

STUDY OF MITRAL VALVE REMODELING IN PATIENTS WITH ATRIAL FUNCTIONAL MITRAL VALVE REGURGITATION USING THREE DIMENTIONAL ECHOCARDIOGRAPHY

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Introduction

The global burden of atrial fibrillation (AF) is enormous for cases, physicians, & healthcare systems. Substantial scientific efforts and resources are committed to elucidating the mechanisms behind AF, its natural progression, & efficient treatments. AF is typically classified into five distinct patterns depending on the onset, progression, and resolution of AF episodes, first diagnosed AF, paroxysmal AF, persistent AF, long-standing persistent AF, permanent AF. Atrial structural remodeling or exacerbation of atrial cardiomyopathy are generally defining features of the transition from paroxysmal to non-paroxysmal AF. The duration of rhythm monitoring and the presence of a substrate are both important factors in determining the rate of AF development. AF is both a risk factor and a hallmark of atrial cardiomyopathy, that could clarify the absence of a temporal correlation among AF & stroke. Atrial remodeling influences major clinical difficulties in AF (i.e. avoidance of thromboembolic consequences & AF development).

In the existence of a structurally normal valve, functional MR develops when there is a mismatch between the tethering forces exerted by the heart (as a result of global and / or focal LV dilation, papillary muscle displacement, and / or dysfunction) & the closing forces exerted by the heart (as a result of decreased LV contractility and/or synchronicity). In the context of functional MR, annular dilation alone, can constitute a separate etiology of MR (atrial functional MR). TEE provides supplementary imaging, particularly if TTE windows are technically challenging, making it a useful tool even if TTE is the primary technique for assessing and quantifying mitral valve disease. 3DE data sets can be acquired from either TTE or TEE approach, allowing real-time visualization of the cardiac structures, it is superior to 2DE in quantification of cardiac chamber volumes and function, assessment of the mechanisms and severity of heart valve diseases, evaluation of cardiac complex anatomy.

Aim of the Work

The aim of the work was to study mitral valve apparatus remodeling in patients with atrial functional mitral valve regurgitation using three dimensional echocardiography.

Subjects and Methods

This study included a total of 30 patients with diagnosis of atrial fibrillation and they were divided into two groups: 15 patients having no / mild mitral regurgitation while 15 patients having moderate / severe mitral regurgitation.

Results

There was a statistically significant difference between the two groups as regards the posterior leaflet area as a larger area was estimated in (Mod / severe MR) group compared to (No / mild MR) group, with mean posterior leaflet area in group I was (8.96 ± 2.60) and (7.30 ± 2.17) in group II with (P value = 0.029) (Table 1) as well as there was a statistically significant difference between the two groups as regards total leaflet area / mitral annular area ratio as a smaller ratio was estimated in (Mod/severe MR) group as compared to (No / mild MR) group, with the mean total leaflet area / mitral annular area ratio in group I was (1.22 ± 0.04) and (1.26 ± 0.04) in group II with (P value = 0.008) (Table 2).

Table 1: Comparison between the two groups according to mitral leaflet parameters

Leaflets parameters	Group I Mod/severe MR (n = 15)	Group II No/mild MR (n = 15)	P
Posterior leaflet area (cm ²)			
Min. – Max.	5.38 – 14.75	4.22 – 12.76	0.029*
Mean \pm SD.	8.96 ± 2.60	7.30 ± 2.17	
Median (IQR)	8.42 (7.54 – 9.28)	7.18 (6.33 – 8.24)	

Table 2: Comparison between the two groups according to mitral leaflet parameters

Leaflets parameters	Group I Non mild MR (n = 15)	Group II Mild MR (n = 15)	P
Total leaflet area / mitral annular area ratio (TLA MAA)			
Min. – Max.	1.15 – 1.28	1.20 – 1.32	0.008*
Mean \pm SD.	1.22 ± 0.04	1.26 ± 0.04	
Median (IQR)	1.20 (1.19 – 1.26)	1.27 (1.23 – 1.30)	

Conclusion

Isolated annular dilatation can cause significant functional atrial mitral regurgitation while mitral leaflet area increases in AF as the annulus dilates, but this adaptation may plateau at larger annular areas, with the resulting leaflet deficiency causing functional atrial mitral regurgitation.