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Trauma Case Reports

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Case Report

Urgent endovascular aorta repair for a rupture of a traumatic infrarenal aortic dissection: Case report and review of literature

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ARTICLE INFO

Keywords:

Aortic rupture
Traumatic aortic injury
Endovascular aorta repair

ABSTRACT

Traumatic aortic injury is a life-threatening condition usually followed by blunt trauma with damage at the thoracic aorta. Abdominal aortic injuries are rare and usually seen with seatbelt trauma. Timing and approach of treatment are associated with significant morbidity and mortality.

This case concerns a 66-year-old man with a high impact trauma after a fall from height. Upon presentation in our level two trauma center, he was conscious but hemodynamically unstable. Computer Tomography scan revealed multiple rib, spine and pelvic fractures with bilateral lung contusions warranting a transfer to a level one trauma center. However, an infrarenal aortic dissection with a retroperitoneal rupture and active bleeding necessitated acute surgical intervention. He was treated endovascularly with an off-the-shelf aortic stent graft which is meant for aortic aneurysm repair. Surgery was performed percutaneously under local anesthetic. Other fractures were treated conservatively. Postoperatively, the patient made a swift recovery without any complications in follow-up.

As this case demonstrates, urgent endovascular repair of a traumatic infrarenal aortic injury can be done quickly with a minimally invasive approach with conventional stent graft systems thereby reducing the high morbidity and mortality rates associated with this life-threatening condition.

Introduction

Traumatic aortic injury (TAI) is a life-threatening condition and the second cause of death in young adults after head injury [1]. Most frequently blunt trauma is the predisposing mechanism, leading to shearing forces on the aorta at anatomically fixed points. The nature of the injury can vary from an intimal tear to a complete transection. Most commonly the thoracic aorta is involved while traumatic injury to the abdominal aorta is rare as it is protected by the spine, rib cage and pelvis [2,3].

In less severe TAI, a delayed repair after management of accompanying injuries or conservative treatment is possible and leads to less mortality. However, in severe cases with unstable patients an urgent repair is necessary. These procedures are associated with more morbidity and mortality. In the past decade, these numbers have been rapidly improving by the increased use and accessibility to endovascular techniques by vascular surgeons [4].

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In this case we present a traumatic abdominal aortic rupture in a hemodynamic unstable patient after a fall from height. The patient was treated with an off-the-shelf aortic stent graft for abdominal aneurysm repair.

Case presentation

A 66-year-old man with no significant medical history presented at the emergency department after a 7-meter fall from a tree. The patient was assessed according to Advanced Trauma Life Support (ATLS) protocol. He was conscious but hemodynamically and respiratory unstable upon admission. He experienced pain in his thoracic and lumbar region. During resuscitation according to the massive transfusion protocol a trauma Computed Tomography (CT) was performed showing multiple rib fractures, bilateral lung contusions, a T2 and L1 vertebrae fracture, pelvic fractures and an extensive retroperitoneal hematoma with an active hemorrhage from a local dissection of the infrarenal aorta (Fig. 1).

According to Dutch guidelines, transfer to a level one trauma center was indicated. However, as the patient was hemodynamic unstable due to the aortic rupture an urgent repair was necessary. Patient underwent an urgent percutaneous Endovascular Aortic Repair (EVAR) using an off-the-shelf Endurant® II (Medtronic, Dublin, Ireland) stent graft. The available stent graft was initially too long, however by pushing up the main device after opening up the top cap, it became suitable for this patient (Fig. 2). The procedure was performed under local anesthesia with lidocaine while the patient was conscious. Afterwards he was admitted to the Intensive Care Unit (ICU) for further hemodynamic stabilization. The following day he was transferred to a level one trauma center.

During his admission there, the main focus was on pain management and mobilization. All fractures were treated conservatively. A follow up CT-angiogram was performed two weeks postoperatively which showed no signs of complications and especially no endoleak (Fig. 3).

Follow up after one month in the outpatient clinic showed good recovery and no surgically related complications. Follow up in one year was planned with a new CT scan.

Discussion

Acute traumatic aortic injury (TAI) is a life-threatening condition associated with 80–90 % prehospital mortality [5,6]. In 70 % of cases TAI is due to blunt trauma in motor vehicle collisions. The aorta is relatively fixed at the arch. This makes the aorta susceptible to injury due to an unequal distribution of shear forces upon trauma. The most common site of injury is the aortic isthmus (45–56 %). Traumatic aortic injury in the abdomen is rare (4–5 %) but usually due to crush injury between the spine and seat belt [7].

In our case a fall from height was the cause of the injury, instead of a deceleration and seatbelt syndrome which is typically seen in abdominal TAI. Our patient was managed upon admission in accordance with Advanced Trauma Life Support (ATLS) protocol. Pulse rate control and permissive hypotension were practiced to reduce aortic-wall stress and prevent progression of the injury. These measures might possibly decrease the chance of rupture to <2 % [5].

If anatomy is favorable for an endovascular approach, the Society for Vascular Surgery (SVS) recommends endovascular treatment over open repair for all age groups. Lower morbidity, mortality and spinal cord ischemia have been reported with an endovascular repair, as well as earlier hospital discharge [8].

Azizzadeh et al. showed that mortality was reduced in patients who underwent a delayed (>24 h) repair compared to patients who had an early repair (<24 h) of their TAI (5.8 % versus 16.5 %) [4]. A delayed repair allows management of associated traumatic injuries and patients stabilization, which is only possible in moderate TAI's.

A solitary abdominal aortic injury is very rare, and no commercial dissection stents grafts are available [9].

Instead, we used an off-the-shelf EVAR stent to treat this rupture which initially was too long, however by pushing up the main device after opening up the top cap, it became suitable for this patient. Eventually we were able to perform the whole procedure under local anesthesia with a conscious patient thereby contributing to stable hemodynamics. Thus, off the shelf EVAR stent grafts can be suitable for emergent abdominal aorta repair, however appropriate knowledge of available materials is crucial.

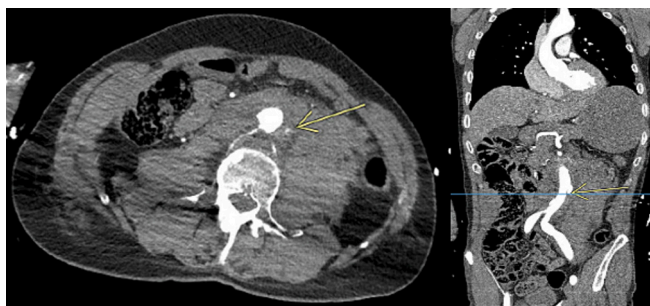


Fig. 1. Initial contrast enhanced trauma CT showing a large retroperitoneal hematoma and an active hemorrhage from a focal dissection of the infrarenal aorta.



Fig. 2. Completion angiogram after positioning the endovascular stent graft and sealing of the active bleeding.



Fig. 3. Postoperative control contrast enhanced CT showing good positioning of the endograft, no signs of endoleak and regression of the retroperitoneal hematoma.

Conclusion

Abdominal traumatic aortic injuries are uncommon and most frequently seen in seatbelt associated motor vehicle accidents. If left untreated it can lead to significant morbidity and mortality. A percutaneous EVAR is nowadays an easily accessible procedure and a quick repair under local anesthetic in hemodynamically unstable patients. In our case we had a rare finding of a ruptured traumatic infrarenal aortic dissection following a fall from height. We believe to have reduced the morbidity and mortality associated with this kind of injury by urgently performing a percutaneous EVAR.

Funding

This study received no funding.

CRediT authorship contribution statement

- D. Dormans: Data collection, data analysis and interpretation, drafting the article
- W.A. Van Dijk: Design of the work, critical revision of the article, final approval
- R.H.D. Vaes: Design of the work, critical revision of the article, final approval.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

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