Original Research

Assessment of heart rate in patients on post-Anesthesia care

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ABSTRACT:
Background: The post-anesthesia care unit (PACU) is the central hub for recovery after surgery, especially when the surgery is performed under general anesthesia. During stays in the PACU, patients have to be monitored (clinically, and by assessing vital parameters) and stabilized in terms of potential volume deficits, pain, and body temperature, if necessary, before being transferred to a normal unit. **Aim of the study:** To study heart rate in patients on post-Anesthesia care. **Materials and methods:** The present study was conducted in the Department of Anesthesia of the Medical institution. We analyzed data from all 50 patients who underwent surgery between study period. We selected patients who underwent surgery because the procedures involved similar surgical time and were performed by the same surgeons, so that acute postoperative surgical pain experienced was thought to be similar in these patients. Patients were also excluded if they were elderly (over 70 years), had a history of cerebrovascular disease and ischemic heart disease, were treated with beta-blockers, had chronic obstructive lung disease, psychiatric illness, and/or active liver disease. **Results:** The mean age of the participants was 50.32 years and the age ranged from 18-70 years. The mean height of the participants was 166.35 cm. The mean weight of the participants was 68.36 kg. We observed that the heart of rate of patients normalized within hours of stay at post anesthesia care unit post operatively. **Conclusion**: Within the limitations of the present study, it can be concluded that heart rate was mildly elevated at the admission of patient to PACU, however, normalized with hours of admission.
Key words: Anesthesia, PACU, Heart rate

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INTRODUCTION
The post-anesthesia care unit (PACU) is the central hub for recovery after surgery, especially when the surgery is performed under general anesthesia.[1] During stays in the PACU, patients have to be monitored (clinically, and by assessing vital parameters) and stabilized in terms of potential volume deficits, pain, and body temperature, if necessary, before being transferred to a normal unit.[2,3] Cardiac complications are a major cause of morbidity and impaired recovery in the PACU, as cardiovascular function is already affected by general anesthesia. The early identification of the patients at high risk not only allows immediate treatment but also accelerates recovery.[4] In PACU patients, early detection of the potential complications may become possible by applying the scoring systems, which provide a systemic approach for assessment of patients with risks and helps early identification of patients with worsening clinical status.[5, 6] Hence, the present study was conducted to study heart rate in patients on post-Anesthesia care.

MATERIALS AND METHODS
The present study was conducted in the Department of Anesthesia of the Medical institution. The ethical clearance for the study was approved from the ethical committee of the hospital. Written, informed consent

was obtained from all patients prior to participation. We analyzed data from all 50 patients who underwent surgery between study period. We selected patients who underwent surgery because the procedures involved similar surgical time and were performed by the same surgeons, so that acute postoperative surgical pain experienced was thought to be similar in these patients. Patients were also excluded if they were elderly (over 70 years), had a history of cerebrovascular disease and ischemic heart disease, were treated with beta-blockers, had chronic obstructive lung disease, psychiatric illness, and/or active liver disease. These patients were further divided into two groups. Group A (n = 30) had no pain upon admission to PACU and remained pain free upon discharge from PACU (12 h after surgery); group B (n = 20) had no pain upon admission to PACU, but experienced increasing pain in PACU 1 h after surgery, requiring analgesic therapy. Heart rate was recorded immediately after admission to PACU and then 2 h thereafter as a single data entry and stored on a computer.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS

Table 1 shows demographic data of participants. The mean age of the participants was 50.32 years and the age ranged from 18-70 years. The mean height of the participants was 166.35 cm. The mean weight of the participants was 68.36 kg. The number of male participants was 28 and female participants was 22. Table 2 shows mean heart rate of the patients postoperatively under post anesthesia care. We observed that the heart of rate of patients normalized within hours of stay at post anesthesia care unit post operatively. (Fig 1)
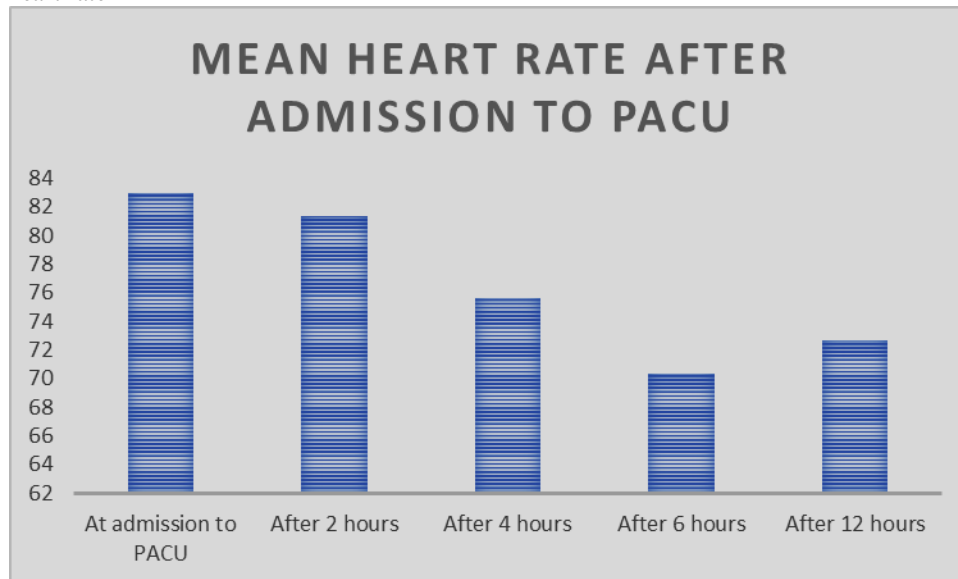
Table 1: Demographic data of participants

Parameters	Values
Mean age (years)	50.32
Mean height (cm)	166.35
Mean weight (kg)	68.36
Sex (M/F)	28/22

Table 2: Mean heart rate of the patients postoperatively under post anesthesia care

Time	At admission to PACU	After 2 hours	After 4 hours	After 6 hours	After 12 hours
Mean Heart rate	**82.98**	**81.36**	**75.65**	**70.32**	**72.65**

Fig 1: Mean heart rate

MEAN HEART RATE AFTER ADMISSION TO PACU

DISCUSSION

In the present study, we observed that that heart of rate of patients normalized within hours of stay at post anesthesia care unit post operatively. The studies were compared with previous studies from the literature. Uchida S et al retrospectively examined whether differences in heart rate variability may be related to the appearance of postoperative pain in patients undergoing breast cancer surgery. They retrospectively analyzed 20 postoperative patients who had no pain immediately upon admission to the post-anesthesia care unit (PACU), divided into two groups: group A (n = 16) had no pain on admission to PACU, remaining pain free upon discharge (12 h after surgery); group B (n = 4) comprised patients with no pain on admission to PACU but who experienced increasing pain requiring intervention in PACU 1 h after surgery. HRV was measured immediately on admission to PACU and 2 h after surgery; this included variables of low-frequency power (LF), high-frequency power (HF), and LF/HF. There were significant differences in HF and LF/HF in group A compared with those in group B on admission to PACU (immediately after arrival): HF, group A, 35.4 ± 18.1; group B, 64.2 ± 9.5*; LF/HF group A, 2.7 ± 2.4; group B, 0.6 ± 0.2*, *p < 0.05). There was no significant difference in the Numerical rating scale (NRS) between the two groups immediately after admission to PACU. At 1 h after the surgery, NRS in Group B increased, and there were significant differences in NRS values between the two groups 1 h after surgery prior to the use of analgesic agents. Patients in group A required no analgesic agents for at least 12 h after surgery. They concluded that lower HF and higher LF/HF values immediately after arrival in PACU were observed in patients remaining pain free for 12 h after surgery compared to patients who experienced increasing postoperative pain 1 h after surgery. The data suggest that differences in HRV may be related to the appearance of postoperative pain. Sesay M et al determined the optimal thresholds of HRV above which the patients are in pain after minor spinal surgery (MSS). Secondly, evaluated the correlation between HRV and the numeric rating scale (NRS). Following institutional review board approval, patients who underwent MSS were assessed in the postanesthesia care unit after extubation. A laptop containing the HRV software was connected to the ECG monitor. The low-frequency band (LF: 0.04 to 0.5 Hz) denoted both sympathetic and parasympathetic activities, whereas the high-frequency band (HF: 0.15 to 0.4 Hz) represented parasympathetic activity. LF/HF was the sympathovagal balance. Pain was quantified by the NRS ranging from 0 (no pain) to 10 (worst imaginable pain). Simultaneously, HRV parameters were noted. Optimal thresholds were calculated using receiver operating characteristic curves with NRS>3 as cutoff. The correlation between HRV and NRS was assessed using the Spearman rank test. They included 120 patients (64 men and 56 women), mean age 51±14 years. The optimal pain threshold values were 298 ms for LF and 3.12 for LF/HF, with no significant change in HF. NRS was correlated with LF and LF/HF but not with HF. This study suggests that, after MSS, values of LF>298 m and LF/HF>3.1 denote acute pain (NRS>3). These HRV parameters are significantly correlated with NRS. [7,8]

Moein Vaziri MT et al investigated the attenuation of cardiovascular responses and upper airway events resulting from tracheal extubation by low dose propofol. 80 patients with ASA physical status I, undergoing an elective surgery in a double blind manner received 0.5mg/kg propofol or normal saline 2 minutes before extubation. Heart rate and blood pressure and quality of tracheal extubation were recorded. Heart rate and blood pressure in patients receiving propofol were less than the control group at the time of injection of propofol, but there were no differences between the two groups at the time of extubation. They concluded that propofol can reduce SBP, DBP, MAP, HR & cough production at the time of injection but there were no significant changes in these parameters after extubation. Conrado VC et al evaluated the occurrence of variables detecting myocardial ischemia during or after dental treatment under anesthesia with vasoconstrictor (epinephrine). A total of 54 coronary patients undergoing dental extraction under local anesthesia with or without vasoconstrictor were included. They were divided into two groups (by drawing envelopes): group I (27 patients) using anesthetics with vasoconstrictor, and group II (27 cases) without vasoconstrictor. 24-hour Holter monitoring, Doppler-echocardiogram before and after dental intervention, and determination of biochemical markers (CK-MB mass, CK-MB activity, and troponin T) before and 24 hours after dental extraction were performed in all patients. Heart rate and blood pressure were also measured in the pre, post-anesthesia and post-dental extraction phases. Doppler echocardiography assessed left ventricular segmental contractility and the occasional occurrence of mitral regurgitation. The usual pharmaceutical treatment prescribed by the cardiologist was maintained in all cases. Three patients in group I presented ST-segment depression (1.0 mm) during administration of anesthesia; two other patients in group I had CK-MB mass elevation, and ischemia was not observed in any other case, as assessed by the other methods. No chest pain, arrhythmias, occurrence or worsening of left ventricular segmental hypocontractility or mitral regurgitation were observed in the study. They concluded that dental extraction performed under anesthesia with 1:100,000 epinephrine does not imply

additional ischemic risks, as long as performed with good anesthetic technique and maintenance of the pharmacological treatment prescribed by the cardiologist. [9,10]

CONCLUSION

Within the limitations of the present study, it can be concluded that heart rate was mildly elevated at the admission of patient to PACU, however, normalized with hours of admission.

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