Complications After Iliac Artery Interventions

An overview of the complications associated with treating iliac arteries.

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Percutaneous transluminal peripheral angioplasty (PTA), with and without stenting, is an effective, accepted, and safe approach for treating iliac artery occlusive disease. Complications, although infrequent, can occur after PTA and may result in significant disability. In one review in the literature, complications after iliac artery interventions occurred with a frequency of 7.9% to 23.7%.[1] In 15% of cases, no specific treatment was required. In the remaining cases, either an endovascular approach (70%) or surgery (15%) was required to treat the complication. The majority of complications are access site-related; however, a variety of procedure-related and device-related complications have been reported (Table 1).

PROCEDURE-RELATED COMPLICATIONS

Access Site Complications

Access site complications include groin hematoma, retroperitoneal bleeding, pseudoaneurysm, and arteriovenous fistula. Such complications were frequent in the early years of iliac stenting due to the need for larger introducer sheaths (9 F and 10 F) with the first-generation Palmaz stent (Cordis Endovascular, a Johnson & Johnson company, Miami, FL), and the frequent need for bilateral groin access (kissing stents). Groin complications are much less common now that the majority of stents can be deployed through 6-F and 7-F introducer sheaths. Arteriotomy closure devices may also be playing a beneficial role.

Dissection

Hemodynamically significant dissection has been reported to occur with a frequency of 7.1% after iliac PTA.[1] Before the era of stenting, urgent surgical revascularization was occasionally required for dissection complicated by limb-threatening ischemia. In the current era, the great majority of these dissections can be treated successfully by the implantation of a stent. A full

TABLE 1. POTENTIAL COMPLICATIONS OF ILIAC ARTERY PTA AND STENTING

Procedure Related
- Access site complications
- Dissection
- Perforation/rupture
- Late aneurysm formation
- Pseudoaneurysm
- Distal embolization
- Compromise/closure of internal iliac artery

Device Related
- Stent thrombosis
- Stent embolization/migration
- Stent crush
- Septic infection/septic endarteritis

complement of self-expanding and balloon-expandable stents is required to allow one to bail out from such difficult situations. Occasionally, retrograde dissection into the aorta or down the contralateral iliac artery will occur and may necessitate a more complex endovascular repair.[2]

Rupture

Iliac artery rupture/perforation is a rare complication of iliac PTA, but when it occurs, the results can be catastrophic. In one study involving 657 iliac interventions from 1981 to 2000, the incidence of vessel rupture was 0.8%.[3] The factors associated with rupture include calcified vessels, occluded vessels, oversized balloons, recent endarterectomy, chronic steroid therapy, and diabetes mellitus.[3] Additional factors associated with an increased risk of rupture include female gender and treatment of external iliac artery lesions (Figure 1). Treatment includes aggressive reversal of anticoagulants, balloon tamponade of the vessel, and use of covered stents. Surgery may be necessary if hemorrhage cannot be controlled with these measures.

In one study, three cases of iliac rupture and one case of iliac aneurysm formation were associated with the use of a particular stent (the Memotherm stent [C.R. Bard, Inc., Murray Hill, NJ]).[4] The investigators suggest that the stent's design significantly contributed to damage to the arterial wall and subsequently prevented closure of the arterial tear by balloon tamponade (in the two cases in which this was attempted). Two patients, one with rupture and one with an aneurysm, were successfully treated with a covered stent, obviating the need for surgery. Two ruptures resulted in death.

In addition to acute iliac artery rupture or perforation, late pseudoaneurysm or aneurysm formation at the treatment site have been reported. Such complications are usually treatable by one of the commercially available endovascular stent grafts.

Distal Embolization

Distal embolization is an important complication of iliac PTA, particularly after interventions for iliac occlusion. Distal embolization has been reported with a frequency of 8.8% to 24%.[5,6] In one study of 75 patients undergoing balloon angioplasty for iliac occlusion, distal embolization occurred in 18 (24%).[6] Thromboaspiration was required in 15 of these patients. For patients presenting with acute limb ischemia or subacute limb ischemia, consideration should be given to pretreatment with a thrombolytic agent or use of mechanical thrombectomy. Balloon angioplasty as the primary therapy in such cases is associated with a high risk of distal embolization. A distal runoff study should be performed after recanalization of any acute or chronic iliac occlusion to evaluate for evidence of distal embolization.

Figure 1. Rupture/perforation of the right external iliac artery after stent implantation.

Stent Misadventures

A variety of misadventures related to stent deployment may occur, including acute stent thrombosis, balloon rupture with partial stent deployment, stent embolization/migration, stent crush, and stent compression of contralateral iliac artery.[7,8] In addition, a rare but dreaded complication of stent implantation is stent infection with septic endarteritis. Acute stent thrombosis should be an extremely rare event, and when it occurs, it is usually related to an unrecognized dissection distal to the stent, incomplete lesion coverage, stent malapposition, or poor runoff. Partial stent deployment, stent migration, or stent embolization is much less frequent with newer-generation premounted stents. Such complications were much more prevalent in the early years of stenting, with hand-mounted stents and suboptimal balloons that tended to pin hole or rupture at lower pressures. Despite the infrequency of such events, individual operators should be familiar with the techniques associated with snaring and retrieval of embolized stents.

One complication associated with the use of newer-

generation nitinol stents is forward movement of the stent during deployment leading to incomplete lesion coverage. Unlike the Wallstent (Boston Scientific Corporation, Natick MA), these stents cannot be reconstrained and repositioned after the deployment process is initiated. When treating lesions at the ostium of the common iliac artery, this lack of precision may lead to the lesion being missed or inappropriate deployment of the stent too far into the aorta (Figure 2).

Iliac Stent Restenosis and Late Clinical Failure

A variety of factors have been identified that affect the long-term outcome after iliac PTA and stenting. Longer lesions, occlusion, critical limb ischemia, diabetes, and poor runoff have a negative influence on the clinical outcome. Women undergoing iliac angioplasty and stenting for limb-threatening ischemia have significantly reduced primary stent patency rates and may need additional procedures to obtain satisfactory clinical improvement and limb salvage. Patients with renal insufficiency also have reduced primary stent patency rates after iliac artery stenting.[9] Angiographic restenosis does occur and has been reported with a frequency of 8% (Palmaz Stent Registry) to 12% (Wallstent Registry) at 6 to 9 months.[10,11] In the more recent randomized comparison of the Cordis self-expanding nitinol stent (Smart, Cordis Endovascular, a Johnson & Johnson company, Miami, FL) and the iliac Wallstent, the 1-year primary patency was excellent for both stents (Smart = 94.7%; Wallstent = 91.1%; *P* = ns).[12] Most restenotic lesions can be successfully redilated or stented providing excellent primary assisted and secondary patency rates.

Figure 2. Forward movement of this self-expanding nitinol stent during release in the left iliac artery resulted in inadvertent deployment into the aorta. The proximal stent markers (arrow) are visible well above the aortic bifurcation.

CONCLUSIONS

Aortoiliac intervention is effective and durable. Complications are infrequent but can be devastating and are more likely to occur when treating chronic iliac occlusions. Meticulous attention to technique is very important, and appropriate inventory of stents, stent grafts, and ancillary equipment (eg, snares) is necessary for bailout from difficult situations. ■

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