

CASE REPORT

Giant, 20 cm Diameter, Ruptured Abdominal Aortic Aneurysm: A Case Report

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WHAT THIS PAPER ADDS

This is the case report of a giant ruptured abdominal aortic aneurysm (AAA) that measured >20 cm in diameter. AAAs of this size are extremely rare. Although multiple possible risk factors have been identified, it remains unclear and intriguing why giant AAAs continue to grow to extreme size without rupturing. Open repair seems to be the treatment of choice for most giant aneurysms, both ruptured and unruptured.

Introduction: The rupture risk of abdominal aortic aneurysms (AAAs) depends primarily on their diameter and increases exponentially with aneurysm growth. Therefore, giant AAAs, defined as > 13.0 cm in diameter, are rare clinical entities.

Report: A giant ruptured AAA that measured >20 cm in diameter was successfully treated by open repair.

Conclusion: It remains unclear why giant AAAs continue to grow to extreme size without rupturing. Open repair seems to be the treatment of choice for most giant aneurysms, both ruptured and unruptured.

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Article history: Received 31 August 2018, Revised 19 November 2018, Accepted 28 November 2018,

Keywords: Abdominal aortic aneurysm, Giant, Open repair

INTRODUCTION

Giant abdominal aortic aneurysms (AAAs) are rare clinical entities. Besides diameter, other parameters such as advancing age, male gender, hypertension, smoking, geometrical AAA shape, peak wall stress (PWS), and quantity of intraluminal thrombus (ILT) may also play a role in causing or predisposing to AAA rupture. This is the case report of a giant ruptured AAA measuring >20 cm in diameter.

REPORT

A 76 year old man with a medical history of smoking, hypertension, appendectomy, and myocardial infarction presented to the emergency department with severe abdominal pain radiating to his back, and nausea and vomiting since the night before. Blood pressure on

admission was 180/100 mmHg, with a heart rate of 120/min. Physical examination of the abdomen demonstrated a large pulsatile mass. Femoral pulses were palpable symmetrically.

Computed tomography with intravenous contrast revealed a giant, ruptured infrarenal AAA with severe neck angulation (91.8°) and a diameter of 20.6 cm, extending from 2 cm below the lowest renal artery to the level of the bifurcation. It also showed hydronephrosis and a hydro-ureter on the left side caused by compression by the AAA (see [Figs. 1 and 2](#)).

The patient was immediately brought to the operating room. Because of the severe neck angulation and the extreme diameter of the aneurysm with compression of the abdominal organs, the decision was made to perform open repair to achieve immediate relief of abdominal hypertension. Extensive periaortic haematoma was present. To reach the infrarenal neck, which was hidden behind the aneurysm, a supraceliac clamp was initially placed to open the aneurysm. After removing the mural thrombus, the clamp was easily replaced infrarenally. Tube graft repair was completed with an 18 mm diameter polyethylene tube graft.

Post-operatively, there were no signs of renal failure. The patient's recovery was uneventful and he was

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<https://doi.org/10.1016/j.ejvsr.2018.11.005>

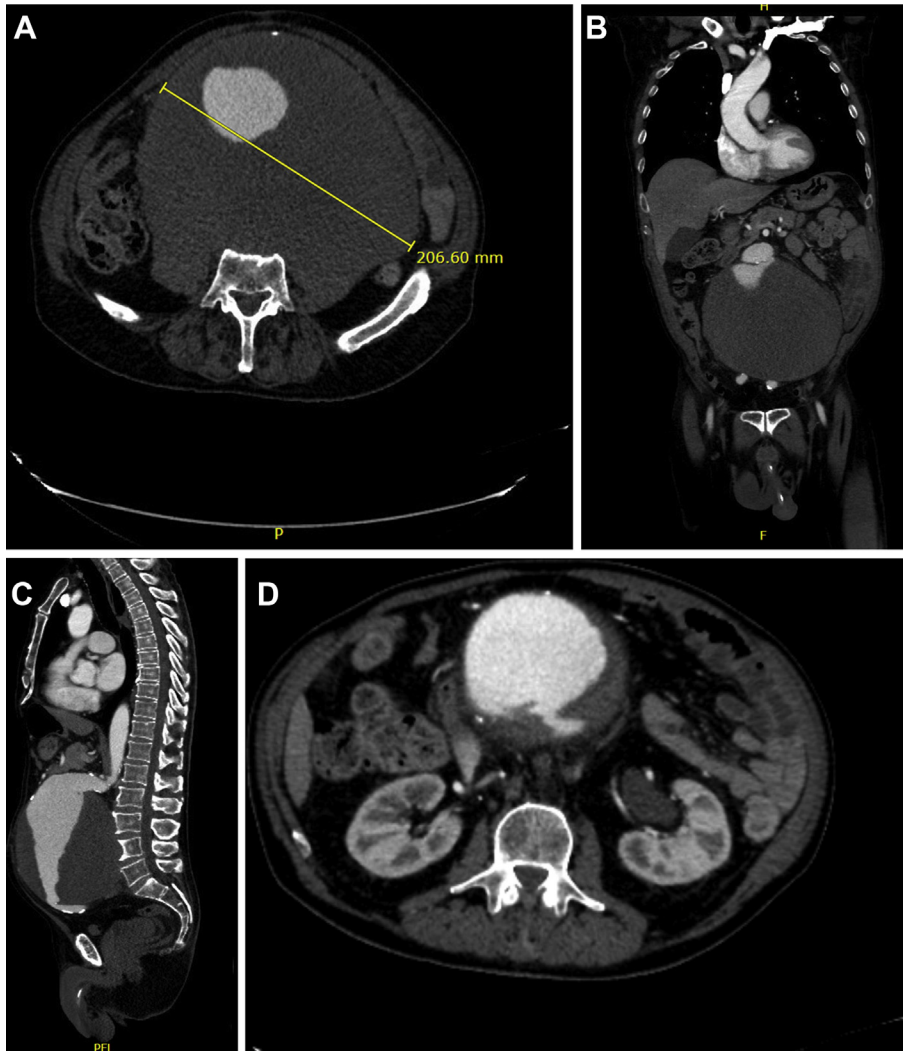


Figure 1. Contrast enhanced computed tomography demonstrating a 20.6 cm diameter infrarenal abdominal aortic aneurysm in axial (A) and coronal (B) views. A sagittal (C) view demonstrates its severe (91.8°) neck angulation and (D) demonstrates an axial view with the rupture site.

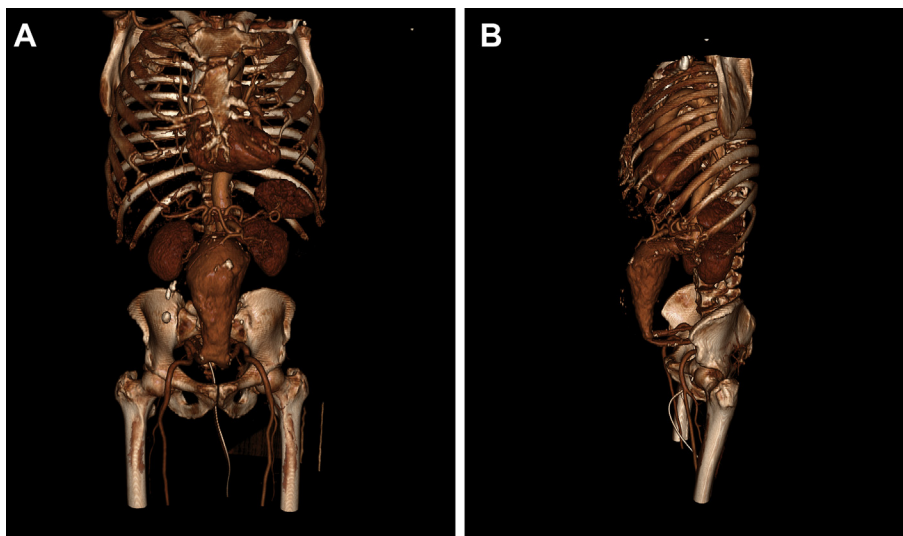


Figure 2. 3D imaging in coronal (A) and sagittal (B) views, showing the rupture site into the thrombus.

discharged from the hospital eight days following surgery. Today, four years later, the patient continues to do well and has not developed any complications such as an incisional hernia.

DISCUSSION

Giant AAAs are generally defined as measuring ≥ 13.0 cm in transverse diameter.¹ The incidence of giant AAAs in the general population is unknown. Results published from the Vascular Study Group of New England show four giant AAAs observed in a sample of 4,045 patients, representing an incidence of only 0.1%.²

This low incidence may be attributed, in part, to the well recognised relationship between rupture and increased aneurysm size as evidenced by rupture rates of 30–50% per year among those patients with AAAs measuring > 8.0 cm in diameter.³ But other risk factors may also play a role in causing an AAA to rupture. Biomechanical factors identified by means of computational modelling techniques, such as PWS, have been positively correlated with rupture risk.⁴ Also, asymmetry in an AAA influences the magnitude of peak stress acting on the aneurysm, increasing the potential for rupture.⁵

Furthermore, the effect of ILT on AAA growth and rupture risk has been studied extensively. ILT has been implicated in creating a pro-oxidant and proteolytic environment that could possibly lead to vessel wall destabilisation.⁶

Hypothetically, this would mean that AAAs with a symmetric shape, low peak wall stress, and no intraluminal thrombus have a higher chance of growing to extreme sizes. However, because of the low incidence of giant AAAs, literature to validate this hypothesis is not available. In addition, the few cases of giant AAAs that have been reported lack biomechanical and anatomical details. By identifying different risk factors for rupture, it could be possible to gain insight into which aneurysms are likely to rupture and which aneurysms can continue to grow to extreme sizes.

The aneurysm described here grew to > 20 cm before rupturing, in spite of the presence of extensive ILT. PWS measurements were not performed.

It remains unclear why giant AAAs continue to grow without rupturing. Ullery et al.¹ published in 2015 what seems to be the largest review of the literature, documenting 13 patients with giant AAAs, of which two were > 20 cm. In this review, four of the aneurysms were ruptured and nine were unruptured. All 13 patients underwent open repair and the overall peri-operative mortality rate was 23%. Of the four patients who had a ruptured giant AAA, two died. In this study, endovascular aneurysm repair (EVAR) was precluded by extensive neck angulation, short neck length, or the degree of concomitant iliac disease.

In addition, significant thrombus may compromise adequate proximal neck fixation or, if accumulated

throughout the sac, may severely limit the available patent lumen diameter for cannulation in EVAR.¹ Also, patients with large AAAs and short necks are at higher risk of endograft migration after EVAR.⁷

An important advantage of open repair is the ability to achieve immediate relief of abdominal hypertension, by removing the thrombus. Although EVAR has evolved to be the preferred therapeutic method for AAAs, open surgical repair is often the only viable treatment for giant AAAs, both ruptured and unruptured.

CONCLUSION

Progress has been made in recent years in understanding the process of AAA progression and rupture. Influencing factors such as geometrical AAA shape, PWS and ILT have been suggested, but to this day it remains unclear why giant AAAs continue to grow to extreme sizes without rupturing. The giant AAA in this case report showed extensive neck angulation, short neck length, and significant thrombus, which made it unsuitable for EVAR. Open repair seems to be the treatment of choice for most giant AAAs.

CONFLICT OF INTEREST

None.

FUNDING

None.

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