Endovascular abdominal aortic aneurysm repair in a centenarian

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ABSTRACT

As the general population ages, there will be an increasing number of vascular patients in their 90s and older. However, geriatric patients have historically been turned down for abdominal aortic aneurysm repair despite high aneurysm-related mortality in the unrepaired. Herein, we describe the perioperative considerations and the successful, uncomplicated operative course of a 100-year-old woman who underwent an elective endovascular aortic aneurysm repair for an expanding 5.3-cm abdominal aortic aneurysm. Given a suitable patient, there is acceptable risk profile of an endovascular approach, even in centenarians. (J Vasc Surg Cases and Innovative Techniques 2020;6:361-4.)

Keywords: EVAR; Geriatric; Centenarian

Although geriatric patients have historically been turned down for abdominal aortic aneurysm (AAA) repair, studies have demonstrated acceptable risk profile of an endovascular approach—even in nonagenarians—given a suitable patient (<5 comorbidities such as history of cancer, myocardial infarction, hypertension, etc).[1,2] Conversely, patients turned down for AAA repair suffer 83% mortality over 3 years.[3] It has thus been concluded that age alone is not an appropriate reason to forego AAA repair.[4]

To date and to the best of our knowledge, the oldest described elective open AAA repair in the literature has been in a 101-year-old patient.[5,6] However, current literature has scant evidence of centenarians undergoing endovascular aortic aneurysm repair (EVAR). We describe important ethical considerations around shared decision-making, and the successful operative course of a 100-year-old woman who underwent elective EVAR for an expanding 5.3-cm AAA.

Consent was obtained to publish this case.

CASE REPORT

A 100-year-old woman presented for a second opinion for an expanding infrarenal AAA. Cardiovascular history included controlled hypertension, stable coronary artery disease (ejection fraction of 75%, no prior interventions), and stable hyperlipidemia. Medical history was, otherwise, notable for a history of resolved immune thrombocytopenic purpura, glaucoma, and hypothyroidism. On physical examination, she was a healthy appearing female patient who seemed to be younger than her stated age, was well-nourished, and in no acute distress. She had a body mass index of 21.5 kg/m^2. We palpated a nontender, pulsatile, midline abdominal mass with diminished but palpable femoral pulses bilaterally.

Computed tomography angiography demonstrated a 5.3-cm infrarenal bilobed AAA with focal outpouchings and ulcerated plaques. The aneurysm had grown from 4.9 cm 6 months prior, as measured side-by-side by the treating vascular surgeon. The proximal neck had a length of 1.5 cm and a diameter of 1.8 cm. There was moderate calcification throughout her aortoiliac vessels extending into her femoral arteries. The left and right common iliac arteries were 8.6 and 8.8 mm, respectively (Fig 1).

A geriatric evaluation was completed. Medication review showed she took 81 mg of aspirin, diltiazem, rosuvastatin, and ezetimibe. Mild cognitive impairment was noted on the Montreal Cognitive Assessment (MOCA of 23/30), with perfect executive function. She had good mood and functional status. Preoperative cardiac risk evaluation revealed no ischemic changes. Preoperative creatinine was 0.89.

A majority of consultation time over two sessions with the patient and her family before and after geriatric conversation were dedicated to shared decision making around goals of care. The patient was adamant that she receive the best care for this life-threatening condition and was seeking a second opinion after being previously refused operative treatment. She was informed of the rupture and mortality risk, but given her age, additional discussions were also critical. Her baseline functional status was excellent. She lived alone, used no assistive walking devices, and was able to perform normal and instrumental activities of daily living. The risk discussion included loss of independence from possible loss of limb and other complications. In addition, code

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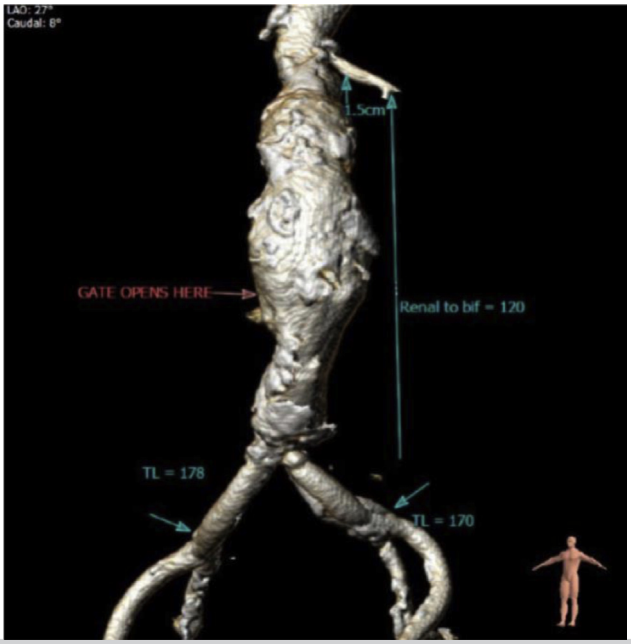

Fig 1. Preoperative computed tomography scan reconstruction.

Fig 2. Preoperative aortography demonstrating anatomy consistent with the computed tomography scan.

status and advance directive conversation occurred with patient and family. The patient chose to remain full code, including cardiopulmonary resuscitation and intubation, after risks and outcomes were discussed.

SURGICAL TECHNIQUE

She was admitted to the hospital the day before surgery for preoperative intravenous hydration and contrast allergy prophylaxis. Intraoperative flush abdominal aortography confirmed computed tomography angiography findings and a suitable anatomy for the proposed repair (Fig 2).

EVAR was performed uneventfully under general anesthesia via femoral cutdown with standard technique. A Medtronic Endurant II (Medtronic, Minneapolis, Minn) modular bifurcated device measuring 23 mm × 13 mm × 166 mm and left iliac limb measuring 16 mm × 10 mm × 93 mm were deployed, and kissing balloon angioplasty of the deployed limbs performed (Fig 3). Postoperative angiography demonstrated successful repair without endoleaks (Fig 4). A left common femoral endarterectomy was performed upon completion of the case. Her postoperative course was unremarkable. She was discharged on postoperative day 4, to allow adequate independant ambulation before discharge, and to make arrangements for short-term rehabilitation.

She was seen at 2 weeks and 6 months for follow-up. All incisions had healed. She had no abdominal or back complaints and her lower extremities were well-perfused. Serial imaging revealed a stable aneurysm sac with no evidence of endoleak. She remained highly functional and was living independently at the time of last follow-up.

DISCUSSION

In 2015, the world's population of centenarians was nearly 500,000. In 2050, that number is predicted to be more than 3,000,000.[7] As the general population ages, there will be an increasing number of vascular patients aged 90s and older.

Centenarians with AAA pose a number of special ethical and operative considerations. The 1-year actuarial mortality of a 100-year-old woman is 30% with expected lifespan of 2.42 years, and the probability of a 5.3-cm AAA rupturing within 1 year is 9.4% and within 2 years is approximately 20%,[7,8] We highlight here that, in well-selected patients, the risk of intervention may align with goals defined in shared decision making between patients, family members, surgeons, and geriatricians.

Lath et al[5] note considerations in evaluating suitability of the very old for elective repair: "aneurysm size, symptomatic nature of disease, history of elderly family members and overall general good condition." Geriatric evaluation includes assessment of cognition, functional status, mood, support system, and overall medical state, addressing Lath et al's point about "overall condition."

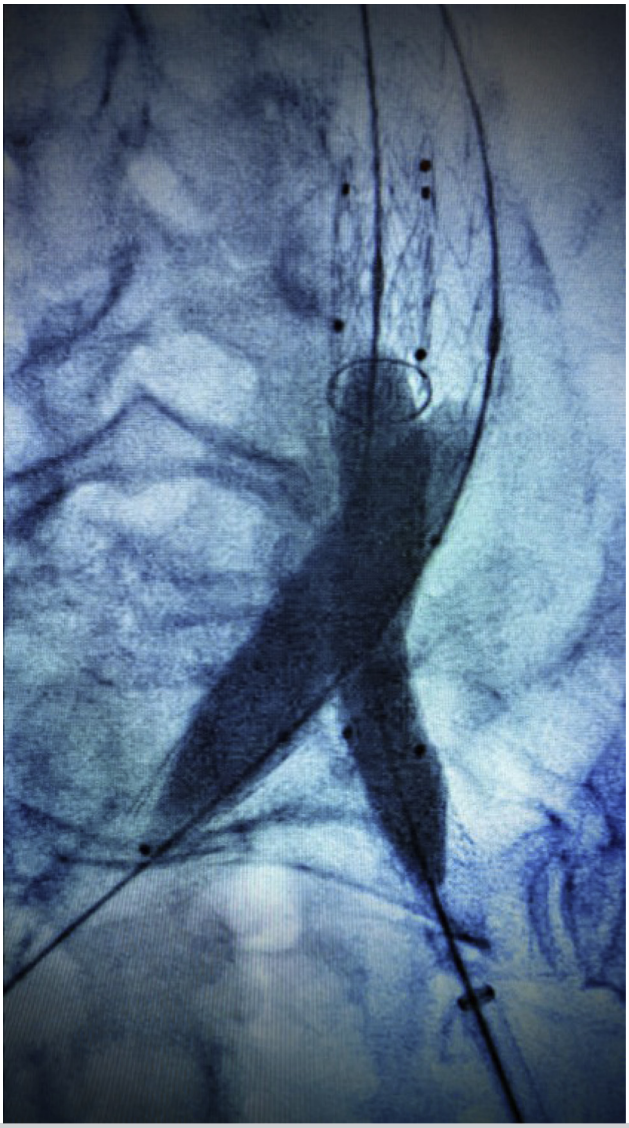

Fig 3. Kissing balloon angioplasty of iliac crossing sections.

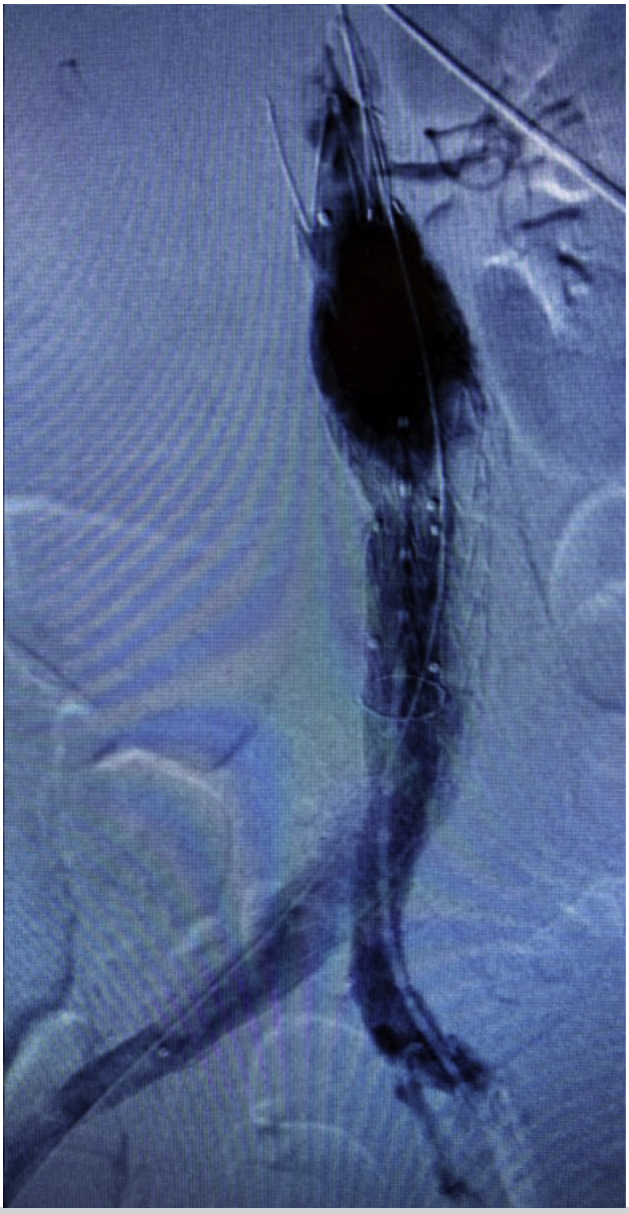

Fig 4. Postoperative angiogram demonstrating absence of endoleak.

Aneurysms exhibiting rapid expansion, saccular and/or ulcerative features, and those in patients with low body surface area are at higher than average risk for rupture. Our patient was a small framed woman—5'0", 37% body surface area index suggesting a higher than average rupture risk.[9] She had a 4-mm expansion over 6 months indicating a near-rapid growth.[10] Although the natural history of saccular aneurysms is poorly defined, general consensus does suggest a relatively lower threshold for elective repair compared with fusiform aneurysms.[11,12] Given the morphology and progression of this patient's AAA, it is safe to assume a greater than average annual rupture risk for this size group, which we estimate between 10% and 20%.

Although the frailty score was not prospectively calculated, information from geriatric evaluation indicates Edmonton score of 1 of 17 (no frailty).[13] A study of centenarian survival shows that 1-year mortality is a mere 12.5% for an individual performing instrumental activities of daily living unassisted.[14] Accounting for mild cognitive impairment and no frailty, 1-year mortality is 15%.[15] Based on the age-adjusted estimated glomerular filtration rate, the 2-year mortality is less than 15%.[16]

Given the increased risk of rupture and less than 15% risk of all-cause mortality per year in this patient, she is an operative candidate. Perioperative risk was considered. Delirium is a concern in the elderly; evidence suggests increased risk only in MOCA of less than 15; this patient has MOCA of 23.[17] Age of more than 70 years correlates with only a small increase in major perioperative complications (7.5% vs 4.8%).[18] The EUROSTAR study demonstrated that EVAR patients return to preoperative status

sooner.[19] In the 80- to 99-year-old age group, multiple studies have shown EVAR is safe and effective with acceptable risk profile. Judicious patient selection remains crucial.[1,20-22]

This patient had previously been refused intervention based on age alone, and was adamant that full consideration be given to her case. She was seeking a second opinion, and fully engaged in decision making, involving her children. In these cases, discussions about the goals of care must go beyond rupture and mortality risks alone; we dedicated multiple consultations to discussions surrounding major morbidities and the resulting impact on independence, and ensured that the patient and family considered code status and advance directives.

EVAR is a safe treatment option for appropriately selected centenarians with need for elective AAA repair; geriatric evaluation and shared decision making are critical additions to the consultation process.

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