Original Article

# Incidence of perioperative arrhythmias – A prospective study

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## Abstract

**Objective:** The objectives of this study were to determine the frequency and characteristics of early perioperative arrhythmias in patients posted for non cardiac surgery and factors associated with their occurrence, and their treatment. **Methodology:** This was a prospective study in patients age group between 18 – 60 years, ASA Gr. I and II, posted for non cardiac surgery between July 2014 and June 2015. Information on demographic, pre-operative, surgical and post-operative characteristics was extracted from each patient. Arrhythmias were classified as bradycardia, tachycardia, atrial flutter, etc. as per their frequencies and implications. **Results:** A total of 200 patients were recruited in study. Among them 168 had significant arrhythmias. The most common severe forms of arrhythmias were atrial fibrillation (21%), VPC's (18.5%) and PSVT (16%). Arrhythmias appeared mainly in the intraoperative period and first 24 hours postoperative. Amiodarone and lidocaine were the most commonly used antiarrhythmic drugs. **Conclusion:** We conclude that systematic evaluation of subjects for routine minor and semi major procedures and strict vigilance during perioperative periods is sufficient to manage successfully the perioperative arrhythmias.

**Keywords:** Arrhythmias, non cardiac surgery, perioperative period, anti arrhythmic measures.

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## INTRODUCTION

Arrhythmia is defined as "Abnormality of cardiac rate, rhythm or conduction which can be LETHAL (sudden cardiac death), symptomatic (syncope, near syncope, dizziness, or palpitations) or asymptomatic". Immediate diagnosis and intervention with appropriate therapy most often will prevent progression of an arrhythmia into a life-threatening event. Cardiac arrhythmias (unattended) are a significant cause of morbidity and mortality in the perioperative period. While literature on antiarrhythmic agent use, in postoperative and non-surgical intensive care settings is expanding, randomized clinical trials examining the use of these agents in the perioperative period are scarce. Nonetheless, as our understanding of the relevant molecular targets for manipulating cardiac excitability grows, the range of options for treating arrhythmias during surgery expands. However routine monitoring and recognition and a simple treatment remains the mainstay of intraoperative management. Although in perioperative period, arrhythmias are transient and reversible, they can cause substantial morbidity and mortality during such a vulnerable phase of hemodynamic instability. They are caused both by mechanical irritation of the conduction tissue and humoral factors.[1,2] The aims of this study were to determine the frequency and characteristics of perioperative arrhythmias during non cardiac surgery in adult population. It would be a contribution to the knowledge of the magnitude of this poorly documented disease in our communities.

## MATERIAL AND METHODS

It was a prospective study on patients operated upon for non cardiac diseases at Bharati Hospital, Sangli between July 2014 and June 2015. Patients included were between age group 18 - 60 years at most with ASA physical status I and II and had a complete medical file. The exclusion criteria were unstable cardiac diseases including valvular heart diseases and recent ischaemic episode within last 6 months and on treatment without experiencing any arrhythmias, arrhythmia documented preoperatively, antiarrhythmic therapy before surgery and admission to

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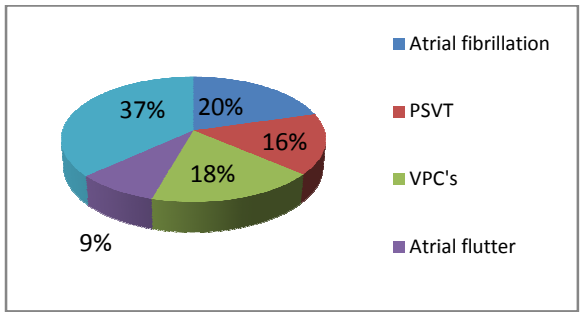
intensive care unit [ICU] on cardiac stimulation. Data were collected were from standard electrocardiogram tracings of pre-intra and post operative. Data collected also included: demographics (age, gender), type of surgical procedure, per-operative parameters and postoperative data (use of inotropic agents, duration of mechanical ventilation if required, ICU and hospital stay). The surgeries were performed by different teams. For each case of arrhythmia, the onset, the type and the treatment modality were recorded. The Patients were monitored using bedside monitors in the recovery and ICU, and standard electrocardiogram tracings in both the recovery and ICU or postoperative wards. The standard electrocardiogram tracings were analyzed by the same anaesthesiologist. Arrhythmia was defined as any rhythm different from normal sinus rhythm, the extreme values being adapted according to the normal ranges used after non cardiac surgery.[3] The postoperative evaluation for each patient was studied until his discharge from the hospital. Data were analyzed and quantitative variables were expressed as Mean±SD and categorical variables as proportions.

## OBSERVATIONS AND RESULTS

A total of 200 patients were included in the study. Their ages ranged from 18 to 60 years (mean 44.25±5.7 years). The sex ratio was 1 Vs 1.17, showing a slight male predominance. Surgical indications were different in all the subjects including head neck surgeries, ENT, abdominal surgeries, orthopedic surgeries, gynecological procedures etc.

**Table 1:** Distributions of patients as per types of arrhythmias

| Type of arrhythmia | Number of patients | Percentage |
|---|---|---|
| Atrial fibrillation | 42 | 21% |
| VPC's | 37 | 18.5% |
| PSVT | 32 | 16% |
| Atrial flutter | 14 | 7% |
| Other dysrrhythmias | 75 | 37.5% |




Graphical distribution

Among 200 patients, 168 patients were having significant changes in rhythm as compared to their preoperative ECG, causing haemodynamic instability. We observed various types of arrhythmias in these patients such as; tachy-brady arrhythmias, atrial fibrillation, atrial flutter, paroxysmal atrial tachycardia, PSVT, ventricular premature complexes etc. We treated these patients as per standard norms and monitored them for further 48 hours for any further rhythm abnormality. Also we evaluated thoroughly them to find out any pathology causing these changes, but most of them were found to be milder variety and during perioperative period. Among above mentioned arrhythmias after tachy-brady arrhythmias (37.5%); atrial fibrillation was the most common and seen in 21% patients and VPC's in 18.5% patients. PSVT were observed in 16%. However amongst 168 patients 7 were having severe forms of arrhythmias with disturbed haemodynamic effects and required cardiolodist's opinion and treatment i.e. defibrillation, pacing and inotropic support which was promptly applied and further period was uneventful.

## DISCUSSION

This study focused on arrhythmias in intraoperative and early postoperative period following non cardiac in adult population. Surgical procedures were not carried out by the same team which may introduce bias on the variables linked to the surgery. This could result in a decrease in the quality of the results when compared to studies guaranteeing standardized surgical procedures or a single competent surgical team carrying out the surgeries[1,4] The evaluation of the patients was observed until discharge from the hospital (continuous monitoring for immediate 48 hours after surgery after an episode of arrhythmia). As such this could reduce the actual incidence of early postoperative arrhythmias.

However, our results are comparable to those from several studies found in the literature, in which the authors also considered shorter periods of follow-up[5,6,7]. This result was explained by the use of the Holter electrocardiogram which is more sensitive in the detection of certain arrhythmias, especially extrasystoles when compared with the bedside monitor[8], as used in our study. This lower frequency of arrhythmias in non cardiac surgery compared to that with cardiac surgery with cardiopulmonary bypass (76%) could be explained by direct injury to cardiac tissue from myocardial incision, cannulation, suture affecting atrioventricular conduction, and rapid change of intracardiac pressure caused by volume and pressure fluctuation[9] and also the underlying cardiac pathology.

**Arrhythmias are classified** as sinus bradycardia, sinus tachycardia, atrial fibrillation, atrial flutter, supraventricular tachycardia, junctional ectopic tachycardia, second and third degree atrioventricular blocks, ventricular tachycardia, ventricular fibrillation

and atrial extrasystoles or ventricular extrasystoles. Sinus bradycardia was defined as a sinus rhythm with a rate too low for a particular age and hemodynamic condition or a junctional escape rhythm in the absence of atrioventricular block or junctional ectopic tachycardia. Sinus tachycardia was an abnormally accelerated sinus rhythm without an identified physiological etiology (anemia, stress). The supraventricular tachycardia was defined as a narrow QRS complex tachycardia with atrioventricular conduction of 1:1 and a reentry mechanism[9]. Junctional ectopic tachycardia was defined as a narrow QRS complex tachycardia with a rate between 170 and 230 beats per minute and atrioventricular dissociation.[10] The early postoperative period was defined as the interval between the exit from the operating room until 30 days after surgery during the same hospitalization.[11] The majority of anaesthetic agents have direct myocardial depressant effects, resulting in reduced excitability, contractility and reduced conduction; resulting in decreased cardiac output (CO). Also there will be decreased vascular resistance contributing to fall in tissue perfusion pressure. This is particularly dangerous in the hypovolemic patient at induction of anaesthesia. Conversely, compensatory tachycardia can have detrimental effects in patients susceptible to ischaemia due to reduced myocardial filling time. Other factors such as electrolyte imbalances, co-morbidity, hormone mediators or mechanical factors can precipitate dysrrhythmias. Among the treatment modalities, amiodarone and lidocaine were the antiarrhythmic drugs administered most. This is probably due to its efficacy previously demonstrated in the postoperative period of cardiac and non cardiac surgery.[12,13]

**Table 2:** Factors and causes of perioperative arrhythmias

| Patient Related | Anesthesia Related | Surgery Related |
|---|---|---|
| **Preexisting cardiac disease:** e.g. Myocardial infarction, Valvular heart disease, CAD, Angina, Dysfunction.<br><br>**Central nervous system disease:** sub-arachnoid haemorrhage (changes in QT intervals, development of Q waves and occurrences of U waves)<br><br>**Old age** Aging causes degenerative change in atrial anatomy and predispose them to postoperative atrial fibrillation Age related respiratory diseases like COPD, pulmonary artery hypertension<br><br>**Hypovolemia** Due to massive blood loss body fluid loss preoperatively undergoing emergency surgeries under anaesthesia can cause arrhythmias.<br><br>**Pre-existing Electrolyte and Acid -Base imbalance** Eg: Hyperkalemia, hypokalemia, Hypercarbia, hypoxemia, acidosis | **General anaesthetics:** In the presence of variety of triggering agents and clinical situations generating high catecholamines such as light plane of anaesthesia with hypertension and tachycardia, hypoxaemia, hypercarbia, drugs used in induction, maintainance and reversal of anaesthesia can cause arrhythmias.<br><br>**Tracheal intubation:**<br>**Regional anaesthesia:** central neuraxial blockade may be associated with pharmacological sympathectomy leading to parasympathetic nervous system predominance causing bradyarrhythmias<br><br>**Electrolyte imbalance and abnormal arterial blood Gases:** Abnormal blood gases such as hypercarbia, hypoxaemia or electrolyte imbalance (hypo-hyperkalemia) produce arrhythmias either by producing reentrant mechanism or by altering phase depolarization of conducting fibers.<br><br>**Central venous cannulation** excess insertion of the central venous catheter into the right atrium lead to arrhythmias. | **Cardiac surgery** Surgical manipulation such as retraction of the heart during operation on beating heart, venous cannulation or taking sutures over the atrium can also precipitate arrhythmias.<br><br>**Non-cardiac surgery** Vagal stimulation due to traction on the peritoneum or direct pressure on the vagus nerve during carotid artery surgery may produce bradycardia or atrioventricular (AV) blocks, or even asystole. Dental surgery causes profound stimulation of both sympathetic and parasympathetic nervous stimuli. |

## SUMMERY AND CONCLUSION

A total no. of 200 cases posted for regular operative procedures (both minor and semi major) under GA were observed for perioperative arrhythmias. There were 84% of cases having different types of arrhythmias. The dysrhythmic changes that observed were tachy-

bradyarrhythmias, conduction block, but no notable major serious haemodynamic effects and other disorders occurred in majority of cases except few- 3.5% (which also were promptly treated by specialist). All other cases in this study were successfully managed by prompt recognition, avoiding the cause of such arrhythmias and institution of simple treatment as per the norms. Hence we conclude that systematic evaluation of subjects for routine minor and semi major procedures and strict vigilance during perioperative periods and routine measures to control and treat is sufficient to manage them successfully.

## REFERENCES


1. Delaney JW, Moltedo JM, Dziura JD, Kopf GS and Snyder CS, "Early postoperative arrhythmias after pediatric cardiac surgery". J Thorac Cardiovasc Surg. 2006 Jun;131(6):1296–300.
2. Alp H, Narin C, Baysal T and Sarıgül A. "Prevalence of and risk factors for early postoperative arrhythmia in children after cardiac surgery", Pediatr Int Of J Jpn Pediatr Soc. 2014 Feb;56(1):19–23.
3. Kouchoukos NT, Blackstone, EH Doty DB, Hanley FL and Karp RB. "Kirklin/Barratt-Boyes cardiac surgery : morphology, diagnostic criteria, natural history, techniques, results, and indications". 3rd ed. Philadelphia, Pa: Churchill Livingstone; 2003.
4. Pfammatter JP, Wagner B, Berdat P et al., "Procedural factors associated with early postoperative arrhythmias after repair of congenital heart defects", J Thorac Cardiovasc Surg. 2002;123(2):258–62.
5. Valsangiacomo E, Schmid ER, Schüpbach RW, et al., "Early postoperative arrhythmias after cardiac operation in children", Ann Thorac Surg. 2002 Sep;74(3):792–6.
6. Rękawek J, Kansy A, Miszczak-Knecht M et al., "Risk factors for cardiac arrhythmias in children with congenital heart disease after surgical intervention in the early postoperative period", J Thorac Cardiovasc Surg. 2007 Apr 1;133(4):900–4.
7. Yıldırım SV, Tokel K, Saygılı B and Varan B, "The incidence and risk factors of arrhythmias in the early period after cardiac surgery.
8. Bertrand CA, Steiner NJ, Jameson AG, et al. Disturbances of cardiac rhythm during anesthesia and surgery. JAMA 1971; 216:1615-17.
9. Chaiyarak K, Soongswang J, Durongpisitkul K et al., "Arrhythmia in early post cardiac surgery in pediatrics: Siriraj experience", J Med Assoc Thai. 2008 Apr;91(4):507– 14.
10. Côté JM and Chetaille P. "Complications rythmiques de la chirurgie des cardiopathies congénitales" Arch Cardiovasc Dis Suppl. 2012 Sep;4(2):171–8.
11. Deal BJ, Mavroudis C, Jacobs, JP Gevitz M andBacker CL, "Arrhythmic complications associated with the treatment of patients with congenital cardiac disease:consensus definitions from the Multi-Societal Database Committee for Pediatric and Congenital Heart Disease", Cardiol Young. 2008;18(Supplement S2):202–5.
12. Saul JP, Scott WA, Brown S, et al., "Intravenous Amiodarone for Incessant Tachyarrhythmias in Children A Randomized, Double-Blind, Antiarrhythmic Drug Trial", Circulation 2005 Nov 29;112(22):3470–7.
13. Kovacikova L, Hakacova N, Dobos D, Skrak P and Zahorec M, "Amiodarone as a first-line therapy for postoperative junctional ectopic tachycardia", Ann Thorac Surg. 2009;88(2):616–22.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