Case report

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INTRAOPERATIVE RUPTURE OF THE RECONSTRUCTED AORTIC VALVE LEAFLET: A CASE REPORT

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The autologous pericardium is often used for the reconstruction of aortic valve, due to its easy accessibility and adequate strength. Reconstruction of insufficient bicuspid aortic valve was performed by resecting the leaflet and reconstructing it by using autologous pericardium. Initial perioperative transesophageal echo registered a sudden increase in regurgitation up to 2+. The rupture of the autologous pericardium used for leaflet reconstruction was noted. Although accompanied with a small number of early and late failures, the reconstruction of aortic valve with autologous pericardium still presents a good choice of treatment of aortic valve insufficiency. The development of new materials is needed for achieving better results.

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Key words: *bicuspid aortic valve, insufficiency, pericardium, reconstruction*

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Introduction

A bicuspid aortic valve (BAV) is present in 1-2% of general population (1). The most frequent causes leading to aortic insufficiency are: aortic root dilatation, incomplete closure of a congenitally bicuspid aortic valve, and infective endocarditis, postinflammatory disease, etc. (2). The most frequent cause of aortic insufficiency in people between 20 and 50 years of age lies in the existence of a BAV (3). The two major ways of treating valve insufficiency are either by a valve replacement with a mechanical or biological prosthesis or by the repair of the native valve (4). Aortic valve replacement increases the risk of adverse effects of anticoagulant therapy or endocarditis (5). When we are talking about valve repair we need to emphasize that the presence of calcifications on the valve leaflets requires decalcification, while any large defects need to be replaced. Autologous pericardium represents easily accessible material that can be used for the repair of valve leaflets (6). The literature contains many descriptions of cases of aortic regurgitation caused by a late rupture of the suture line of the pericardial patch (7). In our case, rupture of the free edge of the pericardium used for leaflet reconstruction took place immediately after surgery resulting in significant aortic regurgitation which led to valve replacement.

Case description

A 48 year old patient was admitted for elective surgical procedure on the aortic valve. For about a year, the patient had been aware of a heart murmur accompanied by fatigue, palpitations and choking during exercise. Ultrasound examination revealed BAV with a decreased separation of leaflets, pressure gradient of 36/14 mmHg and severe aortic regurgitation of up to 3+. The aortic root diameters were 31 mm, while the ascendant aorta was slightly dilated up to 39 mm. During the surgery, and after aortotomy was performed, BAV with a fusion of the right and non-coronary cusp was noticed. An excision of the calcification was performed. The resulting defect was reconstructed with a triangular 2% glutaraldehyde - fixed autologous pericardial patch. A subsequent plication of the central part of the pericardial patch was performed with 6-0 polypropylene sutures in order to ensure adequate leaflet coaptation. A water test confirmed good leaflet symmetry. Following aortic closure and cardiac dearing, the aortic clamp was removed, and the heart spontaneously returned to sinus rhythm. After performing a control transesophageal echocardiogram (TEE), central AR up to 1+ was noticed. Once the heart lung machine

was stopped and full heart activity resumed, the TEE registered sudden increase in the regurgitation up to 2+. Due to the less than optimal reconstruction result, it was decided to substitute the reconstructed native valve with a mechanical prosthesis. Following a repeated aortotomy, a new defect on the free edge of the pericardial patch was visualized (Figure 1). It was a small tear far from suture line, on the free edge of pericardium. That phenomenon was interpreted as the cause of the newly created leaflet insufficiency. The cusps were completely excised. Interrupted mattress suture technique was used to implant the mechanical aortic valve prosthesis (St. Jude medical, USA) No 25. Aortic closure was performed, deaeration completed and aortic clamp removed. After period of reperfusion the patient was weaned from the Heart Lung machine without inotropic support. The further postoperative period was uneventful.

Figure 1. Excided aortic valve leaflet with the visible rupture of free edge of the pericardium used for reconstruction

Discussion

BAV is one of the most frequent congenital heart anomalies with a prevalence of 1.3% (8). It is accompanied by an increased number of complications like aortic stenosis, insufficiency and infectious endocarditis. Many patients do not demonstrate significant hemodynamic alterations prior to 70 years of age (9). Incidence of isolated aortic regurgitation of the bicuspid valve is less frequent than incidence of stenosis, but tends to appear at an earlier age (10). A bicuspid valve substituted with a mechanical prosthesis requires a lifelong use of anticoagulant therapy. Biological valves, on the other hand, are prone to degeneration and require substitution after a while. An implanted valve is accompanied by complications including endocarditis, thromboembolism and repeated surgeries. A reconstruction of the bicuspid valve in younger patients has become a significant alternative to its substitution (11). Leaflet defects occurring during the reconstruction can be repaired with the use of various materials. The most frequently used are the dura mater, fascia lata or bovine pericardium, but autologous pericardium has particular traits. This material is easily accessible and durable. Lausberg et al. (2006) (6) confirmed good results in using autologous pericardium in the reconstruction of aortic valve leaflets. Al Halees et al. (2005) (12) have demonstrated no significant deterioration of tissue structure between bovine and autologous pericardium after or during 16 years of research, but have proven that bovine pericardium is more prone to calcifications in comparison to the autologous. Price et al. (2013) (13) claim that in their 10-year follow-up after aortic leaflets reconstruction with autologous pericardium, the results were comparable to the results of valve substitution with a biological valve, which confirms good results of the reconstruction procedure. The leading reasons for a recurrence of valve insufficiency after reconstruction are the progression of the rheumatic disease, while the second most common cause is the dehiscence of the suture in late postoperative period. Other less common causes are endocarditis and progressive calcification of the pericardial patch (7, 14). In our case, description the acute insufficiency of the reconstructed leaflet was caused by a rupture of the pericardial patch outside the suture line, or the intact pericardium, to be more precise. To the best of our knowledge this is the first case of the kind ever published in a scientific journal.

Conclusion

Aortic valve insufficiency caused by degenerative disease of bicuspid valve can be successfully surgically treated by various reconstruction techniques, thus avoiding potential complications after the implantation of the mechanical prosthesis. Complications like a recurrence of AR, acute or chronic dehiscence of the suture or the bursting of the used pericardium have been described. The published mortality and morbidity data show good results of reconstruction in carefully selected patients, especially younger ones. Leaflet reconstruction is an established modality in treating aortic valve disease. In order to achieve better results in the use of this procedure, constant improvements in surgical techniques and usage of new materials are essential.

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INTRAOPERATIVNA RUPTURA REKONSTRUISANOG LISTIĆA AORTNOG ZALISTKA – PRIKAZ SLUČAJA

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Autologni perikard često se koristi za rekonstrukciju aortne valvule, zbog lake dostupnosti i odgovarajuće čvrstine. Rekonstrukcija insuficijentne bikuspidne aortne valvule učinjena je resekcijom listića i rekonstrukcijom uz upotrebu autolognog perikarda. Tokom inicijalnog perioperativnog transezofagealnog pregleda, registrovan je iznenadni nastanak aortne regurgitacije (do 2+). Iako praćena izvesnim brojem akutnih i hroničnih komplikacija, rekonstrukcija aortne valvule autolognim perikardom predstavlja dobar izbor za lečenje insuficijencije aortne valvule. Razvoj novih materijala je neophodan da bi se poboljšali rezultati lečenja.

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Ključne reči: *bikuspidna aortna valvula, insuficijencija, perikard, rekonstrukcija*