

Limited mitral tissue mitral cleft and leaflet expansion



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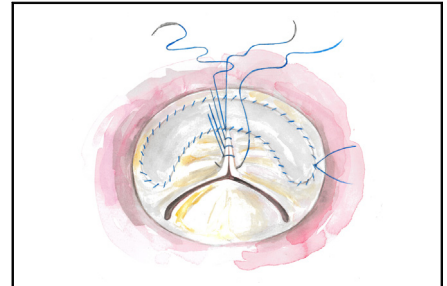
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Leaflet expansion for mitral cleft with limited tissue.

CENTRAL MESSAGE

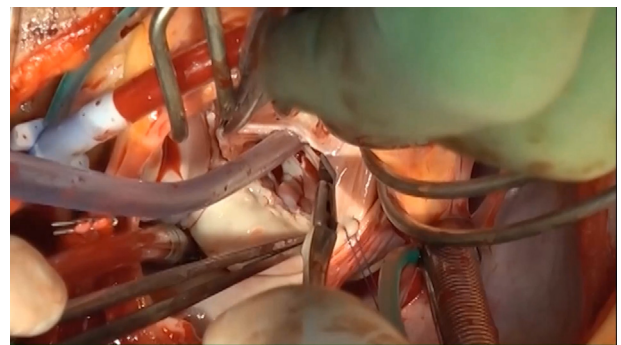
Residual clefts need a modified surgical approach, and leaflet expansion with autologous pericardium is a useful adjunct in cases with limited tissue.

▶ Video clip is available online.

Video 1 describes the surgical aspects of treating mitral clefts in the setting of limited tissue. This study was approved by the Swedish Ethical Review Authority 2017/559. April 19, 2017. We discuss the clinical variations of clefts and challenging situation in which classical techniques are insufficient. In grown-up congenital cases, the surgeon needs to address the thickened edges of the cleft, gently peeling scar tissue and hereby smoothing the edges in order to make them much more pliable, allowing a different closure without creating a restricted anterior leaflet. The frequent combination with restricted posterior leaflet in this setting is solved by using a partial flexible annuloplasty band.

In rare cases, we encounter a severe lack of mitral tissue, and this is most often encountered in small children. Mitral valve replacement in this entity carries an overall dismal prognosis, especially in the younger children, with a perioperative mortality between 11% and 36%¹⁻³ and as high as 52% in children younger than 2 years of age.⁴ Hence, mitral valve repair is an appealing alternative, avoiding most of the complications related to valve replacement. We have developed a strategy with leaflet expansion using nontreated autologous pericardium together with a subpartial annuloplasty made from a strip of polytetrafluoroethylene. This annuloplasty increases the coaptation and creates a stable repair while at the same time allowing young patients to grow.

Video 1 also discusses the technical aspects of this technique and how to avoid the spinnaker phenomenon, which causes a functional mitral stenosis seen with large leaflet expansion. Moreover, it displays an intraoperative video as well as pre- and postoperative echoes and the echo 8 years out from surgery. We have used this technique in 11 children with a mean age of 2 years. After a mean follow-up of 6.5 years, they are all alive, asymptomatic, and without need for subsequent interventions. Their mitral regurgitation is stable and mild, and their mean gradient is low and stable. The children have had an overall positive growth.



VIDEO 1. Describes the surgical aspects of treating congenital mitral regurgitation in the setting of limited tissue. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00305-X/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00305-X/fulltext).

CONCLUSIONS

Residual clefts require a modified surgical approach. Leaflet expansion is a valuable tool in cases with limited tissue.

Conflict of Interest Statement

Per Wierup is a consultant for Medtronic, CryoLife, Edwards Lifesciences, and Bristol Myers Squibb. All other authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict

of interest. The editors and reviewers of this article have no conflicts of interest.

References

1. Alsoufi B, Manlhiot C, McCrindle BW, Al-Halees Z, Sallehuddin A, Al-Oufi S, et al. Results after mitral valve replacement with mechanical prostheses in young children. *J Thorac Cardiovasc Surg.* 2010;139:1189-96, 1196.e1-2.
2. Ibezim C, Sarvestani AL, Knight J, Quyum O, Alshami N, Turk E, et al. Outcomes of mechanical mitral valve replacement in children. *Ann Thorac Surg.* 2019;107:143-50.
3. Beierlein W, Becker V, Yates R, Tsang V, Elliot M, de Laval M, et al. Long-term follow-up after mitral valve replacement in childhood: poor event-free survival in the young child. *Eur J Cardio Thorac Surg.* 2007;31:860-5.
4. Erez E, Kanter KR, Williams WH, Tam VK. Mitral valve replacement in children. *J Heart Valve Dis.* 2003;12:25-9; discussion 30.