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The Surgeon, Journal of the Royal Colleges
of Surgeons of Edinburgh and Irelandwww.thesurgeon.net

Emergency endovascular management of acute thoracic aortic pathology A safe and feasible option

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ARTICLE INFO

Article history:

Received 17 August 2016

Accepted 16 October 2016

Available online xxx

Keywords:

Thoracic endovascular repair

Emergency thoracic pathology

Thoracic aorta stenting

Emergency transfer

ABSTRACT

Endovascular repair has revolutionised the emergency treatment of thoracic aortic disease. We report our 10 year experience using this treatment in emergency cases.

A prospectively maintained vascular database was analysed. Patients' medical records and CT images stored on the hospital PACS system were also reviewed. Statistical analysis was done using IBM SPSS V21.

There were a total of 59 thoracic aortic stenting procedures of which 33 (60% males with a mean age of 58 yrs) were performed for emergency thoracic pathologies: traumatic transection ($n = 10$), ruptured aneurysm ($n = 6$), non-traumatic dissection ($n = 8$) and penetrating aortic ulcer ($n = 9$). All patients had self-expanding endografts implanted. Two patients required debranching procedures before the endovascular treatment.

Thirty-day mortality was 12.1% (4/33). 70% of patients received a single device. There were 7 procedure related complications, 6 requiring re-intervention: thoracotomy and drainage in 2 patients, proximal graft extension in 2, open drainage of groin haematoma in 1 and open repair of a common femoral artery pseudo-aneurysm in one patient.

In total 23 patients were transferred from 11 centres nationwide. There were no mortalities or other complications related to patient transfer from peripheral centres. Although acute thoracic aortic pathology is life threatening, appropriate blood pressure management and treatment of associated injuries can result in favourable outcomes. Endovascular repair is a safe and effective treatment option which enables patients to be treated with reduced morbidity and mortality. Transfer of patients with acute pathology to a tertiary centre can safely be performed.

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Introduction

Acute thoracic aortic pathology is a life threatening condition.^{1,2} In the setting of trauma it can be complicated by

accompanying limb, visceral and head injuries. Impending hypovolemic shock and cardiac compromise can further complicate definitive management.¹ In ruptured aneurysms and type B dissections, the affected population is often elderly and has pre-existing medical co-morbidities.^{3,4}

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<http://dx.doi.org/10.1016/j.surge.2016.10.007>

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Despite improved surgical technique and peri-operative medical management, open repair with resection and graft implantation still carries a high mortality ranging from 20 to 33%.^{5,6} with a high incidence of renal and pulmonary failure, cardiac complications and spinal cord compromise.^{6,7}

Elective endovascular treatment of thoracic aortic pathology has become a well-established management option in recent years.⁸ Initially reserved for patients unfit for open repair, this technique is being used for an increasing number of indications.⁸ Clinical success in elective situations has led to endovascular treatment being used in emergency cases with promising results.^{9,10}

It has been proven in various studies that high volume centers with speciality training confer a significant survival benefit.^{11,12} The impact of patient transfer to high volume centers has also been examined in case of ruptured AAAs and no adverse effect on survival was observed.^{13,14}

The aim of this study was to examine our short to mid-term results using endovascular thoracic aorta repair and to determine the effect of transfer from other hospitals to our unit.

Patients and methods

A prospectively maintained dedicated vascular database was analysed to identify all patients who underwent thoracic stenting between January 2005 and December 2014. Electronic patients records and CT images were also reviewed. Patients who underwent planned thoracic stenting were excluded from the analysis. Emergency surgery was defined as surgery performed within 24 h of presentation to our institution (Fig. 1).

The parameters examined included indications for intervention, co-morbidities, referral source, demographics, complications and 30 day mortality as defined by the Society of Vascular Surgery reporting guidelines.

Operative details

Interventions were planned after 3D reconstruction on a workstation using TeraRecon Intuition™ software. Thoracic

stent grafts were oversized by a factor of 10% in non-aneurysmal cases and 20% in aneurysmal cases. All procedures were performed either in a dedicated endovascular suite or in a standard operating theatre equipped with a digital subtraction angiography capable C-arm.

All operations were performed under general anaesthesia. Intravenous antibiotic prophylaxis was given. Open access was obtained through a cut down in the groin and percutaneous access was obtained in the contralateral groin in all cases. All patients received intravenous heparin 100 IU/kg after obtaining open arterial access. A 260 cm long steerable hydrophilic guide wire was advanced to the aortic arch. A diagnostic catheter was introduced from the femoral site. The floppy wire was exchanged with a stiff guide wire and pre-operative measurements and position were confirmed with an angiogram. The device was deployed and a check angiogram was obtained to evaluate position of the stent graft relative to supra-aortic arch vessels and to confirm closure of the proximal entry tear in case of dissections. No proximal ballooning of the device was performed in aortic transection or dissection. Proximal ballooning in other pathologies was at the discretion of the operating surgeon.

Statistical analysis

Statistical analysis was done using IBM SPSS V21.

Results

During the study period 59 patients underwent endovascular repair of thoracic aortic pathology at our institution of which 33 (56%) were emergency procedures. The majority of patients were male (60%) with a mean age of 58 yrs (17–84 yrs). The indications included traumatic transections in 10 (30%), ruptured aneurysms in 6 (18%), acute type B dissection in 8 (24%) and symptomatic penetrating aortic ulcer in 9 (27%) patients. Nine patients had significant concomitant injuries; multiple long bone and pelvic fractures, liver and kidney

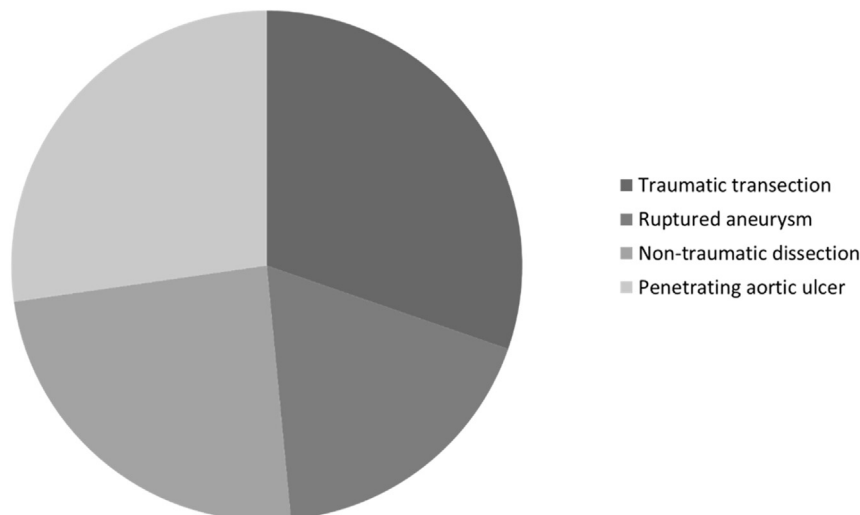


Fig. 1 – Various indications for emergency thoracic aorta stenting.

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