Outcomes of Open Surgical Repair for Type B Dissecting Aortic Aneurysm With Alternative Methods in the Endovascular Stent Era

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We assessed the midterm outcomes of 2 types of open surgical repair for type B dissecting aortic aneurysm (BDA). During the last 4 years, 86 patients with BDA (mean age, 68.5 ± 9.8 years; range: 41-87 years) underwent open repair. The average duration between the dissection onset and surgery was 51.5 ± 31.3 months. If the BDA was of open type with patent false lumen or the aneurysm extended for a long segment, descending or thoracoabdominal aortic repair was performed with left thoracotomy. If the BDA was of the closed type with thrombosed false lumen and the aneurysm was located around the distal arch, open stent implantation was performed with our unique technique using circulatory arrest with a rectal temperature of 28°C without any cerebral perfusion. Left thoracotomy was performed in 68 patients. The durations of aortic clamping and cardiopulmonary bypass were 65.2 ± 16.9 and 78.5 ± 34.6 minutes, respectively. Open stent implantation was performed in 18 patients. The durations of circulatory arrest and cardiopulmonary bypass were 19.1 ± 5.1 and 86.2 ± 17.8 minutes, respectively. In the present study, 4 patients (4.7%) required reexploration for bleeding and 1 patient (1.2%) had a stroke, but none suffered paraplegia. The hospital mortality rate was 1.2% (1 patient), resulting from retrograde type A dissection. The actuarial aortic event-free survival rate, including operative death, was 96.4% at 3 years. Both open surgical procedures for BDA were relatively safe, with favorable early and midterm outcomes, and may be superior for avoiding neurologic complications.

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Type B dissecting aneurysm of maximum diameter of more than 50mm.

Central Message

Open surgeries for type B dissecting aneurysm were relatively safe, with favorable early and mid-term outcomes, even in the stent era.

Perspective

Contemporary open surgical series for type B dissecting aneurysm (BDA) with newly developed techniques have resulted in a positive trend toward more favorable outcomes. It was superior for avoiding neurologic complications. Therefore, open repair still plays a significant role in the management for the patients with BDA, even in the current endovascular stent era.

See Editorial Commentary pages 113–114.

INTRODUCTION

The efficacy of thoracic endovascular aortic repair (TEVAR) has raised new expectations for the treatment of complicated type B aortic dissection.[1] However, no consensus has been reached on the optimal treatment of enlarging false lumens despite endovascular closure of the intimal tear.[2] Furthermore, despite the lower operative morbidity and mortality rates of TEVAR for uncomplicated type B dissecting aneurysm (BDA), the midterm outcomes are less encouraging, with high incidences of retrograde type A dissection and procedural failure due to endoleakage, as well as persisting false lumen perfusion with aneurysmal dilatation.[3-5] Further, a prospective randomized trial also showed that elective TEVAR in survivors of BDA failed to improve the 2-year survival and adverse rates despite favorable aortic remodeling,[6] and recently, it has been reported that TEVAR for BDA does not reduce aortic ruptures or increase life expectancy.[7] On the contrary, open surgical repair can treat large aneurysms and eliminate the risk of aneurysm-related death in the treated segment. Although the open surgical treatment of BDA has been reported to be associated with high morbidity and mortality rates,[8,9] contemporary surgical series

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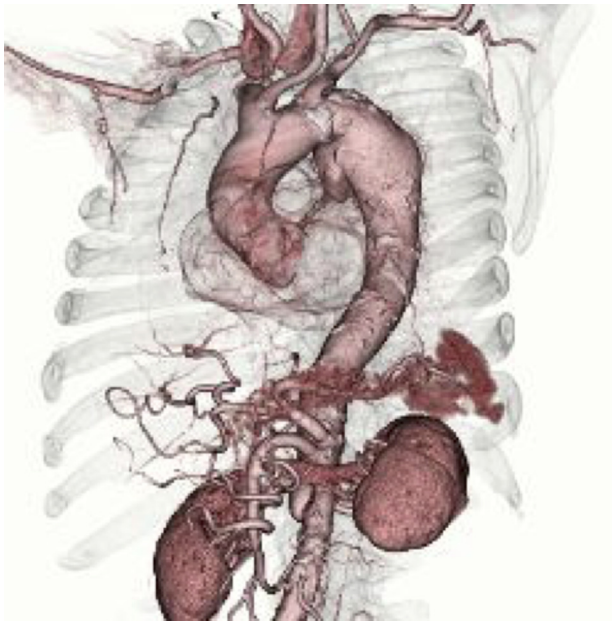

Figure 1. Type B dissecting aneurysm of maximum diameter of more than 50 mm. (Color version of figure is available online at http://www.semthorcardiovascsurg.com.)

with newly developed techniques have resulted in a positive trend toward more favorable outcomes.[10] The aim of the present study was to assess and summarize the outcomes of open surgical repair for BDA, with particular focus on contemporary data in the current endovascular era. Furthermore, our unique procedure, which we have termed "less invasive quick open stenting," performed under mild hypothermic circulatory arrest without cerebral perfusion is also described.

PATIENTS AND METHODS

Between January 2011 and July 2014, 86 patients with BDA of maximum diameter more than 50 mm regardless of type of false lumen (Fig. 1) underwent open surgical repair in our institution. Institutional review board approval was provided before publication of this article and reporting of the information. In all, 71 patients (82.6%) were men, and the average age was 68.5 ± 9.8 years, ranging from 41-87 years. Of these patients, 4 underwent emergency surgery for impending rupture; for the remaining patients, the average duration between the dissection onset and surgery was 51.5 ± 31.3 months, and the maximum aortic diameter at the time of surgery was 60.3 ± 5.9 mm. When the computed tomography (CT) scan showed contrast media in the false lumen as well as the true lumen, we defined it as open type or patent false lumen. On the contrary, if the CT revealed completely occluded false lumen with thrombi, we defined it as closed type.

Surgical Procedure 1

If the false lumen was patent or the aneurysm extended for quite a long segment regardless of open or closed type, descending or thoracoabdominal aortic repair was performed using left thoracotomy. The chest was entered through a left posterolateral thoracotomy in the third and fifth intercostal spaces. The thoracic aorta was exposed from the aortic arch to the diaphragm, and the vagus and left recurrent nerves were isolated. The left subclavian artery was encircled with umbilical tape, and the aortic arch was subsequently taped between the common carotid and subclavian arteries. The intercostal arteries in the chest cavity were clamped using hemoclips before aortic cross-clamping, as much as possible. When thoracoabdominal repair was required, selective blood perfusion for the celiac axis and both renal arteries was performed, and the intercostal arteries at the Th12 and L1 levels were reconstructed. Cerebrospinal drainage was not used. As soon as femoro-femoral cardiopulmonary bypass (CPB), with an assist rate of 50%, was commenced, aortic clamps were placed on the aortic arch, subclavian artery, and the distal part of the descending aorta. The aneurysm was opened longitudinally, and the residual intercostal arteries were closed. Graft replacement was performed with a polyester prosthesis, approximately 20 cm in length. If the false lumen was patent, distal anastomosis was performed using the double barrel technique.