Pseudoaneurysm formation due to bioglue use in aortic valve surgery

Aort kapak cerrahisinde bioglue kullanımı nedeniyle psödoanevrizma oluşumu

Erdal Durmuş[1], Tarık Kıvrak[1], Murat Sunbul[1], Halil Ataş,[1] Koray Ak[2], İbrahim Sarı[1], Kürşat Tigen[1]

[1] Department of Cardiology, Faculty of Medicine, Marmara University, Istanbul, Turkey
[2] Department of Cardiovascular Surgery, Faculty of Medicine, Marmara University, Istanbul, Turkey

Abstract

Introduction of bioglue as surgical adhesive equipment shortens operation time, decreases the need for blood transfusion, and improves hemostasis. However, as all new developments, it is not free of complications. In this study, we present a report of aortic pseudoaneurysm formation due to bioglue use in aortic valve surgery.
Keywords: Aortic valve surgery, bioglue, chronic inflammation, pseudoaneurysm

Öz

Bioglue'nun cerrahi yapıştırıcı madde olarak kullanılmasıyla, operasyon süresi kısalmış, kan transfüzyon ihtiyacı azalmış ve kanamanın durdurulması kolaylaşmıştır. Ancak, tüm yeni gelişmelere rağmen, bioglue bazı komplikasyonlara neden olabilmektedir. Bu olgu sunumunda, aort kapak cerrahisinde bioglue kullanımı nedeniyle meydana gelen aortik psödoanevrizma olgusunu sunacağız.
Anahtar kelimeler: Aort kapak cerrahisi, bioglue, kronik inflamasyon, psödoanevrizma

Introduction

Over the last two decades, mortality of aortic valve surgery decreased with the improvements in hospital care and emerging new technologies. Among these technologies, sutureless aortic valve helps shorten surgery duration (1). Additionally, the introduction of bioglue as surgical adhesive equipment has decreased the need for blood transfusion and improves hemostasis (2). As all new developments, it is not free of weak points. In this case, it was our aim to present a report of aortic pseudoaneurysm formation due to bioglue use in aortic valve surgery.

Case Report

A 61-year-old male patient was admitted to our cardiology clinic with the complaint of dyspnea. He had a history of hypertension for two years and combined aortic valve and ascending aorta replacement 6 months ago. On admission, the patient's exercise capacity was NYHA class 2 and denied any chest pain, fever and orthopnea. The patient's blood pressure was 110/70 mmHg, pulse rate was 62/min and temperature was 37.7 °C. Physical examination revealed metallic valve sounds and 3/6 systolic murmur over the aortic area, and the rest of the physical examination was within normal limits. The patient's routine biochemistry tests, sedimentation rate and C-reactive protein level were within normal range. Transthoracic echocardiographic examination revealed normal left ventricular systolic function, mild mitral regurgitation, and paravalvular aortic valve regurgitation. In order to further evaluate the aortic valve, three-dimensional transesophageal echocardiographic examination was performed and a pseudoaneurysm formation was detected beneath the left atrial side of prosthetic aortic valve and intact anastomosis between prosthetic aortic valve and Dacron aortic graft (Figure 1A, 1B). Then, the patient underwent redo-aortic valve surgery. In the surgery, surgeons confirmed pseudoaneursym formation of aortic root adjacent to the pulmonary artery. After that, the aneurysm sac was opened and a connection between the left ventricle and aneurysm sac was observed. Later, the prosthetic aortic valve annulus was primarily sutured to native aortic annulus tissue, and the operation ended successfully. The biopsy of the aortic root was consistent with chronic inflammation. In order to determine the reason for the pseudoaneursym formation, the surgical notes taken 6 months ago were examined. During that operation, the surgeon used bioglue, a surgical adhesive to

Correspondence: Murat Sunbul, Department of Cardiology, Faculty of Medicine, Marmara University, Istanbul, Turkey
Tel: +90 506 5819015 *drsunbul@yahoo.com.tr*

Received: 09.02.2015 **Accepted:** 07.05.2015
www.gaziantepmedicaljournal.com
DOI: 10.5578/GMJ.10817

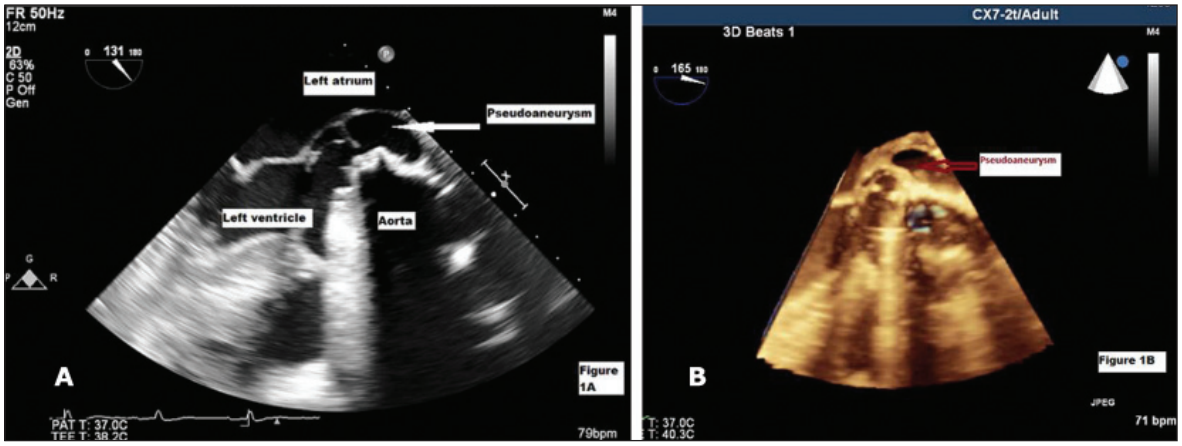

Figure 1. (A) Two-dimensional transesophageal echocardiographic examination showing pseudoaneurysm formation, **(B)** Three-dimensional transesophageal echocardiographic examination showing pseudoaneurysm formation.

strengthen the anastomosis between prosthetic valve and aortic annulus. Infective endocarditis was excluded by blood cultures and laboratory tests. The reason for this dehiscence between the annulus and prosthetic valve might be due to the destruction of normal tissue because of the use of bioglue material.

Discussion

Bioglue is a tissue adhesive which strengthens vascular anastomosis and decreases the need for blood transfusion. It supplies good hemostasis during the perioperative period. It is FDA approved for use in surgery. In a study, ninety-two consecutive patients have undergone aortic root, ascending aorta and aortic arch surgery by using bioglue as an adjunct for anastomotic hemostasis. 28% of these patients had no need for blood transfusion after surgery and mortality rate was 3.3% (2). Another study comparing the standard surgical procedure with standard surgical procedure plus adjunctive use of bioglue has shown that using bioglue significantly decreases anastomotic bleeding (19% vs. 43%, p< 0.001) (3). Using bioglue as an adjunct to standard repair methods has been demonstrated to be safe and beneficial. Bioglue is also used in the repair of aortic root to strengthen tissue for sewing in ascending aorta surgery due to acute dissection (4).

In the literature, there were some case reports about the complications of bioglue such as coronary stenosis, systemic embolism, mechanical valve dysfunction, and pseudoaneursym formation (2,5,6). The main proposed mechanisms for these complications arethe mechanical obstructive effect of the bioglue and inflammatory destruction of tissue due to cytotoxic effect of glutaraldehyte compound of the bioglue (7). Pseudoaneursym formation after aortic surgery has been encountered in 3.3% of patients (2). Inflammatory tissue destruction is the most commonly observed cause of pseudoaneursym formation. However, in a case report, pseudoaneursym formation has been observed without inflammation (8). It is likely caused by mismatch between tissue and bioglue stiffness that causes tears in the tissue. In the present case, the exact reason of pseudoaneursym was unclear because of the absence of pathologic examination, but the reason can be speculated to be the tissue destruction caused by the bioglue. Another reason for pseudoaneursym formation might be infective endocarditis (IE). Yet, it may present with dramatic clinical scenario. In our patient, the only symptom was dyspnea, and blood cultures were negative for microorganisms consistent with IE. Therefore, infective endocarditis was unlikely for this patient.

In conclusion, the use of bioglue is safe but may cause some complications like pseudoaneursym formation that might be misdiagnosed as an IE complication.

Acknowledgements: None.

Conflict of interest: None declared.

References

1. Eichstaedt HC, Easo J, Härle T, Dapunt OE. Early single-center experience in sutureless aortic valve implantation in 120 patients. J Thorac Cardiovasc Surg 2014;147:370-5.
2. Fehrenbacher JW, Siderys H. Use of BioGlue in aortic surgery: proper application techniques and results in 92 patients. Heart Surg Forum 2006;9:E794-9.
3. Coselli JS, Bavaria JE, Fehrenbacher J, Stowe CL, Macheers SK, et al. Prospective randomized study of a protein-based tissue adhesive used as a hemostatic and structural adjunct in cardiac and vascular anastomotic repair procedures. J Am Coll Surg 2003;197:243-52.
4. Raanani E, Georghiou GP, Kogan A, Wandwi B, Shapira Y, Vidne BA. 'BioGlue' for the repair of aortic insufficiency in acute aortic dissection. J Heart Valve Dis 2004;13:734-7.

5. Modi A, Bull R, Tsang G, Kaarne M. Ostial left coronary stenosis following aortic root reconstruction with BioGlue. Interact Cardiovasc Thorac Surg 2011;13:243-5.
6. Goldberg SP, Campbell DN. Mechanical aortic valve dysfunction due to biological glue. Ann Thorac Surg 2009;88:671-2.
7. Furst W, Banerjee A. Release of glutaraldehyde from an albumin-glutaraldehydetissue adhesive causes significant in vitro and in vivo toxicity. Ann Thorac Surg 2005;79:1522-9.
8. Luk A, David TE, Butany J. Complications of Bioglue postsurgery for aortic dissections and aortic valve replacement. J Clin Pathol 2012;65:1008-12.

How to cite:

Durmuş E, Kıvrak T, Sunbul M, Atas H, Ak K, Sari İ, Tigen K. Pseudoaneurysm formation due to bioglue use in aortic valve surgery. Gaziantep Med J 2015;21(4)256-258.