

Original Article

Electrophysiological Evaluation of Bifascicular blocks in a tertiary care Hospital of Kashmir Valley.

Nazir Lone, Khalid Mohidin, Irfan Bhat

Abstract:

Objective: The current guidelines recommend the use of invasive EPS only for the evaluation of syncope in patients having bifascicular block. Strict adherence to these guidelines may not be always feasible in regions with poor peripheral health care infrastructure to deal with cardiac emergencies, transfer delays due to poor transportation and also lack of health awareness among the public. The present study was therefore conducted with this background to know if elective electrophysiological study in patients with chronic BFB irrespective of symptoms would help in the management of these patients and also help to identify the high risk group.

Methods: Seventy nine patients with different types of BFB both symptomatic and asymptomatic were subjected to invasive electrophysiological study. His bundle study was performed and included measurement of HV interval at base line and post stress and was correlated with symptoms and for risk stratification.

Results: The mean baseline HVI was 78.51 ± 22.68 ms (range 40 to 130 ms). HVI measurement after stressing the His bundle by rapid atrial pacing was done in 64 patients. In the remaining patients His bundle stressing was not done in view of either a grossly prolonged HVI (> 100 ms) or the development of high grade AV block or complete heart block particularly in patients having LBBB. The patients who underwent stressing of His bundle the mean basal HVI increased from 70 ± 12.91 ms to 75.89 ± 20.85 ms post stress. Patients of BFB who had attributable symptoms especially syncope and pre syncope, often had moderately or severely prolonged HVI and were implanted pacemakers. Patients with prolonged PR interval on surface ECG tended to have prolonged HVI as compared to those with normal PR interval though not statistically significant. The 4 patients who developed high grade AV block or complete heart block during catheterization also underwent pacemaker implantation because they were having history of recurrent cardiac syncope and the block did not reverse. A total of 36 patients underwent pacemaker implantation. Out of the remaining 43 patients who were put on follow up, two developed cardiac syncope on follow up with prolonged HVI this time and were given pacemaker. 4 patients did not follow. In the remaining 37 patients, the average follow up duration was 10.58 ± 6.12 months. None of these patients had any event during this period of follow up.

Conclusion: Syncope followed by presyncope should be taken seriously in patients with BFB. Invasive electrophysiology is safe in these patients and often identifies high risk group who needs pacemaker therapy. Asymptomatic patients of BFB without PR prolongation should not be subjected to EPS study but should be made aware about above mentioned symptoms and should seek immediate cardiac advice if someone gets such symptoms. In asymptomatic group the rate of progression or of the development of complete heart block is low. However asymptomatic Bifascicular blocks with PR prolongation may be subjected to elective EPS in order to risk stratify them in a setting of ours.

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publication**Key Words:** Electrophysiological
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(BFB), His Bundle Interval (HVI).

INTRODUCTION

The term bifascicular block most commonly refers to conduction disturbance below the atrioventricular (AV) node in which the right bundle branch and one of the two fascicles (anterior or posterior) of the left bundle branch are involved. Although this definition is used in the 2012 American College of Cardiology Foundation / American Heart Association / Heart Rhythm Society (ACCF, AHA/ HRS) guidelines for device-based therapy of cardiac rhythm abnormalities¹, some authors, including those of the guidelines on the management of syncope published by the European Society of Cardiology (ESC), include left bundle branch (LBBB) in the definition of bifascicular block since LBBB, as noted, implies block in both fascicles^{1,2}.

This definition is based on trifascicular concept of activation of heart^{3,4}. An increased prevalence of BFB with increasing age has been reported in an unselected population. The reported prevalence is about 0.1 % in younger population which increases to 1% in people aged 35 years or more⁵⁻⁷. BFB has been detected in 7 % of patients admitted with syncope in emergency wards⁸. The symptom of greatest concern in BFB is syncope, which is reported in upto 25 % of patients. This is the only symptom that has been shown to be predictive of impending high grade AV block/ trifascicular block⁹⁻¹¹.

Most of the invasive EPS performed on patients with BFB have included patients with unexplained syncope (those with no documented arrhythmia on long term monitoring or other non invasive testing). HV interval (HVI) in patients with BFB is a measure of the conduction time through the remaining functioning fascicle and predicts subsequent development of AV block. Patients with BFB and prolonged HVI (> 55 sec) have 2% to 3% risk of developing trifascicular block annually¹¹. The HVI has a high specificity (80%) but a low sensitivity (66%) for predicting the development of complete trifascicular block^{12,13}. Rapid atrial pacing is used to uncover abnormal His-Purkinji conduction through provocation of distal His block during 1:1 AV nodal conduction¹⁴.

Unpublished observational data from our institution indicates a significantly high prevalence of conduction system abnormalities mainly in the form of complete heart block and fascicular blocks in the outpatient clinics and emergency wards. Keeping in view the poor peripheral health care structure to deal with cardiac emergencies in periphery, poor transportation from periphery to the tertiary care

hospitals, this study was undertaken to detect high risk BFB and inform public accordingly.

METHODS

Seventy nine consecutive patients aged 30 years or more with BFB, both symptomatic and asymptomatic, were registered for the study after written informed consent. Patients with cardiomyopathy, valvular or congenital heart disease, myocarditis, pericarditis, acute coronary syndrome, electrolyte disturbances, any acute medical or surgical illness or coexisting medical condition were excluded. Patients with advanced AV block or documented CHB any time were also excluded. Continuous His bundle electrocardiogram was recorded by Quadripolar catheter for 10 minutes. HV interval was measured from the beginning of the His-bundle deflection to the earliest onset of ventricular activation (normal HVI 35-55msec). After recording the baseline HVI, synchronized rapid atrial pacing was done from high right atrium using an incremental staged protocol. Each paced cycle length was maintained for 15-60 sec to ensure a steady state. HVI was continuously measured during and immediately after the rapid atrial pacing.

In symptomatic group, the study formed part of the standard evaluation process in the management. In the asymptomatic patients the aim was to risk stratify the patients and plan the treatment accordingly.

Data was statistically analysed using student's t- test and paired t- test. $p < 0.05$ was taken to be statistically significant. All values were expressed as mean \pm SD.

RESULTS

Seventy nine patients (55 males and 24 females) were enrolled. These comprised of 38 patients with LBBB, 37 with RBBB + LAHB and 4 patients with RBBB+ LPHB. (Table 1). Three-fourths of our patients had symptoms which could be possibly attributed to the presence of BFB at the time of presentation. History of syncope, presyncope and giddiness was recorded in 43 %, 19 % and 14 % patients respectively (Table2).

The mean baseline HVI was 78.51 ± 22.68 ms (range 40-130 sec). HVI measurement after stressing the His bundle by rapid atrial pacing was done in 64 patients. In the remaining patients His bundle stressing was not performed in view of either a grossly prolonged HVI (> 100msec) or the development of high grade AV block or complete heart block during the catheterization. Among the patients in whom His bundle stressing was performed, the mean

basal HVI increased from 70 ± 12.91 msec to 75.89 ± 20.85 msec post stress ($p=0.001$) (Table 3) The decision about pacemaker therapy depended on the highest recorded HVI (baseline or post stress). The average maximum recorded HVI in our patients was 80.00 ± 23.67 sec (range 40-150 sec) with 88% of the symptomatic patients having prolonged HVI (75.5 sec). The immediate and short term outcome of the patients with BFB is shown in (Table 4).

Overall, 38 (48%) of our patients received pacemaker therapy. 32 patients underwent pacemaker implantation because of prolonged HVI

conduction disturbances in our population with poor peripheral health care system to deal with cardiac emergencies. About three quarters of our patients with BFB had attributable symptoms at the time of initial presentation. Syncope of cardiac description was the single most common symptom of BFB present in 43% patients and 88% of these patients had prolonged HV interval and most of these patients underwent pacemaker implantation. Patients with RBBB with LAHB significantly more often reported symptoms, especially syncope, compared to patients with other forms of BFB which

Table 1: Demographic and other baseline characteristics of patients with BFB

	LBBB	RBBB+LAHB	RBBB+LPHB	Overall
Age (Years)				
Males[n]	[22]	[28]	[4]	[54]
	63.4±8.9	68.5±10.0	58.7±16.0	65.7±10.4
Females[n]	[16]	[9]	-	[25]
	56.7±9.3	59.7±7.9		57.68±8.0
Overall[n]	[39]	[36]	[4]	[79]
	59.63±8.49	64.97±8.51	58.75±16.01	62.09±9.22
Male: female	22:16	29:8	4:0	55:24
Associated Disease				
Hypertension	9(24%) ±	11(30%)	1(25%)	21(27%)
Diabetes	6(16%)	5(14%)	0	11(14%)
CHD	4(11%)	1(3%)	0	5(6%)

and in view of their symptoms. 4 patients also were implanted pacemakers in view of the development of advanced AV block or complete heart block at the time of initial invasive study that did not reverse and these were the people who had history of recurrent syncope. Out of 43 patients who were put on follow up, two patients developed cardiac syncope at 13 and 16 month follow up. The repeat HVI was 90ms and 80 ms respectively in these patients and both were given pacemaker therapy. 4 patients did not follow and in the remaining 37 patients, the average follow up duration was 10.58 ± 6.12 months, ranging

from 4-36 months. None of these patients had any event during the follow up period. may be explained on the basis that these patients were more elderly as compared to other groups thus may have advanced degenerative disease of conduction system or may be a chance coincidence. Available literature reveals that the symptom of greatest concern in BFB is syncope since it is highly predictive of impending high grade AV block and may be present in upto 25% of the patients at first medical contact^{8,10,11,15}. The higher prevalence of syncope in our patients with BFB is due to more advanced conduction disorder as revealed by high HV intervals in these patients and the final

Table 2: Symptoms in various Types of BFB

Symptom	LBBB(n=38)	RBBB+LAHB(n=37)	RBBB+LPHB(n=4)	Overall(n=79)	P
Syncope	14(37%)	19(51%)	1(25%)	34(43%)	0.000
Presyncope	8(21%)	6(16%)	1(25%)	15(19%)	0.075
Giddiness	5(13%)	5(14%)	1(25%)	11(14%)	0.234
No Symptom	11(29%)	7(19%)	1(25%)	19(24%)	0.018

from 4-36 months. None of these patients had any event during the follow up period.

DISCUSSION

The present study was undertaken to evaluate bifascicular blocks electrophysiologically in Kashmir valley keeping in view of high prevalence of these

outcome with pacemaker implantation. According to our result the use of pacemaker had significant reduction in syncope in bifascicular block patients in accordance with PRESS study of Santine that implanted DDD with pace rate of 60pbm with clear reduction of syncope in such patients¹⁶.

Table 3: HVI in patients with BFB before and after stress induced by rapid atrial pacing

	LBBB	RBBB+LAHB	RBBB+LPHB	Overall	P
Basal HVI(n)	37	35	4	76	
Mean±SD(ms)	78.51±22.68	74.29±19.63	65.75±8.50	75.89±20.85	0.425
Range	40_130	50_130	55_70	40_130	
Basal HVI (in Patients (n) given RAP)	31	32	4	67	
Mean±SD	72.42±13.43	69.69±12.89	75.89±20.85	70.72±12.91	0.51
Range	40_130	50_130	55- 70	40_130	
Post-stress HVI(n)	31	32	4	67	
Mean±SD	76.84±17.41	75.31±20.04	68.25±11.21	75.60±1834	0.680
Range	50_120	50_150	55_80	50_150	
Paired t-test	0.003	0.035	0.391	0.001	

One third of our patients had prolonged PR interval which is consistent with previously published reports^{12,17}. Since PR interval depends on the conduction of the impulse from the SA node to the His-purkinje system, impairment of conduction anywhere along this pathway can theoretically prolong the PR interval in patients with BFB. Patients with prolonged PR interval on surface ECG tended to have prolonged HV interval as compared to those

during right heart catheterization to the superficially located RBB might induce complete heart block in patients with pre-existing LBBB^{22,23}. This could be the possible explanation in our patients or the coincident development of complete heart block as per the natural history of bifascicular blocks. Ventricular tachyarrhythmia is a rare electrophysiological finding in those with syncope, BFB and preserved left ventricular ejection fraction²⁴. No complications like groin hematoma or deep venous thrombosis

Table 4: Clinical Outcome of patients with BFB

Outcome	LBBB(n=38)	RBBB+LAHB(n=37)	RBBB+LPHB(n=4)	Overall(n=79)
Pacemaker	18(47%)	19(51%)	1(25%)	38(48%)
No follow up	2(5%)	1(3%)	1(25%)	4(5%)
No Event	18(47%)	17(46%)	2(50%)	37(47%)

with normal PR interval in our patient group though not statistically significant.

The other reported symptoms like giddiness/ vertigo did not predict intermittent CHB thus no pacemaker implantation. Absence of symptoms was significantly associated with benign outcome in around 90 % of the patients consistent with the available literature.

Four of our patients developed high grade AV block or CHB at the time of cardiac catheterization. High grade AV block / CHB has been reported previously also but the risk is quite low (< 0.01 %) in patients with preexisting LBBB and in most of these studies the block has been transient although in some studies it has been irreversible¹⁸⁻²¹. In half of our patients this block was irreversible and another half remained intermittently dependent on temporary pacing and the final outcome was pacemaker implantation in all 4 patients as all these patients had history of recurrent cardiac syncope. Injury

occurred in our patients.

CONCLUSION

Unpublished observational data from outpatient clinics, emergency wards, and from day to day practice indicates significantly high prevalence of conduction system abnormalities in form of complete heart block and fascicular blocks mainly Bifascicular blocks in Kashmir valley. Invasive EPS appears to be safe in these patients but it should be limited to those patients of BFB who are symptomatic. Syncope followed by pre syncope of cardiac description should be taken seriously in these patients and HV interval is most often abnormal in these patients and patients be advised to contact urgent medical advice once they come across such problems.

Asymptomatic patients without PR prolongation should not be subjected to EPS study, can be safely put on medical follow up. The rate of progression of conduction disturbance or of development

of complete heart block in these patients is low. Patients with BFB with PR prolongation is a high risk group can be subjected to elective EPS in order to risk stratify them in a setting of ours .We suggest that this parameter be considered while evaluating bifascicular blocks in a setting of ours in addition to already operational Guidelines.

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