

## CASE REPORT

doi: 10.5455/medarch.2016.70.321-323

Med Arch. 2016 Aug; 70(4): 321-323

Received: MAY 15, 2016 | Accepted: JUN 25, 2016

© 2016 Mingjia Ma, Mohamed Abdulkadir, Yang Li, and Xiang Wei

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

# A Modified Wrapping-internal Shunt Method for Hemostasis in Bentall Procedure

Mingjia Ma<sup>1</sup>, Mohamed Abdulkadir<sup>1</sup>, Yang Li<sup>2</sup>, and Xiang Wei<sup>2</sup>

<sup>1</sup>Division of Cardiothoracic and Vascular Surgery, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

<sup>2</sup>Department of Medical Ultrasound, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

**Corresponding author:** Xiang Wei. Department of Medical Ultrasound, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China.

## ABSTRACT

**Introduction:** Blindly punching between aorta and right atrium is dangerous. In that case, there is concerned about leakage between the two referred isolate parts. Besides, as the routine imaging techniques (echocardiography or computer tomography) are incompetent to detect this particular anatomic structure preoperatively, the intraoperative inspection appears necessary. Our method is useful for identifying this innate fusion plane. **Case report:** The thrombosis surrounding prosthesis was detected in the first ultrasound examination after the operation, which was considered to be an indication of successful hemostasis. As the innate fusion between aorta and right atrium appears no rare, the selective creation of left-to-right internal shunt is a valuable maneuver for controlling bleeding in appropriate cases.

**Key words:** composite valve-graft prosthesis, bentall procedure.

## 1. INTRODUCTION

Bentall procedure using composite valve-graft prosthesis is still considered an economical and reliable alternative for aortic root surgery today (1). However, uncontrollable bleeding is occasionally encountered. We employed the modified Bentall procedure with internal shunt technique on complex occasions for hemostasis. The internal shunt that goes through from within the aortic aneurysm sac to right atrium is considered as a facile approach for suitable case. An innate fusion between the aortic wall and right atrium is prerequisite for this approach. This report introduces a simple method of how to identify the fusion and create the internal shunt.

## 2. CASE REPORT

The anesthesia and cannulation procedure for aortic root repair were performed in a standard manner as we described before (2). After a longitudinal aortotomy above sinotubular junction, cold cardioplegic solution was administered in antegrade manner for cardiac ar-

rest. The lesion of aortic root should be carefully inspected under direct vision. Under the circumstance of enough extent of coronary arteries (CA), a modified Bentall procedure was determined. The affected aortic valve cusps were carefully cut off. A prefabricated mechanical valved conduit Open Pivot™ (Medtronic, Minneapolis, Minnesota) was used. Either continuous running suture or mattress suture was performed for the conduit implantation, depending on the surgeon's preference. Then, two 8 mm holes were made by cautery in the conduit graft opposite to ostia of CA. The ostia were anastomosed directly to the conduit in end to side fashion with continuous 7-0 polypropylene suture (Ethicon, Cincinnati, Ohio). Distal end of the conduit was anastomosed to native aorta or arch prosthesis. Following the completion of all major anastomosis, essential pledget sutures were added for reinforcement.

The internal shunt was created just before the cardiopulmonary bypass (CPB) going to be weaned off. A small purse-string suture with 4-0

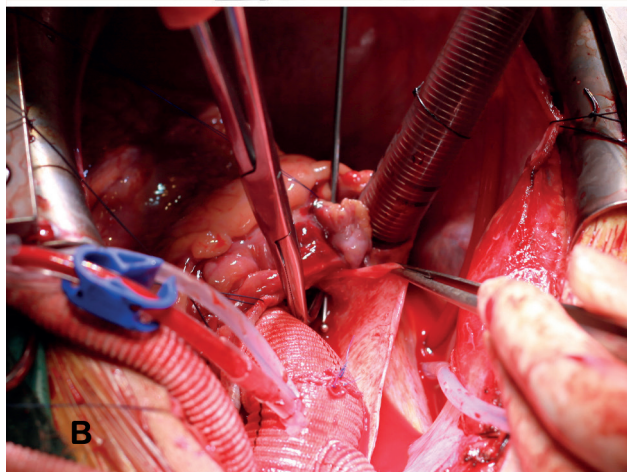
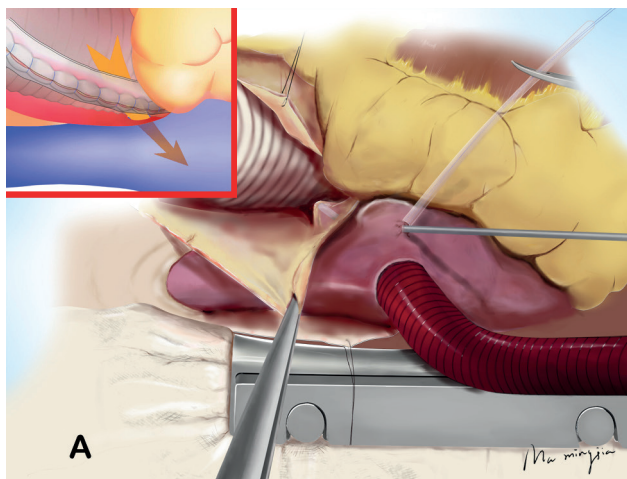


Figure 1. (A) diagram of locating the puncturing site using a right angle stick-like retractor, drainage direction was showed in upper left red box; (B) operative image of creating the internal shunt with an right angle forceps.

polypropylene was made in the right atrial wall between venous cannula and tip of right atrial appendage, within which a small incision was made. A right angle retractor for papillary muscle (Shanghai Medical Instruments, Shanghai, China) was inserted into the right atrium inside the purse-string to detect the existence of the atrium-aorta fusion. A silicone rubber shod was placed over the suture line and snared down for holding and hemostasis temporarily. For the fusion site inspection, the tip of the stick-like retractor was pushed against atrial wall towards the aorta, the adventitia was pulled away and back to the atrial side simultaneously. By this means, the fusion that locates frequently within non-coronary aortic sinus can be precisely identified (Figure 1). A puncture was made by using scalpel blade No.11 (Shanghai Medical Instruments, Shanghai, China) at the very site from within aneurysm, which was then bluntly widened to about 8 mm in diameter by opening forceps tip (Figure 1B). The fistula should be carefully checked for breakage in the atrium-aorta junction. In that case, interrupted suture was added to close the breakage. At last, the probe was taken out, and the purse-string suture was tied to close the incision in right atrium. In the cases of concomitant procedure via right atrium approach (e.g. mitral valve replacement), a right-angle forceps was

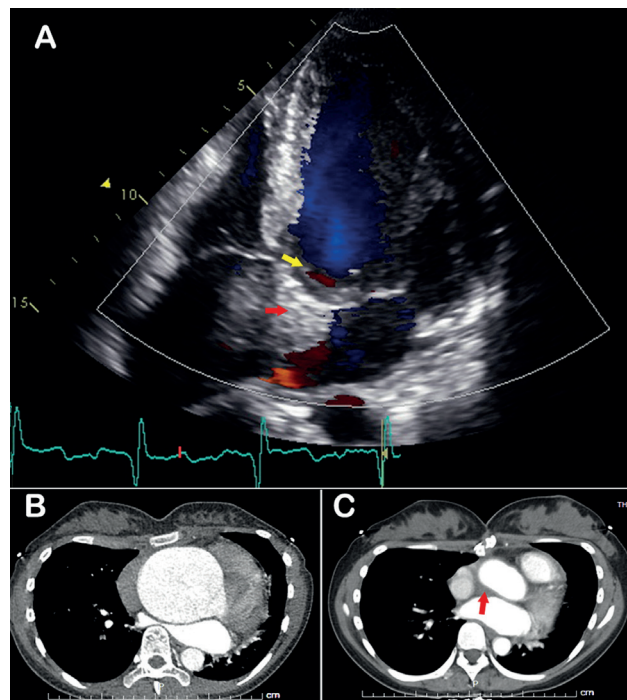


Figure 2. (A) postoperative echocardiographic imaging of the apical five-chamber view. Yellow arrow indicates mechanical valve, red arrow indicates thrombosis surrounding prosthesis; (B) and (C) pre- and postoperative enhanced computer tomography scan of the same patient. Red arrow indicates thrombosis surrounding prosthesis.

employed as an alternative for locating and creating the shunt from within the right atrium.

Once the fistula was accomplished, the wrapping procedure was processed over the revision with autologous or glutaraldehyde-preserved bovine pericardial patch (Figure 1A upper left). Then, the CPB was disaffiliated and the protamine was administered.

### 3. DISCUSSION

From 2010 to 2015, we performed the modified Bentall procedure with internal shunt on 29 patients (23 male). Mean age was  $48.7 \pm 9.2$  years. Mean aortic diameter was  $50.3 \pm 13.7$ mm. Twenty patients were Type A aortic dissection and the others were ascending aortic aneurysm. Concomitant procedures were as follow: total aortic arch replacement with elephant trunk implantation in 18 cases, hybrid procedure in 2 cases, and mitral valve replacement in 1 case. The mean postoperative blood transfusion was  $3.5 \pm 2.2$  U. Three patients were free from homologous blood transfusion. No re-exploration for bleeding was needed. Two patients died because of multiple organs dysfunction syndrome in hospital. Neither patent fistula nor new-onset arrhythmia due to the procedure was observed in follow-up.

The wrapping-shunt technique we currently employ is inspired by stepwise modifications of Cabrol's shunt maneuver (3, 4). It is appropriated for the cases of dilated aortic root with a good extent of cephalic end of coronary artery.

Blindly punching between aorta and right atrium is dangerous. In that case, there is concerned about leakage between the two referred isolate parts. Besides, as

the routine imaging techniques (echocardiography or computer tomography) are incompetent to detect this particular anatomic structure preoperatively, the intraoperative inspection appears necessary. Our method is useful for identifying this innate fusion plane.

The thrombosis surrounding prosthesis was detected in the first ultrasound examination after the operation (Figure 2), which was considered to be an indication of successful hemostasis. As the innate fusion between aorta and right atrium appears no rare, the selective creation of left-to-right internal shunt is a valuable maneuver for controlling bleeding in appropriate cases.

- Conflict of interest: none declared.

## REFERENCES

1. Nezafati P, Shomali A, Nezafati MH. A simple modified Bentall technique for surgical reconstruction of the aortic root—short and long term outcomes. *Journal of cardiothoracic surgery*. 2015; 10: 132.
2. Ma M, Liu L, Feng X. et al. Moderate Hypothermic Circulatory Arrest with Antegrade Cerebral Perfusion for Rapid Total Arch Replacement in Acute Type A Aortic Dissection. *Thorac Cardiovasc Surg*. 2016; 64: 124-32.
3. Cabrol C, Pavie A, Gandjbakhch I. et al. Complete replacement of the ascending aorta with reimplantation of the coronary arteries: new surgical approach. *The Journal of thoracic and cardiovascular surgery*. 1981; 81: 309-15.
4. Hoover EL, Hsu HK, Ergin A. et al. Left-to-right shunts in control of bleeding following surgery for aneurysms of the ascending aorta. *Chest*. 1987; 91: 844-9.