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Case Report

Two-Stage Hybrid Open and Endovascular with Uncovered Stents Repair of a Crawford Type V Aortic Aneurysm

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Abstract

Thoracoabdominal Aortic Aneurysm (TAAA) is a morbid condition, and the management of these aneurysms has historically involved open surgery. However, this approach has high rates of morbidity and mortality, necessitating the development of alternative practices, especially in complex aneurysms. We present a case of a patient with modified Crawford classification type V TAAA. The patient underwent hybrid repair in two stages. Initially a PTFE graft was implanted surgically with revascularization of superior mesenteric artery from the right external iliac artery (debranching). On a later date, the second stage of treatment was with an endovascular technique with two thoracic endoprothesis and uncovered stents for renal arteries. The patient was discharged with no endoleaks and in good clinical condition, normal food intake and present eliminations, besides preserved renal function.

Keywords: Debranching; Hybrid repair; Open chimney; Open periscope; Thoracoabdominal aortic aneurysm

Introduction

Thoracoabdominal Aortic Aneurysm (TAAA) is a morbid conditionof difficult resolution due to the involvement of visceral arteries, and the management of these aneurysms has historically involved open surgery [1]. Open repair of aortic aneurysm has high rates of morbidity and mortality, necessitating the development of alternative practices, especially in complex aneurysms. Hybrid repair has been increasingly used as an alternative to open repair techniques since the procedure was first described in 1999 [2]. In the other hand, endovascular techniques are developing and gaining space, among them are included the sandwich technique, chimney technique, periscope technique and more advanced devices such as fenestrated and ramified endoprothesis.

The choice for one technique depends on the anatomy of the aorta and visceral branches, the clinical conditions of the patient, the ability of the surgeon and the structure of the health unity. Depending on the case a combination of techniques can be done to reach a better result.

The objective of this paper is to show a case report of a treatment of a thoracoabdominal aortic aneurysm using association of surgical and endovascular techniques.

Case Report

A 49-year-old male patient with hypertension was admitted to the University Hospital of Universidade Federal do Maranhao, with a history of sharp, severe pain between the shoulder blades. Thoracic and abdominal CT scans wereperformed. A type V thoracoabdominal aortic aneurysm was detected (according modified Crawford classification type V: sixth intercostal space to just above the renal arteries) with a larger diameter of 5.9cm (Figure 1).

Figure 1: A type V thoracoabdominal aortic aneurysm.

It was decided by a hybrid approach of the aneurysm, with first stage being performed by open surgery and second stage by endovascular treatment. The open surgery, consisted of xipho-pubic laparotomy, transperitoneal dissection of the right common iliac artery and the superior mesenteric artery, followed by a bypassfromthe right common iliac artery to the superior mesenteric artery with PTFE prosthesis of 6mm (Figure 2).

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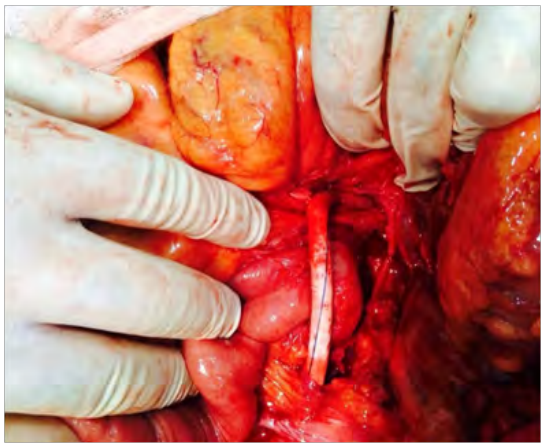

Figure 2: Bypass of the right common iliac artery to the superior mesenteric artery with PTFE.

Nine days later, the endovascular procedure was performed. In this procedure, a transverse incision and dissection of the left common femoral artery and puncture in the right common femoral artery were performed. From the left femoral access, thoracic endoprosthesis E-Vita (from Jotec company) 33mm x 130mm was introduced with a proximal end at the descending aorta. A second thoracic endoprothesis E-Vita 33mm x 170mm was introduced inside the first one with the distal end distal and below the renal arteries. At the same time, two self-expanding stents of 6mm x 40mm were placed in the renal arteries (technique called inverted and open chimney technique or open periscope technique).

Control aortography demonstrated Endoleak (leaking to the aneurysmal sac) type II, appearing to be from the celiac trunk (covered by endoprosthesis) (Figure 3).

Figure 3: Histopathological analysis of the appendix, H&E stain. Presented dysplastic epithelium, sometimes venous, sometimes tubular, with a presence of mucin in the cytoplasm of the cell.

Control angiotomography demonstrated Endoleak persistence without clearly demonstrating the origin of endoleak (Figure 4).

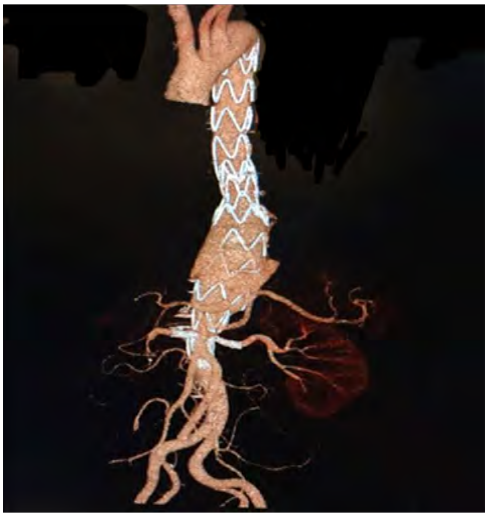

Figure 4: Control angiotomography demonstrated Endoleak persistence.

Then, sixteen days later, arteriography was performed by the right common femoral artery, the PTFE graft was catheterized, and then aortography above the endoprosthesis, no further signs of endoleak were observed (Figures 5 and 6).

Figure 5: Angiography showing no signs of endoleak.

Discussion

Minimally invasive endovascular aneurysm repair was first reported in 1986. The three principal randomized trials comparing endovascular and open repair of abdominal aortic aneurysm have all shown a marked benefit of endovascular repair with respect to 30-day operative mortality [3].

Several groups have reported using hybrid approaches in which open visceral bypass grafting secures organ perfusion and subsequent

stent graft placement achieves endoluminal exclusion of the entire TAAA [4]. The appeal of the hybrid approach (depending on aneurysm location) includes the avoidance of chest cavity invasion, aortic cross-clamping and circulatory support that is necessary in open repair [2]. However, there is little data in the literature to support the combined technique as better, worse, or equivalent to the open repair or simply medical treatment alone [5].

Figure 5: Angiography showing no signs of endoleak.

In 2007, Black and coworkers from St Mary's Hospital, London, published their early results with a combined endovascular and surgical approach for the treatment of TAAA type I - III in 29 patients in a single step approach [6]. They demonstrated good feasibility and the encouraging results of reducing the mortality from 31% to 13% and no paraplegia in this high-risk group of patients. Another study reported their 6-year experience with the visceral hybrid procedure for high-risk TAAA and Chronic Expanding Aortic Dissections (CEAD), a series of 28 patients (20 male, mean age 66 years) were treated between January 2001 and July 2007. Their results are in accordance with the Black and coworkerspublication and add further information on visceral hybrid procedures in the thoracoabdominal aorta [7].

In complex aortic arch disease hybrid procedures were associated with a relatively high primary failure rate. Most failures were associated with type I or type III endoleak, which, in most cases, was successfully managed with extension grafts. The other causes of primary failure were major technical adverse events that required conversion to open surgery, sometimes resulting in death. The overall perioperative mortality and morbidity rates seem to be similar to those associated with open repair [8].

Associated to the complexity of this procedure was the use of an ad vanced endovascular technique, such as "inverted chimney" or "periscope". Due the limitations of our public hospital, this technique was made with bare metal stents (or uncovered stents). The "open periscope" or "open chimney" technique was already demonstrated by other surgeons with good results [9,10].

In this case, we were successful in the treatment of the aneurysm by hybrid technique. The intention of the author was to perform less aggressive and shorter procedures, but still aiming for good results. No doubt perform bypass to all visceral branches would be a good option, but it would also significate greater morbidity.In the early postoperative period, we observed type II endoleak, appearing to be from the celiac trunk, which had spontaneous resolution without the need for a complementary approach. One review showed that intentional coverage of the Celiac Artery (CA) can be safely performed with a wide variety of endografts, as the use of various devices in the United States, Europe, and Asia was reported in the literature. Embolization of the CA prior to aortic endograft deployment is advocated by some to prevent the potential development of a type II endoleak into the aneurysm sac. However, only 21 (23%) reported cases underwent this additional procedure. In the remaining 72 patients, three (4%) developed a delayed type II endoleak on CTA evaluation during postoperative follow-up [11].

Despite the complexityof this advanced aortic aneurysm repair, hybrid open-endovascular with uncovered stents repair provides a feasible option of treatment for a hospital structure that do not provide better options and for high-risk population that are not suitable for conventional open repair [2].

Conclusion

The hybrid open-endovascular with uncovered stents repair provides a feasible option of treatment with good results in short term.

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