



Complications following cardiac pacemaker insertions

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Abstract

Context: Permanent pacemaker insertion is a recognised mode of therapy for cardiac arrhythmias. The procedure is carried out regularly at the Cardiac Catheterization laboratory of Madras Medical Mission India.

Aims: This study reviewed the associated morbidity and complications of cardiac pacemaker insertions carried out over fifteen years.

Settings and Design: This study was carried out in the Cardiac Electrophysiology department, of the Institute of Cardiovascular diseases, Madras Medical Mission, India. The study was retrospective.

Material and methods: Data was collected when previously paced patients presented for cardiac interrogation between January to July of 2013. The patients had undergone implantation over the preceding fifteen years. 501 consecutive cases were chosen for analysis. The data obtained was analysed using SPSS statistical software version 15.

Results: The 501 patients had been on pacemaker for variable durations. They comprised 321 males and 180 females. A variety of complications were observed in 33 (6.58%) patients but there was no procedure-related mortality.

Conclusions: Pacemakers were generally well tolerated. Majority of patients were asymptomatic and the rate of complications is 6.58%.

Key-words: Complications, cardiac pacemaker insertions

Introduction

The first permanent pacemaker was inserted in 1958 by Ake Senning, a thoracic surgeon at the Karolinska Hospital in Stockholm.¹ Over the years, the indications, techniques, affordability as well as type of cardiac pacemakers have evolved.² It is currently estimated that, worldwide, about 3 million persons are on cardiac pacemakers.³

Changing epidemiographic profile in the developing countries with increase in cardiovascular risk factors is also well

documented.⁴ Lifestyle change has been especially rapid in many developing countries over the past two decades. The result is an upsurge in cardiovascular diseases.^{5,6} This supports ongoing research in cardiovascular disease pattern. Appreciation of current trends in cardiac diseases is of public health concern. It is expected that public policy makers as well as individuals adopt the benefit of such research into making choices that lead to better cardiac health outcomes.

This study analysed the clinical morbidity of patients on pacemakers, and the immediate outcome of the cardiac pacemaker insertions at one of the largest tertiary care centres in South-east Asia.

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Materials and methods

We studied records of consecutive cardiac pacemaker insertions carried out between January

to October 2009, and the follow up record over the years. In our study, we described the demographic characteristics of the patients and the prevalence of associated cardiovascular morbidity in the patients. We documented the frequency of various complications of pacemaker insertions as well as electrophysiologic abnormalities detected. The study was carried out at the Cardiac Electrophysiology department of the Institute of Cardiovascular Diseases, Madras Medical Mission, India. The data was obtained from the records of patients.

The data obtained was analysed using SPSS statistical software version 15. Categorical data was compared using the Chi-square-test while continuous data was compared using T-test. Probability levels of less than 0.05 was considered significant.

Table 1: Spectrum of clinical symptoms present at interrogation

Symptoms	No.	%
Asymptomatic	402	80.2
Breathlessness	41	8.2
Shock from device	15	3.0
Dizziness/syncope	21	4.2
Pain over pocket site	3	.6
Diaphragmatic pacer	3	.6
Headache	1	.2
Palpitations	1	.2
Fever	2	.4
Total	479	95.6
Missing	12	2.4
Total	501	100.0

Table 2: Associated medical conditions in paced patients

Diagnosis	No.	%	Diagnosis	No.	%
Coronary artery disease	195	38.9	Atrial fibrillation	19	3.8
Diabetes mellitus	156	31.1	Typical AVNRT	8	1.6
Hypothyroidism	17	3.4	Accessory pathway	4	.8
Hypertension	172	34.3	AFL with fast ventricular rate	1	.2
Dilated cardiomyopathy	41	8.2	Focal atrial tachycardia	1	.2
Rheumatic heart disease	13	2.6	Paroxysmal AT/ Fibrillation	3	.6
Hypertrophic cardiomyopathy	5	1.0	Idiopathic LVOT	1	.2
Restrictive cardiomyopathy	1	.2	Documented polymorphic VT	4	.8
Ischemic cardiomyopathy	19	3.8	Recurrent monomorphic VT	3	.6
Arrhythmogenic RV dysfunction	6	1.2	Long QT syndrome	1	.2
Severe LV dysfunction	54	10.8	Brugada syndrome	1	.2
Moderate LV dysfunction	21	4.2	Dystonic cerebral palsy	1	.2
Severe biventricular dysfunction	5	1.0	Muscular dystrophy	1	.2
Severe aortic stenosis	12	2.4	Chronic kidney disease	2	.4
Moderate aortic stenosis	5	.6	Pulmonary hypertension	1	.2
Degenerative AV disease	4	.8	Atrial septal defect	5	1.0
Bicuspid aortic valve	2	.4	Tetralogy of Fallot	2	.4
Rupture of aortic sinus	1	.2	Double outlet right ventricle	1	.2
Moderate to severe MR	3	.6	TGA	3	.6
Mitral valve prolapse	1	.2	Dextrocardia	1	.2
VSD/ Patent ductus arteriosus	7	1.4	Situs solitus levocardia	1	.2
VSD and Pulmonary stenosis	1	.2	Total number of patients	501	100.0

RV = right ventricular, LV = left ventricular, MR = Mitral regurgitation, VSD = ventricular septal defect, VT = ventricular tachycardia, AV = aortic valve, AFL = atrial flutter, AT = atrial tachycardia, TGA = transposition of great arteries.

Results

A total of 501 patients were interrogated with age range of 4-91 years (61.69 ±16.60). Of these, 321 (64.1 %) were males. 370 (73.9%) had their implantation done at MMM.

The duration following implantation varied from one week to 22.25 years, with a mean duration of 3.24 years (±3.28).

The spectrum of clinical symptoms present at interrogation are shown in table 1 while associated medical conditions in the patients were shown in table 2. The indications for pacemaker implantation has been earlier published.⁷ Only 8 (1.6%) patients had received epicardial leads. Five patients had initial epicardial leads, with endocardial implantation following expiration or elective replacement interval (ERI) of epicardial pacemaker. Two patients had dual epicardial leads, while one had a left ventricular epicardial lead. Three patients were on remote monitoring.

Pacing complications were noted in 33(6.58%). The list includes pacemaker pocket hematoma 4 (0.8%), lead dislodgement 9 (1.8%), endocardial lead displacement 4(0.8%), pocket infection 4 (0.8%), lead fracture 4 (0.8%), lead screw retraction 1 (0.2%) and pocket erosion 3 (0.6%). Abnormal electrophysiologic observations include high lead impedance 7 (1.4%), inappropriate therapy for supraventricular tachycardia 6 (1.2%), ineffective anti-tachycardia pacing and shock from wavelet mismatch 1 (0.2%), T wave over-sensing 2 (0.4%), fusion complexes 2 (0.4%), high lead threshold 20 (4.0%), loss of capture 4 (0.8%), chronotropic incompetence 1 (0.2%), and exit block 1 (0.2%). Complications were managed accordingly, for example explantation and re-implantation for pocket erosion. Electrophysiologic failure were also addressed, supraventricular tachycardia criteria reprogramming for ineffective anti-tachycardia pacing and shock from wavelet mismatch, mode switch was put on for T wave over-sensing, sensed and paced A-V delay was increased in presence of fusion complexes, leads were revised for high impedance and repositioned for loss of capture.

Discussion

Complication rates vary with the definition of complications utilized in various studies. There are no generally accepted norms of complication rates

in pacemaker surgery.⁸ The rate of complications in our study was 6.58%. This compares favourably to the rate of 13.6% reported by Unapkoya et al⁹ in sub-Saharan Africa. Monib et al¹⁰ from a centre in the same subcontinent reported a complication rate of 9.25%. Ozcan et al from Turkey reported 7.6% complication rate in the elderly but 15.1% in young patients¹¹ while Haug and colleagues from Norway had 12.0% complication rate.⁸ Parsonnet et al¹² however identify a complication rate of less than 5% as acceptable.

There was no procedure related mortality. Good procedure related outcome and minimal mortality has also been reported by other workers.¹³

Conclusion

This study shows that pacemakers were generally well tolerated with majority of patients remaining asymptomatic and a low rate of complications. The study creates more awareness for interventional cardiology in developing countries and encourages continued development of manpower.

Limitations: The retrospective nature that made it difficult to fill up missing data and all indications for pacing do not fit neatly into current complex classifications.

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