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Case Report

Giant Symptomatic Unruptured Juxtarenal Abdominal Aortic Aneurysm

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Herein, we present the case of an 84-year-old male with a 13-cm, symptomatic, unruptured juxtarenal abdominal aortic aneurysm. This aneurysm was successfully treated with open surgical repair, which was deemed satisfactory at the 3-year follow-up. Despite a paradigm shift towards endovascular techniques in aortic repair, postgraduate training with a focused exposure to open aortic surgery at high-volume centers is essential for future vascular surgeons to safely perform complex aortic repairs with acceptable mortality and morbidity rates.

Key Words: Giant abdominal aortic aneurysm, Abdominal aortic aneurysm, Operative surgical procedure

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INTRODUCTION

In the era of national screening programs and the wide availability of vascular ultrasound, a giant abdominal aortic aneurysm (AAA) is a rare clinical finding. Moreover, open surgical or endovascular repair is challenging for these patients. Here, we present the case of an 84-year-old male with an unruptured giant juxtarenal AAA measuring 13 cm in diameter, which we successfully treated with open surgical aneurysm repair (OSR). Written informed consent was obtained from the patient for publication of this case report and accompanying images. The need for ethical review and approval was waived for this study by the institutional review board due to the retrospective nature of the case report.

CASE

An 84-year-old male presented to the emergency department of our clinic with complaints of abdominal hardening and discomfort. The onset of symptoms was 12 months prior and had worsened over the previous 2 days. He had a history of atrial fibrillation with tachycardia-bradycardia syndrome, treated with phenprocoumon and an implanted 1-chamber pacemaker. He also had a history of coronary heart disease, myocardial infarction, pulmonary embolism after deep venous thrombosis, and lower median laparotomy for appendectomy. On admission, the patient had a good mental and nutritional status, with a normal heart rate of 71 bpm and a normotensive blood pressure of 135/85 mmHg. Physical examination revealed abdominal tenderness with the maximal point of pain in the left paraumbilical region, where a palpable pulsatile mass was localized. Peripheral arterial foot pulses were present, and the ankle-brachial index was 1.0 on the right and 0.91 on the left. Abdominal duplex sonography revealed a large infrarenal AAA ≥12 cm in diameter. Computed tomography angiography confirmed the clinical diagnosis of a giant 13-cm

juxtarenal aortic aneurysm (Fig. 1, 2). The aneurysmal neck length was 3.2 mm. The suprarenal (α-angle) and infrarenal aortic (β-angle) angles were 66° and 80°, respectively. It also showed a small intramural thrombus extending directly from the ostium of both renal arteries to the aortic bifurcation. The common iliac arteries measured 2.6 cm on the right side and 2.1 cm on the left. Blood tests showed thrombocytopenia (82/nL), a hemoglobin level of 12.8 g/dL, an international normalized ratio of 2.79 and a normal partial thromboplastin time of 45.5 seconds. The renal function was not impaired (glomerular filtration rate of 81.8 mL/min/1.73 m^2). As part of the pre-operative assessment, the patient underwent transthoracic echocardiography, which showed a normal ejection fraction (54%) without wall motion abnormalities or valvular lesions. Spirometry results were unremarkable. Therefore, a low cardiac risk for surgery was noted during the cardiology consultation.

We evaluated the possibility of endovascular aneurysm repair (EVAR). However, as an institution that has performed over 20 open abdominal and thoracoabdominal aortic cases annually for the last 10 years, we had extensive experience in open aortic cases. Moreover, considering a broad range of contributory factors, such as a good cardiorespiratory fitness, the acute onset of pain due to possible aneurysm expansion, unfavorable supra- and infrarenal aortic angles, a possible delay of the procedure due to manufacturing a patient-tailored fenestrated aortic endo-

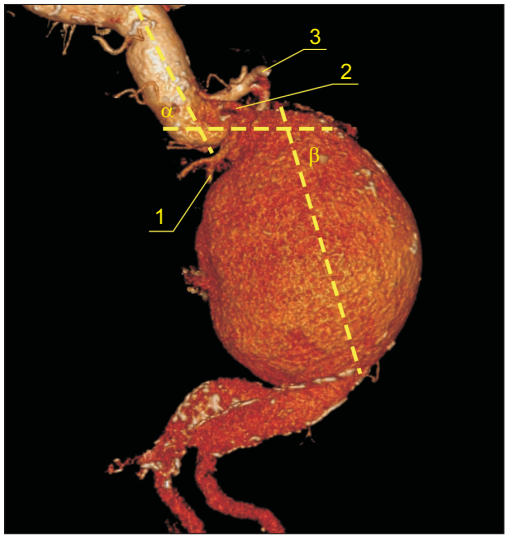

Fig. 1. Three-dimensional computer tomography showed the reconstructed aortic aneurysm. 1, right renal artery; 2, superior mesenteric artery; 3, celiac trunk; α, suprarenal angle; β, infrarenal angle.

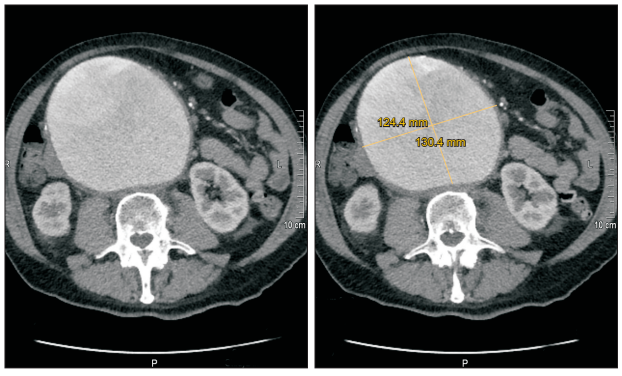

Fig. 2. Computer tomography showed the transverse plane of the aneurysm.

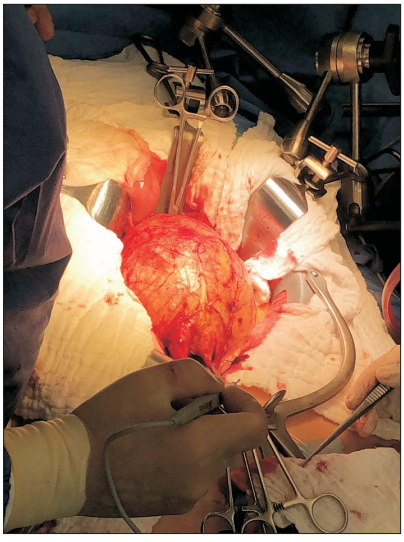

Fig. 3. The intraoperative photo showed the aneurysm.

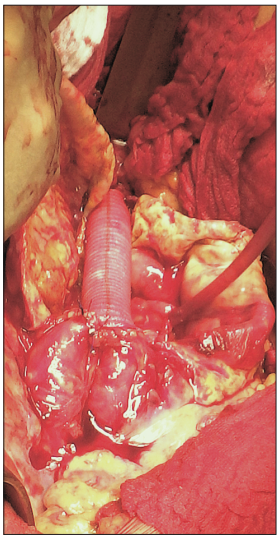

Fig. 4. The photo showed the final view after implantation of the aortic tube graft.

graft, the need to extend the right distal landing zone to the external iliac artery, and the unavailability of off-the-shelf EVAR devices at our institution, we chose an OSR. The patient received one unit of platelet concentrate and 1,500 international units of prothrombin complex concentrate to enable placement of an epidural catheter for postoperative pain therapy. Owing to his clinical and hemodynamic stability with good cardiorespiratory and renal status, no preoperative interventions were required and the patient was scheduled for OSR the following day. Pain was controlled with intravenous metamizole infusion and peroral oxycodone. We accessed the aneurysm via a median laparotomy, placed an inter-renal aortic clamp obliquely distal to the left renal artery and proximal to the right renal artery (Fig. 3), and implanted an 18-mm Dacron tube graft (Fig. 4). The origin of the right renal artery was included in the anastomosis. We intentionally chose not to implant a bifurcational graft to minimize the procedure time. The right renal ischemia time was 28 minutes, and cold renal perfusion was not used. The inferior mesenteric artery was sewn-ligated. Division of the left renal vein was necessary. After completion of the proximal anastomosis, the left renal vein was re-anastomosed end-to-end with a 6-0 Prolene (Ethicon LLC, San Lorenzo, Puerto Rico) suture. The intraoperative blood loss was 1,100 mL. For red cell salvage, we used the Cell SaverElite autotransfusion system (Haemonetics Corp., Boston, MA, USA). No blood products were given perioperatively. The patient's postoperative course was uneventful. He was extubated on the day of surgery and spent 1 day in our intensive care unit for postoperative observation. The renal function was not impaired. Early physical therapy was initiated, and 12 days postoperatively, he was discharged to a rehabilitation clinic. The length of stay was long due to the specific billing requirements for inpatient services in Germany. The patient had follow-up appointments annually for 3 years. The patient had no aorta-related complaints, further clinical admissions or interventions and his ultrasonography revealed a patent aortic graft.

DISCUSSION

There is no clear definition of a giant AAA in the literature. However, many authors define a giant AAA as an aneurysm larger than 11 to 13 cm [1-3]. The estimated annual risk of rupture for an AAA >8.0 cm is 30% to 50% [4]. Jones et al. [5] reported an annual rupture rate of 16% for aneurysms measuring ≥6 cm. Lederle et al. [6] described a 12- and 24-month risk of 36.4% and 54.7%, respectively, for aneurysms ≥8 cm. Brown et al. [7] reported an average risk of rupture of an AAA ≥6 cm in male patients of 14.1%±0.18% per year and 22.3%±0.95% in females. Scott et al. [8] reported that for AAA ≥7 cm, the rupture-free survival rate was 65% after 1 year, 29% after 3 years, and 0% at 5 years. A meta-analysis of 11 studies including 1,514 patients by Parkinson et al. [9] showed a cumulative yearly rupture rate of 6.3% in AAAs >7.0 cm, which is lower than that previously described. A recent study by Lancaster et al. [10] showed a 3-year cumulative incidence of rupture of 18.4% for AAA >7 cm.

Based on our experience and available studies, an open surgical approach was used in this case. Recent studies have shown that OSR is a durable and reliable option for the treatment of juxtarenal AAA. In a series by Chaufour et al. [11], postoperative 30-day mortality and complication rates were 0.9% and 14.6%, respectively; the 5-year freedom rate for combined reintervention/graft or renal artery occlusion was 95%±5% after OSR. In their series, Drazic et al. [12] and van Lammeren et al. [13] presented a postoperative mortality of 2.7% to 3.4% and a significantly higher complication rate of 27.1% to 30%. Proximal clamp positioning is an important and challenging factor during this procedure. Supraceliac clamping compared with inter-or infrarenal clamping was associated with a higher mortality rate, renal dysfunction, and unplanned re-operations [14,15]. Notably, the OSR by high-volume surgeons is associated with lower mortality and fewer complications [16].

However, owing to the rapid development of endovascular techniques, fenestrated/branched EVAR (fEVAR) is a safe and dominant treatment option. Although fEVAR is comparable to OSR in terms of postoperative mortality rates and superior in terms of morbidity rates, it has a higher rate of secondary interventions and is not always anatomically feasible [17-19]. Chimney EVAR is also a viable option for the treatment of juxtarenal AAAs, especially in an emergency, bail-out situation, or with an unfavorable anatomy for fEVAR [20].

We reported a successful case of OSR in a giant juxtarenal AAA. Despite a paradigm shift towards endovascular techniques in aortic repair, we strongly believe that postgraduate training with a focused exposure to open aortic surgery at high-volume centers is essential for future vascular surgeons to safely perform complex aortic repairs with acceptable mortality and morbidity rates, as in this case report.

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CONFLICTS OF INTEREST

The authors have nothing to disclose.

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AUTHOR CONTRIBUTIONS

Concept and design: VT. Analysis and interpretation: VT, AB, FM. Data collection: VT, FM. Writing the article: VT, AB. Critical revision of the article: ESS, JKB. Final approval of the article: all authors. Statistical analysis: none. Obtained funding: none. Overall responsibility: VT.

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