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Case Report

Endovascular Repair of a Ruptured Abdominal Aortic Aneurysm (EVAR): A Case Report with Literature Review

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Abstract

Ruptured abdominal aortic aneurysms represent the typical emergency in vascular pathology, and remain one of the most emergent medical events, with more than 90% mortality in the absence of treatment. For nearly half a century, grafting has been the reference treatment for ruptured abdominal aortic aneurysms, with an estimated mortality rate of around 50% at 1 month. During the last two decades, endovascular treatment has appeared in the therapeutic arsenal, and has demonstrated a benefit in terms of mortality (Divided by 2) and morbidity; as well as a reduction in perioperative complications. We report an endovascular management of a case of ruptured abdominal aortic aneurysm, whose evolution was favorable.

Keywords: *Ruptured Aortic Aneurysm; Endovascular Therapy; Compartment Syndrome*

Introduction

An arterial aneurysm is defined as a dilation of more than 50% of the expected size of a given artery with loss of parallelism of its walls [1,5]. For the aorta, we speak of an aneurysm from a diameter of 3 cm. The treatment of aortic aneurysms is justified when their diameter exceeds 5 cm [1,2,5]. The risk of rupture depends mainly on the size and expansion of the aneurysm. Ruptured abdominal aortic aneurysm is a significant cause of mortality in the elderly population, causing about 80% of deaths and the number of patients admitted for aortic rupture is increasing [1,5,8]. Surgical resection was the treatment of choice for several years, but over the past twenty years, endovascular treatment has been gaining ground in a remarkable way. Less invasive and associated with less morbidity, this treatment has made enormous progress in recent years [1,5].

Case Observation

This is a 61-year-old patient followed for COPD, and having as cardiovascular risk factors chronic smoking for 30 packs a year and type II diabetes. The onset of his symptoms dated back to a week when the patient presented with diffuse abdominal pain associated with cruralgia that did not yield to symptomatic treatment. Faced with the worsening of the clinical symptoms, the patient consulted in the emergency room. On admission the patient was conscious, hypotensive at 90/60 mm Hg and tachycardia at 100 bp/m. Abdominal examination revealed a pulsating abdominal mass, with increased pain. A CT angiography was performed showing a ruptured abdominal aortic aneurysm measuring 99 x 93 mm. The patient was taken directly to the operating room for further treatment. The patient underwent EVAR using a bifurcated bi iliac abdominal aortic stent-graft. Arteriographic control was satisfactory and showed aneurysmal exclusion.

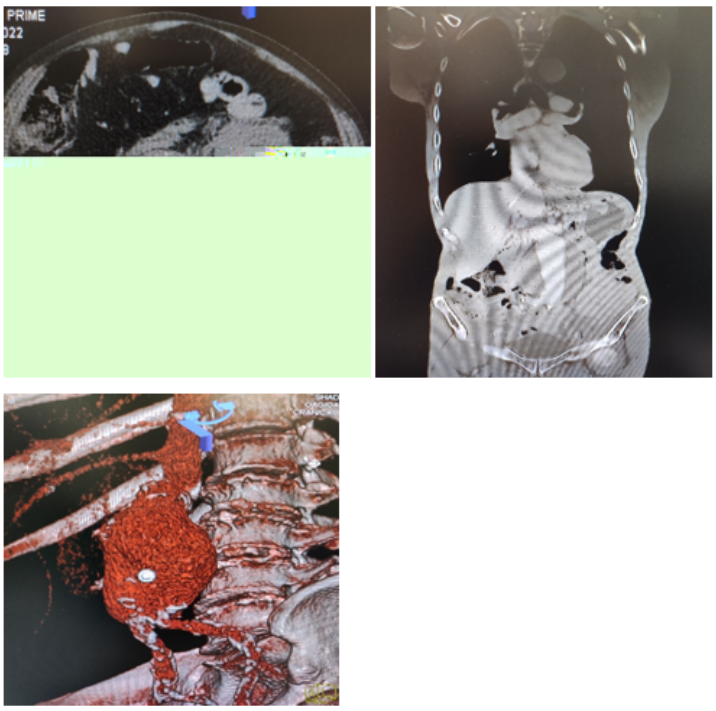

Figure 1: *Abdominal CT scan in reconstruction showing a ruptured subrenal abdominal aortic aneurysm.*

Figure 2: *Placement of an aortoiliac endoprosthesis with satisfactory arteriographic control showing aneurysmal exclusion.*

Discussion

An aortic aneurysm is defined by a localized and permanent loss of parallelism of the three coats of the aortic wall, it becomes aneurysmal when its maximum diameter is greater than 3.0 cm [1,7]. The overall incidence of ruptured abdominal aortic aneurysms in Western societies ranged from 5.6 to 17.5 per 100,000 people per year [4,5]. In the USA, approximately 15,000 people die each year from ruptured aortic aneurysms and dissection [5,8,9]. Studies have shown that the incidence of aortic aneurysm ruptures in sudden death is 4 to 5% [6,10]. The male population over 65 is the most affected and represents 5% of aortic aneurysmal pathology [1,5]. The anteroposterior diameter is the main rupture factor [1,8,12]. If any aortic aneurysm can rupture and if the risk of rupture increases with the anteroposterior diameter, the threshold of 55 mm in diameter appears to be particularly significant [5,8,10]. Smoking and chronic obstructive pulmonary disease (COPD) are also risk factors for rupture [1,5,7,12]. The circumstances of discoveries are multiple ranging from simple abdominal pain to cardiovascular collapse [1,2,5]. As soon as the diagnosis is suspected, it is imperative to calm the pain and avoid all manipulations which would aggravate the hemodynamics by complete rupture of the aneurysmal wall (insertion of nasogastric or bladder tube, coughing, precaution in transport and changes of position). The means to maintain good optimal hemodynamics remain the same as those used in hemorrhagic shock: filling and vasoconstrictors [3-6]. In the event of significant hemodynamic instability, an abdominal ultrasound may be sufficient to confirm the diagnosis (if the aneurysm was not known), but CT angiography remains the reference examination in the preoperative diagnosis and the morphological assessment of aneurysms of the ruptured abdominal aorta [1,7,8,12].

Many prognostic criteria have been established, and the Glasgow Aneurysm Score remains the simplest severity score to use. Patients with a Glasgow Aneurysm Score below 90 can safely undergo urgent open surgical repair. Thorough evaluation and improvement of preoperative condition preferably followed by endovascular treatment is indicated for those with a score ≥ 90. Glasgow Aneurysm Score = Age + (17 points for shock) + (7 points for insufficiency coronary) + (10 points for cerebrovascular insufficiency) + (14 points for renal insufficiency) [1,5,6]. The management of abdominal aortic aneurysms is currently evolving with the development of endovascular treatment. This technique, which is less invasive than the open surgical approach, consists of inserting an endoprosthesis covered by retrograde catheterization of the femoral arteries. The endoprosthesis thus placed will be deployed and dropped at the level of the proximal and distal necks of the aneurysm, allowing the exclusion of the ruptured zone and thus promoting thrombosis [1,2,5,8]. Endovascular treatment represents an alternative increasingly discussed in the literature compared to the surgical treatment of ruptured aneurysms [4,5,8]. The mortality and morbidity rate seems to be lower in EVAR [4,8,5]. Peri- and postoperative complications are dominated by per-procedure endoleaks and post-procedure migrations as well as compartment syndrome [1,3]. Abdominal hyperpressure after endovascular treatment can be caused by: a large retroperitoneal hematoma that acts as a spatial occupation process, persistent back bleeding from the lower lumbar region and mesenteric arteries, coagulopathy or impaired microcirculation of the viscera resulting in interstitial edema. Compartment syndrome usually responds to aggressive fluid resuscitation and surgical decompression. The latter must be urgent [1,4,8]. Endovascular treatment is associated with a significant reduction in blood loss, systemic complications, length of stay in intensive care and length of hospitalization compared to open surgery [1,8,9]. The latter imposes strict eligibility criteria: haemodynamics and morphology with the mandatory prior performance of a spiral CT scan. Its feasibility was estimated between 40 and 70% in the literature [1,5,6]. Endovascular treatment seems to be increasingly the treatment of choice in some teams; in fact, the stability criteria can be optimized by using an endoclamping balloon; the morphological criteria can be broadened thanks to the chimney technique which makes it possible to treat ruptured aneurysms with short necks [1,5,8]. In addition, more controlled treatment of compartment syndrome should in the future improve these consequences [1,8].

Conclusion

Ruptured aneurysms of the abdominal aorta represent a surgical emergency, the treatment is engraved with heavy mortality. The addition of endovascular treatment in the surgeon's therapeutic arsenal has a place that is well defined in experienced centers, and

represents an alternative to surgical treatment. for half a century, it has reduced postoperative mortality/morbidity by 30% compared to open surgery for ruptured abdominal aortic aneurysms and also saved hospital resources.

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