



Endovascular Management of New Proximal Aneurysms After Prior Open Abdominal Aortic Aneurysm Repair: A Case Series

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Abstract

Background: Development of new proximal aortic aneurysms following open abdominal aortic aneurysm (AAA) repair is uncommon but clinically significant. Secondary open surgery is technically demanding and associated with substantial morbidity.

Methods: We present a single-center retrospective case series of seven patients treated for newly diagnosed proximal aortic aneurysms after prior open infrarenal AAA repair between 2003 and 2022.

Results: Six patients underwent thoracic endovascular aortic repair (TEVAR), and one patient with a suprarenal aneurysm underwent hybrid repair consisting of endovascular exclusion and aorto-bi-renal bypass. Technical success was achieved in all cases. Two patients presented with rupture and died in the early postoperative period. No clinically evident spinal cord ischemia occurred. One patient experienced acute myocardial infarction.

Conclusion: Endovascular and hybrid approaches appear technically feasible and may represent a less invasive alternative to complex secondary open surgery in selected patients. These findings underscore the importance of long-term surveillance of the entire aorta after AAA repair.

Keywords: Abdominal Aortic Aneurysm; Open Surgical Repair; Proximal Aortic Aneurysm; Thoracic Endovascular Aortic Repair; Hybrid Aortic Repair

Introduction

Patients undergoing open repair (OR) of abdominal aortic aneurysm (AAA) remain at risk for progressive aneurysmal degeneration in more proximal segments of the aorta. The true incidence of such aneurysms is not well defined, partly due to historically limited long-term imaging surveillance and the absence of routine evaluation of the entire aorta at the time of primary repair [1].

The development of proximal aneurysms may reflect ongoing degenerative aortopathy rather than a localized infrarenal disease process. Risk factors likely include diffuse atherosclerotic disease, persistent hemodynamic stress, and possibly unrecognized genetic predisposition [2].

Open surgery for proximal aneurysms after prior AAA repair is technically complex. Treatment of pararenal or suprarenal

aneurysms often requires supraceliac aortic cross-clamping, while thoracic or thoracoabdominal aneurysms necessitate thoracotomy or thoracophrenolumbotomy with one-lung ventilation and thoracic aortic cross-clamping. Adjunctive measures such as cerebrospinal fluid drainage or mechanical circulatory support may be required. Furthermore, prior infrarenal aortic reconstruction may increase the risk of spinal cord ischemia and renal dysfunction during subsequent thoracic or thoracoabdominal aortic surgery [3,4].

Advances in endovascular techniques have expanded less invasive treatment options for these complex patients. We report our institutional experience with endovascular and hybrid strategies for managing new proximal aneurysms after previous open AAA repair.

Methods

We performed a retrospective review of patients treated between 2003 and 2022 for newly diagnosed proximal aortic aneurysms following previous open infrarenal AAA repair.

Inclusion criteria were:

- Prior open infrarenal AAA repair
- Development of a new suprarenal or thoracic aortic aneurysm

Collected data included patient demographics, interval from primary repair, aneurysm characteristics, operative details, and early (30-day) outcomes.

All patients underwent multidetector computed tomography (MDCT) angiography for diagnosis and operative planning. The study was approved by the institutional ethics committee, and the requirement for informed consent was waived due to the retrospective design.

Case Series

Seven male patients were identified. Baseline characteristics, aneurysm features, treatment strategies, and early outcomes are summarized in Table 1. The mean age at treatment was 71 years, and the mean interval between primary AAA repair and diagnosis of the proximal aneurysm was approximately nine years. The mean aneurysm diameter at presentation was 78 mm.

Pa-tient	Age (yrs)	Interval from AAA Repair (yrs)	Aneurysm Location	Diam-eter (mm)	Presenta-tion	Treat-ment	Adjunct Procedure	Technical Success	30-day Complica-tions	30-day Mortal-ity
1	68	7	Descending thoracic	72	Asymp-tomatic	TEVAR	None	Yes	None	No
2	74	11	Descending thoracic	85	Rupture	TEVAR	None	Yes	-	Yes
3	70	9	Descending thoracic	76	Asymp-tomatic	TEVAR	Carotid-subclavian bypass	Yes	None	No
4	73	6	Descending thoracic	81	Asymp-tomatic	TEVAR	None	Yes	Acute MI	No
5	69	14	Descending thoracic	74	Asymp-tomatic	TEVAR	Carotid-subclavian bypass	Yes	None	No
6	75	8	Descending thoracic	92	Rupture	TEVAR	None	Yes	-	Yes
7	72	10	Suprarenal	66	Asymp-tomatic	Hybrid repair	Aorto-bi-renal bypass	Yes	None	No

Table 1: Baseline Characteristics, Aneurysm Features, and Early Outcomes.

Abbreviations: AAA – abdominal aortic aneurysm; TEVAR – thoracic endovascular aortic repair; MI – myocardial infarction.

Five patients were asymptomatic at diagnosis, whereas two presented with rupture of a descending thoracic aneurysm.

Six patients had descending thoracic aneurysms and underwent thoracic endovascular aortic repair (TEVAR); a representative case is shown in Figure 1. In two cases, carotid–subclavian bypass was required to establish an adequate proximal landing zone.

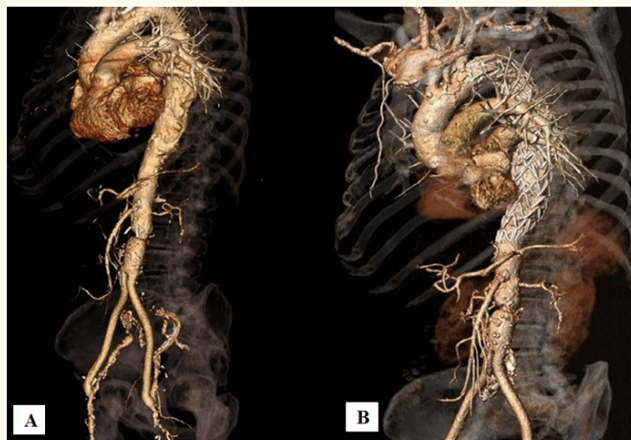


Figure 1: (A) MDCT angiography presents patent bifurcated graft that was used for AAA OR, as well as new aneurysm of the descending thoracic aorta. (B) Control MDCT angiography after TEVAR.

One patient developed a suprarenal aneurysm and was treated with hybrid repair consisting of endovascular aneurysm exclusion and aorto–bi-renal bypass. The distal segment of the previously implanted abdominal graft was used as the inflow source for retrograde renal revascularization.

Technical success was achieved in all patients. Within 30 days, one patient experienced acute myocardial infarction. Two patients died in the early postoperative period; both had presented with ruptured thoracic aneurysms. No cases of clinically evident spinal cord ischemia were observed.

Discussion

Our findings demonstrate that new proximal aortic aneurysms may develop many years after primary open infrarenal AAA repair, reinforcing the concept of diffuse aortic degeneration rather than isolated segmental disease [2,5,6].

Current European Society for Vascular Surgery guidelines recommend imaging of the entire aorta before AAA repair and surveillance imaging of the entire aorta every five years after open repair. Adherence to such surveillance protocols may facilitate earlier detection and elective treatment of proximal aneurysms before rupture occurs [7].

The choice of endovascular strategy depends on the affected aortic segment. In cases of isolated descending thoracic aneurysms, standard TEVAR is generally appropriate, with the proximal descending thoracic aorta serving as the landing zone and the supravisceral abdominal aorta serving as the distal landing zone.

Management becomes more complex when the visceral segment is involved. Fenestrated endovascular aneurysm repair (FEVAR) is likely the preferred option in suitable candidates [8,9]. In these cases, the previously implanted aortic graft serves as the distal landing zone. This configuration is relatively straightforward when a tube graft was used for the initial AAA repair. However, when a bifurcated graft is present, the short main body and narrow limbs may limit device maneuverability and complicate catheterization of target vessels.

In our cohort, endovascular and hybrid strategies achieved 100% technical success, with mortality confined to patients presenting with rupture. These findings are consistent with broader literature suggesting that elective endovascular repair may offer lower perioperative morbidity compared with extensive redo open thoracic or thoracoabdominal surgery [10,11].

Limitations

The main limitations of this study include its retrospective design, small sample size, and lack of long-term follow-up data, which precludes assessment of late endoleaks, reinterventions, and survival. Additionally, the heterogeneity of aneurysm locations limits the generalizability of our findings.

Conclusion

New proximal aortic aneurysms can develop years after open infrarenal AAA repair, reflecting ongoing aortic degeneration. In this small case series, endovascular and hybrid repair were technically feasible and associated with acceptable early outcomes in selected patients. Structured, long-term surveillance of the entire aorta after AAA repair appears essential to enable timely detection and elective treatment of secondary aneurysms.

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