Autopsy Case Reports

Image in Focus

Myxomatous degeneration of the mitral valve

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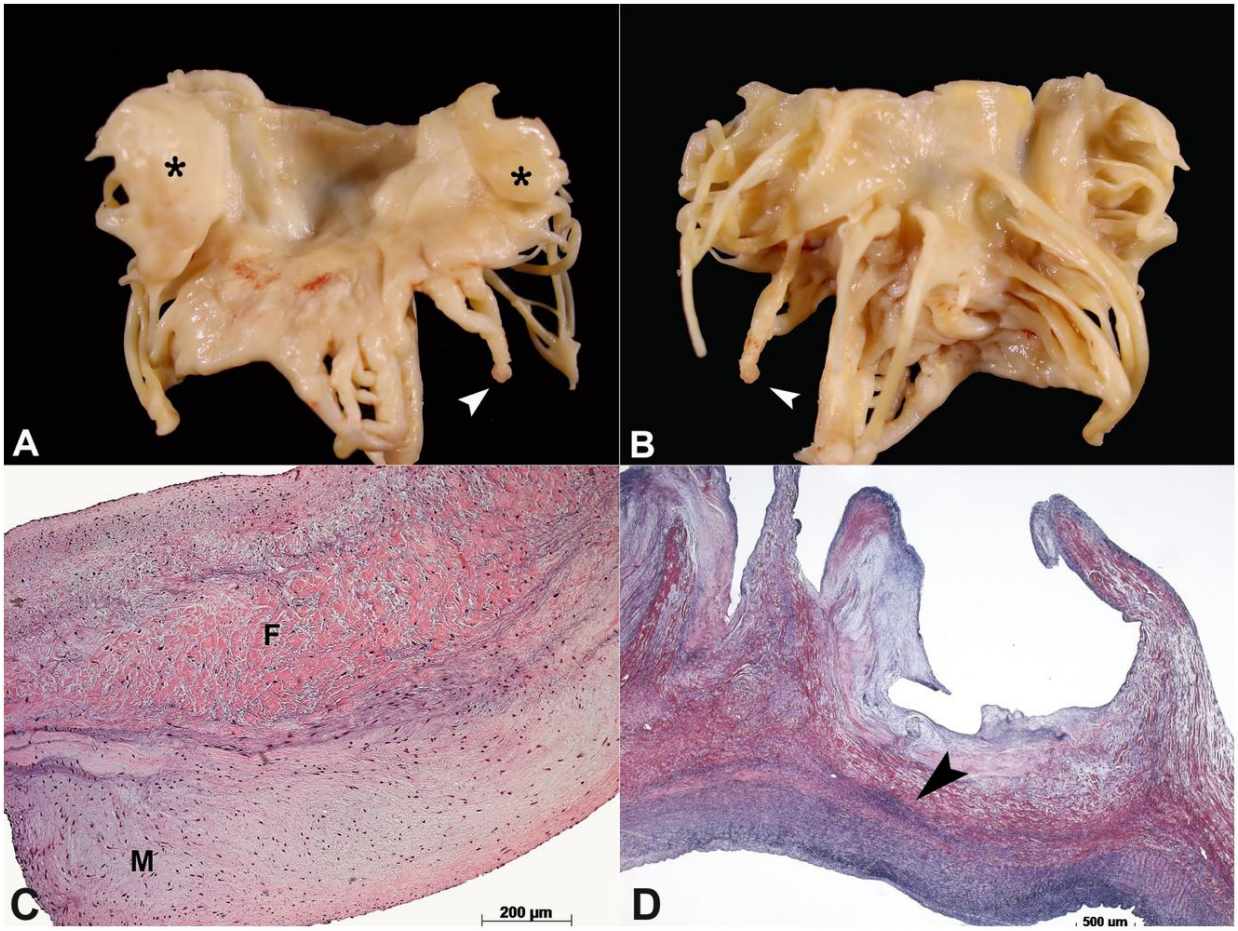

Figure 1. Gross view of the surgical specimen from an insufficient mitral valve represented by the anterior leaflet. **A –** The atrial aspect; **B –** The ventricular aspect. Note the diffuse thickening of the redundant leaflet with focal bulging towards the atrial aspect (asterisks) flagged as areas of valvar prolapse by the imaging exams. The chordae tendineae are also thickened. One of them shows a rounded tail end, which is characteristic of a secondary lesion due to its rupture (arrows); **C** and **D** – Photomicrography of the valve leaflet. In **C**, a central area of dense fibrous tissue (F) is shown, surrounded by a thick layer of loose connective tissue with myxomatous appearance (M). Hematoxylin-eosin stain, objective magnification 10X. In **D**, the valve section stained with Movat pentachrome is shown, revealing pale blue areas corresponding to myxomatous stroma. Black areas correspond to elastic fibers, focally disrupted (black arrowhead). Objective magnification 2.5X.

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Myxomatous degeneration of the cardiac valves (MDMV) stands for the non-inflammatory progressive disarray of the valve structure caused by a defect in the mechanical integrity of the leaflet due to the altered synthesis and/or remodeling by type VI collagen. The gross morphologic features are characterized by voluminous and thickened leaflets, in both longitudinal and transversal axes. This entity involves not only the valve but also the chordae tendineae that has also become thickened, elongated, and sometimes ruptured.[1] Additionally, MDMV mostly involves the posterior leaflet, usually in the absence of commissural fusion and with a normal or enlarged annulus.[1,2] Histologically, MDMV is characterized by thickening and proliferation of the spongiosa with pooling of glycosaminoglycan that expands to the fibrosa, giving the appearance of cystic spaces and less dense collagen. Common alterations include fragmentation of the collagen of the fibrosa layer, and the presence of disrupted, fragmented, and granular elastic fibers forming an amorphous clump.[3]

Although the primary mechanism is uncertain, it is thought to happen due to an imbalance between synthesis and degradation of the extracellular matrix in which overexpression of metalloproteinases and cellular proliferation are involved.[4] A dominant familial inheritance, mapped to Xq28, has been reported in a cohort study.[5] The Marfan and Ehlers–Danlos syndromes are also associated with MDMV, although the pathogenesis is not well known. However, it is conceived that the genetic abnormalities are responsible for the defective synthesis of the elastic fibers and the collagen, respectively, which directly weakens the valve structure or indirectly alters the muscular contraction, placing greater stress on the valves, and inducing the myxomatous alterations.[6] The myxomatous valve can be distinguished from rheumatic valvular disease by retraction and fusion of the chordae, besides commissural fusion and the presence of inflammatory infiltration and neoformed vessels in the latter.[6]

The most frequent complication of myxomatous valvular disease is the mitral valve prolapse (MVP),[7] defined as the atrial bulging of the mitral leaflets of more than 2 mm during systole beyond the annular plane, a valvular thickening of ≥3 mm and/or ruptured chordae tendineae. In a retrospective cohort study,[8] MVP was observed in 87.5% of the patients with myxomatous degeneration. Since MDMV is a histopathological diagnosis, its prevalence is estimated based on the MVP diagnosed by echocardiography which is 1%-4%, in the epidemiological cohorts.[7,9,10] MDMV occurs more frequently in young females; however, the males are more symptomatic.[6] The mitral valve represents more than 60% of myxomatous degenerated valves, followed by the aortic and tricuspid valves.[8] Compared to control individuals, the presence of MVP leads to a greater degree of mitral regurgitation, which is, on average, trace or mild. In addition, no differences were observed concerning the symptoms of chest pain, dyspnea, or electrocardiographic abnormalities.[7,8] Therefore the association of MDMV and cardiovascular symptoms remains uncertain.[11]

The feared complication of MDMV is the rupture of the chordae tendineae, which leads to acute mitral regurgitation or the enhancement of pre-existing insufficiency.[6] Symptoms of acute mitral regurgitation are of acute pulmonary edema, hypotension, and features consistent with cardiogenic shock.[12] The treatment of symptomatic acute severe non-ischemic mitral rupture is immediate mitral valve surgery, which consists of implanting a prosthetic mitral or mitral valve repair.[12] The surgical technique depends on the degree of valve degeneration, the dilation of cardiac chambers, and the experience of the surgical team.[13,14] Complications associated with MDMV include infective endocarditis, sudden death, and the occurrence of stroke in younger patients. A higher prevalence (11.7%) of MVP in sudden cardiac deaths (SCD) compared to the general population provides indirect evidence of the association of MVP and SCD.[15]

The image above (Figure 1) is the surgical specimen of a 50-year-old man who was submitted to a mitral valve replacement. He presented to the emergency room complaining of fatigue and moderate exertional dyspnea. His medical history included systemic arterial hypertension, chronic atrial fibrillation, asthma, and diverticulitis. On the physical examination, a systolic regurgitation murmur was audible on the cardiac apex associated with bilateral pulmonary crackles and increased jugular venous pressure.

The echocardiography showed a normal left ventricular ejection fraction, normal myocardium thickness, a moderate to severe enlargement of the left cardiac chambers, and marked mitral regurgitation. The coronary catheterization was unremarkable.

The patient underwent valve replacement by a Carpentier–Edwards bovine pericardium prosthesis. The postoperative period was uneventful, and he was discharged 3 days after surgery to an outpatient clinic follow-up.

Keywords
Mitral Valve Prolapse, Mitral Valve Insufficiency, Heart Failure, Myxomatous

REFERENCES

1. Lester WM. Myxomatous mitral valve disease and related entities: the role of matrix in valvular heart disease. Cardiovasc Pathol. 1995;4(4):257-64. http://dx.doi.org/10.1016/1054-8807(95)00052-7. PMid:25851088.

2. Mair WJ. Sudden death in young females with floppy mitral valve syndrome. Aust N Z J Med. 1980;10(2):221-3. http://dx.doi.org/10.1111/j.1445-5994.1980.tb03717.x. PMid:6930215.

3. Pellerin, D., Brecker, S. & Veyrat, C. Degenerative mitral valve disease with emphasis on mitral valve prolapse. *Heart*. 2002;88**(**Suppl 4):20iv-28. http://dx.doi.org/10.1136/heart.88.suppl_4.iv20.

4. Loardi C, Alamanni F, Trezzi M, et al. Biology of mitral valve prolapse: the harvest is big, but the workers are few. Int J Cardiol. 2011;151(2):129-35. http://dx.doi.org/10.1016/j.ijcard.2010.11.004. PMid:21168228.

5. Trochu JN, Kyndt F, Schott JJ, et al. Clinical characteristics of a familial inherited myxomatous valvular dystrophy mapped to Xq28. J Am Coll Cardiol. 2000;35(7):1890-7. http://dx.doi.org/10.1016/S0735-1097(00)00617-3. PMid:10841240.

6. Vaideeswar P, Butany J. Valvular heart disease. In LM Buja, J Butany. Cardiovascular pathology. Cambridge: Academic Press; 2016. p. 485-528.

7. Freed LA, Levy D, Levine RA, et al. Prevalence and clinical outcome of mitral-valve prolapse. N Engl J Med. 1999;341(1):1-7. http://dx.doi.org/10.1056/NEJM199907013410101. PMid:10387935.

8. He Y, Guo Y, Li Z, et al. Echocardiographic determination of the prevalence of primary myxomatous degeneration of the cardiac valves. J Am Soc Echocardiogr. 2011;24(4):399-404. http://dx.doi.org/10.1016/j.echo.2011.01.001. PMid:21353473.

9. Flack JM, Kvasnicka JH, Gardin JM, Gidding SS, Manolio TA, Jacobs DR Jr. Anthropometric and physiologic correlates of mitral valve prolapse in a biethnic cohort of young adults: the CARDIA study. Am Heart J. 1999;138(3 Pt 1):486-92. http://dx.doi.org/10.1016/S0002-8703(99)70151-1. PMid:10467199.

10. Devereux RB, Jones EC, Roman MJ, et al. Prevalence and correlates of mitral valve prolapse in a population-based sample of American Indians: the strong heart study. Am J Med. 2001;111(9):679-85. http://dx.doi.org/10.1016/S0002-9343(01)00981-0. PMid:11747846.

11. Dursunoğlu, D., Evrengül, H. & Semiz, E. Mitral valve prolapse syndrome: orthostatic hypotension and physiopathology of its clinical symptomathologies. Anadolu Kardiyol Derg. 2003;3(1)**:**60-4. PMID: 12626313.

12. Ogunbayo GO, Thambiaiyah S, Ojo AO, Obaji A. 'Atypical Pneumonia': acute mitral regurgitation presenting with unilateral infiltrate. Am J Med. 2015;128(6):e5-6. http://dx.doi.org/10.1016/j.amjmed.2014.12.016. PMid:25555551.

13. Nishimura RA, Otto CM, Bonow RO, et al. 2017 AHA/ACC Focused Update of the 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: a Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation. 2017;135(25):e1159-95. http://dx.doi.org/10.1161/CIR.0000000000000503. PMid:28298458.

14. Newcomb AE, David TE, Lad VS, Bobiarski J, Armstrong S, Maganti M. Mitral valve repair for advanced myxomatous degeneration with posterior displacement of the mitral annulus. J Thorac Cardiovasc Surg. 2008;136(6):1503-9. http://dx.doi.org/10.1016/j.jtcvs.2008.05.059. PMid:19114198.

15. Nalliah CJ, Mahajan R, Elliott AD, et al. Mitral valve prolapse and sudden cardiac death: a systematic review and meta-analysis. Heart. 2018;heartjnl-2017-312932. http://dx.doi.org/10.1136/heartjnl-2017-312932. PMid:30242141.

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