Original Article

FREQUENCY OF ATRIAL FIBRILLATION ACCORDING TO QRS DURATION IN PATIENTS WITH LEFT VENTRICULAR SYSTOLIC DYSFUNCTION

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ABSTRACT:
OBJECTIVE:
To see the frequency of atrial fibrillation in patients with LV systolic dysfunction according to various QRS duration groups.
MATERIAL AND METHODS:This observational study was carried out at cardiology department, Punjab Institute of Cardiology, Lahore from 16-02-2012 to 15-08-2012 (six months). 400 cases of LV systolic dysfunction were studied. QRS duration was measured on 12-lead ECG. Patients with QRS duration < 120 ms were categorized as narrow complex (group 1), and patients with QRS duration of 120 to 150 ms and more than 150 ms as intermediate and wide complex groups (group 2 and 3 respectively).
ECG was assessed for the presence of atrial fibrillation in patients with LV dysfunction for all QRS groups.
RESULTS:400 patients of LV dysfunction (EF<45%) were selected and studied as per inclusion and exclusion criteria. The age was 56.5±11.6 of the studied population. The study population consisted of male (72.3%) and female (27.7%). The left atrial diameter was 40.3±6.08 mm and LV ejection fraction 31.8±6.6 %. Most of the patients with having coronary artery disases (87.75%) followed by Non-ischemic cardiomyopathy (around 9%) and valvular heart disease (3.5%). Atrial fibrillation was seen in 15.75%. In group 3 atrial fibrillation was seen in 60.9% patients, while 18.9 and 6.04 % in group 2 and 1 respectively. Atrial fibrillation was seen more commonly in patients with severe systolic dysfunction and wide QRS duration.
CONCLUSION:Atrial fibrillation is more common with LV systolic dysfuncation and wide QRS duration. These groups of people need more attention for preventive strategy.
Key Words:LV dysfunction, atrial fibrillation, QRS duration

INTRODUCTION:

Heart failure is a condition in which heart is unable to pump adequate blood to meet the oxygen supply of the tissues or can do so at the expense of increased filling pressure[1].

Atrial fibrillation (AF) and wider QRS duration are predisposing factors for heart failure, LV dysfunction and increasing morbidity and mortality. So, we must screen out these groups of people whose heart failure can be worsened. EL-Chami et al. described an association between QRS duration and AF[2,3].

So we planned to conduct a study in our population to see how frequent atrial fibrillation is in patients with LV systolic dysfunction according to various QRS duration groups.

MATERIAL AND METHODS:

This observational study was conducted at Cardiology Department, Punjab Institute of Cardiology, Lahore from 16-02-2012 to 15-08-2012 (six months).

OPERATIONAL DEFINITIONS:

Patients were categorized into three groups.
Group 1. Narrow QRS Complex < 120 milliseconds (ms).
Group 2. Intermediate QRS complex (QRSd 120 ms > QRSd ≤ 150 ms).
Group 3. Wide QRS group (QRSd >150 ms).

At rial fibrillation: Absence of P waves, presence of f (fibrillatory) waves between QRS complexes with irregularly irregular R-R intervals.

LV dysfunction: Decreased left ventricular ejection fraction (less than 45%).

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INCLUSION CRITERIA:

Patients of both genders age between 18-80 years with LV dysfunction (as per operational definition).

EXCLUSION CRITERIA:

1)Patients having PPM, CRT and ICD.
2)Patient with electrolyte imbalance (Hyperkalemia, Hypocalcaemia) assessed on serum biochemistry.

400 cases of LV dysfunction were included in study from emergency, outpatient and inpatient departments of Punjab Institute of Cardiology Lahore and a fully informed consent was taken. A 12-lead ECG was recorded. QRS duration was assessed according to operational definition and on this basis patients were divided into three groups: Narrow QRS group QRSd < 120 milliseconds (ms), intermediate QRS group (QRSd 120 ms > QRSd ≤ 150 ms) and wide QRS group (QRSd >150 ms). ECG was assessed for the presence of atrial fibrillation in patients with LV dysfunction for all QRS groups.

SPSS 20 was used for data analysis. Anova test was applied to observe groups mean differences in quantitative variables while, Pearson Chi-Square test was applied to observe the association of qualitative variables with three groups. P value of < 0.05 was considered statistically significant.

RESULTS:

400 patients of LV dysfunction (EF<45%) selected and studied as per inclusion and exclusion criteria. Mean age was 56.5±11.6. The study population consisted of male (72.3%) and female (27.7%). Mean LA diameter was 40.3±6.08 mm and mean LV ejection fraction 31.8±6.6 %. CAD was the most common cause of LV dysfunction (87.75%) followed by Non-ischemic cardiomyopathy (8.75%) and Non-Ischemic valvular heart disease (3.5%). The percentage of Narrow QRSd (<120 ms) was 62%, Intermediate QRSd (120-150 ms) was 26.5% and Wide QRSd (>150 ms) was 11.5%. The frequency of atrial fibrillation in study population was 15.75%. The frequency of atrial fibrillation was highest in Wide QRSd group (60.9%), followed by Intermediate QRSd group (18.9%) and narrow QRSd group (6.04%). Patient with atrial fibrillation are more likely to have poor ejection fraction (P<0.0023) and more likely to have wider QRS duration (P<0.0001) (Table 1).

Regarding gender distribution of patients according to presence of atrial fibrillation 44(69.8%) were males and 19(30.2%) were females (Fig.1).

Regarding the presence of atrial fibrillation in cardiomyopathy groups, ICMP group was having 54(15.3%), valvular cardiomyopathy 6(42.8%) and DCMP 3(9.4%) patients (Fig.2).

Table 1: Baseline Demographic variables

CHARACTERISTICS	Narrow QRSd <120 ms n=248 (62%)	Intermediate QRSd 120-150 ms n=106 (26.5%)	Wide QRSd >150 ms n=46 (11.5%)	Total n=400	P-value
Age mean years	56.31±11.1	55.7±13.5	59.2±9.2	56.5±11.6	0.0626
Gender Male Female	 182(73.4%) 66(26.6%)	 75(70.7%) 31(29.2%)	 32(69.6%) 14(30.4%)	 289(72.3%) 111(27.7%)	0.8025
Non-ischemic cardiomyopathy	18(7.3%)	11(4.4%)	6(13%)	35(8.75%)	0.1901
Ischemic heart disease	224(90.3%)	88(83%)	39(84.7%)	351(87.75%)	0.1142
Non-Ischemic valvular heart disease	6(2.4%)	7(2.8%)	1(2.3%)	14(3.5%)	0.9512
LA diameter mean mm	39.2±5.8	41.4±5.5	43.9±6.9	40.3±6.08	0.056
LV ejection fraction mean percentage	33.6±6.1	29.8±6.3	26.4±6.3	31.8±6.6	0.599
Atrial fibrillation	15(6.04%)	20(18.9%)	28(60.9%)	63(15.75%)	0.001

Figure.1: Gender Distribution According to Presence of Atrial Fibrillation

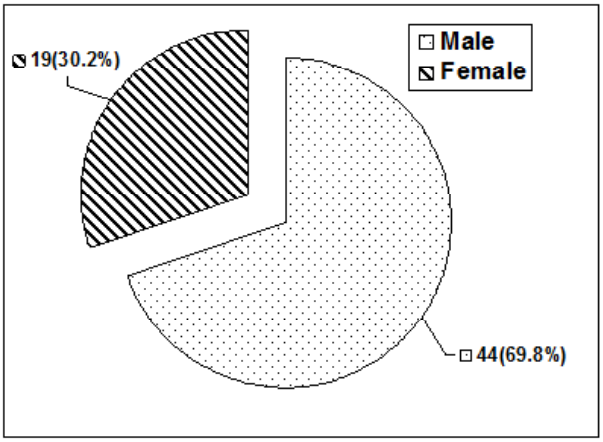
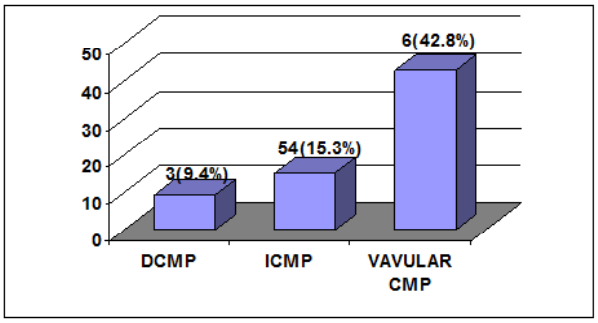


Figure.2: Shows presence of atrial fibrillation in cardiomyopathy Groups.



(DCMP = Dilated Cardiomyopathy; ICMP=Ischemic cardiomyopathy; Valvular CMP = Valvular Cardiomyopathy. NIVHD = Non-ischemic valvular heart disease)

Figure.3: Impact of QRS Duration on Left Ventricular Ejection Fraction

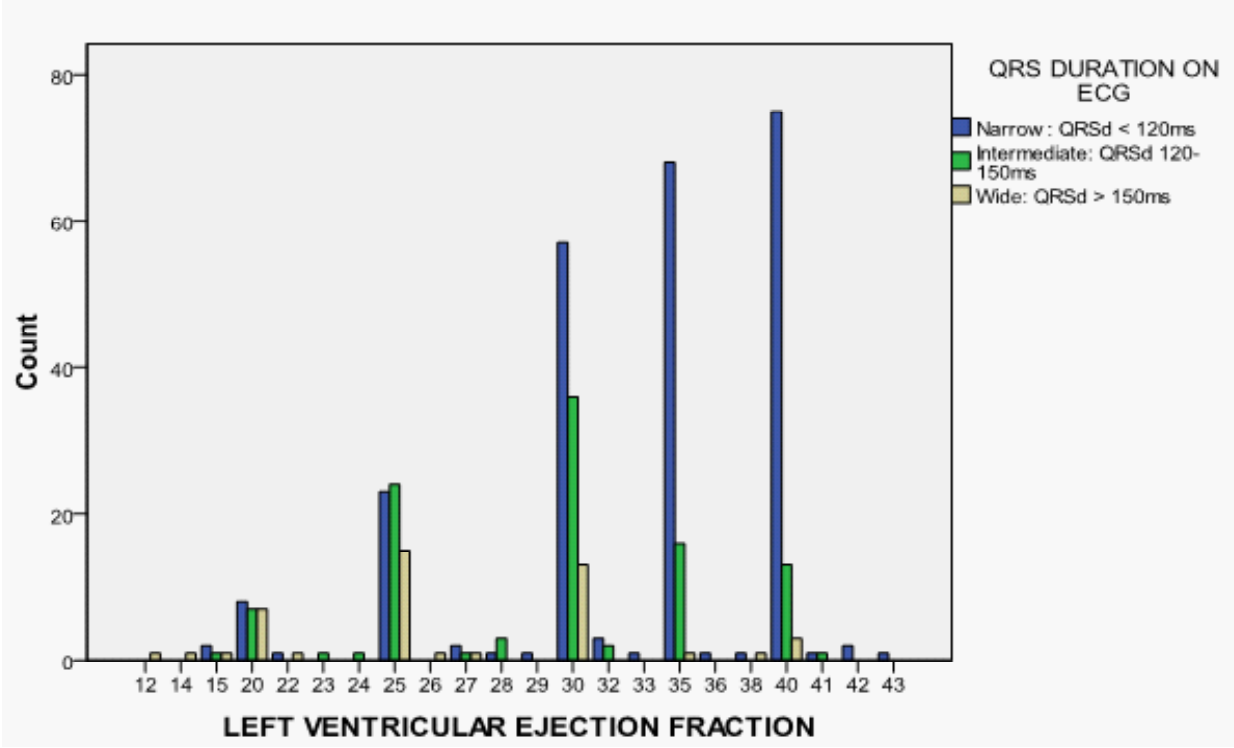


Figure.4: Relationship between QRS duration and Atrial Fibrillation

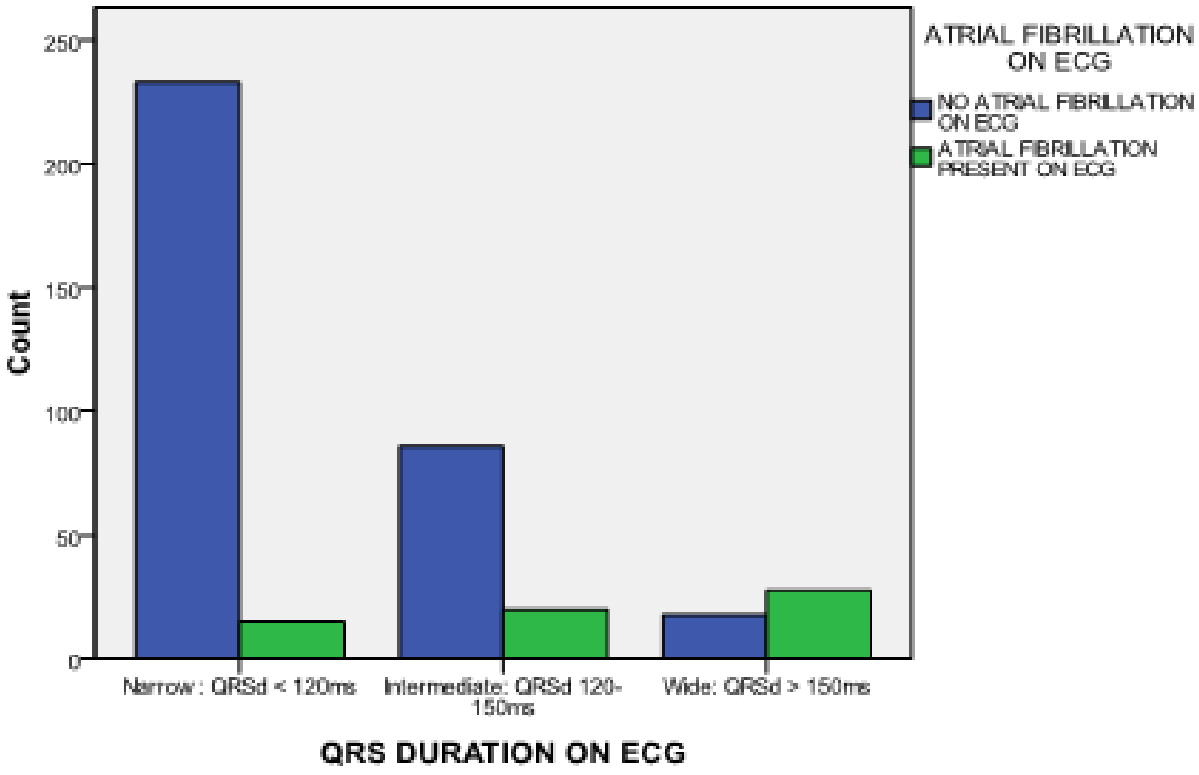
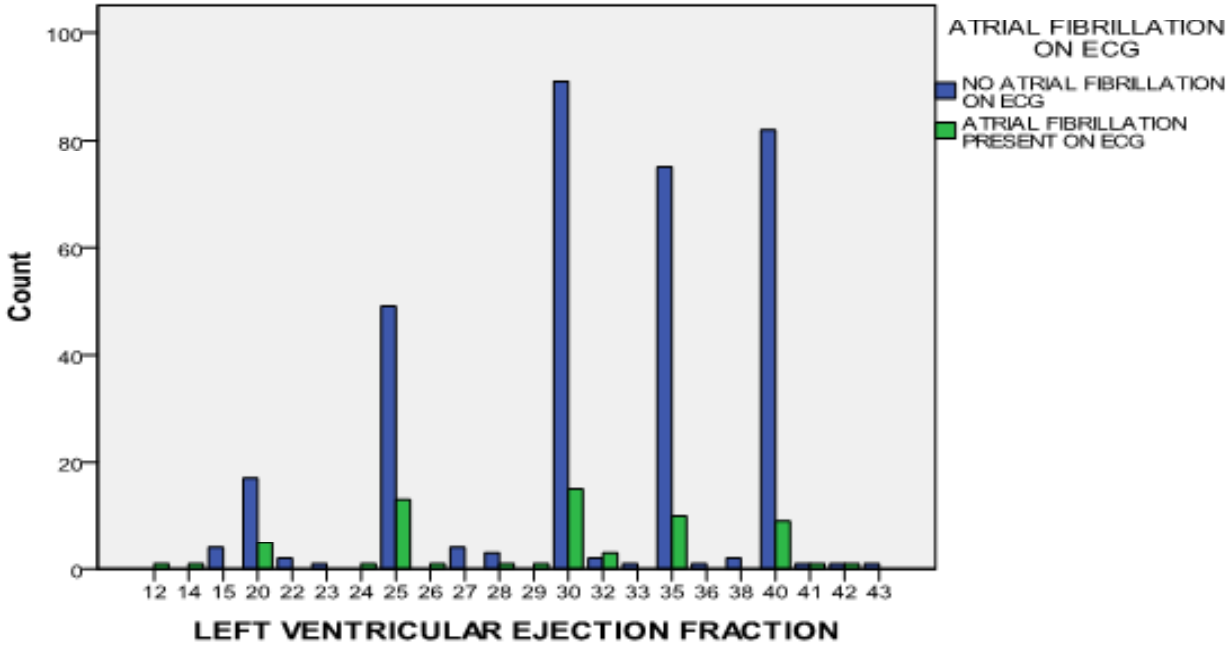


Figure.5: Relationship between Ejection fraction and Atrial Fibrillation



Patients of LV dysfunction selected for the study, the number of patients with wide QRS duration increases as the ejection fraction decreases (Fig.3). The number of patients with atrial fibrillation increases as QRS duration widens. Highest number of patient with atrial fibrillation fall in wide QRS group > 150ms (Fig.4).

There is a relative increase in number of patients with atrial fibrillation as ejection fraction declines. However prevalence of AF appears to be more associated with QRS duration than EF (Fig.5).

DISCUSSION:

In CHF 30%(14-47%) have QRS duration more than 120 ms.[4] According to various reports, around 19% to 29% of CHF patients show a QRSd>150ms.[5-7] QRS duration and ejection fraction are inversiliy related[8]. Shenkman et al showed widening of QRS as EF declines.[9] Various studies have shown that AF prevalence in patients with LV dysfunction varies with severity of CHF.[10]

EL-Chami et al. showed 42% patients having QRS duration more than 120ms in patients with LV dysfuncation[2]. Atrial fibrillation was seen in 20.9% in patients with QRSd < 120ms and 35.5% QRSd more than 150ms.

Our study also showed increased prevalence of atrial fibrillation in patients with LV dysfunction and increasing prevalence from 6% to 60% in patients with narrow QRS complex to patients with wide QRS complex respectively.More than 60% patients with wide QRS duration had EF< 25% and about 32% patients with wide QRS complex had EF< 30%.

QRS duration increases in patients having low EF and the prevalence of AF is also more in this group of population. In patients with wide QRS complex and low EF there are trigger foci around pulmonoray veins. Electrical conduction abnormalities and atrial structural remodeling with fibrosis are major mechanisms for atrial fibrillation.

STUDY LIMITATION:

Confounding variables could not be ruled out in this study. More studies are required to determine the association between QRSd and development of AF.

CONCLUSION:

Atrial fibrillation is more common with LV systolic dysfuncation and wide QRS duration. These groups of people need more attention for preventive strategy.

Author's Contribution

NURM: Conducted the study and wrote the article. IM: Communicated to publish the article. AS: Corrections and did final proof reading. MA: Consultant incharge and supervisor.

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