

## ORIGINAL ARTICLE

## SEQUELAE OF COMPLETE HEART BLOCK PATIENTS COMING TO RAWALPINDI INSTITUTE OF CARDIOLOGY IN ASSOCIATION WITH PRESENTING COMPLAINTS

Faizania Shabbir, Irum Rehman\*, Maria Gill\*\*, Sabahat Fatima\*\*\*, Tanvir Ahmad Raja<sup>†</sup>

Department of Physiology, Rawalpindi Medical University, \*Margalla Institute of Health Sciences, Rawalpindi, \*\*Bakhtawar Amin Medical and Dental College, Multan, \*\*\*Department of Biochemistry, Gujranwala Medical College, Gujranwala,

<sup>†</sup>Rawalpindi Institute of Cardiology, Rawalpindi, Pakistan

**Background:** Complete heart block (CHB) is considered as a medical emergency and can be fatal if left untreated. Most patients with acquired complete heart block require a permanent pacemaker and their condition improves after implantation. Objective of this study was to determine the types and frequency of various presenting complaints and their correlation with treatment modality used. **Methods:** This prospective cohort study was conducted at Rawalpindi Institute of Cardiology, Rawalpindi for a duration of six months. A total of 153 patients who were diagnosed having CHB were enrolled. The patients were extensively worked up for history, physical examination, blood tests, chest X-ray, electrocardiography and echocardiography. A pre-designed proforma was filled for each patient to record demographic details, risk factors, past medical and surgical history, vitals and other parameters. The treatment given to each patient was also recorded. **Results:** The most common presenting complaint was dizziness (37.9%), followed by chest pain (31.4%), and syncope (22.8%). Other presenting complaints (17.6% of patients) include shortness of breath, palpitations, generalized fatigue, tiredness and nausea. There was a negative correlation ( $p=0.003$ ) between chest pain and pacemaker implantation. A negative correlation between syncope and death ( $p=0.050$ ) was also observed. **Conclusions:** The most common presenting complaint was dizziness and majority (58.6%) of these patients were implanted with a pacemaker. Majority of patients who presented with chest pain were treated medically. No death occurred in group of patients who presented with syncope.

**Keywords:** Correlation, presenting complaints, outcome, complete heart block, pacemaker

Pak J Physiol 2023;19(2):40-3

## INTRODUCTION

Diseases of heart and blood vessels are recognized as the prime cause of death worldwide and one of the major contributors towards consequential health problems. A significant part of cost of medical care is spent on treatment of cardiovascular diseases which cause morbidity, mortality, lower quality of life and average life expectancy.<sup>1</sup> In 2016, the cause of death in approximately one third of population was found out to be cardiovascular diseases (CVD).<sup>2</sup>

CVDs are long standing diseases that slowly and silently develop with time and do not cause any symptom. It's only when the disease process has progressed to a certain extent that it causes symptoms and if the disease has caused substantial damage, the advance disease can directly manifest as sudden death.<sup>3</sup>

Defects in conduction system of heart is one of the significant part of CVDs. Atrio-ventricular blocks are especially frequently seen in general population. First degree heart block is most common, subsequently second degree and lastly complete heart block (CHB). CHB is the most far-reaching and can cause death at times.<sup>4</sup>

CHB occurs when atrial impulses do not reach the ventricle and atria and ventricles operate independently. In adults, the cause can be ischemic or

non-ischemic. Non-ischemic causes include excessive vagal tone, fibrosis, sclerosis of conducting system, electrolyte imbalance, infiltrative diseases etc. The manifestation of CHB depends on the extent of block and resultant escape rhythm. Escape rhythm in turn is dependent on the intrinsic rate of tissue distal to the block. Presenting complaint is mostly tiredness, dizziness, palpitation, shortness of breath or syncope.<sup>5</sup> Only sometimes, the patient is asymptomatic and is diagnosed on a routine clinical visit or visit to hospital due to some other ailment. The clinical presentation is also dependent on collateral disease. When heart block results from acute myocardial infarction, the ischemic symptoms like chest pain and dyspnoea predominate.<sup>4</sup> When CHB occurs consequent to vasospastic angina, the patient presents with dizziness, dyspnoea, cardiac arrest or sudden death. Holter monitoring is indicated in these patients to identify the cause of these symptoms.<sup>6</sup> The diagnosis of CHB is confirmed when dissociation between atrial and ventricular function is observed on 12-lead ECG or echocardiography.<sup>7</sup>

The electrical activity in the heart originates in the sino-atrial node and spreads inferiorly into the conducting system. Malfunctioning of conducting system reduces the heart rate and makes heart inadequate to reinforce circulation requiring some medical

intervention.<sup>8</sup> For disturbances in the conducting system of heart, permanent pacemaker implantation is one of the prime therapies used now a days.<sup>9</sup> The first pacemaker implantation in a living person was conducted by Dr. Ake Senning in 1958. This implant lasted for some hours only. From then onwards heart block and bradyarrhythmia are primarily treated using pacemakers. Artificial pacemaker is a tiny electric machine having a weight of up to 50 grams and size is close to that of a match box. This electrical machine recognizes the intrinsic rhythm of heart and has the ability to pass on electrical impulses if required for heart stimulation and replacement of natural defective pacemaker.<sup>10</sup>

Use of pacemakers has risen greatly in past few years particularly in old age group. The rise in pacemaker use is attributed to many factors like technological improvements in the device, geriatric age group, better diagnosis and more clinical indications. Approximately 1.25 million permanent pacemakers are implanted per year in the whole world.<sup>11</sup> The use of this device has resulted in an increase in life expectancy of a patient who has no major co-morbidities to that of a healthy individual, and has improved quality of life.<sup>12</sup>

The aim of the present study was to determine the types and frequency of various presenting complaints in complete heart block patients presenting to a tertiary care hospital and their correlation with the outcome in terms of medical treatment, pacemaker implantation, or death.

## MATERIAL AND METHODS

The present study was a prospective cohort study conducted from January to July 2018 at Rawalpindi Institute of Cardiology, Rawalpindi, after obtaining approval from Ethical Review Committee of Rawalpindi Institute of Cardiology.

The sample size was calculated on WHO sample size calculator assuming confidence level of 95%, alpha error of 5%, study power of 80%, anticipated population proportion with acute myocardial infarction of 8% and desired precision of 4%.<sup>13</sup> The study included a total number of 153 patients, 20 to 96 years old, having complete heart block. A proforma was designed that was filled for each patient. The information recorded on proforma included demographic details, risk factors, presenting complaints, vitals taken at the time of admission, aetiology, haemodynamic status and outcome.

The inclusion criteria were patients presenting to emergency department with complaints of chest pain, vertigo, dizziness or loss of consciousness and having complete heart block manifested on electrocardiogram. Once the heart block was confirmed by ECG, a detailed history of patients was taken to identify the risk factors. Vitals (pulse, arterial blood pressure, temperature and respiratory rate) were monitored regularly during the

admission of patient to monitor haemodynamic stability. The tests performed to determine aetiology were blood complete picture, urea and electrolyte concentration, renal function tests, liver function tests, and chest X-ray. Echocardiography was done to evaluate left ventricular dysfunction.

Data was analysed using SPSS-21. Frequencies of all qualitative variables were analysed and expressed as percentages. Quantitative variables were expressed as Mean±SD. Comparison of outcome in different groups was evaluated using Chi-square test, and  $p < 0.05$  was considered statistically significant.

## RESULTS

In our study, 153 patients were evaluated to estimate the frequency of presenting complaints of complete heart block. Correlation of each presenting complaint with the outcome (pacemaker implantation, no pacemaker implantation/medical treatment or death) was studied.

Most common presenting complaint in emergency department for complete heart block was dizziness (37.9%), followed by chest pain (31.4%) and syncope (22.87%). Other presenting complaints (in 17.6% of patients) included shortness of breath, palpitations, generalized fatigue, tiredness and nausea (Table-1).

Each presenting complaint was studied for its outcome. Forty-eight (48) patients presented with chest pain out of which 16 (33%) were implanted with a pacemaker, 26 (54%) were given medical treatment and 6 (12.5%) patients died. Out of 58 (37.90%) patients presenting with dizziness 34 (58%) were implanted with a pacemaker, 22 (38%) were given medical treatment and 2 (3.4%) died. In 35 patients, the presenting complaint was syncope and 21 (60%) were implanted pacemaker, 14 (40%) were given medical treatment, and no patient died. (Table-2).

The comparison of treatment modality in CHB patients with different presenting complaints revealed a negative correlation ( $p=0.003$ ) between chest pain and pacemaker implantation. The other significant finding was a negative correlation between syncope and death ( $p=0.05$ ). (Table-3).

**Table-1: Frequency of presenting complaints in CHB patients (n=153)**

Presenting complaint	No. of patients	Percentage
Chest pain	48	31.40
Dizziness	58	37.90
Syncope	35	22.87
Others	27	17.64

**Table-2: Outcome in CHB patients with different presenting complaints**

Presenting complaints	Pacemaker	No pacemaker	Death
Chest pain (n=48)	16	26	6
Dizziness (n=58)	34	22	2
Syncope (n=35)	21	14	0
Others (n=27)	15	8	4

**Table-3: Pearson’s correlation between presenting complaints and outcome in CHB patients**

Presenting Complaints	Pacemaker		No Pacemaker		Death	
	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>
Chest Pain	0.003*	-0.243	0.041*	0.166	0.167	0.112
Dizziness	0.110	0.130	0.527	-0.052	0.116	-0.128
Syncope	0.195	0.105	0.873	-0.013	0.050*	-0.159
Others	0.552	0.048	0.181	-0.109	0.139	0.120

\*Significant

## DISCUSSION

The most frequent presenting complaint in our patients was dizziness, followed by chest pain, and syncope. The greatest percentage of patients who presented with syncope were treated by pacemaker implantation. Patients with chest pain were the least percentage implanted with pacemakers. CHB is mostly symptomatic due to a significant decrease in heart rate and it is an indication for implantation of pacemaker. Congenital CHB, however, can be asymptomatic and requires prophylactic pacemaker implantation to avoid any complications.<sup>14</sup>

CHB can present with a variety of symptoms. In a study conducted in patients with PPM in Nigeria<sup>15</sup>, the medical records were retrospectively studied for the presenting complaints. It was found that 86% of the patients had CHB and the most common presenting complaint was easy fatigability (46%) followed by syncope (32%). The procedure was considered as safe and no death was reported in this study.<sup>15</sup>

In a study from Central Africa<sup>7</sup>, 26 enrolled patients having CHB presented with a combination of symptoms that were mainly fatigue, dizziness, lethargy, and dyspnoea on slight physical exertion, while 3 were asymptomatic. Pacemaker was implanted in 15 patients (58%). The follow-up of patients showed death in 45% of patients who were not implanted with a pacemaker. No death was recorded in PPM implanted patients. The mode of treatment in such countries depends on availability of resources. The health of the patients is vulnerable due to high cost and non-affordability of implantation procedures.<sup>7</sup> The results of that study are different from our study where a single presenting complaint was predominantly present.

Our results do not correspond with a study conducted in Jakarta<sup>16</sup> whereby all patients undergoing PPM implantation were included. Most patients in that study presented with syncope (52%) followed by dizziness (16%). Only 8% of patients presented with chest pain. The major indication of implantation was CHB (56%). Their study population was different from ours and included cases other than CHB. The treatment modality had resource and financial limitations.<sup>16</sup>

There is scarcity of data related to CHB presenting complaints. Most studies available are case reports. In a study<sup>17</sup> where cardiac sarcoidosis led to CHB, a 49-year-old male patient presented with complaint of dizziness for one week. He was implanted

with a PPM and the treatment was successful.<sup>17</sup> In another study<sup>18</sup>, an elderly woman presented with dizziness along with chest pain. She had multiple comorbidities as well. Initially temporary pacing was done that failed to relieve her symptoms. Her symptoms were relieved when a PPM was implanted. The treatment was successful after a follow up of 15 months.<sup>18</sup>

The second common presenting complaint in our patients was chest pain, and 33% patients presenting with chest pain were implanted with pacemakers. The cause of chest pain can be cardiac or non-cardiac. If the cause is acute myocardial infarction, it should be properly identified and promptly treated. Hsu *et al*<sup>19</sup> have reported case of a 56-year-old woman presenting to emergency with chest pain and CHB was diagnosed after investigations. She was treated conservatively and was successful. Transient cases can be treated conservatively and PPM is not required in all cases.<sup>19</sup>

A smaller number of patients in our study presented with syncope. However, it is a common presenting complaint in CHB patients and should be worked up thoroughly as the underlying cause can be neurological as well as cardiac. Brownstein *et al*<sup>20</sup> have reported a 31-year-old man presenting with syncope only as the presenting complaint. He had history of anxiety and depression and excessive smoking. He used marijuana to sleep. CHB was diagnosed and PPM was implanted. The pacemaker was removed after 3 months and his ECG showed normal conduction. The underlying cause was Lyme disease and antibiotic therapy improved his condition.<sup>20</sup>

In another study<sup>21</sup> a 39-year-old woman had recurrent seizures since early age. Syncope in this patient was diagnosed being due to CHB, and subsequently PPM was implanted. This was a challenging case as the focus was on nervous system pathology. The treatment was successful and the 2-year follow-up did not show recurrence of symptoms.<sup>21</sup>

Majority of our patients who presented with syncope were implanted with pacemakers. Use of pacemakers in patients presenting with syncope shows mixed results. In a study, 70% symptomatic relief was observed in patients who were implanted with pacemakers as compared to control group who did not receive pacemaker. They also reported non-significant (27%) symptomatic relief in other patients after pacemaker insertion in CHB patients presenting with syncope.<sup>22</sup>

## CONCLUSION

The most common presenting complain in our patients having CHB was dizziness, and majority of these patients were implanted with a pacemaker. The next frequent presenting complaint was chest pain and majority of patients were treated medically. No death occurred in patients presenting with syncope.

## REFERENCES

1. Mensah GA, Roth GA, Fuster V. The global burden of cardiovascular diseases and risk factors: 2020 and beyond. *J Am Coll Cardiol* 2019;74(20):2529–32.
2. GBD 2016 causes of death collaborators. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the global burden of disease study 2016. *Lancet* 2017;390(10100):1151–210.
3. Francula-Zaninovic S, Nola IA. Management of measurable variable cardiovascular disease' risk factors. *Curr Cardiol Rev* 2018;14(3):153–63.
4. Knabben V, Chhabra L, Slane M. Third-Degree atrioventricular block. [Updated 2020 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK545199/>
5. Sundhu M, Yildiz M, Syed M, Shah B, Gul S, Afzal O, *et al.* Clinical characteristics and outcomes of patients with ischemic and non-ischemic complete heart block. *Cureus* 2017;9(5):e1244.
6. Sabzwari SRA, Varga Z, Butt K, Khan N. A reversible cause of complete heart block causing chest pain and syncope. *Cureus* 2017;9(12):e1953.
7. Tanchou Tchoumi JC, Foresti S, Lupo P, Cappato R, Butera G. Follow up in a developing country of patients with complete atrioventricular block. *Cardiovasc J Afr* 2012;23(10):538–40.
8. Cingolani E, Goldhaber JJ, Marbán E. Next-generation pacemakers: from small devices to biological pacemakers. *Nat Rev Cardiol* 2018;15(3):139–50.
9. Ghaem H, Ghorbani M, Zare Dorniani S. Evaluation of death among the patients undergoing permanent pacemaker implantation: A competing risks analysis. *Iran J Public Health* 2017;46(6):820–6.
10. Kotsakou M, Kioumis I, Lazaridis G, Pitsiou G, Lampaki S, Papaiwannou A, *et al.* Pacemaker insertion. *Ann Transl Med* 2015;3(3):42.
11. Carrión-Camacho MR, Marín-León I, Molina-Doñoro JM, González-López JR. Safety of Permanent Pacemaker Implantation: A Prospective Study. *J Clin Med* 2019;8(1):35.
12. Polikandrioti M, Tzirogiannis K, Zyga S, Koutelekos I, Vasilopoulos G, Theofilou P, *et al.* Effect of anxiety and depression on the fatigue of patients with a permanent pacemaker. *Arch Med Sci Atheroscler Dis* 2018;3:e8–17.
13. Laslett LJ, Alagona P Jr, Clark BA 3<sup>rd</sup>, Drozda JP, Saldivar F, Wilson SR, *et al.* The worldwide environment of cardiovascular disease: prevalence, diagnosis, therapy, and policy issues: A report from the American College of Cardiology. *J Am Coll Cardiol* 2012;60(Suppl-25):S1–49.
14. Yang YC, Pata RK, Aung TT. A case of complete heart block with diagnostic challenge and therapeutic dilemma. *J Investig Med High Impact Case Rep* 2018;6:2324709618788110.
15. Onakpoya UU, Ojo OO, Eyekpegba OJ, Oguns AE, Akintomide AO. Early experience with permanent pacemaker implantation at a tertiary hospital in Nigeria. *Pan Afr Med J* 2020;36:177.
16. Harun S, Yamin M. Acute results of permanent pacemaker implantation in Cipto Mangunkusumo General Hospital, Jakarta. *Acta Med Indones* 2007;39(1):19–21.
17. Mcbeath K, Honarbaksh S, Chowdhury M, Farooqi F. Undiagnosed cardiac sarcoidosis presenting as complete heart block and ventricular arrhythmia. *BMJ Case Rep*. 2015;2015:bcr2015211736.
18. Hsu CT, Hsiao PJ, Liu CH, Chou YL, Chen BH, Liou JT. Acute myocarditis complicated with permanent complete atrioventricular block caused by *Escherichia coli* bacteremia: A rare case report. *Medicine (Baltimore)* 2019;98(44):e17833.
19. Potter T, Spencer K, White MD, Comp GB. A 56-year-old female with acute ST-segment elevation myocardial infarction, complete heart block, and hemodynamic instability. *Cureus* 2021;13(1):e12857.
20. Brownstein AJ, Gautam S, Bhatt P, Nanna M. Emergent pacemaker placement in a patient with Lyme carditis-induced complete heart block and ventricular asystole. *BMJ Case Rep* 2016;2016:bcr2016214474.
21. Chaumont C, Bourilhon J, Chastan N, Mirolo A, Eltchaninoff H, Anselme F. Recurrent seizures in a young woman: when video-EEG diagnoses a cardiac cause: a case report. *Eur Heart J Case Rep* 2020;4(5):1–6.
22. Varosy PD, Chen LY, Miller AL, Noseworthy PA, Slotwiner DJ, Thiruganasambandamoorthy V. Pacing as a treatment for reflex-mediated (vasovagal, situational, or carotid sinus hypersensitivity) syncope: a systematic review for the 2017 ACC/AHA/HRS Guideline for the evaluation and management of patients with syncope: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *Circulation* 2017;136:e123–35.

## Address for Correspondence:

**Dr Faizania Shabbir**, Department of Physiology, Rawalpindi Medical University, Tipu Road, Rawalpindi, Pakistan.  
**Cell:** +92-321-9549270  
**Email:** faizaniatausif@gmail.com

Received: 17 Sep 2022

Reviewed: 15 Mar 2023

Accepted: 20 Mar 2023

## Contribution of Authors

**FS:** Study concept, design and drafting of article

**IR:** Acquisition of data and drafting of article

**MG:** Analysis of data

**SF:** Writing assistance and article revision

**TAR:** Acquisition of data

**Conflict of interest:** None

**Funding:** None