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Resection and End-to-End Anastomosis for Ascending Aortic Aneurysms Associated with a Bicuspid Valve: Case Reports

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ABSTRACT

Ascending aortic aneurysms associated with a bicuspid valve are generally treated by replacement with a tubular graft because the aortic wall is claimed to be genetically pathological. We describe 9 cases in which patients with an ascending aortic aneurysm and an associated diseased bicuspid valve underwent aneurysmal resection and end-to-end anastomosis. This technique permitted us to remove the entire aneurysmal wall, avoiding graft interposition.

INTRODUCTION

Ascending aortic aneurysms associated with a bicuspid valve are generally treated by replacement with a tubular graft. The aortic wall is claimed to be pathological in these patients [Braverman 2005], and other conservative surgical techniques, such as aortoplasty, are generally avoided because of the high aneurysm recurrence rate.

Resection and end-to-end anastomosis is a conservative surgical option, which permits surgeons to remove the aneurysmal wall, avoiding graft interposition. It is currently used for the treatment of certain diseases of the descending thoracic aorta [Roques 2003; Kieffer 2005], but it is rarely employed for ascending aortic aneurysm [Vigano 2002; Massetti 2004].

We report our experience to evaluate the direct suture technique as a surgical option for ascending aortic aneurysms associated with a bicuspid valve.

CASE REPORTS

From October 1999 to June 2005, 9 patients (6 men and 3 women) were referred for surgical treatment of ascending aortic aneurysm associated with a diseased bicuspid valve and underwent aneurysmal resection and end-to-end anastomosis. They were 13.4% of the patients with a diseased bicuspid valve and associated ascending aortic aneurysm that underwent surgery at our institution in the same period.

Patients were evaluated with regards to clinical, echocardiographic, and tomographic findings. Data were collected prospectively. Patients were prospectively followed-up by means of direct visit, echocardiography, and computed tomographic scan of the chest.

The mean age of the group was 59.3 ± 7.4 years (range, 43-66). All patients were in New York Heart Association functional class I or II.

A preoperative echocardiography and a computed tomography scan of the chest were performed to evaluate the diameter of the ascending aorta. Aortic dilatation was fusiform in all patients and localized to the ascending aorta without involving the aortic root or arch. The mean preoperative aortic diameter was 51.4 ± 3.1 mm (range, 48.0-55.0 mm). The mean diameter of the sino-tubular junction was 32.3 ± 0.9 mm. None of the patients had Marfan syndrome or other genetic disorders. The mean left ventricular ejection fraction was 64.2% ± 5.8% (range, 55.6%-74.0%).

The bicuspid valve was stenotic in 5 patients (55.6%) and insufficient in 4 (44.4%). Coronary angiography did not document significant coronary artery disease.

The same surgical technique was performed in all patients. Median sternotomy, cardiopulmonary bypass, moderate hypothermia, and aortic cross clamping were used. The arterial cannula was placed in the right common femoral artery to permit a better mobilization of the aortic arch. After aortic cross clamping, the aneurysm was resected with 2-circumferential aortotomy, at the level of sino-tubular junction and at the distal edge of the aneurysm. The mean length of the resected aortic segment was 44.2 ± 1.9 mm. The approximation of the 2 aortic ends permitted us to evaluate the need for further mobilization to relieve suture tension. The aortic valve replacement was then performed. The 2 ends of the aorta were finally sutured with a continuous 4-0 polypropylene suture. Tailoring of the sino-tubular junction was not performed.

No perioperative death occurred. The postoperative course was uneventful in all patients. The postoperative echocardiographic and computed tomographic scan of the

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Changes in Mean Ascending Aortic Diameters*

Diameter	Preoperative	Postoperative	3 mo	1 y	2 y	3 y
Total†	51.4 ± 3.1	37.0 ± 2.8‡	37.3 ± 3.1‡	37.3 ± 3.1‡	37.4 ± 3.8‡	37.3 ± 3.2‡

*Values are mm (mean ± standard deviation). Statistical analysis for ascending aortic diameters was performed until 3-year follow-up; as for longer follow-up, data are not sufficient for statistical analysis.

†$P < .001$ by repeated-measures analysis of variance.

‡$P < .05$ versus preoperative.

chest confirmed the reduction of the ascending aortic diameter (37.0 ± 2.8 mm versus 51.4 ± 3.1 mm; $P < .05$).

Cumulative follow-up time was 207.7 patients-months and was 100% complete. At follow-up, there was no death. Overall survival estimate at 50 months was 100%. There was no ascending aortic redilatation (Table) or pseudoaneurysm formation at follow-up. The actuarial freedom from all cardiac-related mortality and morbidity was 100%.

DISCUSSION

End-to-end anastomosis is an alternative conservative technique that can be performed in patients with an associated bicuspid valve, as it permits the removal of the entire diseased aorta, which is more prone to redilatation [Braverman 2005]. Although it is simple and considered a standard technique for the treatment of certain diseases of the descending thoracic aorta [Roques 2003; Kieffer 2005], it is rarely employed when the aneurysm is localized to the ascending aorta. The formation of pseudoaneurysm and redilatation are considered its limitations. However, the few existing reports indicate good results at long-term follow-up [Vigano 2002; Masetti 2004]. Our experience confirms those data even in patients with an associated bicuspid valve.

The end-to-end anastomosis can be performed only in selected cases. The aneurysm should be limited to the ascending aorta. Surgical mobilization of the aneurysm and aortic arch should be feasible to avoid suture tension. Massetti et al described a surgical technique to relieve tension [Masetti 2004], but in our experience, it can be simply avoided with a wide mobilization.

To our knowledge, this is one of the largest series to date of patients with an ascending aortic aneurysm and associated bicuspid valve undergoing resection and end-to-end anastomosis. It is a limited experience and further larger studies are required to confirm our outcomes.

In conclusion, resection and end-to-end anastomosis appears to be a safe and effective surgical alternative for the treatment of selected ascending aortic aneurysm associated with a diseased bicuspid valve.

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