



Research Brief

Etiology of chronic atrioventricular block in young adults in a public university hospital in India

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ARTICLE INFO

Article history:

Received 24 July 2020

Accepted 30 September 2021

Available online 20 October 2021

Keywords:

Bradycardia

Syncope

Pacemaker

ABSTRACT

In young adults, chronic atrioventricular (AV) block has scant systematic documentation in India. This prospective study included patients 18–40 years old, presenting with AV block without a reversible cause. There were 27 patients, aged 32 ± 6.3 years, with 16 males. All patients had complete AV block with a narrow QRS escape rhythm (rate 40.5 ± 6.5 beats/min). Three patients were ANA positive and of these, 2 patients were anti ds DNA positive. The ESR and CRP levels were mildly elevated in 12 and 8 patients respectively. The rest of the tests were unremarkable. Despite performing multiple tests, the etiology remained idiopathic in most.

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1. Introduction

The data on etiology of AV blocks in young adults is sparse. Only 3–5% of all the patients undergoing pacemaker implantation for AV block are aged 18–55 years.^{1,2} Pacemaker implantation in young adult poses a problem due to the need for repeated replacement or upgrade of the device.^{3,4} Hence, it is very important to determine etiology of the AV block, which will help in appropriate treatment strategies.

2. Method

This was a prospective study conducted from January 2016 to January 2018 at a university hospital in Mumbai. We included patients aged between 18 and 40 years, who presented with chronic AV block. Apart from routine tests, ESR, hs-CRP, troponin T, ACE (Angiotensin converting enzyme) levels, TSH, TORCH titers and an autoimmune battery including ANA and anti-ds DNA were performed. Echocardiography, chest X ray and ultrasound of the abdomen were performed for all patients; chest CT scan, cardiac MRI and cardiac PET scan were performed when indicated.

All analyses were performed using SPSS 20 version. Categorical variables were expressed as percentages, whereas continuous variables were presented as mean \pm standard deviation.

3. Results

The study cohort included 27 patients, age 32 ± 6.3 years. There were 16 (59.3%) males and 11 (40.7%) females. The demographic and clinical profile of all patients is shown in Table 1. Syncope was the commonest presenting complaint (12 patients, 44.5%), while 9 (29.6%) were asymptomatic. The ECG showed complete AV block in 25 (92.6%) of patients, all with a narrow QRS escape rhythm and a normal atrial rate. The ventricular rate was 40.5 ± 6.5 beats/min (range: 30–52 beats/min). In 2 patients, a permanent pacemaker had already been implanted and both showed a ventricular paced rhythm, even at a lower rate of 30/min. Three (11.1%) patients showed a prolonged QTc interval.

The laboratory parameters of the cohort are shown in Table 2. Twelve (44.4%) patients had mildly elevated ESR⁵ and 8 (29.6%) patients had mildly raised CRP levels.⁵ Three (11.1%) patients were ANA positive, of which 2 (7.4%) patients tested positive for anti-ds DNA. The TORCH titres were done in the first 17 patients, and were later discontinued due to uniformly unhelpful results. The serum ACE levels were done in the first 17 patients, they were all normal; in view of this and poor utility of this test, it was discontinued later. The HSV IgG was positive in 13 (76.5%) patients, the CMV IgG was positive in 8 (47%) patients and 2 (11.8%) patients were positive for the Rubella IgG. However, the IgM was negative for all these tests. Three (11.1%) had mildly elevated TSH levels with normal T3 and T4 levels; they were clinically euthyroid. The

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Table 1
Demographic and clinical patient profile.

Parameter	Result	
	n (%)	Mean +/- SD
Age (years)		32 +/- 6.3
Gender (males)	16 (59.3)	
Ventricular rate (beats/min)		40.5 +/- 6.5
Tobacco	10 (37)	
Hypertension	6 (22.2)	
Diabetes mellitus	2 (7.4)	
Clinical presentation		
Syncope	12 (44.5)	
Asymptomatic	8 (29.6)	
DOE	6 (22.2)	
Presyncope	3 (11.1)	
Treatment		
Pacemaker	18 (66.7)	
Conservative	9 (33.3)	

Table 2
Laboratory parameters.

PARAMETER	RESULT	n (%)
ESR (mm/hr) Normal	<20	15 (55.6)
Mildly elevated	20–50	12 (44.4)
CRP (mg/dL) Normal	<0.4	19 (70.4)
Mildly elevated	0.4–4	8 (29.6)
TSH (mIU/L) Normal	0.5–5	24 (88.9)
High	5–10	3 (11.1)
ACE (U/L) Normal	<40	17 (100)
Troponin T	Normal	25 (100)
	Raised	–
ANA	Positive	3 (11.1)
	Negative	24 (88.9)
Anti-ds DNA	Positive	2 (7.4)
	Negative	25 (92.6)
HSV IgG	Positive	13 (76.5)
	Negative	4 (23.5)
CMV IgG	Positive	8 (47.1)
	Negative	9 (52.9)
Rubella IgG	Positive	2 (11.8)
	Negative	15 (88.2)

echocardiogram was normal in 25 (92.6%) patients; one patient had hypertrophic cardiomyopathy and another had global left ventricular hypokinesia (ejection fraction 0.35). Chest CT scans were performed in 11 where a possibility of sarcoidosis (raised ESR) was to be ruled out and were normal. In 6 patients with a profile warranting ruling out myocarditis (hsCRP>2 times normal), cardiac PET scans were performed, which were normal.

4. Discussion

Chronic AV block in India shows significant geographical variation in its prevalence, with eastern India bearing the brunt of the disease. Mustard oil, the cooking medium in Eastern India with high erucic acid content of around 48%, was hypothesized as the etiological factor. A study conducted on cooking medium by the ICMR (Indian Council of Medical Research) showed high erucic acid content in the heart samples obtained from Kolkata. Erucic acid was also shown to produce myocardial fibrosis and lipidosis.⁶ This hypothesis, however, was never proven to be linked to AV block, and anyway does not apply to our patients.

We could not ascribe a definite cause to most cases. However, there were some observations which may be of significance. Toxoplasmosis, Rubella, Cytomegalovirus and Herpes infections

during the fetal period as well as later in life are known to cause AV block. Most of the antibodies detected in our patients were IgG and not IgM; hence, their role as etiology for AV block is extremely unlikely. The ANA was positive in 3 patients, of whom 2 also tested positive for anti-ds DNA. AV block may be a consequence of systemic lupus erythematosus (SLE) and few cases of complete AV block as first manifestation of the disease in the adults have been documented. Maron et al⁷ describe normal AV nodal tissue but interruption in the bundle of His as it coursed through the central fibrous body, while others demonstrated fibrosis in the conduction system in hypertrophic cardiomyopathy. One patient in our study was found to have obstructive HCM.

Sarcoidosis is an important cause of high grade AV block in young adults. Another study shows that the yield of elevated serum ACE levels is significantly lower and that ESR and hs-CRP are more sensitive markers for diagnosis at initial presentation of sarcoidosis, although not specific.⁸ In certain parts of the world, Lyme's disease and Chagas disease are important causes of AV block in young adults. In India, these diseases are almost unknown. Carano et al have compiled 25 cases of complete AV block associated with acute rheumatic fever.⁹ However, chronic complete AV block as a consequence of rheumatic fever is not reported. We did not find any patient with rheumatic heart disease. Congenital heart diseases can be associated with AV block, and congenitally corrected transposition of the great arteries is one such which can go undetected till adulthood.

Isolated congenital AV block has been considered as important cause of complete AV block especially in infancy and early childhood but cases can often be seen in young adults. The AV block is known to progress gradually in many cases, starting off with lower degrees of AV block and developing complete AV block over years or decades. Sometimes this can also result in late onset cardiomyopathy. Typically in congenital complete AV block, the QRS complex is narrow. In our cohort, a possible etiology for the AV block was seen in only 3 patients. The remaining patients had a narrow QRS complex and were by default considered to have congenital/idiopathic AV block.

5. Conclusions

High degree or complete AV block with narrow QRS escape, of congenital or idiopathic etiology by exclusion, was observed in a majority of patients in this study.

Declaration of competing interest

None.

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