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Repair Strategies Based on Pathological Characteristics of the Rheumatic Mitral Valve in Chinese Patients

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Background We aimed to clarify the pathological characteristics of rheumatic mitral valve disease in Chinese individuals, as well as to determine the appropriate rheumatic mitral valve repair strategy according to such characteristics.

Methods We obtained detailed statistics regarding the pathological characteristics of patients who underwent mitral valve repair or replacement for rheumatic disease during the past year at our centre. The outcomes of different repair techniques were compared. Multivariate logistic regression analyses were used to identify predictive factors for successful rheumatic mitral valve repair.

Results Between August 2015 and August 2016, 163 patients underwent rheumatic mitral valve repair (77 cases) or replacement (61 cases) at our centre. Although the prevalence of pathological lesions was typically high, the prevalence of severe lesions was low in the leaflets and high in the commissure and subvalvular apparatus (more than one-third of all lesions in these areas). Commissurotomy (97.40%) and leaflet thinning (84.42%) were performed most frequently. On multivariate logistic regression analysis, pathological score >17.5 (odds ratio [OR] for success, 0.049; $p < 0.0001$) and mixed lesion preoperatively (OR for success, 0.186; $p = 0.011$) predicted repair failure, whereas severe regurgitation preoperatively (OR = 4.897; $p = 0.026$) predicted successful rheumatic mitral valve repair.

Conclusions Lesions of the commissure and subvalvular apparatus are the main pathological features in Chinese patients with rheumatic mitral valve disease. The commissure processing technique is beneficial in most such patients.

Keywords Rheumatic mitral valve • Pathological characteristics • Repair technique • Chinese

Introduction

The feasibility and durability of rheumatic mitral valve repair have been confirmed based on long-term follow-up results reported in previous studies [1–3]. However, although many Chinese patients have rheumatic disease [4,5], very few Chinese surgeons are willing to attempt rheumatic mitral valve repair. In our centre, this technique was introduced only several years ago, whereas hospitals outside

China have been performing it longer. More than 200 of our patients have been treated with rheumatic mitral valve repair, for which the longest follow-up is currently more than five years. Surgical techniques have improved significantly since the first valve repair for rheumatic mitral disease was performed in our hospital. However, in our clinical practice involving Chinese patients with rheumatic mitral valve disease, we found pathological characteristics that were obviously different from those reported in studies from

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other countries [3,6–9], and determined that the repair techniques typically used in other centres were not appropriate for Chinese patients [10–12]. Because of these differences in pathological features, a more targeted treatment strategy is needed. In addition, because there is a paucity of detailed descriptions regarding the pathological features of the rheumatic mitral valve in Chinese patients, a quantitative pathological evaluation system is required. Therefore, after referring to previous clinical experience, our centre put forth

a pathological grading system of rheumatic mitral valve lesions (PGSRMVL) based on visual observations made intraoperatively (Table 1). At our centre, the pathological features of consecutive patients who underwent mitral valve repair or mitral valve replacement for rheumatic disease have been evaluated using PGSRMVL starting in August 2015.

Using detailed statistics of the pathological features of all patients, as well as postoperative follow-up data, we aimed

Table 1 Pathological grading system of rheumatic mitral valve lesions (PGSRMVL).

Pathological characteristic		Definition	Score
Leaflet thickening	Mild	Thickening is confined to the margins of the leaflets; thickened leaflet area is less than one-third of the leaflet area; leaflet mid portions and base portions have normal mobility	1
	Moderate	One half of the leaflet area is thickened and stiff; other portions have normal mobility	2
	Severe	All or most leaflet portions are thickened and stiff	3
Leaflet calcification	Mild	Surface of the leaflet has calcified spots, but calcification does not affect the full thickness of the leaflet	2
	Moderate	Single, localised, calcification area, the diameter of which is <1 cm	4
	Severe	Full thickness of the leaflet is calcified and the diameter is >1 cm, or more than one-third of the leaflet area is calcified	6
Leaflet contractur	Mild	Height of the anterior valve is <2.5 cm; height of the posterior valve is <1.5 cm	1
	Severe	Height of the anterior valve is <2 cm; height of the posterior valve is <1 cm	2
Chordae tendineae thickening	Mild	Only some major chordae tendineae are thickened; thickening is confined to the joint between the leaflet and chordae tendineae	1
	Moderate	Less than half of the major chordae tendineae are thickened	2
	Severe	All or most major chordae tendineae are thickened and thickening reaches the papillary muscles	3
Chordae tendineae fusion	Mild	Not more than 3 chordae tendineae fused	2
	Severe	More than 3 chordae tendineae fused	4
Chordae tendineae calcification	Mild	The end of the single or multiple chordae tendineae is calcified but does not fuse	2
	Severe	Multiple chordae tendineae are fused and calcified; they are shaped like a ball	4
Chordae tendineae shortening	Mild	Clearly distinguished structures of papillary muscles, chordae tendineae, and margins of leaflets; length of major chordae tendineae is >0.5 cm	2
	Severe	Indistinguishable structures of papillary muscles, chordae tendineae, and margins of leaflets; length of the major chordae tendineae is <0.5 cm or the leaflet is almost directly connected with the papillary muscle	4
Commissural fusion	Mild	Length of commissural fusion is <1 cm	1
	Moderate	Length of commissural fusion is between 1 cm and 2 cm	2
	Severe	Length of commissural fusion is >2 cm	3
Commissural calcification	Mild	Scope of commissural calcification is less than half; the whole commissure retains partial mobility	2
	Severe	The whole commissure is calcified and fixed, thereby losing mobility	4

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