PACEMAKER INCIDENCE IN ADULTS AFTER SURGERY FOR CONGENITAL HEART DISEASE

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Introduction

Background: The rate of pacemaker placement following cardiac surgery in adults ranges from 0.4-6%. The requirement for permanent pacemaker (PPM) placement following surgery for adults with congenital heart disease (CHD) is largely unknown and adds considerable complexity to patient care.

Objective: This study aims to assess our experience in PPM placement in adults with CHD after undergoing cardiac surgery.

Methods

Design: Single-center retrospective study

Participants: 144 adults (≥18 years old) with CHD who underwent cardiac surgery at OHSU Hospital between 2010-2021. All adults had a dysrhythmia perioperatively.

Incidence Criteria: PPM placement within thirty days of surgery.

Measurements: Pre-operative, intra-operative, and post-operative characteristics

Analysis: 3:1 propensity matching based on age, BMI, gender, ejection fraction, congenital lesion site was used to investigate risk predictors.

Pacemaker Cohort

Clinical Characteristics	Total (n=28)
Age	46.6±17.9 years
Gender	
Male	16 (57%)
Female	12 (43%)
Caucasian	17 (61%)
BMI	29.7±9.0 kg/m^2
Right sided intervention	11 (40%)
Left sided intervention	13 (46%)
Bilateral sided intervention	4 (14%)
Average sternotomies	2.2±1.1
Mean cardiopulmonary bypass time	212±103.9 mins
Ischemic time	142.1±80.4 mins
Complete Heart Block	19 (68%)
Dual chamber pacemaker	26 (93%)
Single chamber pacemaker	2 (7%)

Results

In our cohort of 144 patients, incidence of PPM was 19% (N=28). At the end of the procedure, 96% (N=27) had arrhythmia and 8 had intraoperative arrhythmia. PPM placement was most often due to complete heart block (68% of cases, N=19). More than 75% of patients received permanent PM within 9 days post-surgery. Amiodarone was rarely used (29% N=8) while beta blockers were widely prescribed at discharge (68% N=19).

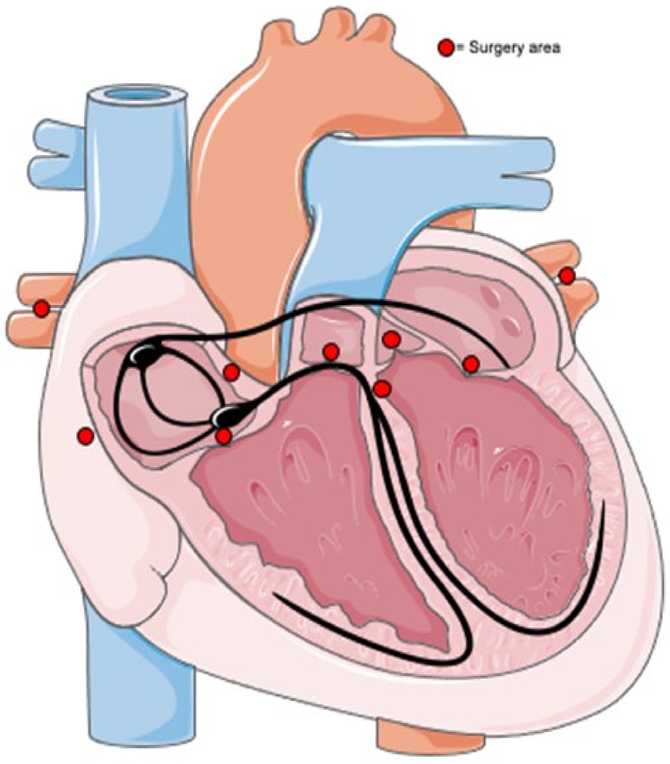

Figure. Conduction system (black) and surgical areas in patients (red dot)

3:1 Propensity Match Comparison

Pre-operative Features	PM (N=27)	Non-PM (N=81)	*P*
Caucasian	20 (74%)	72 (89%)	*0.03*
Dialysis	2 (7%)	0 (0%)	*0.01*
Hypertension	11 (41%)	18 (22%)	*0.05*
Heart Failure	10 (37%)	15 (19%)	*0.05*
BNP, pg/mL	2447.7 (4455.2)	458.2 (576.7)	*0.02*

Post-operative Features	PM (N=27)	Non-PM (N=81)	*P*
Arrhythmia	26 (96%)	66 (82%)	*0.05*
Bradyarrhythmia	23 (85%)	29 (56%)	*<0.001*
Temporary Pacing	17 (63%)	31 (38%)	*0.02*
Complete Heart Block	18 (67%)	3 (4%)	*<0.001*
Post-operative Ionotropic Need	22 (82%)	44 (54%)	*0.01*

Discussion and Conclusions

Our findings indicate that incidences of PPM in adults with CHD following cardiac surgery can be as high as 19%. We found complete heart block being the most common indication and was statistically associated with PPM requirement. Our study revealed association between pre-operative characteristics, that often indicate left ventricular dysfunction and/or renal pathology, to higher risk of PPM requirement. This information could impact the informed consent process for CHD patients undergoing cardiac surgery. Based on our findings, patients requiring ionotropic support, temporary pacing, or complete heart block following surgery may benefit from early intervention by an Electrophysiology consultant. Further research is necessary to better understand the risk factors leading to a higher incidence of complete heart block in aging CHD patients undergoing cardiac surgery.

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