

Interactive CardioVascular and Thoracic Surgery

Suture line reinforcement using suction-assisted bioglue application during surgery for acute aortic dissection

Zan Mitrev, Vladimir Belostotskii and Nikola Hristov

Interact CardioVasc Thorac Surg 2007;6:147-149; originally published online Dec 18,
2006;

DOI: 10.1510/icvts.2006.142422

The online version of this article, along with updated information and services, is
located on the World Wide Web at:

<http://icvts.ctsnetjournals.org/cgi/content/full/6/2/147>

Interactive Cardiovascular and Thoracic Surgery is the official journal of the European Association for Cardio-thoracic Surgery (EACTS) and the European Society for Cardiovascular Surgery (ESCVS). Copyright © 2007 by European Association for Cardio-thoracic Surgery. Print ISSN: 1569-9293.

New ideas - Aortic and aneurysmal

Suture line reinforcement using suction-assisted bioglue application during surgery for acute aortic dissection

Zan Mitrev, Vladimir Belostotskii, Nikola Hristov*

Special Hospital for Cardiac Surgery 'Filip II', 1000 Skopje, Macedonia

Received 22 August 2006; received in revised form 9 November 2006; accepted 29 November 2006

Abstract

Bioglue has been widely and variously applied in treating acute aortic dissection according to the pathological process and surgeon's preference. This publication outlines a new hemostatic technique using suction-assisted bioglue application for aortic suture line reinforcement during surgery on acute aortic dissection. Twenty consecutive patients were treated in our center for acute aortic dissection using this technique. There were no bleeding complications during surgery and there were no re-explorations or early deaths as a result of bleeding. Average daily chest tube drainage was 582 ± 150 ml/day, with the duration of drainage of 2 ± 0.9 days. In conclusion, this new hemostatic technique is simple to use and demonstrates excellent, immediate and early postoperative results.

© 2007 Published by European Association for Cardio-Thoracic Surgery. All rights reserved.

Keywords: Aortic dissection; Glue; Bioglue; Hemostasis

1. Background

In 1977, Guilmet and colleagues first applied gelatin-resorcinol-formaldehyde glue in aortic root reconstruction to reinforce the vessel wall made fragile by acute aortic dissection (AAD), and to reinforce the aortic anastomosis [1]. Since then, bioglue has been widely and variously applied in treating acute aortic dissection according to the pathological process and surgeon's preference.

This publication outlines a new hemostatic technique using suction-assisted bioglue application for aortic suture line reinforcement during surgery on acute aortic dissection.

2. Technique

Following induction of general anesthesia, the right subclavian artery and the right atrium are cannulated in a standard fashion, followed by retrograde cardioplegia catheter placement and left ventricular vent. The ascending aorta is carefully prepared and the innominate vein is mobilized but not divided. The brachiocephalic trunk and left common carotid are exposed and rubber snares are placed around each. Extracorporeal circulation (ECC) is started in a standard fashion. After achieving moderate body hypothermia, 30 °C, whole body perfusion is stopped; the brachiocephalic trunk and left common carotid are snared, and antegrade brain perfusion started. After aortotomy and inspection of the aortic valve, the ascending aorta is completely removed. Then the aortic arch is

inspected for intimal tears. Reconstruction of the dissected layers and open distal aortic anastomosis is performed, reinforcing the suture line with previously cut strips from the Albograft prosthesis (Biomateriali Srl; Brindisi, Italy). After completing the anastomosis, we apply bioglue Surgical Adhesive (Cryo-Life, Inc, Kennesaw, GA) on the outside of the anastomosis while applying suction from the inside of the prosthesis using catheters from the house suction, thus forcing the bioglue to impregnate the suture line, reinforcing it and closing the needle holes (Figs. 1 and 2, Video 1). Care should be taken to ensure that the tissue surface is dry and bloodless.

In the case of a normal size aortic root and no pathological change on the valve or commissural detachment, proximal anastomosis is performed at the sinotubular junction using previously cut prostheses strips after reconstruction of the dissected layers. The proximal suture line is reinforced with the application of bioglue on the outside of the suture line while applying suction from the inside using a needle placed proximally to the aortic cross clamp and connected to the house suction (Figs. 3 and 4, Video 1). Following the de-airing process, the operation is finished in a conventional way.

Between January 2004 and October 2005, 20 consecutive patients were treated in our center for AAD using suction-assisted bioglue application for aortic suture line reinforcement. Moderate hypothermia (30 °C) with antegrade selective cerebral perfusion via the right subclavian artery was used during ascending aorta and hemiarch reconstruction in 17 patients and complete arch reconstruction in three others. Re-suspension of the aortic valve was completed in nine patients and Bentall procedures in two

*Corresponding author. Tel.: +389 2 3091500; fax: +389 2 3091499.

E-mail address: hristov@cardiosurgery.com.mk (N. Hristov).

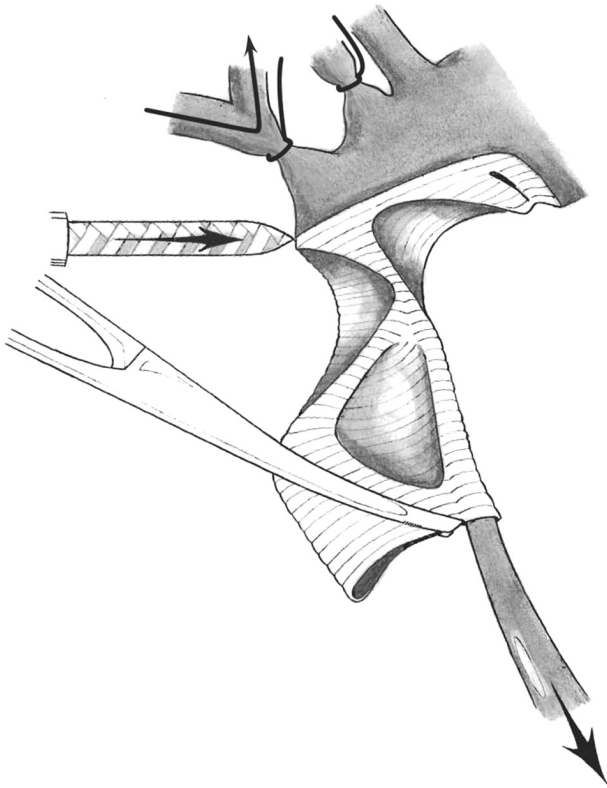


Fig. 1. Suction-assisted application of biogluce on the distal aortic suture line via catheters from the house suction and cell saver placed in the prostheses.

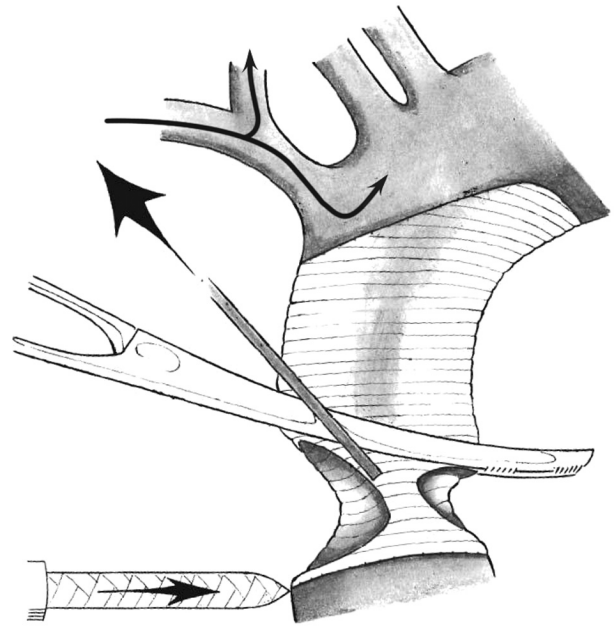


Fig. 3. Suction-assisted application of biogluce on the proximal aortic suture line via a needle connected to the house suction and placed proximal to the aortic cross clamp.

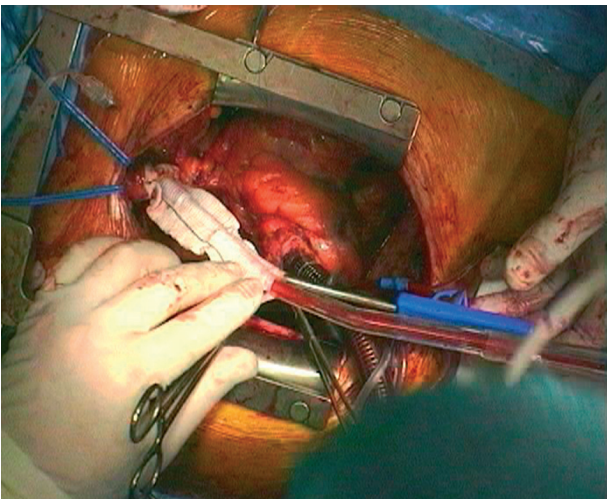


Fig. 2. Suction-assisted application of biogluce on the distal aortic suture line via catheters from the house suction and cell saver placed in the prostheses (intraoperative view).

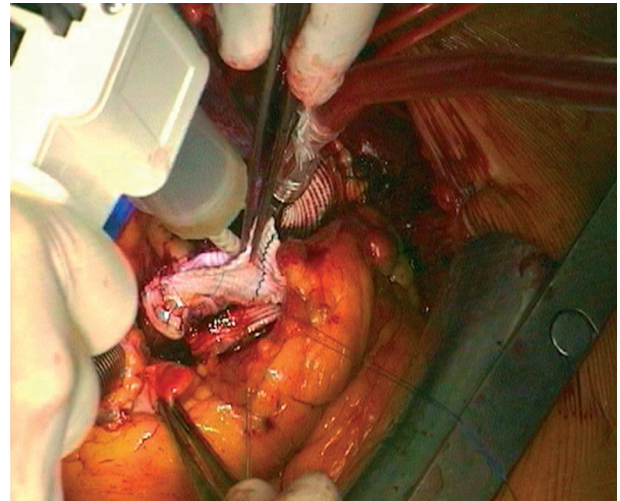


Fig. 4. Suction-assisted application of biogluce on the proximal aortic suture line via a needle connected to the house suction and placed proximal to the aortic cross clamp (intraoperative view).

patients [2]. There were no bleeding complications during surgery and there were no re-explorations or early deaths as a result of bleeding. Average daily chest tube drainage was 582 ± 150 ml/day, with the duration of drainage of 2 ± 0.9 days. There were two early deaths unrelated to bleeding; these resulted from multiple organ failure. Average in-hospital stay was 8.3 ± 3.1 days.



Video 1. Acute aortic dissection, glue reconstruction of the dissected layers, suction-assisted application of biogluce on the proximal and distal aortic suture line (intraoperative video).

3. Comment

One of the biggest challenges during surgery for AAD, besides adequate neurological protection, is preventing suture line bleeding. Fragile aortic walls weakened by the pathological process and further antagonized by impaired coagulation resulting from induced hypothermia and long ECC times, leads to such bleeding. Several techniques are employed in efforts to resolve uncontrollable bleeding, notably the Cabrol-shunt [3]. With the development of novel perfusion and brain protection techniques, bleeding became the biggest problem, despite the development of tissue glues and zero-porosity grafts. This novel method for suction-assisted biogluce application on the aortic suture lines impregnates the prostheses and the aortic wall, reinforcing it and closing the needle holes. Technically elegant, this procedure requires only the house suction and cell saver suction, adding approximately 30 s to the surgery's duration. There were no bleeding complications during surgery, and re-exploration was not necessary in any instance. Additionally, no bleeding-related deaths occurred. Although literature reports exist describing biogluce

embolization through needle holes [4], no such complication was observed, and we try to use the minimal amount of the necessary biogluce to achieve optimal hemostasis.

In conclusion, this new hemostatic technique during surgery on acute aortic dissection using suction-assisted biogluce application for aortic suture line reinforcement is simple and safe and demonstrates excellent operative results.

References

- [1] Guilmet D, Bachet J, Goudot B, Laurian C, Gigou F, Bical O, Barbagelatta M. Use of biological glue in acute aortic dissection. Preliminary clinical results with a new surgical technique. *J Thorac Cardiovasc Surg* 1979; 77:516–521.
- [2] Bentall H, De Bono A. A technique for complete replacement of the ascending aorta. *Thorax* 1968;23:338–339.
- [3] Cabrol C, Pavie A, Gandjbakhch I, Villemot JP, Guiraudon G, Laughlin L, Etievent P, Cham B. Complete replacement of the ascending aorta with reimplantation of the coronary arteries: new surgical approach. *J Thorac Cardiovasc Surg* 1981;81:309–315.
- [4] LeMaire SA, Carter SA, Won T, Wang X, Conklin LD, Coselli JS. The threat of adhesive embolization: BioGlue leaks through needle holes in aortic tissue and prosthetic grafts. *Ann Thorac Surg* 2005;80:106–110.

Suture line reinforcement using suction-assisted bioglue application during surgery for acute aortic dissection

Zan Mitrev, Vladimir Belostotskii and Nikola Hristov

Interact CardioVasc Thorac Surg 2007;6:147-149; originally published online Dec 18, 2006;

DOI: 10.1510/icvts.2006.142422

This information is current as of March 23, 2007

Updated Information & Services	including high-resolution figures, can be found at: http://icvts.ctsnetjournals.org/cgi/content/full/6/2/147
Supplementary Material	Supplementary material can be found at: http://icvts.ctsnetjournals.org/cgi/content/full/icvts.2006.142422/DC1
References	This article cites 4 articles, 3 of which you can access for free at: http://icvts.ctsnetjournals.org/cgi/content/full/6/2/147#BIBL
Permissions & Licensing	Requests to reproducing this article in parts (figures, tables) or in its entirety should be submitted to: icvts@ejcts.ch
Reprints	For information about ordering reprints, please email: icvts@ejcts.ch

Interactive CardioVascular and Thoracic Surgery