Case Report

Cattell-Braasch Maneuver: A Gadget to Manipulate Abdominal Aortic Aneurysm in a Patient with a Left-Sided Inferior Vena Cava

Akiko Tobe, Takuro Shirasu, Takatoshi Furuya, Motoki Nagai, and Yukihiro Nomura

Department of Surgery, Asahi General Hospital, Chiba, Japan

Correspondence should be addressed to Takuro Shirasu; shirasu-tky@umin.ac.jp

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A 76-year-old man was diagnosed with abdominal aortic aneurysm and a left-sided inferior vena cava. He underwent open surgery, and we employed the Cattell-Braasch maneuver to approach the abdominal aortic aneurysm from the right side. This enabled securing of the abdominal aortic aneurysm neck without mobilizing or dissecting the inferior vena cava. His postoperative course was uneventful. Although abdominal aortic aneurysm is typically approached from the left side in open surgery, approaching from the right side is beneficial in patients with abdominal aortic aneurysm and a left-sided inferior vena cava.

1. Introduction

The presence of a left-sided inferior vena cava (LIVC) poses a challenge during open surgery when present with abdominal aortic aneurysm (AAA). The LIVC usually obscures the aortic neck, and proximal anastomosis becomes much more difficult. However, surgical approaches to treat AAA with LIVC have not been well discussed in the literature, partly because this anomaly is rare, with a reported incidence of 0.1%–0.4% [1]. We report the case of a 76-year-old man, whom we successfully treated for AAA with LIVC by approaching the AAA from the right side in open surgery.

2. Case Presentation

A 76-year-old man, who was being monitored for thoracic aortic aneurysm using computed tomography, was first diagnosed with a small AAA 6 years before undergoing surgery. Simultaneously, he was diagnosed with LIVC. Both of his common iliac veins flowed into the infrarenal IVC, which then ran parallel to the left side of the aorta and AAA. The LIVC crossed the aortic neck anteriorly after receiving the left renal vein at the level of the bilateral renal arteries and ran right to the aorta in the normal position. The AAA was located immediately dorsal to the head of the pancreas and duodenum. The left gonadal and adrenal veins were direct tributaries of the LIVC (Figure 1). His AAA rapidly increased by 10 mm in 1 year and finally enlarged to a diameter of 50 mm. After fully receiving an explanation of his condition, he opted to undergo open surgery for the AAA.

The patient’s medical history included chronic kidney disease, hypertension, and a complete atrioventricular block, which had been treated with a cardiac pacemaker implantation. The cortex of the right kidney had already decreased in size since AAA diagnosis. The serum creatinine level was 1.26–1.31 mg/dL throughout the 6-year follow-up period. He had been smoking approximately 40 cigarettes per day for 50 years and had quit smoking 8 years before the surgery.

For the surgery, we employed a transperitoneal approach with right-sided medial visceral rotation. We mobilized the duodenum, the head of the pancreas, and the right-sided colon, which provided a clear view of the AAA with LIVC without dividing any major blood vessels. Without division or mobilization of the LIVC, the infrarenal aortic neck was dissected. The bilateral common iliac arteries were also dissected for clamping in the surgical field (Figure 2). A bifurcated artificial graft (Hemashield Gold 14 × 8, MAQUET Holding B.V. & Co. KG, Germany) was implanted from the infrarenal aorta to the bilateral common iliac arteries (Figure 2). The duration of the operation was 2.9 h, and the estimated blood loss was 210 mL. The postoperative course was uneventful. The patient recovered his normal physical status and was discharged on day 7 after surgery.
3. Discussion

We rarely encounter LIVC in patients with AAA. Since first reported by Davachi et al. in 1965 [2], some reports have been published in the literature to date. Almost all published reports described open surgery, which can be challenging, particularly when securing the AAA neck. In cases with LIVC, the AAA necks are supposed to be obscured by the IVC. According to normal IVC embryology, the right renal vein’s predecessor persists and the IVC runs right to the

Figure 1: Infrarenal abdominal aortic aneurysm and left-sided inferior vena cava. (a) Computed tomography revealed that the inferior vena cava ran left to the abdominal aortic aneurysm (AAA). The AAA was 50 mm in diameter. (b) The left-sided inferior vena cava crossed the aortic neck anteriorly after receiving the left renal vein at the level of the bilateral renal arteries and ran right to the aorta in the normal position.

Figure 2: Surgical view of the abdominal aortic aneurysm and left-sided inferior vena cava. (a) After mobilizing the duodenum, right colon, and intestine by employing the Cattell-Braasch maneuver, the aorta was clearly observed from the neck of the abdominal aortic aneurysm (AAA) to both of the common iliac arteries. (b) A bifurcated artificial graft was implanted from the infrarenal aorta to the bilateral common iliac arteries. Arrows indicate the left-sided inferior vena cava. Arrowheads indicate the neck of the AAA.
The IVC should be avoided if possible because dividing the IVC or its tributaries poses a high risk of bleeding. However, the Cattell-Braasch maneuver involves the risk of injury to the duodenum, pancreas and ascending colon, and right ureter and paralytic ileus as described previously [13]. Another disadvantage of adopting the Cattell-Braasch maneuver would be poor access to the suprarenal part of the abdominal aorta. When combined with the retroperitoneal incision from the aortic bifurcation along the inferior mesenteric vein to the ligament of Treitz, the Cattell-Braasch maneuver can provide a clear surgical field for suprarenal regions [14]. However, even this procedure does not allow access to the paravisceral region of the abdominal aorta, which can be better manipulated in the retroperitoneal approach.

In our patient as well as in cases reported previously, AAAs were located in the infrarenal region of the abdominal aorta. Interestingly, some cases including ours described the formation of the AAA at the inflection point of the angulated aortic axis. We need to scrutinize more cases to determine the possible reason for this, such as hemodynamic influences, but the Cattell-Braasch maneuver is more appropriate in such cases, since those will have infrarenal normal neck for proximal control. Endovascular aortic repair (EVAR) may also be suggested for this complex anatomy. In fact, we had proposed EVAR as an option to the patient, but he chose open surgery to minimize the necessity for reinterventions in the long term.

The difference between the transperitoneal and retroperitoneal approaches in patients with LIVC has been reported previously [11, 12]. According to Dimic et al., retroperitoneal approach would complicate the aortoiliac procedure [12]. In patients with normal anatomy, the retroperitoneal approach is generally useful for more proximal aneurysms like pararenal and suprarenal AAA, and there is no significant difference in terms of the rates of perioperative morbidity and mortality between transperitoneal and retroperitoneal approach for AAA repair [15]. As mentioned earlier, proximal
anastomosis is key in the management of this anomaly, for which the retroperitoneal approach might be helpful. However, patients with AAA sometimes have iliac artery aneurysms, which require simultaneous treatment. Although the decision must be made on a case-by-case basis, the transperitoneal approach is more suitable than the retroperitoneal approach in cases of LIVC because it provides a larger surgical field caudally.

In conclusion, right-sided medial visceral rotation or the Cattell-Braasch maneuver was useful in open surgery for AAA with LIVC.

Consent

Our patient consented to the publication of his case details and images, and written informed consent was obtained.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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