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Tecnical Note

A novel bileaflet sparing technique during mitral valve replacement: Lafci's fold down technique

Mitral kapak replasmanı için yeni bir biliflet koruma tekniği: Lafçı'nın katlama tekniği

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Abstract

Sub-valvular apparatus preservation procedure is an additional technique to mitral valve replacement which decrease the prevalence of low cardiac output syndrome and associated complications that may be seen after mitral valve replacement. A number of surgical techniques for both bileaflet and posterior leaflet preservation have been described previously. We aimed to share how we do the bileaflet preservation with a modified technique, Lafci's anterior leaflet fold down technique, in selected patients who underwent mitral valve replacement procedure.

With absence of resection and use of same sutures for both sparing leaflet and fixing mechanical valve may shorten cross-clamping time, and so, we believe that this technique is simple, reproducible when it is appropriate for the patient's existing anatomy.

Keywords: Bileaflet sparing; mitral valve replacement; surgical technique

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Öz

Subvalvüler yapıların korunması mitral kapak replasmanı sırasında ek olarak uygulanan, düşük kardiyak debi sendromu ve ilişkili olabilecek komplikasyonların prevelansını azaltan bir prosedürdür. Her iki lifletin ya da izole posteriyor lifletin korunmasını sağlayan birden çok teknik bu zamana kadar tariflenmiştir. Biz bu yazıda mitral kapak replasmanı sırasında "Lafçı'nın anteriyor liflet katlama tekniği" adını verdiğimiz ve uyguladığımız modifiye bir biliflet koruma tekniğini tariflemeyi amaçladık.

Herhangi bir rezeksiyon yapmadan tek bir dikiş ile hem kapağı anülüse sabitleyecek hem de lifletin korunmasını sağlayacak bu tekniğin kros-klemp zamanlarını kısaltan, uygun anatomiye sahip hastalarda basit ve uygulanabilir bir teknik olduğu inancındayız

Anahtar kelimeler: Biliflet koruma; mitral kapak replasmanı; cerrahi teknik

Introduction

The first reported mitral valve replacement (MVR) procedure with implantation of the Starr—Edwards prosthetic valve was achieved in 60's and involved the complete excision of mitral leaflets and most of subvalvular apparatus.[1] But low cardiac output syndrome and complications associated with mortality were seen after this procedure and since then several techniques have been developed to decrease the prevalence of these undesired situations. One of them was sub-valvular apparatus preservation technique, which Lillehei and colleagues provided a more than 50% reduction in operative mortality with chordal-sparing techniques.[2-4] After that a number of surgical techniques for both bileaflet and posterior leaflet preservation have been described. Athanasiou and his friends[5] have made a classification and outline of the currently used preservation techniques in a review.

In our clinic, we prefer bileaflet preservation with a modified technique, Lafci's anterior leaflet fold down technique, in selected patients who underwent MVR procedure. From January 2017 we have used this technique in 11 patients. In this study, we aim to share how we do it and to preserve the advantages of this quality technique.

Surgical Technique

Standardized bicaval cannulation is used with exposure of the valve through either a classic left atriotomy or a transatrial incision. Careful valve examination is performed in first step. The existence of prosthetic leaflet impingement risk due to diffuse calcifications or thickening, massive chordal fusion and shortness, huge perforations on leaflet surface are the exclusion criteria. We did not perform this technique to patients with mitral stenosis because of possible subvalvular narrowing caused by the calcified and thickened subvalvular apparatus. We prefer this technique in patients with mitral regurgitation and in which the repair of the valve is not possible.

Distance between annulus and free edge of anterior leaflet is divided into three equal zone by two visionary lines. First of them is called as "line A" and other one as "line B". Firstly a 3/0 pledgeted "U" shaped Ethibond (Ethicon, Somerville, NJ) suture with double-armed needle are passed annulus of A2 leaflet through the ventricular surface from the atrial surface. Secondly, the free segment of anterior leaflet is encircled by the same everted stitch passed through annulus, and a bite is taken from "A" to "B" point on the atrial side of the leaflet. Then, when the "U" shaped stiches passed the "B" point are pulled upwards, 1/3 free segments of the anterior leaflet with attached chordal segments are folded down and closed to the ventricular surface. Second and annular segments are folded up towards annulus as a button box (Figure 1A-B). Also, all the folded segments of the anterior leaflet provide perfect exposure to facilitate the passing of the other sutures. After preparing the anterior annulus, the posterior leaflet and its chordae are completely preserved in standard technique. Finally, optimal sized mechanical valve is placed to the annulus with same sutures (Figure 2A-B).

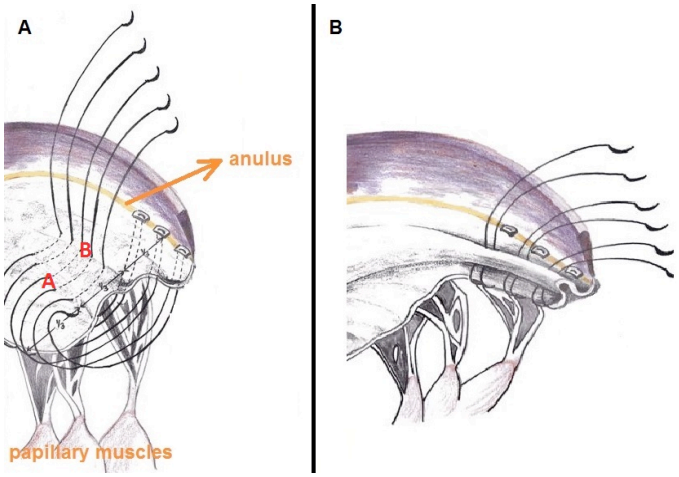

Figure 1. (A) 3/0 pledgeted "U" shaped ethibond suture with double-armed needle are passed annulus of A2 leaflet through the ventricular surface from the atrial surface. Secondly, the free segment of anterior leaflet is encircled by the same everted stitch passed through annulus, and a bite is taken from "A" to "B" point on the atrial side of leaflet. **(B)** Chordal segment are folded down and closed to the ventricular surface and annular segments are folded up towards annulus as a button box.

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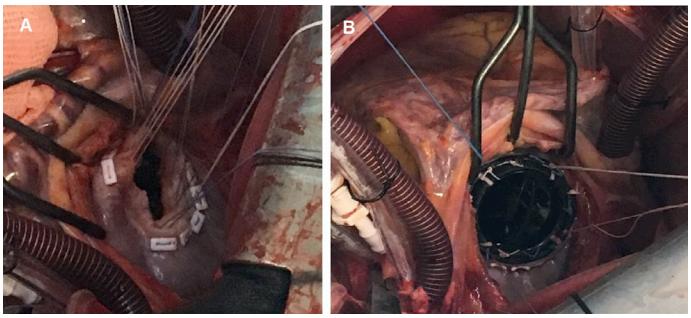

Figure 2. Intraoperative images.

Possible Advantages and Disadvantages

Traditional sparing technique with resection prevents impingement of mechanical valve due to valve tissue. But even so it can be considered as a cumbersome technique if we compare it with our technique. With absence of resection and using of same sutures for both sparing the leaflet and fixing the mechanical valve shorten the cross-clamping time.

Without resection we can be sure that we spare all secondary chordae and this situation provides us a better annulo-ventricular continuity and thick tissue between annulus and mechanical valve decreases the risk of paravalvular leakage and also catastrophic complications such as ventricular wall rupture.

The bite which was passed through the middle of leaflet obtains a more symmetrical folding and minimizes postprocedural chordal tension especially for secondary chordae.

Concerns can be also voiced regarding a tendency towards insertion of a smaller prosthesis and its long-term results if whole leaflet tissue was preserved without resection. But we think that careful intraoperative evaluation of mitral valve complex is essential and help us to foresee these unwanted consequences. In patients with mitral regurgitation and existence of annular dilatation, mild commissurotomy may provide us an adequate annular wideness for efficient sized mechanical valve. But in patients with diffuse rheumatic disease we do not prefer this technique because of mitral secondary orifice can be narrowed by subvalvular tissue. There seems to be the risk of pulling up papillary muscles and decreasing the diastolic compliance of left ventricle but we have not yet encountered this situation owing to careful inspection of subvalvular appartus. In case of chordal shortening we do not use this technique also. We have never had to take down the replacement or abandon this technique.

Comment

Over the past 50 years, concepts for valve preservation have altered the surgical techniques used for MVR. Many investigators have reported the importance of chordal preservation during MVR during this period.[6-11] Maintenance of annuloventricular continuity is thought to be crucial for preventing progressive left ventricular dilatation and reduction of ventricular function in postoperative period. [12] Furthermore valve-sparing MVR decreases the risk of catastrophic complications such as ventricular wall rupture. Interest in preservation techniques was stimulated by several reports. The simplicity and reproducibility of the technique, as well as the anatomical and pathological characteristics of the mitral valve is important for selection of surgeon. We prefer bileaflet preservation and use a modified technique as we described above. Finally, with absence of resection and use of same sutures for both sparing leaflet and fixing the mechanical valve shorten the cross-clamping time, and so, we believe that this technique is simple, reproducible when it is appropriate for the patient's existing anatomy. Further comparative studies are planned also.

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