Isolated common iliac artery aneurysms are rare, comprising <2% of all aneurysm disease. These aneurysms present as either isolated disease, 0.03% of the population, or, in conjunction with abdominal aortic aneurysm, in approximately 20% to 25% of such cases. Common iliac artery aneurysms are defined as any localized dilatation of the common iliac artery >1.5 cm in diameter. Elective repair for isolated common iliac artery aneurysms is generally not undertaken for aneurysms <3 cm in diameter unless they are part of an abdominal aortic aneurysm repair. Most common iliac artery aneurysms are found incidentally during abdominal/pelvic diagnostic imaging studies or at the time of pelvic or abdominal surgery. As with abdominal aortic aneurysms, endovascular repair of common iliac artery aneurysms follows techniques similar to those used for endovascular repair of abdominal aortic aneurysm. Management includes aneurysm exclusion with an endograft, which seals at sites within the proximal and distal common iliac artery and may involve coil occlusion of the hypogastric artery with extension of the reconstruction into the proximal external iliac artery, or use a “bell-bottom” endograft limb placed at the common iliac bifurcation. Technical tips for successful outcome are described here, and all US Food and Drug Administration approved endografts have been used for repair. There were no statistically significant differences in outcomes that correlated with device or repair techniques used for management of common iliac artery aneurysms. Mid-term 54-month outcome has been excellent, with no common iliac artery ruptures or aneurysm-related deaths and the need for secondary interventions was gratifyingly small.

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with reduced length of stay, reduced operative blood loss, reduced need for invasive monitoring/intensive care unit care postoperatively, and reduced perioperative complications.

**Endovascular Management**

Patients with common iliac artery aneurysms are evaluated preoperatively using computed tomography angiography and, on occasion, conventional arteriography. Calibrated pigtail catheter arteriography is used intraoperatively to determine device length and length of seal/landing zones. Intravascular ultrasonography (IVUS) is used intraoperatively to confirm computed tomography (CT) and/or angiographic dimensions and other findings. Where differences were observed, we have favored relying on information provided by IVUS.

Local anesthesia with intravenous sedation and intraarterial blood pressure monitoring is used for the majority of cases. Open femoral artery exposure, either unilateral or bilateral, is used, depending on the extent of the aneurysmal disease. Systemic anticoagulation with intravenous heparin is used in all cases, maintaining an activated clotting time >250 seconds. Anticoagulation is not reversed at the completion of the procedure. Vascular access is obtained using a Seldinger needle (Medical Device Tech, Gainesville, FL) and a 0.035 inch glide wire, which is advanced under fluoroscopic guidance into the aorta. A 9Fr Cordis Brite-Tip (Cordis Corp., Miami, FL) introducer sheath is then passed over the wire and positioned in the ipsilateral external iliac artery. IVUS is used next to measure diameters of the external and common iliac arteries, length of the common iliac artery, and localization of the orifice of the hypogastric artery. If the aneurysmal disease also involves the infrarenal abdominal aorta or both common iliac vessels, IVUS is used to identify other pathology of the arterial wall, eg, calcification, thrombus, etc.

In tortuous iliac vessels, a stiff guide wire, ie, Amplatz (Cook, Inc., Indianapolis, IN), Meier (Boston Scientific, Natick, MA), or Lunderquist (Cook, Inc.) is used to straighten the arterial anatomy. In extremely tortuous arteries, a “buddy wire” system is additionally used to straighten the arterial pathway. In the latter instance, two 0.035 inch angled glide wires are passed through the sheath and positioned in the infrarenal aorta using fluoroscopy. 4Fr exchange catheters are passed over each glide wire and one glide wire is replaced with an Amplatz stiff wire; the other exchanged for a Meier or Lunderquist wire. Once these wires are in proper position in the aorta, the 9Fr sheath is removed and a new 16Fr or 18Fr sheath is passed over the Amplatz wire and inserted to the level of the aortic bifurcation. The Meier/Lunderquist buddy wire is now outside the sheath, but exits the femoral vessel through the same arteriotomy. This buddy wire provides structural support to straighten tortuous vessels so that landing/seal zones can be stabilized and accurate length measurements made for endograft selection. The buddy wire is removed after the endograft has been placed and prior to balloon angioplasty of the attachment sites and the endograft itself. The radial force provided by the endograft usually replaces the support provided by the buddy wire.

Approximately 10 to 15 mm of normal arterial wall “necks” are required as proximal and distal seal zones above and below the aneurysm for successful endograft management. If a suitable proximal common iliac seal zone is not available or if there is associated significant aneurysm disease of the infrarenal aorta or contralateral common iliac artery, an aorto-bi-iliac endograft should be considered as the preferred endovascular technique. This is deployed in the same manner used for endovascular aneurysm repair. If a suitable non-aneurysmal landing zone is available in the distal common iliac artery beyond the aneurysmally degenerated arterial segment, the endograft can terminate in the distal common iliac artery. As stated, if sufficient seal or landing zones are available in the common iliac artery proximal and distal to the aneurysmally degenerated segment, a straight endograft limb can be used for repair.

If the aneurysm degeneration of the common iliac artery extends to the common iliac bifurcation, a “bell-bottom” graft limb can be placed down to the level of the common iliac bifurcation. If a hypogastric artery aneurysm is present, or if the common iliac bifurcation is >25 mm diameter, the hy-
pogastric artery should be coiled (Nester, Tornado; Cook, Inc.) or occluded (Amplatz Vascular Obstruction Device; Cook, Inc.) and the distal limb of the endograft extended to reach a suitable landing or seal zone in the proximal external iliac artery. These various management options are depicted in Figure 1, representing combined aortic and iliac aneurysm disease and Figure 2 representing an isolated common iliac aneurysm.

Once the endograft has been deployed, IVUS is used to interrogate the repair to ensure there are no kinks, twists, fabric in-folds, or other device-related vascular complications and that the endograft is in good apposition to the arterial wall at all seal zones. Pull-back pressure measurements are obtained from the suprarenal aorta to the femoral vessels to ensure that no pressure gradient implying a significant stenosis exists across the treated arterial pathway. Finally, a pigtail catheter is inserted above the level of repair and a completion arteriogram is obtained to look for endoleaks, and assure aneurysm sac exclusion and adequacy of the reconstruction.

If all of these completion maneuvers are satisfactory, the introducer sheath and guide wire are removed from the femoral vessels and, after flushing, the arteriotomy(s) are repaired with interrupted fine monofilament horizontal mattress sutures (5-0 Prolene or equivalent; Ethicon, New Brunswick, NJ). If extensive occlusive disease is present in the femoral artery, localized endarterectomy with/without patch angioplasty may be required for appropriate femoral artery reconstruction. Upon completion of the femoral artery repair, continuous wave Doppler flow signals are obtained across the repair to ensure patency without focal turbulence. Also, adequate perfusion of both feet is verified using Doppler-derived ankle pressure measurements. Groin wounds are then closed with interrupted absorbable suture and skin staples or Steri-strips.

Some surgeons prefer to use a modified percutaneous approach for arterial closure. This employs a very limited exposure of the femoral vessels and use of the preclose technique (Perclose; Abbott Vascular, Redwood City, CA) as fully described in the article by Drs. Murphy and Arko in this issue. Patients are usually discharged on postoperative day 1. CT evaluation is obtained at 6 weeks, 6 months, and yearly thereafter. High-quality ultrasonography imaging can be used after two negative/satisfactory postoperative CT scans. Additional CT scans are obtained when indicated by clinical or ultrasound findings.

### Mid-Term Outcomes Following Endovascular Repair of Iliac Artery Aneurysms

Institutional Review Board approval was obtained to review clinical data for 102 patients undergoing endovascular repair of 150 common iliac artery aneurysms between 2000 and 2007 at our institution. Repair was undertaken using only US Food and Drug Administration–approved devices: Medtronic AneuRx (n = 55); Guidant Ancure (n = 28); Cook Zenith (n = 26); Gore Excluder (n = 17); and Endologix PowerLink (n = 6). Treatment techniques included: exclude aneurysm with iliac graft limb (n = 66); coil hypogastric/graft limb to external iliac (n = 25); bell-bottom cuff at common iliac bifurcation (n = 59) (refer to Figs 1 and 2).

Statistical analyses were done using the Kaplan-Meier method for censored data and log-rank test to ascertain device and management technique differences.

One-hundred and thirty-two common iliac aneurysms were repaired in conjunction with endovascular aortic aneurysm repair and 18 were treated as isolated disease. There were three emergent repairs carried out because of either rupture or symptomatic status. One-hundred males and two females, ages 61 to 90 years (mean 70 years) had 150 common iliac artery aneurysms ranging in size from 1.7 to 5.7 cm (mean 2.3 cm). Forty-seven patients had bilateral involve-
ment and 55 patients had unilateral disease. Comorbidities included coronary artery disease (72%), chronic obstructive pulmonary disease (99%), tobacco abuse (96%), hyperlipidemia (82%), renal insufficiency (21%), and morbid obesity (28%).

There were no statistically significant differences in outcomes for device or repair techniques used for management of common iliac artery aneurysms. Overall patient survival was 79% at 54 months. There were no ruptures and no aneurysm-related deaths. The 30-day mortality was 2%, with both deaths related to severe underlying coronary artery disease. There was one secondary intervention in an Ancure device related to graft limb occlusion and one type I endoleak in a Gore Excluder device, which was repaired at the time of implantation (see Table 1).

**Conclusion**

Common iliac artery aneurysms are uncommon, and extremely rare in females. Endovascular repair of common iliac artery aneurysms appears durable and produces excellent outcomes. The availability of multiple US Food and Drug Administration approved endografts permits treatment of a variety of iliac artery aneurysm anatomic features. In our experience, mid-term (54-month) outcomes related to common iliac artery aneurysm rupture, aneurysm-related death, and secondary interventions have been excellent using the techniques described.

**References**