

Endovascular Abdominal Aortic Aneurysm Repair in Nonagenarians—Beyond Limits?

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Herein, we report a single institution's experience with endovascular abdominal aortic aneurysm repair in nonagenarians, over a 4-year period of time. We performed a retrospective study of cases, in which we documented patient demographics, symptoms, physical findings, surgical interventions, complications, and deaths. The survivors answered a questionnaire.

Endovascular abdominal aneurysm repair was performed in 4 male nonagenarians (age range, 90–92 yr): 2 underwent repair of asymptomatic aneurysm and 2 underwent repair of symptomatic aneurysm. There was no in-hospital death, and patients were discharged after a median time of 11 days. Both patients with symptomatic abdominal aortic aneurysm died within 30 days, 1 of an occluded left femoral artery and the other of unknown cause. After follow-ups of 6 and 54 months, both survivors were in good physical condition and patient satisfaction appeared to be very high.

We have shown that elective endovascular abdominal aneurysm repair in a small, selected group of nonagenarians was feasible and afforded acceptable short-term survival. In patients with symptomatic disease, however, the early postprocedural mortality rate appears to be high. Decision-making should focus chiefly on comorbidities, on subjective issues such as fear of rupture, and on ethical and financial considerations. (*Tex Heart Inst J* 2009;36(4):345-8)

The incidence of abdominal aortic aneurysms (AAAs) increases with age.¹ Because aging of the population is progressing rapidly in many industrialized countries, the prevalence of AAAs is likely to increase. In the elderly patient, open reconstruction of AAAs is often considered to be unfeasible, mainly due to comorbidities that increase the inherent mortality risk. The British EVAR-2 trial has shown that endovascular abdominal aneurysm repair (EVAR) has a considerable 30-day operative mortality rate in patients who are unfit for open repair and that endovascular repair may not improve survival in these patients, compared with no intervention.²

A recent systematic review of the elective treatment of AAAs in octogenarians has demonstrated that the perioperative mortality rate associated with open repair is approximately 7.5% and that the 5-year survival rate is 60%.³ In the group treated by endovascular means, the perioperative mortality rate was 4.6%. Long-term survival rates in both groups were acceptable, but small sample size, selection, and publication bias have to be taken into account. It was concluded that the mortality rate after open or endovascular AAA repair might be acceptable in a selected group of octogenarians (selection criteria for successful surgery, with low rates of morbidity and mortality, could not be derived from the literature, however). Recently, Paolini and colleagues⁴ described a series of octogenarian patients who were treated electively for AAA. They found that EVAR and open repair are comparable in safety and efficacy in octogenarians and that these patients have acceptable outcomes. Patient selection is generally performed on the basis of comorbidity (conditions such as cardiac and pulmonary disease). Occasionally, patients over the age of 90 years present with AAAs. Because of the short life expectancy of this group, treatment is usually denied. Nevertheless, we have treated 4 patients over the age of 90 who have presented with AAAs. Results of this treatment are presented herein.

Patients and Methods

From November 2003 through October 2007, a single department performed 229 EVAR procedures in 229 patients; 4 of those patients (1.7%) were aged above 90 years. Two of them were treated electively and 2 presented with symptomatic AAA. The 4 case files were studied retrospectively: we documented all demographic characteristics, symptoms, physical findings, surgical interventions, complications, and deaths. Information was supplemented where necessary by contacting the general practitioner. The survivors answered a questionnaire.

Asymptomatic Patients

Patient 1. A 90-year-old man, who had a history of coronary artery bypass surgery, inguinal hernia, and chemical pleurodesis, presented with a growing infrarenal AAA. In 1 year, the diameter had increased 15 mm to a maximal diameter of 61 mm. The patient was in good physical condition. He was living independently and was regularly riding a bicycle, driving a car, and swimming. Options and consequences were discussed with the patient and his family, and finally it was decided to exclude the aneurysm by EVAR. The main reason for this decision was that the patient feared a possible rupture, which was affecting the quality of his life.

Under regional anesthesia, both common femoral arteries were surgically exposed in order to insert the delivery system and to position an angiocatheter in the suprarenal aorta. The aneurysm was then excluded with a bifurcated Talent™ Abdominal Stent Graft (Medtronic, Inc.; Minneapolis, Minn) from the infrarenal aorta to both common iliac arteries. Postoperatively, the patient was treated with aspirin (80 mg daily, lifelong). Postoperatively, the ankle–brachial indices were normal in both legs.

After an uneventful course, the patient was discharged from the hospital in good ambulatory condition on the 8th postoperative day. After 4.5 years of follow-up, there have been no late complications or reinterventions. The patient is still feeling healthy and living independently. He is very satisfied with the decision to exclude the aneurysm.

Patient 2. A 90-year-old man presented with a 60-mm infrarenal AAA. His medical history included myocardial infarction, coronary artery bypass surgery, carotid surgery, and moderate renal failure with a glomerular filtration rate of 47 mL/(min·1.73 m²). The patient was feeling very fit, living independently, and enjoying his life. After the patient and his family had been informed about the options and the risks, he chose EVAR. Again, the main reason for this decision was that the patient feared rupture, which affected the quality of his life.

Under regional anesthesia, both common femoral arteries were surgically exposed, and the aneurysm was excluded with a bifurcated Talent Abdominal Stent Graft (Medtronic) from the infrarenal aorta to both common iliac arteries. Postoperatively, the patient was treated with aspirin (80 mg daily, lifelong). The patient's postoperative ankle–brachial indices were normal in both legs.

The patient developed postoperative pneumonia, which was treated with antibiotics. He was discharged in good physical condition on the 9th postoperative day. After 6 months of follow-up, there were no complications or reinterventions. There was no progression of his renal failure. He is very satisfied with the results of EVAR and has mentioned his release from fear of a potentially fatal condition.

Symptomatic Patients

Patient 3. A 92-year-old man presented at the emergency department with abdominal and back pain. Computed tomographic (CT) scanning showed an 80-mm AAA and urinary retention. Although there was no clear rupture, the AAA was considered to be symptomatic. The patient had a history of inguinal hernia, recurrent urinary tract infections, and prostatic cancer cured by radiotherapy. He was still living independently with his wife. After extensive discussions of the options, the patient and his family chose to exclude the AAA by EVAR in an emergency setting.

Under regional anesthesia, both common femoral arteries were surgically exposed, and a bifurcated Talent Abdominal Stent Graft (Medtronic) was used to exclude the aneurysm from the infrarenal aorta to both common iliac arteries. Postoperatively, the patient was treated with aspirin (80 mg daily, lifelong). Duplex ultrasonography and computed tomography showed good position and deployment of the stent-graft. The ankle–brachial indices were normal. The postoperative course was complicated by delirium, which was treated with medication. The patient was discharged in good ambulatory condition on the 13th postoperative day.

Twelve days later, however, the patient was readmitted with an occlusion of the left superficial femoral artery. Surgical thrombectomy was unsuccessful, due to progressive ischemia. An above-knee amputation was considered but was refused by the patient because of the impact of this procedure on his quality of life and his independence. The patient died on the 28th postoperative day. An autopsy was not performed.

Patient 4. A 91-year-old man presented at the emergency department with symptomatic AAA. Computed tomographic scanning showed a 77-mm infrarenal AAA in combination with aneurysmal common femoral arteries. He had a history of bilateral inguinal hernia, strumectomy, polyneuropathy, and myocardial infar-

tion. Considering the low chance of survival without treatment, he chose immediate EVAR.

The procedure was performed under regional anesthesia. A bifurcated Talent Abdominal Stent Graft (Medtronic) was deployed from the infrarenal aorta to both common iliac arteries. Postoperatively, the patient was started on aspirin (80 mg daily, lifelong). His postoperative ankle-brachial indices were normal in both legs.

His postoperative hospital course was complicated by atrial fibrillation and delirium, both of which were treated with medication. He was discharged in good ambulatory condition on the 22nd postoperative day. He died unexpectedly at home 6 days later of an unknown cause. An autopsy was not performed. Despite his death, his family was content that the patient had been given a chance when confronted with a likely fatal condition.

Discussion

In the present paper, we have shown that elective EVAR can be feasible in nonagenarians who are physically fit and have good quality of life at presentation.

After follow-up of 6 and 54 months, respectively, both surviving patients were living independently and were satisfied to have been treated by EVAR. The overall mortality rate in our small series, however, was 50%. The 2 patients who underwent EVAR for symptomatic AAA died within 30 days after surgery. Although these patients had been discharged from the hospital, their deaths should be considered the consequence of procedure-related complications. Considering the low survival in conservatively treated patients who have symptomatic AAA, EVAR might still be considered in this group of patients.

The main issues in considering treatment for very old patients who have asymptomatic AAA are comorbidity and quality of life. Usually, these considerations lead to a decision not to treat the aneurysm. The 2 electively treated patients in our series had both good quality of life and no comorbidities that were strict contraindications. Issues such as the risk of rupture attendant upon conservative management and the absence of a survival benefit among high-risk patients who undergo EVAR (vs those who undergo no intervention) were all extensively discussed.² Nevertheless, both patients chose treatment, because the fear of rupture would have affected the quality of their lives. Given the lack of evidence in this very old group—which in theory could be treated by EVAR—the ethical decision depends chiefly upon the opinions of the patient, the family, and the treating physician. Baril and colleagues, in 2006, published the only other series on EVAR in nonagenarians, in which they reported a high rate of technical success and a relatively low rate of morbidity.⁵ In their group of 18 patients, there were 2 emergency procedures, and 2

patients died within 30 days. The mean survival time among patients who died during the follow-up period (after the first 30 postoperative days) was 34 months. In common with us, these authors concluded that a select group of patients over 90 years of age might benefit from EVAR.

Another important consideration is the cost of EVAR, which has been reported to be 20,000 to 29,000 euros.^{6,7} The mean life expectancy of a nonagenarian in The Netherlands in 2006 was 3.8 years.⁸ Given this short time of survival, excluding aneurysms in very old patients may never be cost effective. The same, however, might be true for patients in their 80s and even their 70s, who were shown to have mean survival times of 7.7 and 14.1 years, respectively.⁸ Moreover, it is likely that the perioperative risk of a patient in his late 80s does not differ from that of a patient in his early 90s, as in our series. The financial discussion should focus on what investments are considered to be valuable in attaining what survival rates; but whether cost effectiveness is the most important consideration is really an ethical issue.

In our series, both patients who underwent EVAR for symptomatic AAA initially survived treatment and were discharged from the hospital in good condition. Both of them, however, died within 30 days—the first of a procedure-related complication and the other of unknown cause. This is a reminder that very old patients are always at risk and that treatment should be very carefully considered. In view of the minimal chances of survival without treatment, EVAR might still be an option for some patients over the age of 90 who have symptomatic AAA.

It would be of interest to know how many patients in their 90s actually present with AAA and how many are considered unfit for treatment, or choose no treatment. Unfortunately, these data could not be derived from our medical system. A prospective registry of such patients could answer the questions and elucidate the course of untreated AAAs in this group.

In conclusion, we have shown that elective EVAR in a small, selected group of nonagenarians was feasible and afforded acceptable short-term survival. In patients with symptomatic disease, however, the early postprocedural mortality rate appears to be high. Decision-making should focus chiefly on comorbidities, on subjective issues such as fear of rupture, and on ethical and financial considerations.

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