Case report

Dissecting thoracoabdominal aortic aneurysm associated with an isolated right-sided aortic arch

Satoru Kuki*, Kazuhiro Taniguchi, Shigeru Miyagawa, Hiroshi Takano

Department of Cardiovascular Surgery, Osaka Rosai Hospital, 1179-3 Nagasone-cho, Sakai 591-8025, Japan

Received 27 September 1999; received in revised form 20 January 2000; accepted 9 February 2000

Abstract

Although a right-sided aortic arch is not a rare anomaly, an aortic dissection involving an isolated right-sided aortic arch is extremely rare and remains a complicated entity for surgical therapy because of its anatomical characteristics. Previous reports that we have identified in English literature include only six surgical cases of aortic dissection involving a right-sided aortic arch. We report on a 75-year-old female who had a chronic thoracoabdominal aortic aneurysm following type B aortic dissection in a right-sided aortic arch. Graft replacement including reconstruction of Adamkiewicz artery and a celiac trunk was performed. The postoperative course was uneventful except for a prolonged ventilatory support. This case seems to be the first successful case of extended graft replacement for this pathology. © 2000 Elsevier Science B.V. All rights reserved.

Keywords: Right-sided aortic arch; Aortic dissection; Thoracoabdominal aortic aneurysm; Graft replacement

1. Introduction

Mirror image type of right-sided aortic arch is often associated with major cardiac anomalies, however, an isolated right-sided aortic arch is less symptomatic [1]. Surgical management for aortic aneurysm involving right-sided aortic arch remains a complicated problem even in either true or dissecting aneurysm because of its anatomical feature. Previous reports that we have identified include only six surgical cases of aortic dissection (five of type B and one of type A) in this vascular anomaly [2–7], and a successful graft replacement was performed only in three of those cases [5–7]. We present a case of thoracoabdominal aortic aneurysm following type B dissection involving right-sided aortic arch, in which a successful graft replacement was performed.

2. Case report

A 75-year-old woman was admitted on 5th May, 1993 to our hospital with a complaint of back pain. The patient had stable vital signs. Contrast enhanced computed tomographic (CT) scan on admission day demonstrated a type B aortic dissection associated with a right-sided aortic arch. Echocardiography showed no cardiac anomaly. The maximum diameter of the aorta was 5.0 cm, so that an aggressive medical treatment was followed. In August 1997, a follow-up CT showed an enlarged aneurysm with a diameter of 6.0 cm. She was readmitted for operation. Aortography demonstrated a Kommerel’s diverticulum, an aberrant left subclavian artery, and an extended dissection in the thoracoabdominal aorta including celiac axis arising from the false lumen. Following the Kommerel’s diverticulum, the aorta passed behind both the right main bronchus and the esophagus then descended on midline, and located on the left side of the spine below the Th 9 (Fig. 1). The operation was carried out on 9th November, 1997. A double-lumen endobronchial tube could not be placed because of an anomalous configuration of the right main bronchus. On the left side-up position, a spiral thoracoabdominal skin incision was made, then the aorta was exposed by a standard thoracotomy. Cardiopulmonary bypass (CPB) using a centrifugal pump was instituted with two arterial return cannulae in both the left axillary and the left femoral arteries, and venous drainage from left femoral vein. The abdominal aorta was cross-clamped between the renal arteries and the superior mesenteric artery (SMA). The distal anastomosis was made at the level just
proximal to SMA with a Hemashield (Meadox Medicals, Inc.) 22-mm Dacron woven arch graft using a segmental repair technique. During this procedure a separate arterial perfusion to SMA was performed. The celiac artery was anastomosed to the 10-mm branch of the graft, and two pairs of intercostal arteries were also reconstructed. The proximal anastomosis was made at the level of Th 7. CPB was weaned off without difficulty. Her postoperative course was uneventful except for a prolonged mechanical ventilation. Neither paraplegia nor visceral ischemia had occurred. A follow-up aortography revealed no residual false lumen and a good patency of the branched graft except for the occluded graft to intercostal arteries (Fig. 2). She remains well after 22 months of follow-up.

3. Comment

Aortic dissection involving a right-sided aortic arch is rare. The first instance described by Roan et. al in 1979 did not survive operation [2]. They emphasized that the precise definition of the pathoanatomy is essential for treatment of this pathology. The previous reports dealing with aortic dissection involving a right-sided aortic arch include an unsatisfactory surgical outcome. Froten et. al. reported a case of exclusion of aneurysm and extraanatomical bypass [3]. Ohteki et. al. reported a case of plication of the diver-
ticulum [4]. Although various surgical approaches were tried for this pathology, the in situ graft replacement for type B aortic dissection was performed only in the recent two cases [5,6]. The present case was a chronic thoracoabdominal aortic aneurysm following successful medical treatment for aortic dissection, so that the precise surgical anatomy was obtained by aortography and repeated CT scans. Fortunately, the proximal descending aorta to be cross-clamped was located on mid-line, so that we could place an aortic clamp only through a left thoracotomy even with some difficulties. Otherwise, procedures such as an additional right thoracotomy or a deep hypothermic circulatory arrest might be necessary. We used a heparin-coated CPB circuit, a moderate hypothermia, and a segmental repair technique with cerebrospinal fluid drainage and naloxone (1 μg/kg per h) to reduce the risk of hypothermic coagulopathy and paraplegia due to spinal cord injury. Recent reports demonstrate that endovascular surgery is useful for aortic dissection and aortic aneurysm in highly selected patients [8]. However we abandoned the use of the stented-graft because of several reasons such as a celiac axis originating from false lumen, a short length of so called aneurysmal neck, an aortic elongation, or the unavailability of stented graft in Japan.

In conclusion, once the diagnosis was made for aortic dissection associated with right-sided aortic arch, a surgical strategy based on its pathoanatomy should be planned.

Fig. 1. (A) Angiography showing an aberrant left subclavian artery originating from a Kommerel’s diverticulum (arrow). (B) Aortography demonstrating a type B aortic dissection including celiac artery originating from false lumen, with comparable contrast enhanced computed tomographic (CT) scans at various levels.
References


Fig. 2. Postoperative aortography demonstrating a patent graft to celiac artery (arrow).