

## A RARE ECHOCARDIOGRAPHIC FEATURE: SYSTOLIC FLUTTERING OF THE NONCORONARY CUSP OF THE AORTIC VALVE

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### ABSTRACT

Fluttering of the cusps of the aortic valve is an abnormal motion of the cusps, it occurs often in diastole and it is usually associated with flail cusps. Systolic fluttering of the aortic cusps is a less frequent phenomenon, and limited data are found in the literature to explain the mechanism of this echocardiographical feature. We report on a 60-year-old-male patient in whom systolic fluttering of the aortic cusps was encountered incidentally during a routine echocardiographic exam.

**Keywords:** Aortic cusp; Fluttering; Non coronary

### INTRODUCTION

Fluttering of the cusps of the aortic valve is a rare echocardiographic finding, it is mostly reported during diastole and it is associated with flail cusps with consecutive severe aortic regurgitation [1]. Systolic fluttering of the aortic cusps is an uncommon echocardiographic feature and it is less frequently reported in the literature [2, 3].

The normal aortic valve is a trileaflet structure and the leaflet is composed of three layers: fibrosa, spongiosa, and ventricularis, also the leaflet structure is covered on both the ventricular and aortic surfaces by endothelium. The fibrosa contains collagen fibers and provides most of the strength of the leaflets, the spongiosa contains mucopolysaccharides and functions to resist compressive forces while the ventricularis contains elastin and contributes to the flexibility of the leaflets [4]. Though not completely demonstrated, it is estimated that systolic fluttering is mainly due to ventricularis dysfunction owing to elastin deficit while diastolic fluttering is mainly due to fibrosa dysfunction owing to collagen deficit [4, 5].

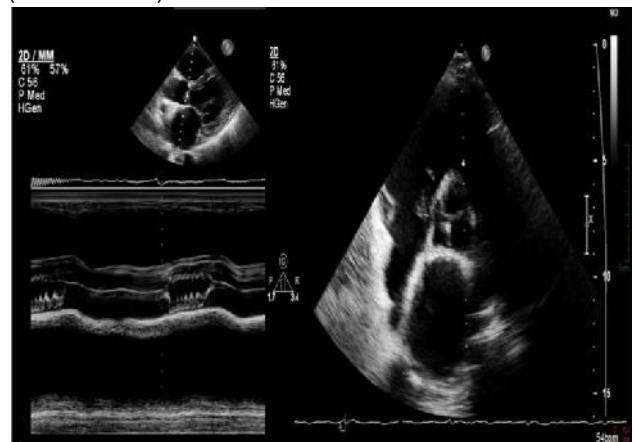
In this paper, we report on a patient with no relevant medical history, in whom a major systolic fluttering of the noncoronary cusp along with a minor systolic fluttering of the right coronary cusp were documented. Discussion was made while giving an insight into primary and secondary causes of systolic cusps fluttering, on the light of the available medical literature.

### CLINICAL PRESENTATION

A 60-year-old-male patient with no relevant medical history was admitted for palpitations. Physical examination revealed a mild apical systolic murmur with no radiation, surface electrocardiogram showed rare

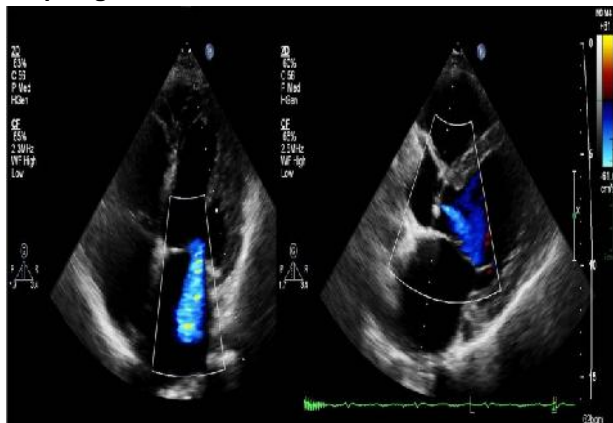
premature ventricular complexes with non specific ST/T changes and exercise stress test was negative.

Echocardiogram revealed a normal systolic function, normal cavities dimensions and normal aortic root dimensions, mild diastolic dysfunction, aortic valve with tricuspid morphology, thickened and remodeled aortic cusps with myxomatous pattern, presence of small nodules (of Arantius) on the free edge of the cusps, normal antegrade aortic flow, moderate aortic regurgitation with central jet (vena contracta: 3 mm, pressure half time: 750 ms), moderate eccentric mitral regurgitation, thickened and remodeled mitral leaflets. Interestingly, the M-mode showed a coarse systolic fluttering of the noncoronary cusp associated with minimal fluttering of the right coronary cusp (figures 1, 2). Three-dimensional echocardiography was not performed (non available).



**Figure 1:** left panel: M Mode showing coarse fluttering of noncoronary cusp with minor fluttering of the right coronary cusp; right panel: parasternal short axis showing a tricuspid form of the aortic

valve with a prominent nodule at the noncoronary cusp edge.



**Fig 2:** Color Doppler mode showing moderate mitral (right panel) and aortic (left panel) regurgitation.

## DISCUSSION

Fluttering of the aortic cusps is an abnormal motion of the aortic valve leaflets and it may occur in systole or in diastole. Diastolic fluttering is a typical finding encountered in aortic cusps flail, and it is often consecutive to myxomatous degeneration which usually results in severe aortic regurgitation [6]. Systolic fluttering of the aortic cusp(s) is a rare finding and to the best of our knowledge, the first reported case of systolic fluttering of the aortic cusps was in 1978 [6]; later on in 1985, systolic fluttering of the noncoronary cusp and of the posterior wall of the aortic root was reported and the authors correlated the fluttering to an eccentric mitral regurgitation owing to posterior mitral leaflet dysfunction [2]. In the presented patient, fluttering was noted mainly in the noncoronary cusp, without fluttering of the posterior wall of the aortic root, also the right coronary cusp exhibits minimal fluttering; of note the left coronary cusp, visualized in the parasternal short axis, did not exhibit any fluttering (visual assessment). In this patient, we estimate that cusp fluttering is rather consecutive to a primary factor (cusps remodeling with myxomatous degeneration) rather than to a functional etiology (correlated to peri-valvular structures dysfunction), given the presence of aortic cusps myxomatous pattern [6]; moreover, minor fluttering of the right coronary cusp and the absence of fluttering of the posterior wall of the aortic root is against the hypothesis of a functional origin secondary to eccentric mitral regurgitation [2]. Owing to its central location, the aortic root is in close proximity with most cardiac chambers, atrial septum and ventricular septum; accordingly, we estimate that three-dimensional echocardiography is of high interest in this case in order to display the detailed anatomy [7] and functionality of the cusps and related structures (hingelines, sinuses, interleaflets triangles, sinotubular junction, aortic wall...). Moreover, more investigations are needed to understand the physiology and the pathophysiology of aortic valve dynamics, beyond the opening and closing process related to pressure gradient difference [8].

## CONCLUSION

Systolic fluttering of the aortic cusps is a rare echocardiographic finding, and it may occur as a primary valvular dysfunction or as secondary dysfunction. Myxomatous valvular degeneration is the main primary cause of valvular dysfunction, however, the exact physiopathology of this echocardiographic feature is still poorly understood and future investigations are needed to unfold its precise mechanism, whether it is a primary or a secondary cusp fluttering.

**Conflict of interest:** Nothing to declare

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