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Successful endovascular repair of challenging abdominal aortic aneurysm with anaconda LoPro 90 stent graft system: Case report

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Abstract
An abdominal aortic aneurysm is a life-threatening condition requiring monitoring or treatment depending upon the size and symptomatology. An abdominal aortic aneurysm may be detected incidentally or at the time of rupture. The most typical manifestation of rupture is abdominal or back pain with a pulsatile abdominal mass. Sometimes, the symptoms may be vague, and the abdominal mass may be missed. Currently, available management approaches include the traditional open laparotomy, newer minimally invasive methodologies, and the placement of endovascular stents. Endovascular aneurysm repair (EVAR) has been widely accepted and has become the preferred treatment option in several centers around the world. However challenging anatomy of aortic aneurysms such as short necks, juxta renal, thoracoabdominal, and pararenal locations are difficult to treat with conventional EVAR devices. Endograft technology and creative designs of EVAR devices have made the procedure easier and less stressful compared to open repair. Successful endovascular repair of abdominal aortic aneurysm (AAA) depends on the correct selection of patients, choice of the correct endoprosthesis, and familiarity with the technique and procedure-specific complications. Anaconda AAA Stent Graft System is the one introduced for repair of infra-renal abdominal aortic aneurysm (AAA) with complicated vascular anatomy. This case report briefs the challenging anatomy of an infrarenal abdominal aortic aneurysm in an asymptomatic patient and its successful repair.

Keywords: Pulsatile abdominal mass, Endovascular aneurysm repair (EVAR), challenging vascular anatomy, infrarenal abdominal aortic aneurysm (IAAA), Anaconda LoPro90 stent graft system

Introduction

Case report

A 62-year-old gentleman, a known case of systemic hypertension came to surgical OPD for left inguinal hernia repair. No history of coronary artery disease, cerebral vascular disease, dyslipidemia or diabetes mellitus. No history of smoking or alcoholism. He underwent right inguinal hernia repair and surgical repair of fistula in ano 15 years ago. On general examination, his heart rate was 68 beats/minute, his Blood pressure was 140/80 mm of Hg and respiratory rate was 22/minute. On per abdomen examination, a palpable central abdominal mass was detected measuring about 5 x 5 cm with expansile pulsation. Basic blood investigations revealed Total count - 7500 cells/cumm, hemoglobin -14.4 g/dL, Platelet count-361 thousand/cumm, serum creatinine - 1.6 mg/dL and normal liver function test and clotting parameters. ECG and ECHO showed no significant abnormalities. On imaging, the Chest radiograph was within normal limits. Ultrasound of the abdomen was done which showed a fusiform dilation of the abdominal aorta measuring >6 cm in length and >5 cm in luminal diameter.

Aortic angiography with 3D reconstruction showed an infrarenal fusiform aneurysmal dilation of the abdominal aorta with a maximum diameter of 6.2 cm, maximum length of 8.4 cm, and 62 degrees of angulation at the neck (Fig 1, 2). The main branches of the abdominal aorta the celiac, superior mesenteric, bilateral renal, and inferior mesenteric arteries were normal in caliber and showed normal contrast opacification. Infra-renal location, angulation, and size were the challenges regarding its repair.

It was then decided to do an endovascular repair considering his age and complicated vascular anatomy. The patient was electively posted for Endovascular aneurysm repair (EVAR) under general anaesthesia after cardiology and nephrology clearance.

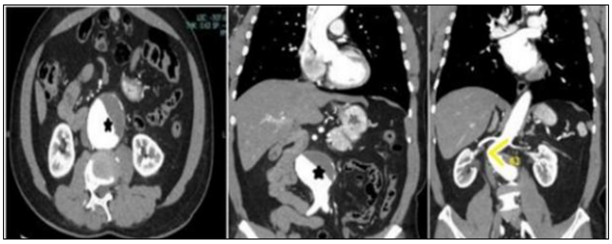

Fig 1: Aortic angiography images axial and coronal views. Infrarenal abdominal aortic aneurysm with thrombus partially filling the lumen (*). Neck angulation measures 62 degrees in the coronal image.

Fig 2: 3D reconstruction image owing infrarenal aortic aneurysm with acute angulation at its neck

Right upper and bilateral lower limb vascular accesses were created and then the main body delivery system (23 cm) of the Anaconda LoPro AAA Stent Graft System (Fig. 3) was raised up to the level of the renal arteries via right femoral access, and the body was released just distal to the left lower renal artery. The proximal ring stent was anchored by four pairs of nitinol hooks, which prevented device migration. The top of the graft consists of a dual-ring stent design, which provides hemostatic sealing against the vessel wall. The ipsilateral anaconda LoPro 90 12-13 x 110 mm device deployed up to the right common iliac bifurcation.

Fig 3: Anaconda LoPro AAA Stent graft system. Three separate components, main aortic body component and two bilateral iliac components

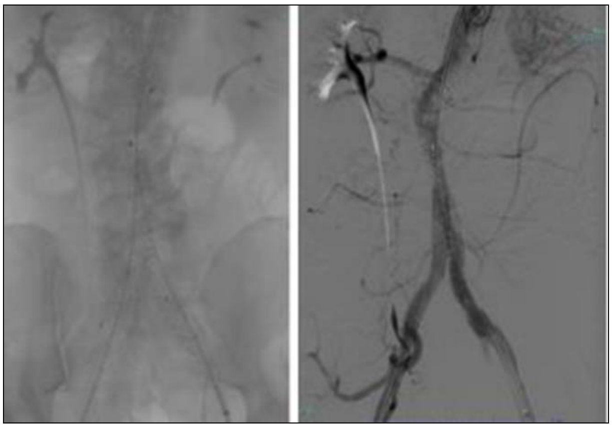

Fig 4: Post procedure angiogram shows stent in situ and good filling of aorta and its branches

The cannulation of the contralateral gate of the body was facilitated with a magnet system and an Anaconda LoPro90 12-17 x 130 mm device deployed up to the left Iliac bifurcation. Post Procedure angiogram (Figure: 4) showed normal filling of the right and left main renal artery and good flow was noted in bilateral internal iliac arteries. Left accessory renal artery showed no opacification. A small type II end leak was noted from IMA, which was decided for follow-up. Post procedure period was uneventful and the patient was discharged on the third postoperative day. The patient reported for review one week after discharge and had no significant issues except for mild intermittent back pain, clinical and lab parameters were within normal limits.

Discussion

Abdominal aortic aneurysms tend to occur when there is a failure of the structural proteins of the aorta that results in the gradual weakening of the aortic wall. The number of lamellar units is lower in the infrarenal aorta than in the thoracic aorta. This is felt to contribute to the higher incidence of aneurysmal formation in the infrarenal aorta [1]. An aortic diameter of 3 cm or more is used to define an abdominal aortic aneurysm [2]. Clinical palpation of a pulsating abdominal mass alerts the clinician to the presence of a possible abdominal aortic aneurysm (AAA), a common vascular disorder seen in older individuals, more commonly in male patients with a history of hypertension and smoking. Imaging studies are important in diagnosing the cause of a pulsatile abdominal mass and, if an AAA is found, in determining its size, involvement of abdominal branches, and any associated significant stenosis or aneurysm involving abdominal visceral and extremity arteries that may aid in treatment planning. Imaging studies should also categorize the extent of the aneurysm and can also be used for routine surveillance of AAAs [3]. The larger an aneurysm is, the greater the chances are that it will rupture. It is estimated that an abdominal aortic aneurysm that is over 5.5 cm in diameter will rupture within one year in about 3 to 6 out of 100 men [4]. Ultrasound, CT angiography, and MR angiography provide an accurate and reproducible assessment of size, while radiographs and aortography provide limited evaluation [5]. Volume rendering, sub-volume maximum-intensity projection (MIP), and curved planar reformations are integral components of the 3-D analysis. Three-dimensional analysis is useful for measuring the correct size of an AAA [3]. The treatment of un-ruptured abdominal aortic aneurysms has changed over time.

Treatment is recommended when it reaches 5 cm to 5.5 cm, is demonstrated as rapidly enlarging > 0.5 cm over 6 months, or becomes symptomatic. Open surgical repair via transabdominal or retroperitoneal approach has been the gold standard [1]. Endovascular repair from a femoral arterial approach is now applied for most repairs, especially in older and higher-risk patients. Endovascular therapy is recommended in patients who are not fit for open surgery. This includes patients with severe heart disease and/or other comorbidities that preclude open repair. The endovascular approach for ruptured AAA has demonstrated superior results and survival compared to open repair if the anatomy is suitable, but the mortality rates remain high. The risk of surgery is influenced by the patient's age, the presence of renal failure, and the status of the cardiopulmonary system1. (EVAR), first described in 1991, and is an alternative to traditional open repair. This involves a stent-graft system consisting of a metallic stent framework covered with a synthetic fabric material which is placed in the lumen of the aneurysm [5]. Since the early EVAR experience, several devices have been proposed but no single device seems to completely solve all the problems associated with endovascular AAA management [7]. Stent graft migration, ephemeral sealing between the vessel wall and the stent graft, stent breakage, stent component disconnection, prosthetic tearing, and limb occlusion were the causes of increased EVAR failure [8]. Original EVAR devices were based upon a neck length of 15 mm and < 60° angulation. Newer devices now available can treat 10 mm necks and/or 90° angulation. However, a number of AAA cases are not suitable for conventional EVAR. These are cases with anatomy such as short necks or juxta renal, thoracoabdominal, and pararenal aneurysms [7]. Challenging anatomy is characterized by > 60° infrarenal angulation or > 90° iliac axis tortuosity, short (< 15 mm) infrarenal neck, or reversed conical and bell-shaped necks. Of these, severe proximal aortic neck angulation has the greatest potential for fixation failure, a situation that may lead to complications including type I endoleak and late rupture [9]. Anaconda AAA Stent Graft System is a suitable choice for infrarenal abdominal aortic aneurysm with complicated anatomy which is characterized by a three-piece system consisting of two proximal independent saddle-shaped nitinol self-expandable rings with hook fixation, zero body support and vacuum-cleaner tube leg design [10]. Fenestrated Anaconda Custom AAA Stent Graft System coupled with continued utilization of the latest 3D printing technology, computer-aided design, and clinical measurement software has led to a number of further customizable opportunities in device design [8]. It makes a personalized stent for each patient’s individual anatomy which allows for optimal alignment of fenestrations with target vessels. From the cases reported so far it is evident that, earlier the detection of an aortic aneurysm, the best is its management either medical or surgical. The American College of Cardiology and the American Heart Association jointly recommend 1-time screening for AAA with physical examination and ultrasonography in men aged 65 to 75 years who have ever smoked or in men 60 years or older who are the sibling or offspring of a person with AAA [11].

Conclusion
Early diagnosis and accurate decision on the management of abdominal aortic aneurysm always brings good clinical outcomes. This case report of an incidentally detected large abdominal aortic aneurysm glorifies the importance of clinical examination and excellent endovascular repair, irrespective of the challenging vascular anatomy. Imaging helps in making the diagnosis, eliciting exact anatomical orientation, and associated complications and choosing the appropriate management. Endovascular aneurysm repair (EVAR) is a procedure that has revolutionized AAA repair, making intervention safer in high-surgical-risk patients. Special cases with complicated infrarenal vascular anatomy can be successfully managed with endovascular repair using the Anaconda LoPro AAA Stent Graft System.

Conflict of Interest
Not available

Financial Support
Not available

References
1. Shaw PM, Loree J, Gibbons RC. Abdominal Aortic Aneurysm. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; c2023 [cited 2023 Oct 8]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK470237/
2. Rakita D, Newatia A, Hines JJ, Siegel DN, Friedman B. Spectrum of CT findings in rupture and impending rupture of abdominal aortic aneurysms. Radiogr Rev Publ Radiol Soc N Am Inc. 2007;27(2):497–507.
3. Expert Panel on Vascular Imaging:, Reis SP, Majdalany BS, AbuRahma AF, Collins JD, Francois CJ, *et al*. ACR Appropriateness Criteria® Pulsatile Abdominal Mass Suspected Abdominal Aortic Aneurysm. J Am Coll Radiol JACR. 2017 May;14(5S):S258–65.
4. When is surgery recommended for the treatment of abdominal aortic aneurysm? - InformedHealth.org - NCBI Bookshelf [Internet]. [Cited 2023 Oct 8]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441584/
5. Expert Panel on Vascular Imaging:, Collard M, Sutphin PD, Kalva SP, Majdalany BS, Collins JD, *et al*. ACR Appropriateness Criteria® Abdominal Aortic Aneurysm Follow-up (Without Repair). J Am Coll Radiol JACR. 2019 May;16(5S):S2–6.
6. Reis PV, Morgado M, Valdoleiros I, Neto MD, Mourão J. Complications of Endovascular Aneurysm Repair: Mortality, Myocardial Infarction and Acute Kidney Injury. Turk J Anaesthesiol Reanim. 2018 Jun;46(3):222–8.
7. Picel AC, Kansal N. Essentials of endovascular abdominal aortic aneurysm repair imaging: preprocedural assessment. AJR Am J Roentgenol. 2014 Oct;203(4):W347-357.
8. Freyrie A, Gallitto E, Gargiulo M, Faggioli G, Massoni CB, Mascoli C, *et al*. Results of the endovascular abdominal aortic aneurysm repair using the Anaconda aortic endograft. J Vasc Surg. 2014 Nov;60(5):1132–9.
9. Anaconda™ AAA Stent Graft System for Challenging AAA Anatomy - Endovascular Today [Internet]. [Cited 2023 Oct 8].
10. Kliewer ME, Bordet M, Chavent B, Reijnen MMPJ, Frisch N, Midy D, *et al*. Assessment of fenestrated Anaconda stent graft design by numerical simulation: Results of a European prospective multicenter study. J

Vasc Surg. 2022 Jan;75(1):99-108.e2.
11. Hirsch AT, Haskal ZJ, Hertzer NR, Bakal CW, Creager MA, Halperin JL, *et al*. ACC/AHA 2005 Practice Guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic): a collaborative report from the American Association for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA Task Force on Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Peripheral Arterial Disease): endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation; National Heart, Lung, and Blood Institute; Society for Vascular Nursing; Trans-Atlantic Inter-Society Consensus; and Vascular Disease Foundation. Circulation. 2006 Mar 21;113(11):e463-654.

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