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ORIGINAL ARTICLE

# Clinical Profile and Outcome of Patients with Atrioventricular Block Admitted in a Tertiary Cardiac Care Centre in Nepal

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## Abstract

**Background:** Atrioventricular block is generally caused by congenital and acquired causes; acquired causes are further divided into ischemic and non-ischemic etiologies. Majority of patients will get permanent pacemaker however few cases with reversible causes have good recovery of sinus rhythm. The main aim of this study is to determine the clinical profile and outcome of patients with atrioventricular block admitted in a tertiary cardiac care centre.

**Methods:** This is prospective, observational study conducted at Shahid Gangalal National Heart Centre, Kathmandu, Nepal. Our study included 126 patients with atrioventricular block fulfilling inclusion criteria from June 1, 2023 to January 31, 2024.

**Results:** 126 patients were enrolled for the study. Out of which 72 (57.1%) were males and 54 (42.9%) were females. Mean age of patient was 68.4±13.3 years. Most common presenting symptom was dizziness 81 (64.3%). Hypertension was the most common comorbid condition present in 73 (57.9%) of patients while 45 (35.7%) did not have any associated conditions. Complete heart block was the most common AV block documented, accounting for 108 (85.8%) of cases. Non ischemic etiology was found in 99 (78.6%) and ischemic etiology were found in 27 (21.4%) patients. Majority of patients 102 (81%) had undergone permanent pacemaker insertion, while only 3 (2.4%) death occurred during hospitalization. 21 (16.7%) patients recovered to sinus rhythm, majority (95.2%) belong to ischemic sub group.

**Conclusion:** Non-ischemic causes of Atrioventricular block is common in clinical practice however, majority of patients with ischemic cause recovered to sinus rhythm.

**Key words:** Electrocardiogram (ECG), Complete Heart Block (CHB), Pacemaker

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## Introduction:

Heart block can be recognized as sinoatrial, intra-atrial, atrioventricular or intraventricular block. Atrioventricular (AV) block occurs when atrial conduction to ventricle is delayed or blocked when AV node is not physiologically refractory.(1) Using His-bundle electro gram recordings, three anatomic sites of Atrioventricular block can be identified: AV nodal, intra-Hisian, or infra-Hisian.(2)

Atrioventricular block can be caused by congenital or acquired forms of diseases of which degenerative causes being the most common of acquired form seen in clinical practice associated with increasing age, Hypertension (HTN) and Diabetes (DM).(3) Other causes being ischemia mainly inferior or anterior myocardial infarction(4); cardiomyopathies, including hypertrophic obstructive cardiomyopathy and infiltrative conditions such as sarcoidosis and amyloidosis.(5) Infectious causes such as Lyme disease(6), rheumatic fever, endocarditis(7), viruses as well as autoimmune disease such as systemic lupus erythematosus should also be explored(8). Other potential triggers include cardiac surgery, medications, and inherited conditions.(9)

Clinical manifestations of AV block depend on the degree of block, ventricular rate and frequency of

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occurrence.[10] Complete AV block is associated with syncope, presyncope, symptoms of decreased cardiac output, angina or palpitations.[1]

Generally, atrioventricular block at the atrioventricular nodal level is associated with slower progression, a faster and more reliable atrioventricular junctional escape mechanism, and greater responsiveness to autonomic manipulation such as atropine, isoproterenol, and epinephrine administration. In contrast, atrioventricular block within or below the His bundle may progress rapidly and unexpectedly, is associated with a slower and more unpredictable ventricular escape mechanism, will not respond to atropine but will sometimes improve with catecholamines.[3] The guideline recommended treatment for mobitz type II, high grade AV block, complete heart block not due to transient cause is pacemaker implantation. [11]

Researches regarding AV block is scarce in Nepal as searched in online sites including google, google scholor, pubmed. This research would put some light on the demographics and symptoms of patients presenting with second and third degree AV block with the common age group of presentation and their causes. The overall outcome of patients and whether it will be differing between ischemic and non-ischemic causes.

**Study Methodology:**

This study is a hospital based, prospective, observational study conducted at Shahid Gangalal National Heart Centre (SGNHC), Kathmandu, Nepal from June 1, 2023 to January 31, 2024 (8 months). Written informed consent was taken before enrollment in the study. After approval from Institutional review board (IRB) of National Academy of Medical Sciences (NAMS), Bir hospital, 126 patients fulfilling inclusion criteria were enrolled.

Patients admitted in Shahid Gangalal National Heart Centre with the diagnosis of Atrioventricular block was evaluated. The medical records of the patients including age, gender, symptoms, comorbid conditions and medications taken were reviewed by the principal investigator. A 12-lead ECG and simultaneous rhythm strip was recorded at 25mm/s with a gain setting of 10mm/ mV. The ECG was interpreted and categorized as second degree mobitz type II, high grade atrioventricular block or complete heart block and evidence of ischemia was evaluated. Second degree mobitz type II has fixed PR interval and intermittent non conducted P waves. High degree AV block refers to situations where >2 consecutive P waves at normal rate are not conducted without complete loss of AV conduction. Complete heart block implies no conduction at all from atria to ventricles and may be paroxysmal or persistent and is usually associated with either a junctional or ventricular escape mechanism. Causes were differentiated into Ischemic or non-ischemic based on history, ECG changes suggestive of ischemia including ST segment elevation, cardiac biomarkers such as Troponin.

Standard treatments were provided according to the diagnosis of patient by the treating team. The need of permanent pacemaker and revascularization were decided by the treating cardiologist and team. The outcome was documented as recovered, permanent pacemaker inserted or death at the time of discharge.

The data was collected by the principal investigator and was recorded in a structured proforma.

**Inclusion Criteria:**

All patients ≥18 years admitted with Atrioventricular block

**Exclusion Criteria:**

1) Patient already has Permanent pacemaker insertion
2) Patient with first degree Atrioventricular block
3) Patient not willing to continue medical therapy or left against medical advice
4) Patient not willing to give consent

**Statistical Methods:**

All data were entered into an electronic spreadsheet (Microsoft Excel) and the statistical analysis was done using the SPSS version 26 software. All Categorical variables were expressed in frequency and percentage. All numerical data were presented in mean ± SD.

**Results:**

Among 126 patients, 72 (57.1%) were males and 54 (42.9%) were females. Age of patients ranges from 30-98 years with mean age of 68.4±13.3 years. Most common age group was 61 years and older which accounted for 73.8% of all cases.

Most common presenting symptom was dizziness 81 (64.3%), followed by dyspnea 44 (34.9%), chest

pain 39 (30.9%), syncope 34 (26.9%), presyncope 22 (17.5%) and palpitation 7 (5.6%) respectively. Minority were asymptomatic 5 (3.9%), other less common symptoms were fatigue 3 (2.4%), vomiting 2 (1.6%), headache 2 (1.6%), epigastric pain 1 (0.8%) and seizure 1 (0.8%) respectively as shown in table I.

**Table-I**

*Distribution of presentation of study populations (n=126)*

| Symptoms | Frequency (n) | Percentage (%) |
|---|---|---|
| Dizziness | 81 | 64.3 |
| Dyspnea | 44 | 34.9 |
| Chest pain | 39 | 30.9 |
| Syncope | 34 | 26.9 |
| Presyncope | 22 | 17.5 |
| Palpitation | 7 | 5.6 |
| Asymptomatic | 5 | 4.0 |
| Fatigue | 3 | 2.4 |
| Vomiting | 2 | 1.6 |
| Headache | 2 | 1.6 |
| Epigastric pain | 1 | 0.8 |
| Seizure | 1 | 0.8 |

Majority of patients were hypertensive 73 (57.9%) followed by diabetes 29 (23.0%). Other less common comorbidities were aortic stenosis 4 (3.1%), mitral regurgitation 2 (1.6%) and hypertrophic cardiomyopathy 1 (0.8%) respectively. 1 (0.8%) patient had complete heart block following electrophysiological study and radiofrequency ablation of slow pathway for atrioventricular nodal reentrant tachycardia (AVNRT). However, 45 (35.7%) patients did not have any comorbid conditions. (Table II)

**Table-II**

*Comorbidities of study populations (n=126)*

| Comorbid conditions | Frequency (n) | Percentage(%) |
|---|---|---|
| Hypertension | 73 | 57.9 |
| Diabetes | 29 | 23.0 |
| Aortic stenosis | 4 | 3.1 |
| Mitral regurgitation | 2 | 1.6 |
| Hypertrophic cardiomyopathy | 1 | 0.8 |
| s/p Radiofrequency ablation | 1 | 0.8 |
| None | 45 | 35.7 |

3 types of AV block were encountered in our study. Most common being CHB 108(85.8%), followed by high grade AV block 16 (12.7%) and mobitz type II 2 (1.6%). Of 108 CHB, 45 (41.7%) were females and 63 (58.3%) were males. 8 (50%) were males and remaining were females in 16 patients with high grade AV block. 50% were males and 50% were females in mobitz type II second degree AV block. (Figure 1)

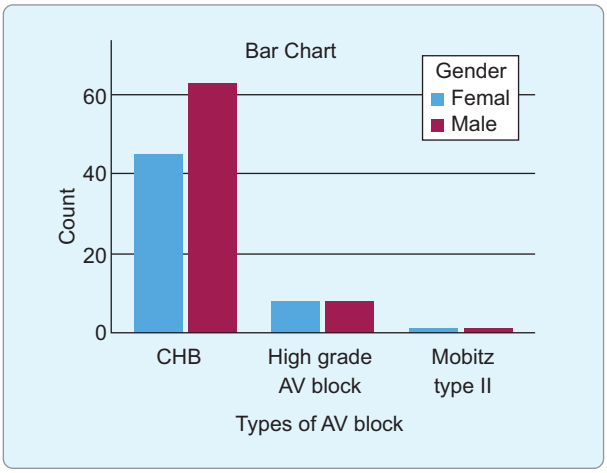


**Figure 1:** *Frequency of types of AV block*

The causes of AV block were non ischemic 99 (78.6%) and ischemic 27 (21.4%). Out of 99 non ischemic causes, 84 (84.8%) had complete heart block, 14 (14.1%) had high grade and 1 (1.0%) had mobitz type II AV block. Of ischemic causes most common were inferior wall myocardial infarction (IWMI) 23 (85.2%) followed by anterior wall myocardial infarction (AWMI) 2 (7.4%) and non ST segment elevation myocardial infarction (NSTEMI) 2 (7.4%). All patients with AWMI and NSTEMI had complete heart block. 20 (87%) patients with IWMI had complete heart block while 2 (8.7%) had high grade AV block and 1 (4.3%) had mobitz type II block. Figure 2

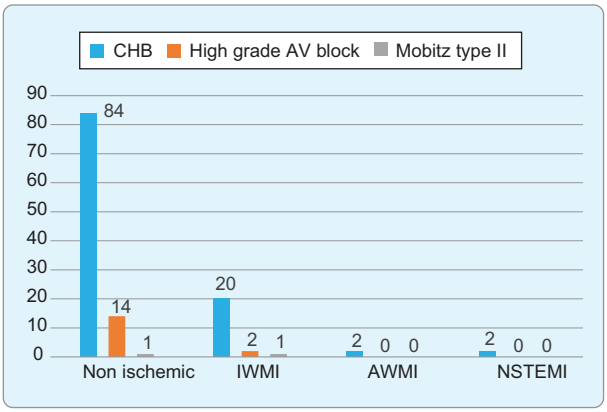


**Figure 2:** *Causes of AV block*

**Table 3:** *Outcome according to causes of AV block*

| Causes | Outcomes (n) | | | | Total(n) (%) |
|---|---|---|---|---|---|
| | Pacemaker Insertion | | Recovered | Death | |
| | VVIR | DDDR | | | |
| Non ischemic | 81 (81.8%) | 17 (17.2%) | 1 (1%) | 0 (0%) | 99 (100%) |
| IWMI | 3 (13%) | 0 (0%) | 18 (78.3%) | 2 (8.7%) | 23 (100%) |
| AWMI | 0 (0%) | 0 (0%) | 1 (50%) | 1 (50%) | 2 (100%) |
| NSTEMI | 1 (50%) | 0 (0%) | 1 (50%) | 0 (0%) | 2 (100%) |
| Total (n) (%) | 85 (67.5%) | 17 (13.5%) | 21 (16.7%) | 3 (2.4%) | 126 (100%) |

The main outcome during hospital discharge were death from any cause, complete recovery of AV block to sinus rhythm and permanent pacemaker insertion. The permanent pacemaker mainly consisted of VVIR or DDDR. Of total patient, 102 (81%) received permanent pacemaker, out of which 85 (67.5%) received VVIR and 17 (13.5%) received DDDR. 21 (16.7%) recovered and 3 (2.4%) died during hospitalization. Figure 3

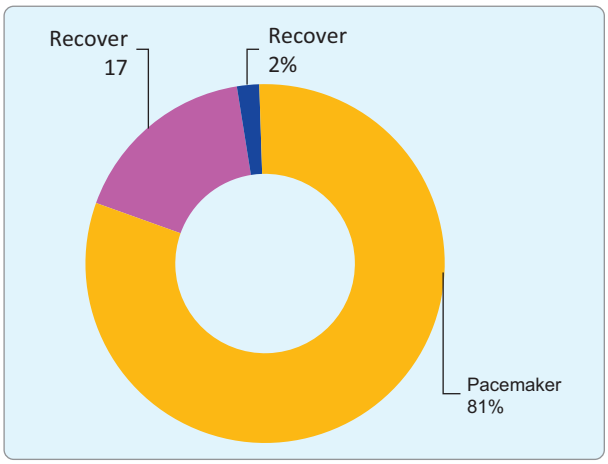


**Figure 3:** *In hospital outcome of AV block*

Out of total 99 non ischemic causes, 81 (81.8%) received VVIR, 17 (17.2%) received DDDR, and 1 (1%) recovered. The recovered patient had diarrhea with hypovolemic shock and hyperkalemia which recovered after treatment.

In ischemic causes, 20 (74.1%) recovered, 4 (14.8%) received VVIR and 3 (11.1%) died. 18 (78.3%) cases recovered, 3 (13%) received VVIR and 2 (8.7%) died in IWMI sub group. Out of 2 patients in AWMI sub group, 50% recovered and another 50% died while 1 (50%) patient recovered and 1 (50%) received VVIR in NSTEMI group respectively. Table III

**Discussion:**

The mean age of patients in a study by Sundhu M et. al published in 2017 was 73.8±12.7 with patients having ischemic causes being younger.[12] The finding was similar in our study with mean age of 68.4±13.3 years. Most common age group for AV block in our study was ≥61 years which was similar to a study published in 1956 by Penton GB, Miller H, Levine SA.[13] In another study by Shan R. et al the prevalence of AV block increased from age 53–57 years and then reached the peak in age ≥78 years.[14]

A study published in 1956 with complete heart block patients showed that the most common presenting symptom was syncope followed by palpitation and dyspnea.[13] Another study by Kanse VY et al had syncope being the most common symptom followed by light headedness, palpitation and dyspnea.[15] A nation wise cohort in Denmark including 1027 patients below age of 50 years receiving first pacemaker insertion between 1996 and 2015, the most common symptoms being dizziness followed by syncope, dyspnea, malaise and chest pain.[16] Our study also has dizziness being the most common presenting symptoms followed by dyspnea, chest pain and syncope.

Hypertension was the most common comorbidities in patients with AV block. Other comorbidities were Diabetes, hypothyroidism.[12,15]

In a cohort of 13862 patients with acute myocardial infarction, 378(2.7%) had heart block at the time of initial admission. The most common myocardial infarction being IWMI (83.3%) and worse outcome in the form of cardiac death were seen in patients with AWMI.[17] Of total 106780 patients in another cohort, 4.7% had heart block at the time of myocardial infarction, most commonly seen in patients with IWMI. Patients with AWMI and heart block had higher in

hospital mortality rates compared with IWMI and heart block patients.[18] In a study performed by U. J. O Gang et al had shown approximately 55% of patients with AWMI and high grade AV block died compared with 36% of patients with IWMI. 9% of patients required implantation of permanent pacemaker prior to discharge as a result of persistent of recurrent high grade AV block.[19] The results of our study was also similar with IWMI being most commonly associated with AV block in ischemic sub group, with 14.8% patients receiving permanent pacemaker insertion. The in hospital mortality was higher for AWMI with AV block (50%), however the mortality rate was quite low with IWMI with AV block (8.7%) in our study.

**Limitations:**

Our study is a single centre hospital based study with sample size of 126. The exact causes of non-ischemic group were not identified in all patients. Only in hospital outcomes were recorded.

**Conclusions:**

Non-ischemic causes of AV block are common with most of them requiring permanent pacemaker insertion. IWMI being the most common ischemic causes of AV block, majority of which recovers to sinus rhythm. AWMI being less common but associated with worse outcome.

**Conflict of Interest:**

None

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