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Anatomy of the Human Mitral Valve Leaflets: Implications for Transcatheter and Surgical Mitral Valve Repair Techniques

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Abstract : Introduction: Rapid development of the surgical and less-invasive percutaneous mitral valve repair procedures greatly increase the interest of the mitral valve anatomy. The aim of this study was to characterize morphological variability of the mitral valve leaflets and to provide the size of their particular parts. Materials and Methods: In the study, we included 200 autopsied human hearts from Caucasian individuals (25% females) with mean age 47.5 (±17.9) without any valvular diseases. The morphology of the mitral valve was evaluated. The intercommissural and aorto-mural diameters of the mitral annulus were measured. All leaflets and their scallops were identified. The base and the height of the posteromedial commissure (PM-C), anterolateral commissure (AL-C), anterior leaflet (AL) and posterior leaflet (PL) with their scallops were measured. Results: The intercommissural diameter was 28.0±4.8 mm, the aorto-mural diameter 19.7±4.8 mm, circumference of the mitral annulus 89.9±12.6 mm and the area of the mitral valve 485.4±171.4 mm2. Classical mitral valves (AL+AL-C+PL(P1,P2,P3)+PM-C) were found in 141 (70.5%) specimens. In classical type, the mean AL base and height were 30.8±4.9 mm and 20.6±4.2 mm, while mean PL base and height 45.1±8.2 mm 12.9±2.8 mm respectively. The mean ratio of the AL base to PL base was 0.7±0.2. Variations in PL were found in 55 (27.5%) and in AL in 5 (2.5%) hearts. The most common variations were: valve with one accessory scallop (AcS) between P3 and PM-C (7%); AcS between P1 and AL-C (4%); connections of P2 and P3 scallops (4%); connections of P1 and P2 scallops (3%); AcS in AL (2.5%). All AcS were smaller than the main PL scallops. The mean intertrigonal distance was 21.9±3.8 mm. Conclusions: In all cases, the mitral valve is built by two main leaflets with possible variants in secondary to leaflets scallops (29.5%). The variations are largely associated with PL and are mostly related to the presence of AcS. Anatomically the AL is not divided into scallops, and it occupies 34.5% of the mitral annulus circumference. Understanding the anatomy of the mitral valve leaflets helps to planning and performing mitral valve repair procedures.

Keywords : accessory scallop, commissure, connected scallops, human heart, mitral leaflets, mitral valve
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