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RECONSTRUCTIVE SURGERY OF AN EXTREMELY CALCIFIED MITRAL VALVE IN BARLOW DISEASE PATIENT – A CASE REPORT

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Short title: REPAIR OF CALCIFIED BARLOW MITRAL VALVE

Kratak naslov: REKONSTRUKCIJA KALCIFIKOVANE MITRALNE VALVULE
Apstrakt

**Uvod:** Kalcifikacije mitralne valvule su čest nalaz kod bolesnika sa Barlowljevom bolesti što čini rekonstruktivnu hirurgiju zalistka kod ovih bolesnika znatno složenijom.

**Prikaz bolesnika:** Bolesniku starom 55 godina je uradjena rekonstrukcija mitralnog zalistka zbog prolapsa posteriornog listića i značajnih kalcifikacija na P2 segmentu i posteriornomanulusu. Nakon resekcije P2 segmenta i odvajanja P1 i P3 segmenta od anulusa, uradjena je kompletna resekcija velikog kalcifikata sa skoro polovine obima posteriornog anulusa. Nastali atrio-ventrikularnog defekt rekonstruisan je autolognim perikardomelipsoildnog oblika sašivenim u dva sloja. P1 i P3 segment su potom reinplantirani na rekonstruisani anulus i medjusobno spojeni. Rekonstruktivna procedure je kompleterana anuloplastikom pomoću sedlastog rigidnogprstena veličine 36. Bolesnik jeotpustjen 9 postoperativnog dana sa trviljnom mitralnom regurgitacijom.

**Zaključak:** Dekalcifikacija posteriornog anulusa uz preciznu rekonstrukciju nastalog atrioventikularnog defekta je neophodna procedura za bezbednu i funkcionalno trajnu rekonstrukciju mitralnog zalistka.

Abstract

**Introduction:** Mitral valve calcifications are frequent finding in the Barlow disease. This is making mitral repair surgery even more demanding in already complex valve pathology.

**Case report:** Fifty–five year old Barlow disease patient underwent mitral repair surgery due to posterior leaflet prolapse at P2 level and extensive posterior leaflet and annular calcifications as well. Prolapsed scalop was resected, while P1 and P3 scalops were detached from the annulus. After complete posterior annulus decalcification, so formed large atrio-ventricular defect was reconstructed with autologous pericardial patch and double suture line technique. P1 and P3 segments were reattached thereafter by sliding technique, and sutured with no strain. Annuloplasty was performed with saddle rigid ring No 36. Patient was discharged nine days after the surgery with just a trace of mitral reguritation.

**Conclusion:** Annular decalcificaiion and reconstruction in patients with calcified Barlow mitral disease is neccessary for safe and durable mitral valve repair surgery.
Introduction
Extremely enlarged and thick mixomatous leaflets, along with significant annular dilatation are the main features of the Barlow mitral valve disease. Excessive leaflet mobility in these patients, results in micro traumas at the leaflet base. The healing processes stimulates fibrous scar formation thereafter and annular calcifications in some patients. Adjacent leaflet and myocardial tissue could be affected by the calcification process as well (1,2). Therefore calcified posterior annulus, is not a rare finding in Barlow patients (3) and makes already complex reconstructive surgery more demanding. This is a case report of a patient who underwent successful mitral repair surgery in spite of excessive posterior leaflet and annular calcifications.

Case report
Fifty-five year old patient was admitted to the hospital for the chronic severe mitral insufficiency. He was in NYHA functional class III. Echocardiography exam revealed grade 4 mitral regurgitation due to posterior leaflet prolapse at P2 level. Prolapsed segment was at the same time immobile due to severe calcifications that were extending down into the posterior annulus. Heart chambers were moderately enlarged. Left atrium was 44 mm, while left ventricle end-systolic and end-diastolic diameters were 43 mm and 59 mm respectively. Left ventricle ejection fraction was 60 %. Patient had no history of rheumatism or bacterial endocarditis as well.

Surgery was performed through the median sternotomy. Valve anatomy and leaflet thickness confirmed the diagnosis of the Barlow disease. Posterior leaflet P2 scallop was prolapsing due to elongated and ruptured chordae, and was at same time rigid and immobile due to severe calcifications. Posterior anulus was severely calcifiedas well, Fig 1a. Prolapsed segment was excised while P1 and P3 scallops were detached from the anulus. Posterior anulus calcification were completely removedleaving a large gap between the left ventricle and atrium, Fig 1b. The most demanding part of the procedure was a reconstruction of such an important atrioventricular discontinuity. Posterior anulus therefore, was repaired with 4 x 2 cm oval shape autologous pericardium, Fig 1c. Six separate pledgeted 4/0 „U“ stiches, were placed through the lower rim of the pericardal patch, left ventricle myocardium, and thereafter pullesthrough the left atrial wall and tied on the left atrial side, Fig 2a. The upper rim of the pericardial patch was then sutured to the left
atrial wall with 4/0 running polypropylene suture, making quite a strong posterior annulus reconstruction, Fig 2b. P1 and P3 scallop were thereafter reattached to the reconstructed posterior annulus by the leaflet sliding technique and sutured with no strain. Anuloplasty was performed with No 36 SJM Saddle ring, Saint Jude Medical, SAD, Fig 1d. Postoperative course was uneventful, and the patient was discharged 9 days after the surgery with fully competent mitral valve, Fig 1d.

Discussion
Barlow disease is one of the most complex pathologies in the mitral repair surgery. When present, annular calcifications makes mitral reconstructive surgery even more demanding. Although there is a quite enough leaflet tissue for the repair in these patients, leaflet mobility, pliability and overall repair durability as well could not be fully achieved without posterior annulus decalcification (4). This is a complex and risky procedure for two reasons. Firstly, we must take care in order to protect circumflex artery in atrio-ventricular (AV) groove, Fig 2b. Secondly, we have to keep in mind that decalcification at this level creates an AV defect (5,6), which, if not repaired properly, results in catastrophic bleeding afterwards. We reduced a possibility to entrap the circumflex artery by placing every single „U“ stitch under direct vision. Additional support for such a large AV defect repair was achieved by additional running suture. Therefore, we found that double stitch line pericardial patch technique we described is effective in preventing both adverse events, Fig 2. Furthermore, pliability of the new posterior annulus we created, provides elastic and solid base for the leaflet sliding suture, and annuloplasty ring stitches as well. Such a solid, but elastic anular reconstruction allows surgeon to achieve full leaflet mobility after the sliding plasty and to reduce the stress at leaflet base as well.

Conclusion:
Annulus calcifications in Barlow mitral valve disease has to be removed in order to obtain pliable and durable valve repair. Atrioventricular defect upon decalcification could be safely reconstructed with autologous pericardium reinforced by double suture line technique.
Literature:


Figure 1. Intraoperative images. a) Massive leaflet calcification that extends down into the posterior anulus. b) Anulus decalcification resulted in a huge atrioventricular defect (arrow). c) Atrioventricular defect was reconstructed with autologous pericardial patch (arrow). d) Preserved anatomy and fully competent mitral valve as well after the reconstruction. Postoperative echocardiography exam confirms long coaptation line (e) with just a trace of residual MR (f).

Figure 2. Posterior atrioventricular defect reconstruction with autologous pericardium. a) First suture line is performed with single pledgetet „U“ stiches passed through the patch, myocardium and pulled out high on the atrial side. That way atrial tissue is slided down to close atrioventricular defect, and prevent circumflex artery entrampment - atrial sliding technique (b). Second running suture line reinforces the repair and covers the first lineknotes. CSL – continious suture line; SUSL – single „U“ stich line; Pp – pericardial patch; LV – left ventricle myocardium; LA – left atrial wall; Cx – circumplex artery; PL – pledget on a single „U“ stich.