Negative results - Vascular thoracic

Retrograde aortic dissection after a stent graft repair of a type B dissection: how to improve the endovascular technique

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Received 14 April 2006; received in revised form 21 July 2006; accepted 26 July 2006

Abstract

To date, endovascular repair of thoracic dissections is a reality, associated with acceptable morbidity and mortality. We present the case of a 72-year-old woman presenting a retrograde aortic dissection at the postoperative day 12, after an endovascular repair for a 60-mm thoracic dissecting aneurysm. Two years earlier, she had presented an uncomplicated thoracoabdominal type B aortic dissection between the isthmic aorta and the iliac bifurcation. Despite an acceptable blood pressure control, a 62-mm thoracic dissecting aneurysm was observed on the 24-month CT-scan. Due to a chronic obstructive pulmonary disease, we chose the endovascular approach to exclude the thoracic entry tear leading to the complete false lumen thrombosis around the endoprosthesis. However, the inferior part of the false lumen remained patent due to a second abdominal entry tear. The initial outcome was uneventful but the patient presented a sudden death syndrome twelve days after the endovascular repair. During the autopsy, we discovered an intrapericardial rupture of a retrograde dissection, starting at the level of the proximal bare spring of the endoprosthesis. We discuss some important technical details to improve the safety, and to reduce the risk of immediate or delayed complications.

1. Introduction

To date, uncomplicated type B dissections are classically treated by medical therapies. However, in 80% of these dissections, the aortic false lumen stays patent with potential risks of aneurysmal evolution and rupture. In 1995, Dake [1] introduced the endovascular repair as a feasible and safe alternative leading to the partial or complete false lumen thrombosis. We describe a fatal retrograde dissection, starting at the level of the proximal bare springs of the endoprosthesis, despite the proximal false lumen thrombosis of the previous type B dissection.

2. Clinical case

A 72-year-old woman admitted for chest pain presented an uncomplicated type B dissection between the left subclavian artery and the iliac bifurcation. Diameters of the ascending aorta and the aortic arch were respectively 32 and 30 mm. An antihypertensive therapy was instituted with an uneventful outcome.

The 24-month CT-scan showed a 62-mm dissecting aneurysm of the proximal thoracic aorta. Usually, in our institution, the left subclavian artery was transposed into the left primitive carotid artery, in order to liberate the distal aortic arch allowing the endovascular repair (Talent Endoprosthesis, 34 mm, Medtronic Ave, Santa Rosa, California). The distance between the thoracic entry tear and the left common carotid ostium was 27 mm. Then, balloon dilations of the endoprosthesis extremities were performed. The entry tear exclusion was confirmed by the preoperative angiography. However, the echocardiography revealed a persistent retrograde flow in the false lumen due to a second abdominal entry tear.

The initial outcome was uneventful. The one-week CT scan, classically performed before discharge, found a complete false lumen thrombosis around the endoprosthesis. The false lumen remained patent in the uncovered part of the aorta.

On the postoperative day 12, the patient presented a fatal sudden death syndrome. The autopsy showed a ruptured retrograde type A dissection into the pericardium (Fig. 1). A new aortic arch intimal tear, performed by proximal bare springs of the endoprosthesis, was noticed (Fig. 2). However, the entry tear of the type B dissection was totally covered and the false lumen was thrombosed at this level.

3. Comment

The management of type B aortic dissections has been described many years ago [1,2] and uncomplicated cases...
are medically treated using antihypertensive and antalgic therapies [2,3]. For complicated type B aortic dissections, two choices are now available: the surgical repair with high mortality and morbidity, or the endovascular repair with a lower risk of paraplegia. It should be noted that serious complications can occur during endovascular repairs and long-term results remain unknown [4,5].

Classically, type B dissection repairs are considered for aortic diameters > 55 mm [3]. The choice between surgical and endovascular repairs is always discussed [3,6]. The endovascular repair during the acute phase of the dissection is dangerous because of the aortic wall fragility [5]. Furthermore, endovascular repairs of chronic aortic dissections tend to be dangerous due to the rigidity of the dissection flap and the difficulty to evaluate the exact endoprosthesis diameter [7,8]. Through our experience, we have come to the conclusion that aortic type B dissections must be treated endovascularly during the sub-acute phase.

Guidewires and stent graft delivery systems, introduced in dissected aortas, are potentially dangerous. For these reasons, we always use consecutively hydrophilic guidewires, angiographic catheters and a PTFE stiff guidewire to lead the endoprosthesis, eliminating the risk of aortic lesion. The supervision of the stiff guidewire extremity is mandatory during all the endoprosthesis progression, due to the spontaneous tendency to remove it progressively. A free progression of the delivery system extremity in the aorta can perforate the arterial wall, especially in curved parts of the aorta as in the aortic arch.

The endoprosthesis sizing is also important because of the generated radial forces [10]. For dissections, we believe that a moderate oversizing of the diameter (10–15%) is sufficient to achieve the stabilization without a major aortic wall stress. Moreover, the design of the endoprosthesis must be considered. Since this dramatic fatal case, we have used endoprostheses without proximal uncovered bare springs for aortic dissections and dissecting aneurysms, as suggested by Grabenwoger et al. [9].

To secure the endoprosthesis implantation, a standardized procedure is required. The deployment of the first endoprosthesis segment is performed a few centimeters before the ideal landing zone, frequently in the ascending aorta. The next step consists of a removing movement, which allows for the exact placement of endoprosthesis markers, in front of the previous marked landing zone. In case of incorrect endovascular implantation, no further attempts of device mobilization must be done after the first contact with the aortic wall; due to the high risk of aortic rupture and dissection [4,5,8]. Even for a short non-covered aortic area, a second endoprosthesis placement is required to achieve the complete exclusion of the aortic lesion.

We believe that intra-operative balloon dilatations are not necessary in all stentgraft repairs, and are probably dangerous in some cases of aortic dissections due to the high aortic wall fragility. In our practice (52 cases), two patients presenting chronic aortic dissections died after...
endovascular repairs associated with multiple balloon dilatations of endoprosthesis extremities. No patient with aortic aneurysm, requiring balloon dilatations, has presented this fatal complication after an endovascular repair. The aneurysmal aorta is probably more resistant to radial forces than the arterial wall of aortic dissections [9]. As a result, we only use balloon dilatations for type I endoleaks, incomplete device deployments, or for overlapping zones between two endoprostheses in complex stent graft repairs. Using these simple rules, no new retrograde dissection has occurred during our endovascular practice.

This dramatic case demonstrates that the complete thrombosis of the chronic dissecting aneurysm does not eliminate the risk of delayed retrograde aortic dissection after a stent graft repair for type B aortic dissection.

4. Conclusion

Endoprostheses are an important evolution in the treatment of aortic lesions and perhaps a revolution. However, some endovascular specificities and potential complications must be known. Retrograde dissections of the ascending aorta after an endovascular repair are infrequent but some simple procedures can reduce the risk of such complications.

References