

MODIFIED BENTALL TECHNIQUE FOR AORTIC ROOT REPLACEMENT: A SIMPLIFIED APPROACH TO THE SHORT LEFT CORONARY ARTERY

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The short left coronary artery encountered during aortic root replacement with the modified Bentall (coronary button) technique may pose a significant problem for the surgeon. A simple solution entails the placement of a short interposition Dacron graft between the native coronary artery and the aortic graft. This approach has been successfully employed in 2 patients.

L'artère coronarienne gauche courte rencontrée pendant un remplacement de l'extrémité inférieure de la crosse de l'aorte par la technique de Bentall modifiée (bouton coronarien) peut poser un important problème au chirurgien. Une solution simple consiste à mettre en place une courte greffe d'interposition en Dacron entre l'artère coronarienne originale et la greffe aortique. On a utilisé cette technique avec succès chez deux patients.

Several options exist for restoring coronary artery blood flow after composite valve-graft replacement of the aortic root. Although the long-term success of these techniques is established,¹ they are all associated with certain drawbacks.

Bentall and De Bono² originally described direct anastomosis of the ascending aortic shell at the location of coronary ostia to the aortic graft. Disadvantages of this approach include difficult exposure, especially of the left coronary anastomosis in cases of bleeding, and late false-aneurysm formation.¹

A modification of the technique of Bentall and De Bono entails construction of a "button" of native aortic wall around each coronary ostium. In turn, each button is then sewn to appropriately positioned orifices in the aortic graft.³ This technique is particularly

useful for larger ascending aortic aneurysms that have caused cranial displacement of coronary ostia. A disadvantage of this technique is the limited exposure of the left coronary anastomosis during establishment of hemostasis. In addition, a short left coronary artery (LCA) may result in excessive tension on the aortic graft anastomosis. A kink in the LCA with compromise of flow or a late false aneurysm may result. Injury to proximal left coronary branches including the circumflex coronary artery or septal perforators may also occur.¹

In 1981, Cabrol and associates⁴ described a technique of aortic root replacement with a composite valve-graft in which coronary flow was re-established in extra-anatomic fashion with use of a Dacron graft connecting the coronary ostia to the aortic graft.

A potential problem identified with this technique relates to kinking of the right coronary anastomosis.^{1,5}

We present a simple technique whereby the modified Bentall button operation may be safely undertaken in the setting of a short LCA. This modification has been successfully used in 2 patients. One had annuloaortic ectasia and the other a type A aortic dissection. Our objective is to lengthen the LCA enough to achieve precise visualization of suture lines and to avoid kinking the artery yet allowing anatomic coronary reconstruction.

OPERATIVE PROCEDURE

The essential feature of the technique described is simply an extension of the LCA during the coronary button phase of the Bentall operation

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(Fig. 1). This extension is constructed with a 1- to 2-cm segment of 7-mm collagen-impregnated Dacron graft.

The operation is conducted under cardiopulmonary bypass at moderate systemic hypothermia (30° to 32 °C). Arterial inflow in our patients was through the left common femoral artery, although the distal ascending aorta may be used if anatomically appropriate. Intermittent, cold, antegrade blood cardioplegia through selective coronary cannulation was used in both patients, supplemented at 20-minute intervals. The left ventricle is vented through the right superior pulmonary vein.

With the heart under cardioplegic arrest, the right and left coronary arteries are identified. Buttons of aortic wall (1 cm in dimension) containing each ostium are carefully fashioned. Mobilization of the LCA is kept to a minimum. The right coronary artery is mobilized to a greater extent. The aortic valve is then excised and the annulus sized. An appropriate collagen-coated valve-graft conduit is chosen.

Pledged 2-0 braided Dacron su-

tures are inserted into the aortic annulus and subsequently through the sewing ring of the prosthetic valve. The valve is seated and the sutures are tied. Next, a 1-cm segment of collagen-coated Dacron vascular graft 7-mm in diameter is sewn to the left coronary button with 5-0 running polypropylene suture. A 6-mm orifice is created in an appropriate position on the posterior aspect of the Dacron aortic graft with an ophthalmic cautery. The graft is filled with cardioplegic solution to distend it so as to facilitate positioning of the anastomotic site on the aortic graft, which is also constructed with 5-0 polypropylene. The Dacron interposition graft allows a more cranial and hence much more accessible anastomosis to the aortic graft than would otherwise be possible. The short length of the interposition graft also minimizes the possibility of kinking of this conduit.

The right coronary button is directly inserted into the anterior aspect of the aortic graft at an appropriately positioned orifice within the aortic graft. Again, 5-0 polypropylene is used for this anastomosis. Finally, the distal aortic anastomosis is completed with a running 3-0 polypropylene stitch. With the patient in steep Trendelenburg position, air is removed from the heart, the aortic cross-clamp removed and the patient weaned from cardiopulmonary bypass.

COMMENT

The proposed technique provides a simple solution to a potentially troublesome problem, that of the short LCA, which may be encountered during the coronary button modified Bentall procedure. In our limited preliminary experience, we have not had a problem of LCA kinking with this modified technique. The anastomoses at each end of the interposition con-

duit are well visualized and therefore precisely constructed with minimal subsequent anastomotic bleeding. Bleeding from the LCA button to the aortic graft anastomosis can be difficult to visualize and control. At times, takedown of the anastomosis and reconstruction are required. With our modification, the crimping of the Dacron interposition graft allows easy mobilization and inspection of all anastomoses. We have not used a similar extension to the right coronary artery (RCA) because we have found that even with minimal mobilization of this artery from the atrioventricular groove there is ample length for a tension-free anastomosis. But in the future, we will not hesitate to use a similar RCA interposition graft if necessary.

Svensson⁶ has described a technique of LCA attachment to the aortic graft upon which our proposed technique is based. He advises minimal LCA mobilization and uses an 8- to 10-mm Dacron interposition graft. The length of this interposition graft, however, is considerably longer than the length we advocate. The interposition graft is routed behind the aortic graft to emerge on the right anterolateral surface of the aortic graft. The subsequent graft-to-graft anastomosis is positioned at this location. Although visualization of the latter anastomosis is good, the potential for kinking of the long interposition graft still exists. We believe that conduit kinking, with its attendant problems, is unlikely with our short interposition graft technique.

References

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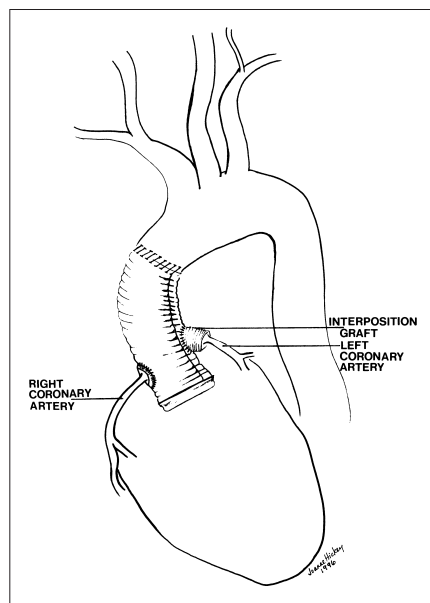


FIG. 1. Diagram shows how the left coronary artery is lengthened with an interposition graft.

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Notices

Avis

Radiation oncology symposium

The Mayo Clinic Scottsdale will sponsor the 3rd annual radiation oncology symposium and resident essay presentations on Feb. 5 and 6, 1999, in Phoenix, Ariz. The course director is James A. Bonner, MD. Course credit: AMA Category 1. For further information contact CME Department, Mayo Clinic Scottsdale, 13400 East Shea Blvd., Scottsdale AZ 85259; tel 602 301-7447, fax 602 301-8323

Colorectal disease in 1999

The Cleveland Clinic Florida will sponsor the 10th annual international colorectal disease symposium under the title "Colorectal Disease in 1999: an International Exchange of Medical and Surgical Concepts." The course will be held from Feb. 11 to 13, 1999, at the Marriott's Harbor Beach Resort in Fort Lauderdale, Fla. The symposium director is Steven D. Wexner. Topics of guest lectures and panels include controversies in ulcerative colitis surgery, frustrating fistulas, treating complications, and reoperative surgery. Four areas will be analysed in detail: colorectal neoplasia, inflammatory bowel disease, colorectal physiology and technical aspects of surgery. For further information contact: Cleveland Clinic Florida, Depart-

ment of Continuing Education, 2950 West Cypress Creek Rd., Fort Lauderdale FL 33309; tel 800 359-5101 x5056, fax 954 978-5539, jagelms@cesmtp.ccf.org

Mayo interactive surgical symposium

The Mayo interactive surgical symposium will be held from Feb. 18 to 20, 1999, at Marriott's Camelback Inn Resort, Scottsdale, Ariz. Sponsored by the Mayo Clinic Scottsdale, it will present interactive sessions designed to update general surgeons on state-of-the-art current issues on breast surgery, trauma and critical care, endocrine, gastrointestinal/hepatobiliary and vascular and thoracic surgery. Course directors are John H. Donohue and William M. Stone. Course credits: AMA Category 1. For further information contact: Kristin Eberhard, Mayo Clinic Scottsdale, 13400 East Shea Blvd., Scottsdale AZ 85259; tel 602 301-7552, fax 602 301-8323

Urogynecology and disorders of the female pelvic floor

The Mayo Clinic Scottsdale will sponsor the 8th annual course on urogynecology and disorders of the female pelvic floor, to be held from Mar. 25 to 27, 1999, at

Marriott's Camelback Inn Resort, Scottsdale, Ariz. The course director is Jeffrey L. Cornella. Course credits: AMA Category I and ACOG. For further information contact: Kristin Eberhard, Mayo Clinic Scottsdale, 13400 East Shea Blvd., Scottsdale AZ 85259; tel 602 301-7552, fax 602 301-8323

Interventional ultrasonography

The 8th International Congress on Interventional Ultrasound will be held from Aug. 31 to Sept. 3, 1999, at Herlev Hospital, University of Copenhagen, Copenhagen, Denmark. Further information may be obtained by contacting the Department of Ultrasound — Herlev Hospital, University of Copenhagen, DK-2730 Denmark; tel +45 44 88 32 40, fax +45 44 94 80 09, ultrasound@herlevhosp.dk

Pediatric Orthopedic Review Course

The 12th Sainte-Justine Paediatric Orthopaedic Review Course will be held from Apr. 7 to 9, 1999, at the Hotel de Parc in Montreal. For further information contact Dr. Thierry Benaroch, Secretary, SPORC, Hôpital Sainte-Justine, 3175 Côte Sainte-Catherine, Montréal QC H3T 1C5; tel 514 345-4876, fax 514 345-4755