exacerbate the risk of chronic heart failure, coronary artery disease, perioperative hypertension, and tachycardia [22, 24]. In this regard, the anesthesiologist is required to maintain the appropriate levels of hemoglobin (10g/dl) along with optimal oxygenation to avoid lack of oxygen saturation in the major organs and circulatory system, [25]. Selection of the right drugs for anesthesia is also critical and must be in correspondence to the medical history, drug allergies, and renal function to limit the negative impact and consequences of anesthesia on the patients [26, 27].

Conclusion

The common complications are postoperative complications such as vomiting, pain and nausea. It is important to have better recovery for the optimization of patient status. Modifiable factors such as patient history, drug allergies, and co-existing conditions should be taken into consideration to limit the impact of risk during major surgery. On the other hand, age, gender, and physical status, type of surgery, and duration of anesthesia are the non-modifiable aspects. Equal consideration of the modifiable and non-modifiable factors is needed prior to the selection of the types of anesthesia. General complications such as nausea, vomiting, and headache were mainly reported while pulmonary, and cardiac complications were also recorded in this study. This research suggests that complications of anesthesia are common after major surgery that is subjected to underlying pathology, surgical factors, and anesthetic management.

Conflict of Interest

No conflict of interest was reported by any author of this study.

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