

Incidence of new onset arrhythmia after non cardiac surgery

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Abstract

Background: Although new-onset arrhythmia are a common problem in cardiothoracic surgery, their incidence in major non- cardiac surgery has not been studied properly. The aim of the study is to assess the incidence of arrhythmia after non cardiac surgery. While we have some data on postop arrhythmia after general surgery, we don't have much data on orthopedic surgery, and good proportion of our patient in the study belong to this category. Thus it is also aimed to compare the incidence of arrhythmia in different types of surgery.

Methodology: The present study is a retrospective cohort of 100 patients who recently underwent surgery between 2023 January 1st till 2023 June 1st. All included patients were monitored in ICU and post-operative ward after surgery. 100 patients (28 female and 72 male) without any history of prior arrhythmia were analyzed and included in the study.

Incidence of postoperative arrhythmia (PA) was observed and compared in patients undergoing different types of surgery. Impact of age factor on the incidence of PA was also studied.

Results: Incidence of overall PA among all patients were 31%. Incidence of significant PA were 14.3%. Incidence of significant PA was highest in gastro-surgery patients (22%) whereas orthopedics patients had 11% incidence of PA.

Conclusion: Gastro surgery seem to give high impact on incidence of PA. In our analysis, age of the patient appear to be associated with the causation of PA.

Introduction

Atrial fibrillation (AF) is the commonest sustained cardiac arrhythmia.¹ The incidence of Postoperative atrial fibrillation (POAF) varies between 20 and 50%^{2,3} among all post-surgical patients including those undergoing cardiac surgery. For general surgery, the incidence of PA is not well described. The available literature has focused mainly on PA incidence on gastric surgery, which ranges from 9-23%.⁴⁻⁸ Systemic factors such as electrolyte imbalance, sympathetic activation and hypoxia seem to play major role in the causation.

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Methodology

Inclusion criteria were patients age more than 18 year and any non-cardiac surgery performed at B and B hospital between 1st of January 2023 to 1st of June 2023, who have stayed at hospital for more than 24 hours under ECG monitoring in ICU or post op ward.

Exclusion criteria were pre-existing arrhythmia.

All cases fulfilling the inclusion criteria was included in the study. Their consent were waived as this was an observational retrospective study without intervention to the patient's treatment. The data were collected on the same day of operation from the ICU/postop ward till the next day for any new onset arrhythmia. Significant arrhythmia were considered as atrial fibrillation with fast ventricular rate, ventricular tachycardia, paroxysmal supraventricular tachycardia, significant sinus bradycardia, AV block or any clinically significant arrhythmia requiring treatment or if they had any hemodynamic or clinical significance. Overall arrhythmias included arrhythmias like PAC PVC sinus tachycardia also and were considered separately.

Surgical procedures were grouped into Gastro- surgery, neuro-surgery uro-surgery and orthopedic-surgery; and their individual arrhythmia incidence were noted.

We also looked for cardiovascular risk factors like heart failure, coronary artery disease, previous CABG or PCI, COPD sepsis and organ failure like CKD etc.

All patients were observed in ICU/post op ward under monitoring device for at least 24 hours.

The arrhythmia was confirmed by ECG or observing the ECG monitor by a cardiologist or an intensivist or a trained physician.

Statistical analysis

Categorical variables were compared using Chi square test. Multivariate logistic regression analysis could not be done because of insufficient data.

Results

100 patients who underwent non cardiac surgery at B and B hospital Lalitpur between 1st of January 2023 to 1st of June 2023 were screened and analyzed before discharge for new onset arrhythmia. Few were excluded because of pre-existing intermittent AF and history of PSVT, and demographic data like under-age.

Incidence of overall PA among all patients were found to 31%. This included overall arrhythmia including PVC and PAC. Incidence of significant PA were 14.3%. Incidence of significant PA was highest in gastro-surgery patients (22%) whereas orthopedics patients had 11% incidence of PA. However these were not of statistical significance with p value of 0.78. Likewise incidence of overall arrhythmia including PVC and PAC was 29% for orthopedic case and 34 % for gastro surgery case. Our study showed significant association between incidence of arrhythmia and age of the patient.

Elderly group of more than 65 years had more frequent overall arrhythmia 42% vs 21.9 % than among those with age less than 65year, with p value of 0.027.

Incidence of PA among patients undergoing GA vs spinal anesthesia was also compared. Spinal anesthesia patients had more arrhythmia

(39.1%) than those with GA (27.2%) However this was not of statistical significance $p= 0.32$. The incidence of bradycardia was most probably due to the effect of anesthetic drug itself (bupivacaine); and the non-significant p value could be due to small size of the study.

Organic failure (CKD) also appeared to be strong predictor for development of arrhythmia although the affected number was low in the study.

Different demographic data and postoperative arrhythmia are shown in table 1 and 2.

Table 1: Demographics and clinical data of patients

| Variables | Frequency (n) |
|---|---------------|
| Population size | 100 |
| Female | 27 |
| Age \geq 65 years | 37 |
| Hypertension | 30 |
| Diabetes mellitus | 9 |
| Coronary heart disease | 7 |
| Chronic kidney disease | 6 |
| Surgery done under general anesthesia | 66 |
| Surgery under spinal and local anesthesia | 34 |
| Gastrointestinal and uro-surgery patient number | 25 |
| Orthopedic surgery patients number | 66 |
| Neuro surgery patient number | 4 |
| Other surgery | 5 |
| Patient who had postoperative arrhythmias (%) | 14.3 |

Table 2: Post-operative arrhythmias

| Type of arrhythmia | Frequency (n) |
|---|---------------|
| Atrioventricular Block | 2 |
| Sinus Bradycardia | 10 |
| PVCs or PACs | 22 |
| Paroxysmal supraventricular tachycardia (requiring treatment) | 3 |
| Short runs of supraventricular ectopics | 9 |
| Atrial fibrillation | 1 |

Discussion

Among large studies conducted, the incidence of new on-set AF in cardiac surgery patient is reported to be high (about 35 %) and arrhythmia after gastro surgery are reported to be around 4.4%-13.7%⁹⁻¹¹

In our study, incidence was found to be 14.3%, slightly on the higher side of the value; probably because of the fact that we had taken wider range as definition of PA (which included short run SVE although clinically not significant).

Obviously longer stay in ICU gives higher incidence of PA. Our

patient had shorter stay and this has probably reduced the apparent incidence of PA in the study. In cardiac surgery and esophageal surgery, mechanical manipulation of these structures causes high incidence of PA which is not there in our cases.

In non-cardiac surgery, precipitating factors are increase in hormonal and sympathetic activity resulting as response to anesthesia and surgery. These generate postoperative inflammation and inflammatory response.

Infection and sepsis also appear to be associated with PA. Usually peak arrhythmia occurs in first four days¹². Most of our patients are transferred out of ICU in day 1 or 2. So this might have affected the result as well. Furthermore, electrolyte imbalance, perioperative intravenous fluid management also might have affected the occurrence of PA.

In our study atrial fibrillation is not found that common, probably because our study group had more orthopedic surgery cases.

In the demography of the study patients the number of female sex was low, smoking patients were low. Similarly the prevalence of diabetic persons were also low because most of the patients were of low age group and many of them were orthopedic patients with road traffic accident. Orthopedic surgery seems to have less number of arrhythmia; this is probably because orthopedic cases included minor cases as well. Apparently elderly patients had many risk factors of coronary artery disease etc so they had more incidence of PA.

Conclusion

In our analysis, age of the patient appears to be associated with the causation of PA. Gastro surgery seems to have high incidence of PA. Orthopedic surgery cases have low number of incidence of PA.

Limitations of the study

The study is retrospective in nature and the sample size is not very large. So it may not reflect the true nature of causalities.

The small sample size might have increased the chances of error. Also the real incidence of PA after non cardiac surgery might have been higher, because the incidences of PA which occurred 2 day later would not be taken into account, as many patients were taken to ward after day 2.

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