

# A Modified Adventitial Inversion With Graft Insertion Technique in Acute Type A Aortic Dissection

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## Research article

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# Abstract

Acute type A aortic dissection may originate from a primary intimal tear located in the ascending aorta and often extends retrogradely into the aortic root. How to prevent bleeding in the aortic root and eliminate false lumen is very important in aortic dissection. We have developed a modified anastomotic technique that involves inverting adventitial and graft into aorta and reinforcing with a felt strip on the external border of the aortic wall. 45 consecutive patients had undergone this surgical procedure for aortic root reconstruction in aortic dissection, there had been no reoperations either for bleeding or remnant dissection so far.

## Introduction

In patients with type A aortic dissection, the replacement of ascending aorta and aortic arch with implantation of frozen elephant trunk had been a standard procedure in our center. The axillary artery was cannulated and antegrade selected cerebral perfusion was performed with occlusion of the brachiocephalic trunk. Because of the most common destroyed part of the non-coronary aortic sinus, the aortic root can be safely reconstructed by reinforcement of the dissected aortic layers in most cases of acute type A aortic dissection. Once the coronary ostium was not destroyed, the aortic root reconstruction could be performed by using several methods in patients without aortic root dilatation. Preventing bleeding from the aortic root and eliminating false lumen are crucial to aortic root reconstruction surgery in aortic dissection. Although biologic glues such as BioGlu have been used to obliterate false lumen <sup>[1]</sup>, they are unavailable in our country. We have developed a modified anastomotic technique that involves inverting adventitial and graft into aorta and reinforcing with a felt strip on the external border of the aortic wall. The surgical techniques are as follows:

### Technique:

After initiating antegrade blood cardioplegia, the diseased ascending aorta was resected while the adventitial margin was trimmed 5-10 mm longer than the level of the intimal edge. The aortic valve resuspension and coronary ostial reinforcement with 5-0 or 6-0 polypropylene suture with pledget were performed if necessary. A Dacron tube graft of appropriate size which was usually smaller than the diameter of sinus tube junction was held and inverted. After the inversion graft was inserted into the aortic lumen through preserved aortic valve, the aortic wall was reinforced with an extraluminal circumferential felt strip by a horizontal mattress suture. Then the redundant adventitia was inverted into the graft lumen and the aortic wall was reinforced twice by a running suture. Once completion of the anastomosis, the inversion graft was pulled out and the antegrade perfusion with cardioplegia was performed to test the aortic valve function and bleeding (Figure 1, Movie1).

Since 2020, 45 consecutive patients had undergone safe emergency surgical procedures for aortic dissection by one surgeon using this technique. There had been no reoperations either for bleeding or

remnant dissection. It was a feasible and safe technique providing successful exclusion of the false lumen from antegrade flow at the anastomotic level.

### **Comment:**

The treatment of aortic root is crucial in patients with acute type A aortic dissection. Although Bentall procedure is the classic technique for aortic root replacement, it has been associated with a high incidence of prosthesis related complications [2]. Valve-sparing aortic root replacement (the David procedure) offers the benefit of preserving the native aortic valve; however, it is technically both more complex and time-consuming. With this method, the aortic valve can be preserved and the anastomotic hemostasis be achieved.

Regarding this technique, the aortic wall is supported on the outside by a felt strip and on the inside by inverting the graft, mimicking the effect of a double felt anastomosis while avoiding an anastomotic stenosis. Furthermore, the adventitia is completely inverted outside of the graft, eliminating the potential risk of thrombus formation. Although various anastomotic options have been described for reconstructive prosthetic techniques, the technique described is superior to use of interrupted sutures and easier than the graft telescopic insertion with or without adventitial inversion technique [3-5]. It is easy to learn and perform for aortic anastomosis in acute type A aortic dissection surgery and arch replacement as well.

## **Declarations**

### **Availability of data and material:**

Not applicable

### **Competing interests:**

The authors declare that they have no competing interests.

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### **Authors' contributions:**

Z.W. designed the report and revised the paper; WT.L. and HH.Y. contributed equally to this work. They collected the patient's clinical data and wrote the paper, WT.L. and HH.Y. were involved in management and evaluation of the patient. All authors read and approved the final manuscript.

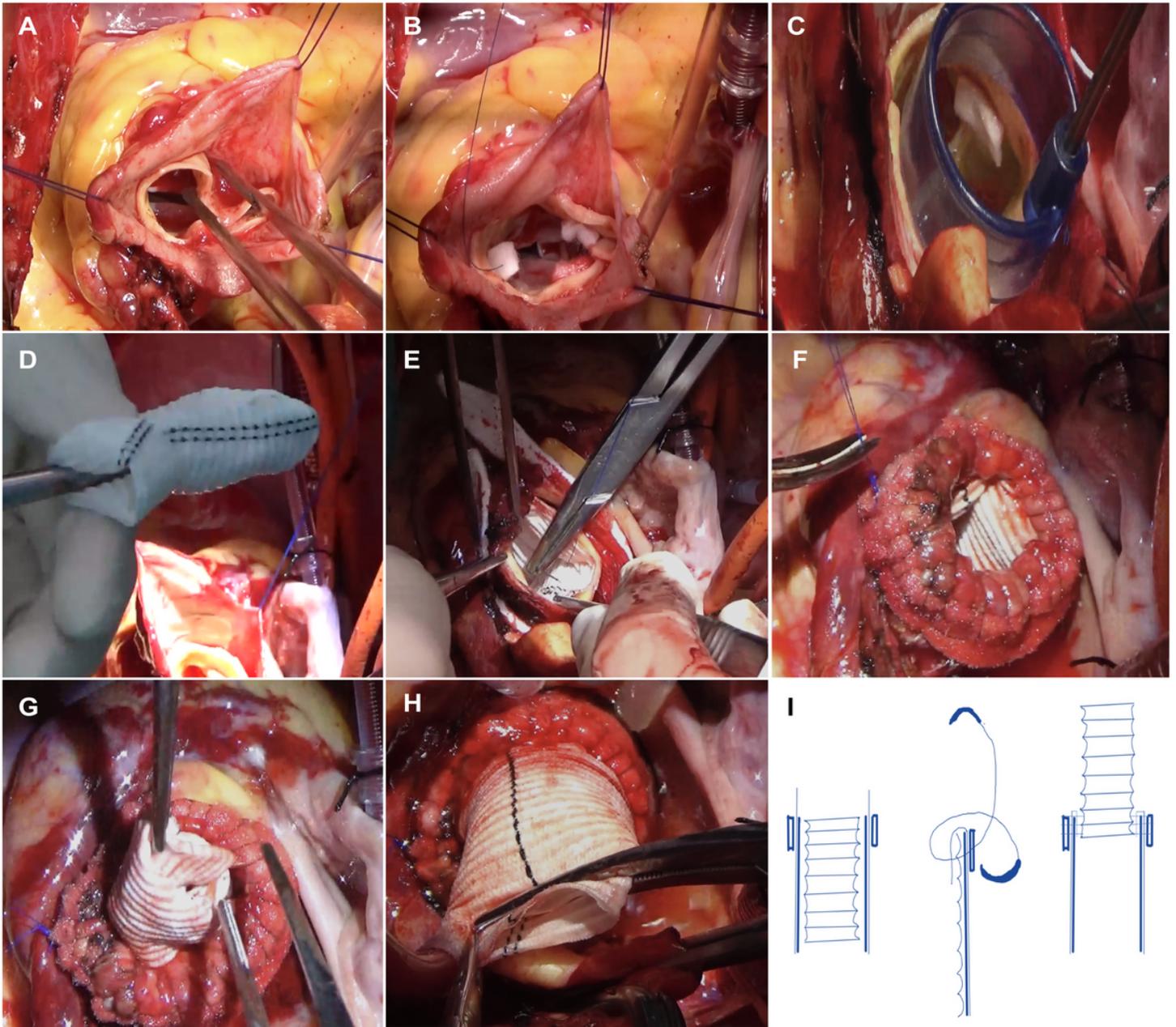
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## Figures



**Figure 1**

A, The diseased ascending aorta was resected while the adventitial margin was trimmed 5-10 mm longer than the level of the intimal edge. B, The aortic valve resuspension and coronary ostial reinforcement with 5-0 or 6-0 polypropylene suture with pledget were performed is necessary. C, Measure the size of the aortic root. D. A Dacron tube graft of appropriate size which was usually smaller than the diameter of sinus tube junction was held and inverted. E-F, The aortic wall was reinforced with an extraluminal circumferential felt strip by a horizontal mattress suture. Then the redundant adventitia was inverted into the graft lumen and the aortic wall was reinforced twice by a running suture. G-H, The inversion graft was pulled out and the antegrade perfusion with cardioplegia was performed to test the aortic valve function and bleeding. I, A schematic of this surgical technique.

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Movie1.mp4](#)