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Pararenal Aortic Ulcer Repair

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WHAT THIS PAPER ADDS

This study assesses the feasibility and outcome of different surgical and endovascular techniques for the treatment of pararenal penetrating aortic ulcers. There is a paucity of data in the English language literature that deals with this topic and the indications for and associated complications of treatment options for affected patients have not been fully elucidated. The present study reports a single center experience with treatment of patients with pararenal penetrating aortic ulcers and provides information that will guide pre-operative decision making, procedure planning, and the informed consent process.

Objective/background: In order to investigate techniques and outcomes of pararenal penetrating aortic ulcer (PAU) repair, a retrospective cohort study was performed.

Methods: Over the 6 year study period, 12 patients treated for a pararenal PAU were included. Outcome measures included technical success, survival, and peri-operative complications, as well as stent patency.

Results: Treatment modalities included hybrid procedures with endovascular aneurysm repair (EVAR) and bypass grafting, chimney EVAR (Ch-EVAR), and fenestrated EVAR (FEVAR). Four of the 12 patients were symptomatic, and eight patients underwent elective surgery. The technical success rate was 100%. Symptom resolution was recorded in all symptomatic patients immediately post-operatively. Complications encountered included one type I endoleak in a patient who underwent Ch-EVAR, and one case of post-operative stroke, paralysis, and death in a patient who underwent FEVAR. No adverse events were recorded in the remaining 10 patients. The PAU protrusion distance was significantly greater in symptomatic patients. Perforation and leakage were more prevalent in patients with pre-operative abdominal or back pain.

Conclusion: Encouraging results of endovascular treatment of pararenal PAUs were observed. One major and fatal complication was encountered, which underlines the complexity and risks of the techniques. Another patient required re-intervention owing to an endoleak following off label use of covered stents for Ch-EVAR. FEVAR, which generally requires a custom made graft, was increasingly applied over the study period, potentially because of an increased awareness of this distinct pathology allowing for elective procedure planning. Ch-EVAR and hybrid procedures were predominantly used in symptomatic patients, whereas FEVAR was the preferred elective treatment option.

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INTRODUCTION

Penetrating aortic ulcers (PAUs) represent a distinct pathology affecting the aortic wall. The term PAU is used to describe atherosclerotic intimal lesions that may ulcerate into the media.[1] They are sometimes asymptomatic and found incidentally. Increasingly performed abdominal scans in a vascular and non-vascular setting may result in the detection of an asymptomatic PAU. Often, however, PAUs cause symptoms similar to those of a ruptured aortic aneurysm, an aortic intramural hematoma, or an aortic dissection.[2,3] To date, it is unclear, whether an anecdotally increasing incidence of PAUs is reflective of a truly higher occurrence of the disease, or merely a consequence of an increased awareness of this pathology of the aorta. A differentiation from aortic aneurysms is clinically important to account for apparently higher rupture rates at relatively low aortic diameters, and an increased risk of embolization.[4—6] There seems to be no consensus on the exact indications for surgical treatment of PAUs located in the descending aorta, with some authors recommending best conservative management in asymptomatic patients with annual follow up using computed tomography angiography (CTA).[7] However it is usually strongly recommended to consider surgical treatment in symptomatic patients, as well as PAUs that increase in diameter.[8]

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Treatment of PAUs is strongly influenced by recent advances in endovascular aneurysm repair (EVAR),[9] and anecdotally, the majority of diagnosed PAUs are treated by endovascular techniques rather than by open surgery. There is currently no consensus on what the indications for surgical management of asymptomatic PAUs really are. Studies assessing the results following EVAR for aneurysms of the infrarenal or thoracic aorta have been reviewed elsewhere and generally generated encouraging results.[10,11] Often, endovascular techniques are favored owing to their minimally invasive nature and their ability to avoid the complications associated with open surgical management.[12] Fewer studies exist that describe the performance of EVAR in patients with PAUs, with the largest series to date being limited to 26 patients.[9,13,14] Table 1 gives an overview of some important reports on the outcome of open and endovascular PAU treatment.

In EVAR, the need to treat aneurysms expanding beyond the renal or visceral arteries has lead to widespread use of somewhat more complex endovascular techniques, such as EVAR involving chimneys (Ch-EVAR) and, more recently, endovascular repair with fenestrated aortic grafts (FEVAR).[15] There is a paucity of published data that assesses the feasibility of these techniques, established primarily for the treatment of aortic aneurysms, in patients with PAUs. While some studies exist that describe treatment of PAUs in an acute or elective setting,[16,17] none have presented a series of patients undergoing treatment for complex pararenal PAUs. The present study reports a single center experience with the management of an increasingly diagnosed, complex, and potentially deadly pathology of the aorta.

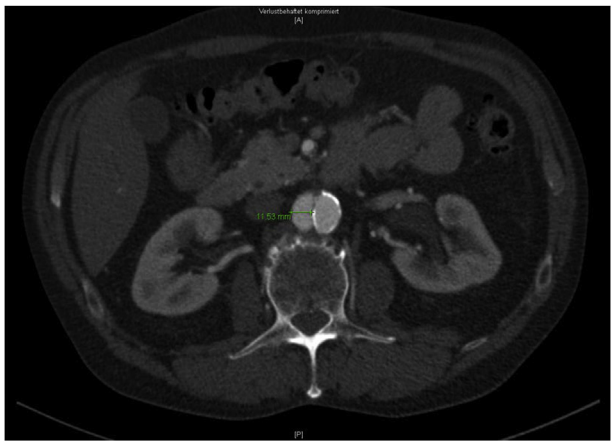

Figure 1. Measuring technique of protrusion distance of a penetrating aortic ulcer shown on computed axial tomography angiography.

PATIENTS AND METHODS

The study period spanned August 2009—September 2014, and patients who were treated for a pararenal PAU at a single department for vascular and endovascular surgery during this time were included in the study. CTA scans from each patient were assessed by a vascular surgeon, a vascular surgery resident, and a radiologist experienced in vascular imaging studies, to identify patients with pararenal PAUs. The protrusion distance of the PAU was measured and signs of perforation were recorded (Fig. 1). Surgical logs and office notes, as well as electronic and physical medical charts, were further consulted to retrieve any missing perioperative or follow up data. Electronic radiographic imaging

Table 1. Important reports on the outcome of penetrating aortic ulcer treatment.

Reference	Patients (*n*)	Treatment modality	Adverse events	Technical success
Firschke et al., 2003[22]	1	Open repair (arch replacement)	None	Excellent technical success
Heidenreich et al., 2003[23]	1	Thoracic endovascular aneurysm repair	Post-operative stroke	Excellent technical success
Ventura et al., 2003[24]	1	Open repair (aortobi-iliac graft)	None	Excellent technical success
Dong Xu et al., 2005[25]	30 (5 with aortic ulcer)	Endovascular repair	16.7% type I endoleaks; 10% peri-operative dissections; 6.7% 1 mo mortality	Excellent technical success
Hyhlik-Durr et al., 2010[18]	20	Endovascular repair	25% post-operative complications (including myocardial infarction); 10% in hospital mortality	Excellent technical success
Sadeghi-Azandaryan et al., 2011[26]	1	Embolization of aortic ulcer (coils and Onyx cast) plus endovascular aneurysm repair	None	Excellent technical success
Eggebrecht et al., 2006[13]	22	Endovascular repair	4.5% minor stroke	96% technical success
Aidinian et al., 2007[16]	1	Endovascular repair	None	Excellent technical success
Palombo et al., 2012[14]	16	12 endovascular and 4 hybrid procedures	6.25% mortality	Excellent technical success
Demers et al., 2004[9]	26	Endovascular repair	7.7% type I endoleak; 11.5% 30 d mortality	92% technical success