



## Balloon Mitral Valvuloplasty in a 7 Years Old Boy (Using Pediatric Hardware) With Severe Rheumatic Mitral Stenosis With Orthopnea

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### ABSTRACT

Mitral stenosis one of the grave consequences of Rheumatic Heart disease is generally considered to take decade to evolve. However several studies from developing countries have shown mitral stenosis following a different course from that seen in developed countries. Percutaneous mitral commissurotomy is known treatment for mitral stenosis in adults as well as children with pliable valves. Here we report a successful balloon mitral valvotomy in 7 years old boy who had severe symptomatic Rheumatic mitral valve stenosis

### KEYWORDS

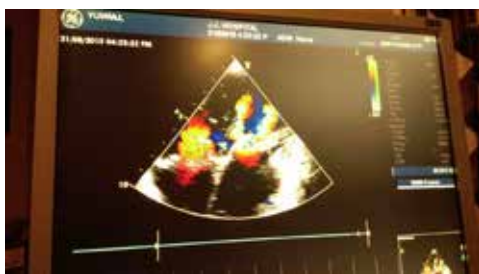
Inoue balloon, Pediatric broken brough needle, Pediatric mullins sheath, mitral stenosis

### Case Report

In August 2015 a 7 years old boy presented with 6 months history of severe dyspnea on exertion & 1 month history of orthopnea. This patient height was 98 cm, his weight was 24 kg. His history revealed episode of arthritis 2 years earlier which, we thought was episode of rheumatic fever. Clinical examination showed evidence of severe mitral stenosis and severe pulmonary hypertension. Electrocardiogram showed right axis deviation, RVH and left atrial enlargement

Chest x-ray showed evidence of severe PAH and pulmonary venous hypertension. 2d Echo showed severe Rheumatic mitral stenosis. Thickened sclerotic mitral stenosis (fig) a narrow turbulent mitral inflow Jet (fig) severe subvalvular stenosis and mild mitral regurgitation with an overall wilkins score of 7/16. There was also moderate tricuspid regurgitation with predicted right ventricular systolic pressure of 65 mmHg.

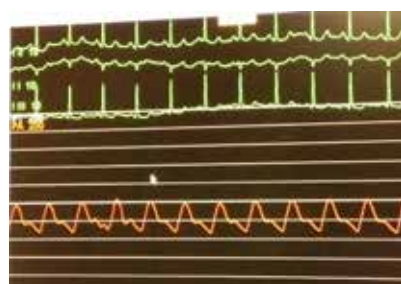
**Fig -> Severe MS severe subvalvular stenosis (B) narrow turbulent mitral inflow jet.**

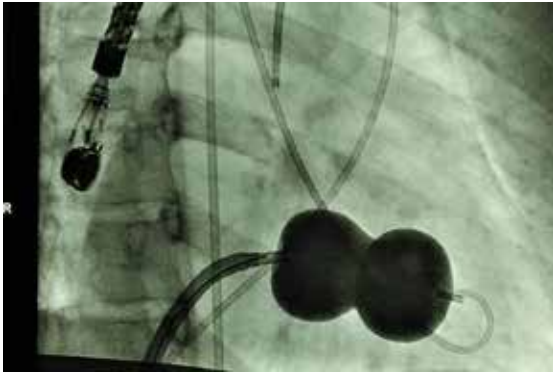
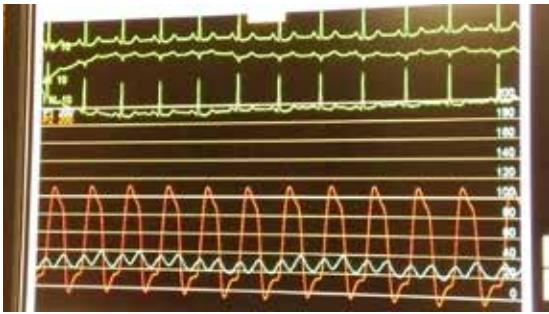


The child was taken for balloon mitral valvotomy with the use of Inoue technique. The patient was given light sedation with fentanyl. Right and left sided cardiac catheterization was done and baseline pressure data was obtained.

Pediatric mullins sheath and pediatric brokenbrough puncture needle was used. Transeptal puncture was performed by the brokenbrough technique and access to left atrium was obtained after dilation of transseptal puncture. Heparin 100 u/kg was given. The pressures in LA were 45/37 (mean 40)

LVEDp was 18 (fig). The optimal balloon size 19 mm was determined in accordance with the height of the patient. Serial dilations were done. With use of Accura balloon No 19-22 starting with balloon diameter smaller than optimal size. After balloon dilatation the LA pressure of 20/15 mean 17 and LVEDp of 18. Transvalvular mean pressure gradient was 4 mmHg and end diastolic pressure gradient of 1 mmHg. 2D echo showed both commissures split. MVA increased from 0.8 cm<sup>2</sup> to 1.8 cm<sup>2</sup>. At 3 months follow up patient was asymptomatic with open valve and No MR.





**Discussion** - Although the prevalence of Rheumatic fever has declined in most developed countries, the disease continues to be quite common elsewhere.<sup>1</sup> Its sequelae are severe. Isolated severe rheumatic mitral stenosis in children and young adults is frequently encountered in developing countries, and up to 25% of patients are younger than 20 years of age.<sup>4</sup> This disease has been called juvenile mitral stenosis. It is characterized by a high prevalence of severe PAH and pulmonary venous hypertension, often with critical stenosis of the mitral valve.<sup>5</sup> Before the availability of balloon mitral valvotomy, open or closed surgical commissurotomy was the only approach available for this subgroup of patients. Mitral valve surgery carries the risk of acute complications, and children and adolescents may require reoperation 10 to 15 years later.

Percutaneous transvenous mitral commissurotomy is currently the treatment of choice for children and young adults with rheumatic mitral stenosis. The procedure typically yields good short- and long-term results, obviating the need for surgery in many young patients.<sup>6-10</sup> Children with rheumatic mitral stenosis typically have significantly higher pulmonary artery pressure than do adults with the condition. Balloon mitral valvotomy with use of an Inoue balloon is very effective and safe in children who are symptomatic.<sup>10</sup> Other methods of percutaneous mitral valvuloplasty, such as metallic commissurotomy<sup>11</sup> and multitrack double-balloon valvuloplasty,<sup>12</sup> are equally as effective as the single balloon technique. Even in the presence of severe PAH and pulmonary venous hypertension, balloon mitral commissurotomy is associated with better immediate hemodynamic results, larger final MVA, and a higher percentage of increase in MVA in younger patients than in adults.<sup>13,14</sup>

Nearly 10% of patients with juvenile mitral stenosis present before they are 12 years old. In this group, symptoms and hemodynamic impairment develop unusually rapidly.<sup>4,15</sup> Most reports of percutaneous transvenous mitral commissurotomy in juvenile mitral stenosis have involved adolescents aged 12 to 18 years. A few series of balloon mitral valvotomy in patients aged 7 to 12 years have also been reported, and the procedure has been safe and effective even in this young population.<sup>16-18</sup> Our patient's medical history and the typical echocardiographic findings strongly indicated a rheumatic origin of his condition. To our knowledge, there has been no report of balloon mitral valvotomy for rheumatic mitral stenosis in a child younger than 5 years of age.

#### Unique Features of Juvenile Mitral Stenosis and Balloon

#### Valvotomy

In comparison with adults, children and adolescents with rheumatic mitral stenosis more often have severe PAH and pulmonary venous hypertension but less often have atrial fibrillation and left atrial dilation. Although the mitral valves in these younger patients are typically more pliable, with less calcification and lesser echocardiographic scores than in older populations,<sup>9,11</sup> we frequently encounter young patients with mitral stenosis who have severe subvalvular disease and grossly thickened leaflets, indicative of the fulminant course of the disease in this population.

The usual benchmark of successful percutaneous transvenous mitral commissurotomy in adults is an absolute MVA greater than 1.5 cm<sup>2</sup>. However, in younger patients, procedural success is better defined by MVA indexed to body surface area. Hence, MVA greater than 1 cm<sup>2</sup>/m<sup>2</sup> body surface area or the achievement of more than a 50% increase in MVA without major complications is considered to be an adequate hemodynamic result.<sup>14</sup> The final indexed MVA in our patient was 3.04 cm<sup>2</sup>/m<sup>2</sup>.

Another important consideration is the choice of balloon size in younger patients. The risk of MR after balloon mitral valvotomy in small children has been reduced by performing initial dilations with balloons 2 to 4 mm smaller than the balloon size that would be optimal for adults.

#### Conclusion-

We performed successful balloon mitral valvotomy using Accura balloon in a 7 years old boy. A careful attention to procedural details .

- Use of pediatric mullins sheath and pediatric brokenbrough needle.
- Use of balloon diameter smaller than typically recommended size.
- Stepwise increase in balloon diameter
- Meticulous pressure gradient measurement .
- Auscultation of MR at each step are important in these young patients.

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