Case report - Aortic and aneurysmal
Management of a chronic Stanford type B dissection in a patient with a right-sided aortic arch

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Abstract

We report the case of a 44-year-old male with a right-sided aortic arch who presented with dissection extending from his distal arch to his left common iliac artery. He was initially managed conservatively, but later became symptomatic with back pain; enlargement of the descending thoracic aorta was demonstrated on computed tomography scanning. He underwent staged repair of the aortic arch and descending thoracic aorta with the elephant trunk procedure – two operations one year apart, each time making a good postoperative recovery.

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1. Introduction

Right-sided aortic arch (RAA) is an uncommon aortic anomaly which may be associated with Stanford type B dissection. Owing to the position of the arch and descending aorta, management of this condition can be challenging. We present the case of a patient with an RAA with Stanford B dissection and related management issues.

2. Case report

A 44-year-old male with a history of hypertension and peptic ulcer presented with severe epigastric pain radiating to his back. Except for a blood pressure of 150/60 mmHg, his physical examination was normal.

A computed tomography (CT) scan demonstrated an RAA with a Kommerell’s diverticulum arising from the distal arch (Fig. 1) and a dissection extending from the diverticulum to left common iliac artery. The maximum diameter of the dilated descending thoracic aorta (DTA) was 5.0 cm. Both common carotid arteries were arising from a common origin on the anterior aspect of the distal ascending aorta. The right subclavian artery (RSA) was arising distal to the common carotid origin from the right side of the arch, and the left subclavian artery (LSA) arose from the thrombosed Kommerell’s diverticulum and was partially occluded. The aortic arch passed behind the trachea and oesophagus on the left; no vascular ring or obliteration of the aorta was present.

The patient was managed conservatively for a year until an episode of back pain occurred. At that point, a CT-scan revealed enlargement of the DTA to 5.5 cm and progression of the thrombosis of the diverticulum.

It was decided to perform the surgical intervention procedure in two stages with initial replacement of the ascending aorta and arch with elephant trunk via a sternotomy, followed by a second stage replacing the DTA via a right thoracotomy.

After median sternotomy and systemic heparinisation, cardiopulmonary bypass was established via cannulation of the right atrium and aortic arch. With a temperature of 20 °C and on hypothermic circulatory arrest, anterograde cerebral perfusion via direct cannulation of both carotid arteries was established.

The ascending aorta and arch were fashioned to replace the arch with elephant trunk proximal to the LSA using a 22 mm Vascutek (Vascutek Terumo, Inchinnan, Renfrewshire, UK) single side branch collared tube graft, the proximal end of which was anastomosed to the proximal ascending aorta. The RSA was anastomosed to a 10 mm Hemashield (Boston Scientific, Hemel Hempstead, Hertfordshire, UK) tube graft, which was anastomosed to the main tube graft. The common origin of both common carotid arteries was anastomosed to the main tube graft via another 10 mm Hemashield tube graft. The total duration of cross-clamping was 153 min, circulatory arrest lasted 16 min, and bypass time was 424 min. Except for a hoarse voice, the patient made a full recovery.

The second stage of elephant trunk repair was performed 14 months later through a right thoracotomy due to patient preference. The elephant trunk was found to be clean and sitting in the proximal DTA just to the right of the midline. The distal DTA was inspected; dissection septum was
excised and the organised thrombus from the false lumen was evacuated.

Deep fenestration was created downwards. The distal DTA was fashioned and anastomosed to a 24 mm Hemashield tube graft, the proximal end of which was anastomosed to the distal end of the previous graft, both with 3.0 Prolene, reinforced with interrupted Teflon pledgeted sutures, 3.0 and 4.0 Prolene, respectively. The tube graft was wrapped with the aneurysm wall. Total cross-clamping time was 61 min and bypass time was 229 min. Again, the patient made a good postoperative recovery and remains under follow-up with six-monthly CT-scans (Fig. 2).

3. Discussion

An RAA is defined as an aortic arch that crosses the right main bronchus and has a reported incidence of 0.1% [1]. Patients with RAA may be asymptomatic unless a vascular ring is present. Although no figures for incidence have been reported, thoracic aortic dissection or aneurysm occurring with RAA is thought to be rare. However, it has been suggested that Stanford type B dissections are more common than the other types of dissection in patients with RAA [2]. One proposed explanation for this association is that the sharper curvature of an RAA leads to differences in blood flow, which, in turn, result in increased stress on the vessel wall [3]. The approach to the dissection in a RAA is also not extensively described in literature.

In our case, although the diverticulum was situated in the left portion of the arch, the DTA was right-sided. Despite the fact that the arch and ascending aorta were of normal size, a more conventional approach to treating the pathological descending aorta at a single operation rather than with a staged approach would have had its pitfalls.

Using a single-stage approach through a right thoracotomy to replace the DTA, access to the distal arch and proximal DTA would have been difficult, and even with hypothermic circulatory arrest it would have been impossible to deal with the Kommerell’s diverticulum and ensure that the true lumen was being anastomosed to the proximal DTA. Another single-stage option was a clamshell incision to replace the arch and DTA. This, however, is a traumatic incision with harmful effects on the lungs. A third possibility was a one-stage approach to perform a left thoracotomy and pull the DTA from the left. The advantage of this approach is access to the proximal and distal DTA for anastomosis. However, management of intercostal back bleeding from dissected DTA would have been extremely difficult.

Therefore, it was decided to replace the aorta in two stages, the first being an elephant trunk to replace the
ascending aorta and arch to provide a suitable proximal clamp site for the intended replacement of the DTA via a right thoracotomy. This also served the purpose of replacing the portion of the arch involved in the dissection.

With the staged approach, there are two episodes of hospitalisation and twice the recovery time. However, owing to the extensive nature of the involvement of the aorta, each procedure is less extensive, with the first stage preparing the aorta for the second part of the operation.

References

