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Indications and Frequency Rate of Permanent Pacemaker Implantation in Elderly Patients

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ABSTRACT

Background: Permanent pacemaker has become essential for the treatment of various cardiac diseases nowadays. The process is carried out regularly at the Cardiac Catheterization Laboratory of Hayatabad Medical Complex, Peshawar.
Objective: The purpose of the study was to determine the demographic details, indications, and type of permanent pacemaker implanted in elderly population.
Methods: This was a single-center, prospective study conducted in at Hayatabad Medical Complex, Peshawar from March 2023 to August 2023. During these six months, a total of 218 Patients were included in the study who were regular in their visits to outpatient clinic and had given a written informed permission for participation. Those who did not give a written informed consent for participation were excluded from the study.
Results: Total 218 patients with mean age of 63.4 years range (43-88) undergone Permanent Pacemaker Implantation. Of these 130 (60%) were males. The mean duration of hospital stay was 4.5 days with range (3-7 days). Sinus Node Disease (115 patients, 52.75%) was the most common indication for permanent pacemaker Implantation. Single chamber (VVIR) pacing mode (123 patients, 56.42%) was found to be the most common pacing mode.
Conclusion: Permanent pacemaker implantation has been observed to be common among the elderly population, with a male majority. The most frequent reason for cardiac pacing in older people is sinus node disease, which is followed by atrioventricular block. In Pakistan, due to financial constraints, the single chamber (VVIR) pacing mode is frequently used, followed by the dual chamber (DDDR).

INTRODUCTION

It was in 1958 that first permanent pacemaker was inserted by Ake Senning at Karolinska Hospital in Stockholm.[1] Pacemakers are compact, battery-operated medical devices that utilize electrical impulses to deliver stimulation, helping to maintain the electrical rhythms of a diseased heart..[2] The indications, techniques, and types of permanent pacemakers have evolved with the passage of time.[3, 4] Overall, it is estimated that about 3 million people around the world are on permanent pacemakers for the maintenance of their cardiac rhythm.[5] There is a steady increase in the number of permanent pacemaker insertions throughout the world. In the USA, the annual growth rate of patients with permanent pacemakers is 4.7%, attributed to various cardiac diseases.[5, 6, 7]

The guidelines highlighting the purpose of pacemaker insertion resources can be accessed through the 'American Heart Association and the European Society of Cardiology' [8, 9]

It has been observed that geriatric age group had a considerably increase in number of permanent pacemaker insertions. Similarly, sinus node disease, atrio-ventricular block (AV Block) and complete heart block are most common indications for permanent pacemaker implantation in many studies.[10, 11]

The purpose of this study was to examine the demographic features and indications., and frequency rate of permanent pacemaker implantation in elderly patients.

MATERIAL AND METHODS

This observational prospective study was conducted at Cardiology Unit of Hayatabad Medical Complex, Peshawar from March 2023 to August 2023. During these six months, the study included a total of 218 patients, who were regular in their visits to outpatient clinic and had given a written informed permission for participation. Those who did not give a written informed consent for participation were excluded from the study.

All permanent pacemakers were inserted in a highly sterilized Electro-Physiologic Cardiac Catheterization Laboratory. It was a team effort consisting of 'a consultant cardiologist, a cardiac technician, and a cardiac nurse'.

The patients were given local anesthesia and left subclavian vein was used for access and pocket for the placement of device was in left subclavian fossa. Access from Left Subclavian vein was difficult then the Right Subclavian vein was used.

All the post operated patients had chest radiographs after 24 hours of the procedure and pacemakers were reviewed before leaving the hospital. They had follow up visits on monthly basis in the outpatient department.

RESULTS

Total 218 patients with a mean age 63.4 years and range 43-88 years were included in the study. Out of the total, 130 patients sixty percent were identified as male. The mean hospital stay lasted 4.5 days, ranging from 3 to 7 days.

Table 1

Demographic characteristics of the patient

Variables	Frequency	Percentage
Mean Age (Years)	Mean age 63.4 years	Range 43-88 years
Gender		
Male	130	59.63%
Female	88	40.36%
Address		
Rural	63	28.89%
Urban	155	71.10%
Literacy		
Yes	127	58.25%
No	91	41.74%
Marital Status		
Yes	175	80.27%
No	43	19.72%
Duration of Stay in Hospital	Mean 4.5 Days	Range 3-7 Days

Table 2

Frequency rate of PPM Implantation with respect to age and sex

Age Group (Years)	Male	Female
40-64 years	18(8.2%)	12(5.5%)
65-74 years	44(20.18%)	35(16.05%)
>75 years	68(31.20%)	35(16.05%)
Total	130(59.63%)	88(40.36%)

The above table shows that the implantation of Permanent Pacemaker was higher in the age group 65-74 years and >75 years age group. The frequency rate was comparatively lower in the age group 40-64 years.

Table 3

Indications of PPM implantation

	Indication For PPM	Number of Patients
1	Sinus Node Disease	115(52.75)
2	Atrioventricular Block (AV Block)	103(47.25%)
a	Complete Heart Block	66(30.27%)
b	Trifascicular Block	23(10.5%)
c	Left Bundle Branch Block	6(2.75%)
d	Bifascicular Block	4(1.83%)
e	2:1 AV Block	4(1.83%)
3	Temporary Pacemaker Implantation	139

The table above details the indications for pacemaker implantation. 'Sinus node disease' was the primary reason, identified in 115 (52.75%) patients, 'followed by atrioventricular (AV) block', which was present in 103 (47.25%) patients. Among the 103 'patients with AV block', 66 (30.27%) patients were 'diagnosed with complete heart block', 23 patients (10.5%) 'had trifascicular block', 6 (2.75%) patients 'experienced left bundle branch block (LBBB)', 4 (1.83%) patients had 'bifascicular block', and another four patients

(1.83%) exhibited a '2:1 block. Furthermore, a temporary pacemaker was placed in 139 patients prior to the insertion of the permanent pacemaker'.

Table 4
Modes used in Permanent Pacemakers

Modes used in Permanent Pacemakers	Number of Patients
VVIR Pacing	117(53.66%)
DDDR Pacing	74(33.94%)
VVI Pacing	23(10.55%)
VDDR Pacing	4(1.83%)

The VVIR mode was the 'most commonly used mode of pacemaker among the study population accounting for' 117 patients (53.66%), 'followed by DDDR pacing mode in' 74 patients (33.94%), 'VVI and VDDR pacing modes were used in 23 patients' (10.55%) and 4 patients (1.83%) respectively.

DISCUSSION

Aim of study was to analyze the demographic features and indications for the insertion of 'Permanent Pacemakers' in geriatric population. In our study the mean age for pacemaker implantation was 63.4 years. This suggests that the pacemaker implantation becomes necessary in the geriatric age group due to various reasons and this is comparable to the age distribution in the UK. For symptomatic bradycardia, permanent pacemaker implantation is still the only viable therapy option. This is consistent with data that have been released globally and reaffirms that one major contributing factor to geriatric morbidity is arrhythmia that necessitate permanent pacemaker installation. In this study there was a male predominance about 60 percent of the study patients were male. This is comparable with the age distribution reported worldwide.[12]

Over 50% patients in the USA have sinus node disease as their primary reason for having a pacemaker implanted.[8] Pacemaker implantation is the treatment of choice for elderly people with AV block or sick sinus syndrome.[8, 9] Persistent pacing was recommended for 'sinus node disease (52.5%) and AV block (47.5%)' in this study. This discrepancy may be due to the availability of 24-hour Holter recording being more widely available than in prior years, which has increased the general population's rate of early diagnosis of sinus node disease. According to this report, the other major indications for permanent pacemaker implantation were AV block, and complete heart block which was comparable to what had been reported in earlier studies. [10, 11]

According to research by Harrigan RA et al., temporary cardiac pacemakers can save lives in emergency rooms. It can maintain heart rhythm and improves cardiac output which can save the life of a patient [12]. In our study, 139 Of the 218 patients, had their permanent pacemaker implanted after having temporary pacemaker at the time of their emergency room visit. This suggests that many patients in Pakistan have permanent pacemakers for survival, rather than merely to enhance their 'quality of life, as is the practice in western nations'.

In comparison to the dual chamber DDDR pacing method (33.94%), the single chamber VVIR pacing mode was more common (53.66%) in our study. This information is consistent with data from previous studies from developing countries [13, 14, 15]. This shows 'the underlying economic problems in healthcare and the absence of health insurance in developing countries'. It is in contrast with the trend seen in developed countries where permanent pacemakers were implanted to improve the quality of life apart from its main indication of saving the life of a person.

In our study, pacemakers were implanted through subclavian vein with a pocket in the subclavian fossa. This is a worldwide accepted safe route and place for a permanent pacemaker [16.] In our investigation, the average length of hospital admission was 4.5 days, indicating that the implantation of a permanent pacemaker is associated with minimal perioperative and postoperative complications.

CONCLUSION

The Current study suggests that a considerable majority of permanent pacemakers are implanted in the elderly population with a male predominance. The two most obvious reasons for pacemaker implantation were sinus node disease and AV block. For financial reasons, VVIR is the most often used pacing mode in Pakistan.

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