

Endovascular Treatment of Peripheral Arterial Aneurysms

NICHOLAS J. MORRISSEY, M.D.

Abstract

Aneurysmal degeneration of peripheral arteries occurs less frequently than aortic aneurysm. While rupture is the most common complication of aortic aneurysms, peripheral aneurysms frequently cause thrombosis or embolization of the involved vessels. It has generally been accepted that most peripheral aneurysms in good risk patients should be repaired to avoid the ischemic complications of thrombosis or embolization. Endovascular repair of abdominal aneurysms has revolutionized the treatment of aortic aneurysms. Endovascular techniques have been used to treat peripheral artery aneurysms with varying success. Thrombosis of stent grafts has been a significant problem which has limited the success of this treatment. At present, endovascular treatment of peripheral aneurysms must be reserved for selective instances in very high risk patients. Until devices are developed which resist kinking and thrombosis, open surgery will remain the treatment of choice.

Key Words: Endovascular treatment, peripheral arterial aneurysm, aneurysms.

Introduction

SINCE THE INTRODUCTION of endovascular aortic aneurysm repair by Parodi in 1991(1), there has been a great deal of enthusiasm for endovascular treatment of arterial pathology. Some stent grafts for abdominal aortic aneurysm (AAA) have been approved for use in the U.S. A number are currently in various stages of development and investigation. Coil embolization of saccular aneurysms, which is generally not applicable to most cases, represents a crude form of endovascular treatment since treatment must exclude the lesion while maintaining blood flow to the tissues distal to the aneurysm. The introduction of devices and strategies for treatment of peripheral and visceral aneurysms has proceeded at a slower pace because of the relatively rare nature of these lesions along with difficulties developing smaller diameter devices which can function effectively in the peripheral vessels. Despite these challenges, endovascular treatment of peripheral aneurysms

has been performed in sufficient numbers of cases to allow some analysis.

Popliteal Aneurysms

The popliteal artery is the most common site for an aneurysm of the peripheral arteries. They occur in 7.39 of 100,000 hospitalized men. Patients with AAA have a 3.1% risk of also having peripheral aneurysms while patients with peripheral aneurysms have a 70% risk of having AAA (2). Popliteal aneurysms are bilateral in 50–70% of cases (2). While rupture of popliteal aneurysms does occur, the most common complications are thrombosis and distal embolization. The amputation rate rises dramatically for symptomatic patients undergoing repair of popliteal aneurysms when compared to asymptomatic patients (3). It is therefore recommended that aneurysms of 2 cm in diameter, or larger, be repaired electively (4–6). Successful stent-graft repair of popliteal aneurysms has been reported (7–12). Approximately 50% of cases failed and required reintervention, such as thrombolysis or angioplasty to maintain patency at one year of follow-up. A review of 7 femoral and 13 popliteal aneurysms treated with endovascular techniques was published recently (13). All aneurysms were treated with a

Address all correspondence to Nicholas J. Morrissey, M.D., Assistant Professor of Surgery, Division of Vascular Surgery, Box 1273, Mount Sinai School of Medicine, One East 100th Street, New York, NY 10029; Nicholas.morrissey@msnyuhealth.org

Wallgraft™ endoprosthesis. Of the 13 popliteal aneurysms treated, the one year successful exclusion rate was 100%, while primary one year patency was 69%. Using thrombolysis in cases with thrombosis of the graft, and repeat endovascular procedures in cases of stent stenosis, patency at one year was raised to 92%. No patients suffered thromboembolic complications related to the aneurysms and there were no amputations. While endovascular stent graft repair of popliteal aneurysms is possible and safe, patency, the duration of long-term is not known.

Femoral Artery Aneurysms

Femoral artery aneurysms are less common than the popliteal variety. While pseudoaneurysms are relatively common after aorto-femoral reconstruction, true femoral artery aneurysms are rare. Due to the proximity of the femoral artery to the inguinal ligament, stent placement in the proximal femoral artery has had poor patency rates. Covered stents may be useful in treating aneurysms of the superficial femoral artery down to the above knee level. In the series discussed above (13), 7 femoral arteries were successfully treated with Wallgraft endoprostheses. The patency at one year was 100%. These data are encouraging but long-term follow-up is necessary before endovascular repair can be recommended as first line therapy for femoral artery aneurysms.

Upper Extremity Arterial Aneurysms

Aneurysms of the innominate, subclavian and axillary artery are rare. These lesions typically result from trauma, thoracic outlet compression or post stenotic dilatation of Takayasu's arteritis. Other lesions may represent typical degenerative aneurysm formation. Since these lesions are less common, the number of patients who have had endovascular repair for such aneurysms is few. Many of these aneurysms were due to trauma (14). Covered stents have been used with excellent initial success rates to treat traumatic pseudoaneurysms of the axillary and subclavian arteries (15, 16). Sufficient long-term follow-up data are not yet available to prove the durability of endovascular stent grafting (EVSG) repair for upper extremity aneurysms, but the results published to date (14) are encouraging. Certainly, the performance of a larger study to prove efficacy and long-term durability is warranted.

Visceral Artery Aneurysms

Lesions of the celiac, superior mesenteric artery (SMA) and their branches are less common than popliteal or femoral artery aneurysms. There are few large series (17, 18) of open treatment of visceral artery aneurysms because such lesions are rare. Splenic artery aneurysms are found more frequently (60%), followed by the hepatic artery (20%) and superior mesenteric artery (5.5%). Visceral aneurysms are often diagnosed after they have ruptured and when urgent surgery is needed to save the patient's life. When lesions are discovered incidentally or for symptoms other than rupture, the possibility of elective endovascular repair exists. Coil or thrombin embolization of renal and visceral artery aneurysms has been performed successfully (19, 20). Small stent-grafts also have seen limited success in the treatment of visceral artery aneurysms (21, 22). In poor risk patients, coil embolization of the artery and the aneurysm may be possible if adequate collateral circulation as in some hepatic artery lesions. The current status of endovascular therapy of visceral aneurysms remains limited by technical factors such as stent size, wire and catheter capabilities and aneurysm neck size. Most renal artery lesions remain better suited to open repair while mesenteric, hepatic and splenic arterial aneurysms can be treated initially by an endovascular procedure.

Summary

Advances in endovascular technology for treatment of peripheral arterial aneurysms has proceeded slowly. While device design is simple, the challenges of small vessel diameter and location of peripheral lesions near joints and branch vessels has restricted the application of endografting techniques. Endovascular treatment of aneurysms in larger vessels, in segments without branches and distant from joints seem to achieve the best results. The efficacy of endovascular treatment in preventing the long-term sequelae of thrombosis, embolization, and rupture has not been shown. As endovascular devices are developed for use in peripheral artery aneurysms, it will be necessary to evaluate them in prospective, multicenter trials with strict follow-up guidelines before their widespread use can be advocated.

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