Incidence, Risk Factors, and Impact of ATRIAL FIBRILLATION AFTER CARDIAC Surgery on Patients Outcome: A Retrospective Study

Thesis

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Abb.	Full term
AB	*Active bleeding*
ACC	*American college of cardiology*
AF	*Atrial fibrillation*
AHA	*American heart association*
AKI	*Acute kidney injury*
CABG	*Coronary artery bypass graft*
CABG	*Coronary artery bypass grafting*
CAD	*Coronary artery disease*
CAST	*Cardiac arrhythmia suppression trial*
CHD	*Coronary heart disease*
CHF	*Congestive heart failure*
CPB	*Cardiopulmonary bypass*
CRP	*C-reactive protein*
DAPT	*Dual antiplatelet therapy*
DCC	*Direct current cardioversion*
DM	*Diabetes mellitus*
DSWI	*Deep sternal wound infection*
DVR	*Double valve replacement*
ECV	*External cardioversion*
EF	*Ejection fraction*
ESC	*European society of cardiology*
FDA	*Food and drug administration*
GP	*Ganglionated plexi*
Hb	*Haemoglobin*
HDLC	*High-density lipoprotein cholesterol*
HRS	*Heart rhythm society*
HTN	*Hypertension*
ICU	*Intensive care unit*

List of Abbreviations Cont...

Abb.	Full term
IL	*Interleukin*
INR	*International normalized ratio*
IV	*Intravenous*
KIM-1	*Kidney injury molecule-1*
LA	*Left atrium*
LAD	*Left anterior descending*
LDLC	*low-density lipoprotein cholesterol*
L-FABP	*Liver-type fatty acid binding protein*
LGE-MRI	*Late gadolinium-enhanced magnetic resonance imaging*
LIMA	*Left internal mammary artery*
LITA	*Left internal thoracic artery*
LMWH	*Low-molecular-weight heparin*
LOE	*Level of evidence*
LV	*Left ventricular*
MI	*Myocardial infarction*
MIDCAB	*Minimally invasive coronary arteries bypass*
MVR	*Mitral valve replacement*
NAG	*N-acetyl--dglucosaminidase*
NCEP	*National cholesterol education program*
NGAL	*Neutrophil gelatinase-associated lipocalin*
NMDA	*N-methyl-D-aspartate*
NVAF	*Nonvalvular atrial fibrillation*
NYHA	*New york heart association*
OPCAB	*Off pump or beating heart bypass surgery*
PARs	*Protease-activated receptors*
POAF	*Postoperative atrial fibrillation*
PRBCs	*Packed red blood cells*

List of Abbreviations Cont...

Abb.	Full term

RGEA..... Right gastroepiploic artery
RIMA ..... Right internal mammary artery
RITA ..... Right internal thoracic artery
ROS..... Reactive oxygen species
RSDN..... Renal sympathetic denervation
RyR2 ..... Resistance of rianodine cardiac receptors
SSI ..... Surgical site infection
SVG..... Saphenous vein graft
TIA..... Transient ischemic attack
TLC..... Total leucocytic counts

INTRODUCTION

After open cardiac procedures, postoperative arrhythmias are rather common. The majority of these rhythm disturbances are supraventricular, mainly atrial fibrillation (AF) and atrial flutter Postoperative AF has been regarded, by some, to be a benign, transient, and self-limited arrhythmia and of no consequence, as more information has accumulated through multiple studies, it has become evident that postoperative AF is a major contributing factor or marker of increasing postoperative morbidity and mortality ***(Almassi et al., 1997).***

Atrial fibrillation (AF) is a common complication after cardiac surgery, affecting about 10% to 40% of patients undergoing Coronary Artery Bypass Grafting (CABG). This arrhythmia occurs most frequently in the first five days of the postoperative period, peaking between 24 and 72 hours, being uncommon after the first week ***(Abbaszadeh et al., 2012).***

The true incidence of postoperative atrial fibrillation (POAF) following cardiac surgery is unclear. Reported incidences range from 10 - 65%. This range is wide, because studies that examined Atrial Fibrillation (AF) following coronary artery bypass graft (CABG) differ in baseline patient characteristics, type of surgery, methods of detection, and definitions of AF ***(Maisel et al., 2001).*** Overall, it is estimated that the incidence of POAF is approximately 30% after pure CABG surgery, 40% following valve replacements or repair,

and increases to approximately 50% after combined CABG / valvular procedures. It is expected that the incidence will rise in the future, as the population going for cardiac surgery is getting older and the incidence of AF in general is age-dependent. POAF tends to occur within two to four days after the procedure, with the peak incidence on the second postoperative day ***(Aranki et al., 1996; Almassi et al., 1997).***

The mechanism of POAF is not fully elucidated and no optimal strategy has been established for POAF. There are two important elements of "structural" and "electrical" remodelling of the atrium in the mechanism of POAF. A patient's age and preoperative left atrial fibrosis can predict POAF associated with structural remodelling. Although inflammation and oxidative stress during cardiac surgery may be the underlying mechanisms for electrical remodelling causing POAF, there are no reliable clinical parameters for their detection ***(Shingu et al., 2012).***

Numerous studies have identified risk factors associated with the development of atrial fibrillation following cardiac surgery ***(Almassi et al., 1997).*** Risk factors such as older age, previous history of AF, male gender, decreased left-ventricular ejection fraction, valvular heart surgery, left-atrial enlargement, chronic obstructive pulmonary disease, chronic renal failure, diabetes mellitus, and rheumatic heart disease are associated with development of atrial fibrillation ***(Abboud et al., 2004).***

Older age has consistently predicted a higher incidence of postoperative atrial fibrillation, older age may cause structural changes in the heart such as an increase in chamber size, senile cardiac amyloidosis and fibrosis, In addition, the majority of these patients suffer from high blood pressure with secondary cardiac hypertrophy that, combined with senescent changes in myocardium, can provide a suitable substrate for generation of AF. Some studies have found an increased incidence of POAF in males, while other studies have reported no gender impact ***(Fuller et al., 1989).*** Hypertension a predictor of atrial fibrillation in the general population appears to predict atrial fibrillation after cardiac surgery-and this may be related to associated fibrosis and dispersion of atrial refractoriness ***(Aranki et al., 1996).***

While POAF is often considered both transient and "benign", it has been associated with congestive heart failure (CHF), three-fold higher risk of postoperative stroke and renal insufficiency. Moreover, POAF results in longer ICU and hospital stays by an average of 1 to 4 days and is associated with increased cost per patient ***(Patel et al., 2008).***

Beta blockers, sotalol, amiodarone can be used as prophylaxis of POAF, their efficacy has demonstrated in several trials, different trials compared sotalol and beta blockers have showed that sotalol is more effective but benefits of sotalol for POAF offsetting the risk of associated proarrhythmia, Bi-atrial pacing was found to reduce the length

of hospital stay by 1.54 days and POAF. Calcium channel blockers and digoxin should not be used as prophylaxis. The ACC guidelines recommend β-receptor antagonists be used as first-line prevention of POAF and that sotalol and amiodarone be used as second-line prevention ***(Patel et al., 2008).***

In the majority of patients, POAF will spontaneously convert to sinus rhythm within 24 hours after surgery. In hemodynamically stable patients, correction of predisposing factors such as hypoxia, anemia, and electrolyte imbalance, should be the first step in the management of POAF ***(Bidar et al., 2013).*** In case of haemodynamically instable patients, cardioversion to sinus rhythm by direct current (ECV) or pharmacologically with ibutilide or amiodarone, should be pursued. Also if patients are highly symptomatic or when rate control is difficult to achieve, electrical direct current shock is recommended ***(Members et al., 2006).***

AIM OF THE STUDY

The purpose of this study is to retrospectively investigate the incidence and risk factors associated with postoperative atrial fibrillation (POAF) and its impact on intensive care unit (ICU) and postoperative hospital stay in patients undergoing cardiac surgery at National Heart Institute using the medical records of patients who underwent CABG or valvular surgery from January 2018 to June 2018.