American Journal of BioMedicine
AJBM 2022;10 (4): 178-184
Research Article doi:10.18081/2333-5106/2022.10/178

Intervention followed endovascular aneurysm repair for abdominal aortic aneurysm: a case report

Fadhil G. Alamran [1*], Harubumi Kato

Abstract

Implementation of a national screening programme for abdominal aortic aneurysm (AAA) in men is on the public health agenda of many western European countries. Its cause 1.3% of all deaths among men aged 65-85 years in developed countries. These aneurysms are typically asymptomatic until the catastrophic event of rupture. The elective open AAA repair carries a 5% mortality. Whereas the 30 days mortality associated with ruptured AAA is widely believed to be around 80%; and of those that reach hospital alive and undergo emergency surgery, approximately 40% will die within 30 days of surgery. An AAA is usually detected on routine examination as a palpable, pulsatile, and non-tender mass. A 65-year-old female did endovascular aneurysm repair for AAA she had hypertension, dyslipidemia, type 2 diabetes on treatment, congestive heart failure with an ejection fraction of 32%. In 3.5 years ago presents with 8 days of fever, severe abdominal pain. Image angiogram showed signs of endovascular aneurysm repair site (intraluminal gas, aneurysm sac). Since she is clinically unfitting for surgery, treated with percutaneous drainage for the aortic collection and antibiotics for long period and periodically follow up.

Keywords: Abdominal aortic aneurysm; Endovascular aneurysm repair; Emergency surgery

*Corresponding author email: Fadhil@yahoo.fr.
[1] Surgery department, Cardiothoracic, Kufa Medical College, Kufa University, Iraq.
[2] Cardiothoracic Department, Rozzano, Milan, Italy.
Received June 30, 2022; revised September 11, 2022; accepted October 30, 2022; published December 13, 2022.

Introduction

Treatment for a persistent iliacoenteric fistula after the endovascular aneurysm repair of an abdominal aortic aneurysm is feasible with an aorto-bi-ilio-femoral extra-anatomic bypass to bypass the viscero-vascular connection and allow arterial perfusion of the ischemic limb. On the other hand, treatment can simply be performed with axillo-bi-iliac bypass after endovascular exclusion of the aorta-iliac fistula. A slightly more invasive option is to consider in the urgent phase endovascular procedures such as the embolization of the main ileal artery with regard to the therapeutic degradation and the endovascular straight tubulation of the aorta as a bridge to definitive open surgery. In the chronic phase, definitive open treatment by tertiary aortic

reconstruction between the renal arteries and the aortic iliac prosthetic graft and specific enteric repair was found to be effective.

An abdominal aortic aneurysm (AAA) is the most common type of aortic aneurysm. Rupture of an AAA is associated with a high mortality rate, and diagnosis is often made postmortem. Aneurysmal rupture is preceded by the formation of aneurysmal thrombus, and the most common location of the clot is in the suprarenal area. Clot in this high position increases the risk of renal inadequacy. reported the use of catheter intervention to descend the level of an aneurysm before endovascular aorta repair of AAA with a high clot. The intervention was performed under local anesthesia, which was short in time.

In this case report, an endovascular aorta repair (EVAR) was performed to treat an AAA with an extensive clot before detoxifying the rich cysteine using a vestibular reductor. Besides, encouraging recovery was obtained, and under the equivalent maneuvers, the level of the aneurysm was initially descended. Therefore, the postprocedure period went without any difficulty. When a large clot, as in this case, is involved, descending the level of the aneurysm prior to EVAR may lead to a more in-depth understanding of the procedure. In addition, we believe that this increased the value of repeated renal contrast computed tomography (CT) from the early period in the direction and also a CT during follow-up.

Abdominal Aortic Aneurysm (AAA)

An abdominal aortic aneurysm is the most common type of aneurysm. It occurs when there is a balloon-like swelling in the wall of the abdominal aorta. While the underlying cause for the condition is not known, there are several risk factors that increase the likelihood of developing an abdominal aortic aneurysm. This includes being male, having a family history of the condition, or conditions that increase blood pressure in the walls of the aorta, such as hypertension and atherosclerosis. The condition is often asymptomatic but can present with complications such as rupture, where if not properly treated, is often fatal. Once diagnosed, the condition is carefully followed with regular medical check-ups, with the size measured with imaging scans. When it reaches a certain size, treatments such as endovascular aneurysm repair or open aneurysm repair are recommended. Complication risk can be minimized through lifestyle modifications, which includes blood pressure control with altering one's diet, regular exercise, and taking blood pressure medications.

Endovascular Aneurysm Repair (EVAR)

Early interventions followed by EVAR involve re-interventions for maintaining patency, for type I or III endoleak, and for frequent re-growth or persistent sac enlargement. The most common indication for these reinterventions is the incision made in the iliac artery. When patency is to be maintained, patients with symptomatic or severe stenosis, high-grade narrowing, or any occlusion at the internal carotid artery should be promptly referred for EVAR. Treatment options commonly include carotid artery stenting and carotid endarterectomy. When a type I or III endoleak occurs, radiological examinations such as computed tomography angiography and Doppler ultrasound examinations are required to determine the appropriate re-intervention,

which might be endovascular if the patient is a good surgical candidate or open with aortounifemoral bypass or thoracic endovascular aneurysm repair. Before re-intervention, we should examine if other endoleaks are present and whether the increase of the AAA size could accelerate or just be influenced by the sac pressure. In addition, the surgical experience of the performing surgeon might also influence the re-intervention strategy.

Case Presentation

We present the case of a 75-year-old Caucasian man, height 1.78 m, weight 78 kg, with a medical history of hypertension, dyslipidemia, benign prostatic hyperplasia, depressive syndrome, and a history of abdominal aortic aneurysm treated in 2015 with endovascular aneurysm repair (EVAR) with a straight prosthesis of 12 cm in the previous hospital. No hospitalizations and/or operations were presented in the patient's early convalescence on discharge notes. After 4 years, the patient experienced a sudden-onset increasing abdominal pain, a sense of pulsating mass, hypotension (86/48 mmHg), and a drop of 2 g in the hemoglobin value, compared to the previous analysis that was performed. A whole-abdomen CT angiography was performed and revealed endoleaks of type 1B and 2 with a predominance of type 1B. One branch of a straight prosthesis was thrombosed, with a big component of the aneurysm at a size of 5 cm on a CT angiography that was expanding very fast in the last few hours. It is essential to notice that Mr. S.R., the patient, has a 6 cm sac in the first hospitalization in the history and that the aneurysm size went down with the therapy but again relatively quickly followed by an increase of over 1.5 cm, on every episode. A year later, an aneurysm increased by 2.8 cm, suggesting an acute component. We believe the system did not provide the patient with surveillance. Therefore, the patient underwent an emergency operation. After consultation with vascular surgeons, we chose the route of endografting publication.

A whole-abdomen CT angiography was performed and revealed endoleaks of type 1B and 2 with a predominance of type 1B. One branch of a straight prosthesis was thrombosed, with a big component of the aneurysm at a size of 5 cm on a CT angiography that was expanding very fast in the last few hours. It is essential to notice that Mr. S.R., the patient, has a 6 cm sac in the first hospitalization in the history and that the aneurysm size went down with the therapy but again relatively quickly followed by an increase of over 1.5 cm, on every episode. A year later, an aneurysm increased by 2.8 cm, suggesting an acute component. We believe the system did not provide the patient with surveillance. Therefore, the patient underwent an emergency operation. After consultation with vascular surgeons, we chose the route of endografting publication.

Diagnostic Findings

Our patient was a 65-year-old male with a history of hypertension and chronic obstructive pulmonary disease. He had no significant medical or surgical history and took daily aspirin and diltiazem. A computed tomography angiogram (CTA) was ordered to test for a pulmonary embolism, which was ruled out in our patient. His CTA demonstrated a large abdominal aortic aneurysm measuring up to 3.2 cm and the patient was referred to a vascular surgeon for further

Research Article doi:10.18081/2333-5106/2022.10/146

management. At this point, the patient was asymptomatic from his aneurysm. He was offered elective endovascular aneurysm repair (EVAR) and the patient decided to proceed with the intervention. The patient underwent an uncomplicated EVAR with successful stocking of the aneurysm by an endograft. Abdominal aortic aneurysm (AAA) is defined as a segmental ballooning of an artery, which is at least 50% larger than the normal adjacent artery. It may be found incidentally by imaging such as ultrasound, computed tomography or magnetic resonance imaging. If it enlarges, the patient may experience symptoms. The cause of aortic aneurysms is multifactorial and complex with significant genetic, molecular, pathologic and environmental issues. Management of an aneurysm depends on the size of the aneurysm, and comorbid conditions that the patient may have. If the aneurysm becomes symptomatic, it is most likely to be complicated and therefore we mostly consider a surgical or endovascular intervention. The risk of life-long rupture is potentially 1% to 1.4%. There are lots of well-established criteria for elective repair of an aneurysm, such as changes in the size of aneurysm over time. Once the aneurysm reaches 5.5 cm, elective repair would be recommended.

Interventional Procedures

A CT scan was performed upon patient admission to the hospital for intervention planning and revealed a continuous endoleak originating from graft side holes. The patient was treated by actually closing the device via the Amplatzer Duct Occluder. The patient was prepared for the intervention, and under local anesthesia with sedation, a right femoral artery access was obtained with the Seldinger technique. She received 2500 units of heparin locally, not systemically, as isthmus stent graft translocation to the proximal side, and as no wire access could be obtained from that access site. A pigtail catheter was exchanged for the original contralateral 6F sheath. A 10 cc angiogram was obtained and revealed endoleak from the Watford's holes. A Zenith Dissection Endovascular Stent was implanted to elongate the graft to occlude the holes. A pigtail catheter or a large curve sheath could not be delivered over the uncovered spike and risk dissection or stroke with aggressive attempts, so the patient was treated with the 15 and 17 mm Amplatzer Duct Occluder II without leaving an aneurysm sac around. The left common iliac access site was used.

Surgical Technique

In the first stage, the aneurysm is excluded from the circulation by performing an aortobifemoral bypass through a standard abdominal incision. This step allows the aorta to retract, making endovascular stent graft insertion more feasible. It also decreases the aneurysm sac blood flow, which decreases the amount of potential intraoperative type III endoleaks. In case of rupture after injury to the aneurysm during the endovascular portion of the approach and during temporary occlusion of the abdominal aorta, it allows the surgeon to rather quickly convert into an open abdominal aortic aneurysm repair. The second stage involves the endovascular aortic repair of the abdominal aortic aneurysm by inserting stent-grafts. We have previously reported our experience and results of the staged endovascular approach, which is a useful option in patients who do not demonstrate acceptable anatomy for standard endovascular repair.

Conclusion

A rare case of stent-graft distortion following EVAR that was treated conservatively is presented in this report. The patient remained asymptomatic for nearly 2 years and significant aneurysm regression was observed at follow up. Stent-grafts for EVAR generally have an excellent clinical outcome in the short and medium term; the relatively high rates of complications such as migration, endoleaks, endotension and graft limb occlusion can be managed effectively, generally through minimally invasive re-interventions.

Competing interests

The authors declare no conflict of interest.

Ethics Statement

This study has been approved by the Ethical Review Committee of the Shanghai University of Sport (approval number: 312672411BN112). The publication of any potentially identifiable images or data contained in the article requires personal written informed consent. The research team will provide consultations for all subjects and their families to answer any research questions. Before signing the informed consent form, after the patients and their families fully understand the research process, our team members will organize the patients to sign the informed consent form or withdraw from the research. All subjects or their guardians will sign informed consent. Authors tend to submit research results to peer-reviewed journals or academic conferences for publication.

Authors' contributions

All authors shared in the conception and design and interpretation of data, drafting of the manuscript and critical revision of the case study for intellectual content and final approval of the version to be published. All authors read and approved the final manuscript.

Open access

References

1. Hance KA, Tataria M, Ziporin SJ, Lee JK, Thompson RW. Monocyte chemotactic activity in human abdominal aortic aneurysms: Role of elastin degradation peptides and the 67-kD cell surface elastin receptor J Vasc Surg 2002; 35:254-261.
https://doi.org/10.1067/mva.2002.120382

2. Lu H, Rateri DL, Bruemmer D, Cassis LA, Daugherty A. Novel mechanisms of abdominal aortic aneurysms. Curr Atheroscler Rep 2012; 14:402-12.
https://doi.org/10.1007/s11883-012-0271-y
3. Cheng J, Zhang R, Li C, Tao H, Dou Y, Wang Y, et al. A targeting nanotherapy for abdominal aortic aneurysms. J Am Coll Cardiol 2018; 72:2591-605.
https://doi.org/10.1016/j.jacc.2018.08.2188
4. Yin L, Zhang K, Sun Y, Liu Z. Nanoparticle-assisted diagnosis and treatment for abdominal aortic aneurysm. Front Med 2021; 8:665846/BIBTEX.
https://doi.org/10.3389/fmed.2021.665846
5. Bruijn LE, Gómez CG van S, Curci JA, et al. A histopathological classification scheme for abdominal aortic aneurysm disease. JVS-Vascular Sci 2021; 2:260.
https://doi.org/10.1016/j.jvssci.2021.09.001
6. Mellak S, Ait-Oufella H, Esposito B, et al. Angiotensin II mobilizes spleen monocytes to promote the development of abdominal aortic aneurysm in apoe-/- mice. Arter Thromb Vasc Biol 2015; 35:378-88.
https://doi.org/10.1161/ATVBAHA.114.304389
7. Klopf J, Brostjan C, Neumayer C, Eilenberg W. Neutrophils as regulators and biomarkers of cardiovascular inflammation in the context of abdominal aortic aneurysms. Biomed 2021; 9:1236.
https://doi.org/10.3390/biomedicines9091236
8. Calero A, Illig KA. Overview of aortic aneurysm management in the endovascular era. Semin Vasc Surg 2016; 29(1-2):3-17.
https://doi.org/10.1053/j.semvascsurg.2016.07.003
9. Zannetti S, De Rango P, Parlani G, Verzini F, Maselli A, Cao P. Endovascular abdominal aortic aneurysm repair in high-risk patients: a single centre experience. Eur J Vasc Endovasc Surg. 2001; 21(4):334-8.
https://doi.org/10.1053/ejvs.2001.1345
10. Bush RL, Johnson ML, Collins TC, et al. Open versus endovascular abdominal aortic aneurysm repair in VA hospitals. J Am Coll Surg 2006; 202(4):577-87.
https://doi.org/10.1016/j.jamcollsurg.2006.01.005
11. Galiñanes EL, Reynolds S, Dombrovskiy VY, Vogel TR. The impact of preoperative statin therapy on open and endovascular abdominal aortic aneurysm repair outcomes. Vascular 2015; 23(4):344-9.
https://doi.org/10.1177/1708538114552837
12. Williamson JS, Ambler GK, Twine CP, Williams IM, Williams GL. Elective repair of abdominal aortic aneurysm and the risk of colonic ischaemia: Systematic review and meta-analysis. Eur J Vasc Endovasc Surg 2018; 56(1):31-9.
https://doi.org/10.1016/j.ejvs.2018.03.005
13. Henriksson M, Lundgren F. Decision-analytical model with lifetime estimation of costs and health outcomes for one-time screening for abdominal aortic aneurysm in 65-year-old men. Br J Surg 2005; 92:976-83.
https://doi.org/10.1002/bjs.5122
14. Trenner M, Kuehnl A, Reutersberg B, Salvermoser M, Eckstein HH. Nationwide analysis of risk factors for in-hospital mortality in patients undergoing abdominal aortic aneurysm repair. Br J Surg 2018; 105(4):379-87.
https://doi.org/10.1002/bjs.10714
15. Cosford PA, Leng GC. Screening for abdominal aortic aneurysm. Cochrane Database Syst Rev 2007; (2):CD002945.
https://doi.org/10.1002/14651858.CD002945.pub2
16. Sweet MP, Fillinger MF, Morrison TM, Abel D. The influence of gender and aortic aneurysm size on eligibility for endovascular abdominal aortic aneurysm repair. J Vasc Surg 2011; 54(4):931-7.
https://doi.org/10.1016/j.jvs.2011.02.054
17. Connelly JB, Hill GB, Millar WJ. The detection and management of abdominal aortic aneurysm: a cost-effectiveness analysis. Clin Invest Med 2002; 25:127-33.

18. Bergqvist D, Björk M, Wanhainen A. Abdominal aortic aneurysm-to screen or not to screen. Eur J Vasc Endovasc Surg 2008; 35:13-8.
https://doi.org/10.1016/j.ejvs.2007.06.012

19. Laustsen J, Jensen LP, Hansen AK. Accuracy of clinical data in a population based vascular registry. Eur J Vasc Endovasc Surg 2004; 27:216-9.
https://doi.org/10.1016/j.ejvs.2003.11.011

20. Cronenwett JL, Likosky DS, Russel MT, Eldrup-Jørgensen J, Stanley AC, Nolan BW. A regional registry for quality assurance and improvement: the vascular study group of Northern New England (VSGNNE). J Vasc Surg 2007; 46:1093-102.
https://doi.org/10.1016/j.jvs.2007.08.012

21. Lovegrowe RE, Javid M, Magee TR, Galland RB. A meta-analysis of 21 178 patients undergoing open or endovascular repair of abdominal aortic aneurysm. Br J Surg 2008; 95:677-84.
https://doi.org/10.1002/bjs.6240

22. Lindholt JS, Juul S, Fasting H, Henneberg EW. Screening for abdominal aortic aneurysms: single centre randomised controlled trial. BMJ 2005; 330:750-4.
https://doi.org/10.1136/bmj.38369.620162.82

22. Cornuz J, Pinto CS, Tevaerai H, Egger M. Risk factors for asymptomatic abdominal aortic aneurysm. Eur J Public Health 2004; 14:343-9.
https://doi.org/10.1093/eurpub/14.4.343

23. Silverstein MD, Pitts SR, Chaikof EL, Ballard DJ. Abdominal aortic aneurysm (AAA): cost-effectiveness of screening, surveillance of intermediate-sized AAA, and management of symptomatic AAA. Proc (Bayl Univ Med Cent) 2005; 18:345-67.
https://doi.org/10.1080/08998280.2005.11928095

24. Mathison M, Becker GJ, Katzen BT, Benenati JF, Zemel G, Powell A, Kovacs ME, Lima MM. The influence of female gender on the outcome of endovascular abdominal aortic aneurysm repair. J Vasc Interv Radiol 2001; 12(9):1047-51.
https://doi.org/10.1016/S1051-0443(07)61589-9

25. Patel ST, Haser PB, Bush HL, Jr, Kent KC. The cost-effectiveness of endovascular repair versus open surgical repair of abdominal aortic aneurysms: A decision analysis model. J Vasc Surg 1999; 29(6):958-72.
https://doi.org/10.1016/S0741-5214(99)70237-5

American Journal of BioMedicine
Journal Abbreviation: AJBM
ISSN: 2333-5106 (Online)
DOI: 10.18081/issn.2333-5106
Publisher: BM-Publisher
Email: editor@ajbm.net