The Influence of the Ipsilateral Superficial Femoral Artery on Iliac Angioplasty

Toshifumi Kudo, MD, PhD, David A. Rigberg, MD, Todd D. Reil, MD, Fiona A. Chandra, BS, and Samuel S. Ahn, MD, Los Angeles, USA

Our objective was to evaluate the impact of the ipsilateral superficial femoral artery (SFA) on percutaneous transluminal angioplasty (PTA) of the iliac arteries. From 1993 to 2005, 183 iliac lesions (179 stenoses, 4 occlusions; 37 common, 35 external, and 111 both iliac arteries) in 127 patients with disabling claudication [94 (52%)], rest pain [43 (23%)], and ulcer/gangrene [46 (25%)] were treated by PTA. TransAtlantic Inter-Society Consensus (TASC) iliac lesion types were A in 48 limbs (26%), B in 92 (50%), C in 38 (21%), and D in 5 (3%). Stents were placed selectively for primary angioplasty failure [residual stenosis (>30%) or pressure gradient (>5 mm Hg)]. Seventy-seven limbs (42%) had patent SFAs (66 intact/<50% stenosis and 11 previously bypassed, pSFA group), 28 (15%) had stenotic SFAs (50-99%, sSFA group), 51 (28%) had occluded SFAs (oSFA group), and 27 (15%) had concomitant SFA angioplasty (aSFA group). The Society for Vascular Surgery and the International Society for Cardiovascular Surgery reporting standards were followed to define outcomes. There were no perioperative deaths. Total complication rate was 1.1% (2/183, groin hematomas). The mean follow-up was 20 months (range 1-115). One hundred twenty-five limbs (68%) had PTA alone for iliac lesions, and 58 (32%) had iliac stenting (a total of 91 stents). TASC iliac lesion types and the status of the ipsilateral profunda femoris artery were not significantly different among the four groups. Seventeen limbs (9%) had subsequent infrainguinal bypass: three in the pSFA, seven in the oSFA, four in the sSFA, and three in the aSFA groups ($p = 0.19$). The primary patency rate was significantly decreased in the sSFA group (29% at 3 years, Kaplan-Meier log-rank, $p < 0.0001$) compared with the other three groups; however, there were no significant differences among the pSFA, oSFA, and aSFA groups (67%, 67%, and 86% at 3 years, respectively; $p = 0.92$). The continued clinical improvement rates were significantly decreased in the sSFA group (36% at 3 years, $p = 0.0043$) compared with the other three groups; however, there was no significant difference between the pSFA, oSFA, and aSFA groups (81%, 84%, and 75% at 3 years, respectively; $p = 0.088$). The assisted primary and secondary patency and limb salvage rates were not significantly different among the four groups ($p > 0.40$). Stratified analysis in patients with TASC type B/type C, critical limb ischemia, or claudicants revealed similar results. The primary patency and continued clinical improvement were significantly decreased in patients with stenotic SFAs, suggesting that concomitant SFA angioplasty might improve iliac patency after iliac PTA for patients with stenotic SFAs. The presence of an occluded SFA did not adversely affect the outcomes of iliac PTA. During iliac PTA, a stenotic SFA should be considered for revascularization via endovascular means but an occluded SFA can be observed.

Gonda (Goldschmied) Vascular Center, University of California at Los Angeles, Los Angeles, CA, USA.

Correspondence to: Samuel S. Ahn, MD, UCLA Gonda (Goldschmied) Vascular Center, 200 UCLA Medical Plaza, Suite 526, Los Angeles, CA, 90095-6958, USA, E-mail: sahn@mednet.ucla.edu

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INTRODUCTION

Several observational studies have established that poor runoff is an independent predictor for adverse outcome following percutaneous transluminal angioplasty (PTA) of the iliac arteries.[1-3] However, the influence of superficial femoral artery (SFA) patency on iliac PTA is not well known.[4-7] Addi-

tionally, increasing multilevel arterial lesions are now treated with endovascular procedures. Some reports advocate combined use of iliac PTA and concomitant infrainguinal bypass surgery in patients with iliac and infrainguinal arterial occlusive disease.[8-11] However, such a strategy is not always justified because only intervention to treat inflow lesions is required in most of these patients.[12,13] Indications for concomitant infrainguinal revascularization should be better defined.

The purpose of this study was to review the outcomes, including the long-term patency and clinical success rates, of iliac PTA according to the status (patent, stenotic, occluded, and balloon-dilated/stented) of the ipsilateral SFA and to evaluate its influence on iliac PTA results.

MATERIAL AND METHODS

Patient Population

From August 1993 to February 2005, 183 primary iliac endovascular procedures in 127 patients were performed at the University of California, Los Angeles, Center for the Health Science by three attending vascular surgeons. All patients were treated with the same protocol; primary iliac angioplasty with selective stenting. Stents were inserted only for primary PTA failure, including residual stenosis (>30%), pressure gradient (>5 mm Hg), and dissection. Stent placement also was limited for femoropopliteal occlusive lesions (SFA, popliteal artery, or both) that did not respond to balloon dilation because of elastic recoil, flow-limiting arterial dissection, or both. No stents were placed in tibial lesions. All patients in our retrospective cohort had evidence of symptomatic chronic limb ischemia. Preoperative, intraoperative, and follow-up information was available for all patients, obtained via office and hospital chart review and dictated operative records. The study protocol was approved by the local institutional review board.

Iliac and Infrainguinal PTA and Stent Technique

Angiography and PTA were performed in the operating room on the same day in all patients.[14] During the study period, all patients with critical limb ischemia were treated with the same protocol for multiple lesions as follows: in patients with severe proximal (iliac, femoropopliteal, or both) lesions and mild or moderate distal (femoropopliteal, tibial, or both) lesions, proximal (inflow) lesions were treated first without distal (outflow) angioplasty; patients whose main lesions were distal (femoropopliteal, tibial, or both) arteries were treated with distal angioplasty with or without concomitant proximal SFA angioplasty. All patients in the current study had iliac PTA.

Iliac endovascular procedures were performed through an ipsilateral or contralateral femoral approach through introducer sheaths ranging 5-8 Fr. Occlusions and stenoses were traversed with a 0.035-inch hydrophilic guidewire (Terumo Glidewire®; Boston Scientific, Natick, MA). A bilateral femoral approach was used frequently for patients with bilateral iliac lesions. Prior to any intervention, 4,000-8,000 IU of heparin sodium was administered systemically. Angiographic examination and brachiofemoral pressure gradient measurement were performed before and after the interventional procedures. An angiogram was performed via a pigtail catheter inside the aorta or the ipsilateral common iliac artery with manual injection of contrast medium (10 mL). An anteroposterior (AP) view was taken to evaluate the lesion. If the pressure gradient was 0-5 mm Hg and the AP view did not detect significant stenosis, an oblique (45°) view was taken and the pressure gradient was reevaluated following administration of 30 mg of papaverine. PTA was performed with standard angioplasty balloons (4-8 cm in length, 6-10 mm in diameter, Ultra-thin® SDS; Boston Scientific, Watertown, MA). Balloon inflation was maintained for 60-120 sec and repeated routinely two to four times at the same segment. Pressure was 4-16 atmospheres. If the primary angioplasty resulted in a residual reduction of ≥30% luminal diameter in comparison with adjacent segments and/or if the mean brachiofemoral pressure gradient was ≥5 mm Hg, angioplasty was repeated with a balloon 1 mm larger than that originally used. Only in cases of persistent stenosis after repeat angioplasty was a stent inserted. The procedure was terminated when both angiographic and hemodynamic success had been achieved. This protocol was applied prospectively to all patients. Stents were selected according to the length of the stenosis to be treated. A balloon-expandable stent (Palmaz®; Cordis Johnson & Johnson, Warren, NJ) was generally selected. Stents were delivered via a long introducer sheath (25 cm at the ipsilateral approach and 45 cm at the contralateral approach). A self-expanding stent (Cordis SMART®, Cordis Johnson & Johnson) was selected for longer lesions, particularly near the inguinal ligament, for the treatment of tortuous iliac arteries and for contralateral approaches to the treated lesion.

After the inflow PTA, outflow revascularization was performed if necessary (at the discretion of the