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Original Article

Postoperative Hypotension and Adverse Clinical Outcomes in Patients without Intraoperative Hypotension during noncardiac surgery

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ABSTRACT

Background*:** *The incidence of postoperative hypotension (POH) is linked to serious complications. Postoperative patients in the general-care unit who did not experience IOH had a lower threshold for blood pressure monitoring, although the relationship between this threshold and outcomes is poorly understood.* ***Objective: *To determine whether or not postoperative hypotension is linked to serious clinical complications in those whose blood pressure didn't drop while they were having surgery.* ***Method:*** *The location of this cross-sectional study, which took place between January 2020 and January 2023, was the Department of Anaesthesiology at the Holy Family Red Crescent Medical College Hospital in Dhaka, Bangladesh. This study was carried out between the years of 2020 and 2023. The inquiry called for a sample size of 200 participants, and that number was intentionally chosen.* ***Results****: In our study, 34% were between 50 to 59 years age group and 3.5% were more than 80 years old. Maximum patients (54%) were female patients and minimum patients (46%) were male patients. Maximum patients (32%) had undergone a open reduction of fracture surgery and the minimum number of patients (5%) had undergone colon surgery. Maximum patients had hypertension (51.75%) and diabetes (36.25%). And a minimum number of patients (4.5%) had myocardial infarction.* ***Conclusion:*** *Patient and surgical variables, such as age and kind of operation, have been shown to affect the association between IOH and bad result in clinical practice.*

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INTRODUCTION

Patients who have undergone noncardiac surgery are at increased risk for complications such myocardial injury after noncardiac surgery (MINS), acute kidney injury (AKI), and serious adverse cardiac or cerebrovascular events [1–3]. The majority of risk factors are non-modifiable patient features or surgical variables at the beginning of treatment. Hypotension, a risk factor that is frequently present before and after noncardiac surgery and which could be reduced, is one such factor [4-9]. Mortality, AKI, and MINS are all linked to even brief periods of intraoperative hypotension (IOH) once the MAP drops to less than 70 mm Hg [6–12]. Major adverse events (AEs) are also linked to postoperative hypotension [9]. Although it appears to be dependent on IOH, this association is particularly clear in individuals who are seriously unwell [13,14]. The incidence of postoperative hypotension over a range of blood pressure (BP) thresholds in a random sample of patients who were recently discharged from the operating room and admitted to the ward, however, not well covered in literature [9,15]. Furthermore, previous research failed to account for the independent connection of patient outcomes in POH studies a range of BP thresholds because they did not exclude individuals with IOH. On the ward, hemodynamic monitoring is limited to periodic reviews of vital signs, in contrast to surgical procedure rooms as well as the intensive care unit (ICU), both of which implement continuous monitoring as part of their standard operating procedures. Therefore, since constant monitoring on the ward frequently delays intervention, it could be harmful [16].

A suspected causative relationship between IOH and unfavorable outcomes following non-cardiac surgery, Including but not limited to myocardial infarction, stroke, delayed graft function following liver or kidney transplantation, and even mortality after one year, has drawn more attention in recent years [17,18]. It is not shocking that a number of research failed to find a link between IOH and unfavorable outcomes [19.20]. A recent meta-analysis lends credence to the theory that even "moderate" hypotension experienced during orthopedic surgical procedures can strengthen patient outcomes by lessening the amount of blood lost and the requirement for transfusions [21]. The capacity of a patient to resist episodes of hypotension is also influenced by a variety of other factors, including the patient's age, the existence of comorbidities, and the surgical indication. Organ perfusion will be affected if blood pressure drops sufficiently low for a relatively lengthy amount of time.

OBJECTIVE

To determine whether or not postoperative hypotension is linked to serious clinical complications in those whose blood pressure didn't drop while they were having surgery.

MATERIALS AND METHODS

The location of this cross-sectional study, which took place between January 2020 and January 2023, was the Department of Anaesthesiology at the Holy Family Red Crescent Medical College Hospital in Dhaka, Bangladesh. This study was carried out between the years of 2020 and 2023. The inquiry called for a sample size of 200 participants, and that number was

intentionally chosen. Data gathered from the patients in accordance with the established procedure. All of the data was examined using a standard statistical tool (version 23 of SPSS).

RESULTS

The age distribution of the patients in our study is presented in **Table I**. The age group with the highest number of patients (34%) was between 50 to 59 years old, while the age group with the lowest number of patients (3.5%) was those over 80 years old.

Table I: Statistical Analysis of the Age Distribution of Patients

Age (years)	Frequency	Percentage (%)
<40	23	11.5%
40-49	29	14.5%
50-59	68	34%
60-69	42	21%
70-79	31	15.5%
80+	7	3.5%

The gender breakdown of the people that participated in our study is presented in **Figure 1**. Here, maximum patients (54%) were female patients and minimum patients (46%) were male patients. Take a look at the chart down below:

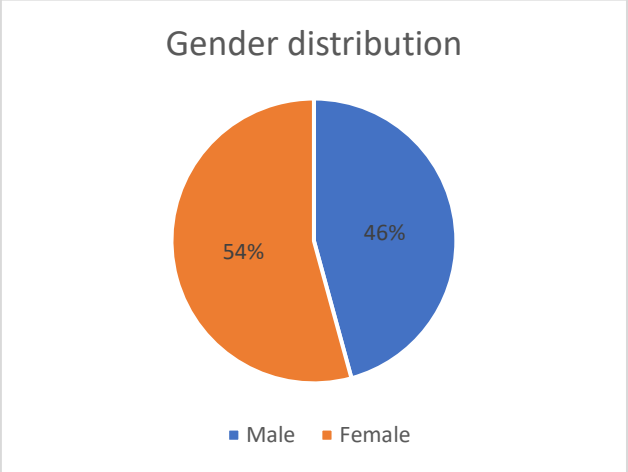

Figure 1: Patients' gender breakdown.

The types of surgeries performed on the participants in our study are outlined in **Table II**. In this particular case, The vast majority of hospitalized patients had undergone a open reduction of fracture surgery (32%), whereas only a small percentage of patients had undergone colon surgery (5%). Please refer to table 2 below.

Table II: Surgery types of the patients

Surgery types	Frequency	Percentage (%)
Limb amputation	11	5.5%
Gallbladder surgery	51	25.5%
Colon surgery	10	5%
Craniotomy	14	7%
Spinal fusion	15	7.5%
Spinal fusion laminectomy	11	5.5%
Open reduction of fracture	64	32%
Knee prosthesis	12	6%
Hip prosthesis	12	6%

The incidence of serious cardiovascular or cerebrovascular events according to the IOH is presented in **Table III**. The mean duration spent below the threshold as well as the mean lowest arterial pressure below the threshold are both displayed here. Please refer to **Table III** down below:

Table III: The Impact of Heart Disease and Stroke Risk on Quality of Life

Variable	IOH Threshold				
	≤55 mm Hg	≤65 mm Hg	≤75 mm Hg	≥20% Below Baseline	≥40% Below Baseline
Mean time under threshold (min) (SD)	16 (26)	24 (63)	39 (42)	23 (42)	13 (31)
Mean lowest MAP under threshold (SD)	53 (13)	59 (42)	63 (23)	51 (22)	36 (12)

The participants who participated in the trial had their comorbidities outlined in **Table IV**. The majority of these individuals suffered from hypertension (51.75%) and diabetes (36.25%) respectively. Myocardial infarction was found in 4.5 percent of the individuals who were examined. Take a look at the table below here:

Table IV: Comorbidities of the patients of the study

Comorbidities	Frequency	Percentage (%)
Stroke	73	18.25%
COPD	35	8.75%
Myocardial infarction	18	4.5%
Heart failure	52	13%
Hypertension	207	51.75%
Paralysis	23	5.75%
Diabetes	145	36.25%
Hypothyroidism	79	19.75%
Renal disease	63	15.75%
Liver disease	115	28.75%
Obesity	148	37%
Anemia	164	41%
Smoking	49	12.25%
Dialysis	37	9.25%
Coronary artery bypass graft	11	2.75%
Coagulopathy	58	14.5%

Peripheral vascular disease	113	28.25%
Sleep apnea	83	20.75%
Dementia	41	10.25%

***Multiple response added**

DISCUSSION

In order to accomplish this, many different definitions of IOH that are already in use were applied. Low systolic and mean blood pressure levels, as well as a significant decrease in both, within a year after surgery, increase the risk of mortality [21]. Few patients at low or high blood pressure extremes caused hazard ratios to drop below 1. No conclusions can be drawn about safe blood pressure levels from this data. Shorter IOH durations were linked to higher 1-year mortality rates than longer hypotension tolerance at higher thresholds. Results support the idea that lowering blood pressure in the elderly is only tolerated for shorter periods.

This study presents the average shortest duration below threshold and the lowest mean arterial pressure. Rather than labeling the operation as hypotensive or not, we reduced the issue by measuring IOH as the duration below the IOH threshold. The preoperative blood pressure reading was used as the baseline, considering the sedative used beforehand. It lessened the sedative's blood pressure drop. Even after controlling for baseline blood pressure and sedation, studies that used a fixed threshold for IOH showed comparable outcomes. The reasons for death don't affect the total number of deaths, so the correlation between IOH and 1-year mortality stays the same. IOH is when blood pressure drops below certain levels, usually 80/55 mmHg or a 20-25% reduction from baseline [22]. Only one study has linked IOH to mortality within a year [18].

In the United States, one of the most common reasons for death occurs within the first thirty days after surgery [23,24]. Significant bleeding and cardiac damage are two examples of the surgical consequences associated with hypotension.In patients undergoing noncardiac surgery Postoperatively, when the MAP threshold was below 65 mm Hg, there was an increase in AEs associated with hypotension, but POH was not associated with the main result of the 30-day MACCE. Liem et al. produced data linking POH with cardiac injury; however, their research depended on blood pressure readings conducted hourly in a high-dependency situation. presented evidence linking POH with cardiac injury [25]. At MAP 75 mm Hg, a significant correlation was seen with 30-day returning to the hospital, and this association grew stronger at MAP 55 mm Hg. When the MAP was less than 65 mm Hg, an upward trend in the 90-day mortality association could be observed. Previous research has established a correlation between renal dysfunction and low blood pressure [17].

CONCLUSION

This research suggests that the length of time low blood pressure persists plays a role in the possible relationship of IOH with bad outcome, in addition to absolute or relative blood pressure thresholds. It has been demonstrated that patient and surgical characteristics, such as age and the type of surgery being performed, might influence

the link between IOH and a poor result in clinical practice.

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