

# Repair Techniques for Mitral Valve Insufficiency in Children



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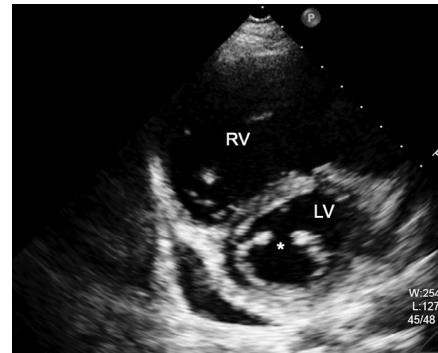
Congenital mitral valve (MV) dysplasia is a relatively rare and highly complex cardiac disease. We sought to provide a comprehensive analysis of the current surgical techniques for treating mitral valve insufficiency and the results of mitral valve repair at our institution. Between 1972 and 2017, 104 consecutive patients underwent surgical repair of congenital MV dysplasia- insufficiency at our institution. Among these, 59 patients presented with MV insufficiency (or prevalent MV insufficiency) and were part of the study. There was 1 early (1.7%) and 1 late death (1.7%). Survival at 5, 10 and 20 years was 98%, 98% and 94%, respectively. Eight patients (14%) required MV replacement for residual significant MV insufficiency. Freedom from re-intervention for MV dysfunction at 5, 10 and 20 years were 89%, 84% and 79%, respectively. Surgical techniques for treating mitral valve insufficiency must be tailored for each patient with the main goal of achieving a proper valve function, rather than a “normal” anatomy. The mechanism underlying valve dysfunction in congenital mitral valve insufficiency is multifactorial and requires the application of a variety of surgical techniques in each case.

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## Introduction

Congenital mitral valve (MV) dysplasia is a relatively rare and highly complex congenital cardiac disease including a variety of different anatomical abnormalities, which can affect each component of the MV apparatus (leaflets, fibrous ring, chordae and papillary muscles). In 1976, Carpentier published the first pathophysiological classification (which was subsequently revised in 1998)<sup>1,2</sup> comprising two main categories based on MV dysfunction: 1) insufficiency (or prevalent insufficiency) and stenosis (or prevalent stenosis). Surgical treatment of MV dysplasia and dysfunction remains a major therapeutic challenge and should aim for valve repair rather than replacement, because of the untoward deleterious effects of prosthetic valve replacement, particularly in small children.<sup>2-6</sup> The aim of this study is to provide a comprehensive analysis of the current surgical techniques for treating mitral valve insufficiency (or prevalent insufficiency) and their results in our Institution.



Preoperative 2D echo image (short axis view) showing an isolated mitral valve cleft. LV: left ventricle, RV: right ventricle.

### Central Message

Surgical techniques for treating mitral valve insufficiency must be tailored with the main goal of achieving a proper valve function, rather than a “normal” anatomy.

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## Mitral Valve Instrumental Evaluation

An accurate preoperative diagnostic assessment is of paramount importance for understanding the mechanism underlying the valve dysfunction and for planning the ideal surgical strategy. Intraoperative 2D or 3D echo assessment of the mitral valve anatomy and function, either by epicardial or trans-oesophageal probe has a major role in the optimal surgical management for paediatric cardiac surgery as it gives useful information during all procedural phases.<sup>7,8</sup> In addition, the re-assessment of mitral valve function by hydrodynamic tests and eventually with 2D/3D echocardiography is essential to check the accuracy of surgical repair.

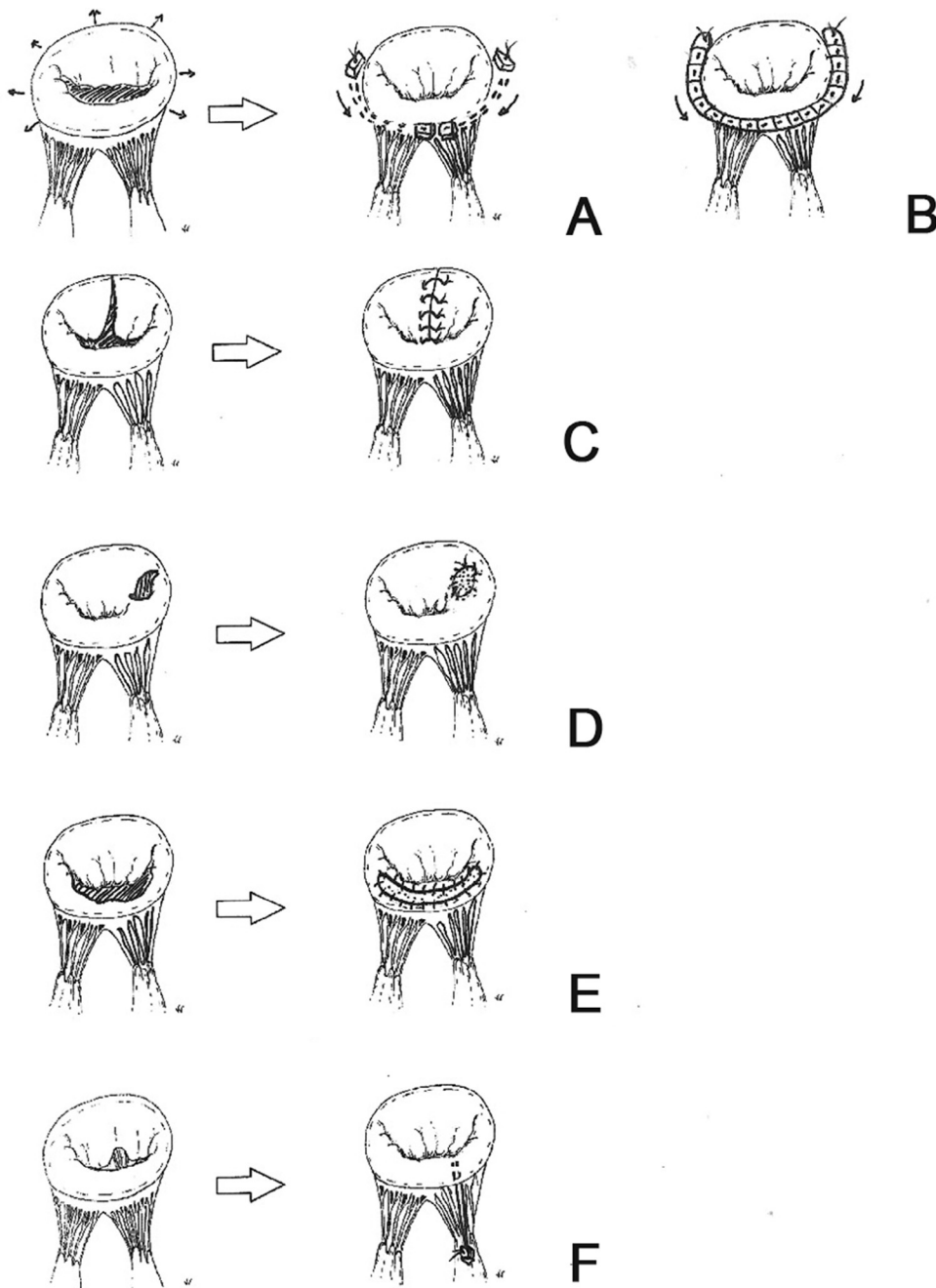
## Repair Techniques in MV Insufficiency

Due to the complexity of the different types of MV dysplasia, surgical techniques for treating mitral valve insufficiency must be tailored with the main goal of achieving a proper valve function, rather than a "normal" anatomy. Usually a combination of techniques may be required to achieve a good functional result.

Surgical techniques include:

- MV annuloplasty

When MV annular dilation is present, a posterior annular plication is performed with pledgeted sutures (Fig. 1A).



**Figure 1** Figure showing repair techniques in mitral valve (MV) insufficiency: A) MV annuloplasty (posterior annular plication is performed with pledgeted sutures), B) prosthetic ring annuloplasty, C) isolated cleft closure, D) aberrant orifice closure, E) leaflet's patch augmentation, F) chordae shortening, G) neo-chordae implantation.

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