Percutaneous arterial puncture for transluminal angioplasty may not be feasible when the groin is extensively scarred or vascular grafts are present. In order to avoid puncturing the scarred groin, the authors recommend exposure of the proximal superficial femoral artery in the upper thigh and puncture under direct vision in order to dilate (a) the iliac artery proximal to a femoro-femoral graft or (b) a femoral anastomotic stenosis of an aorto-femoral bypass graft.

Index terms: Arteries, femoral • Arteries, grafts • Arteries, iliac • Arteries, transluminal angioplasty, 9,454

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Percutaneous transluminal angioplasty (PTA) with the Grünzig balloon dilatation catheter has had widespread success in the treatment of vascular stenoses. However, in patients with bypass grafts in the groin or scarring in the femoral or axillary region, its use has been limited by (a) difficulty in introducing the catheter through scars or graft material, (b) difficulty in manipulating and advancing the catheter in the artery, (c) damage to the balloon, and (d) inability to withdraw the catheter (1–6). Other potential hazards include disruption of the pseudo-intima with resultant thrombogenesis and embolization, infection of the graft site, and bleeding from the punctured graft (7). In order to avoid these hazards, we have used the proximal superficial femoral artery to gain access for transluminal angioplasty.

TECHNIQUE

Under local lidocaine anesthesia, a small incision is made in a non-scarred area just distal to the previous groin incision. The proximal portion of the superficial femoral artery is exposed, and the parietal sympathetic nerves are infiltrated with lidocaine to prevent arterial spasm at the puncture site (8). The artery is punctured with a Cournand needle under direct vision, thereby minimizing the risk of injury to the posterior arterial wall. A guide wire is then introduced, followed by the Grünzig catheter (9, 10). Bleeding from the puncture during the procedure and after withdrawal of the catheter is controlled by gentle direct pressure on the puncture site, without occlusion of the artery. In rare cases, suture of the hole may be necessary. Pre- and postoperative care is the same as for other PTA patients.

CASE REPORTS

Case I: A 65-year-old woman who had had extensive pelvic and abdominal radiation therapy and multiple surgical procedures for intestinal adhesions underwent an axillo-femoral and femoro-femoral bypass because of total occlusion of the right and stenosis of the left external iliac artery. She was hospitalized with thrombosis of the bypass and acute ischemia of both legs. Arteriography via the left axillary approach revealed complete iliac obstruction on the right and a 4-cm stenotic segment on the left (Fig. 1, a). A thrombectomy of the bypass was performed, but thrombosis recurred two days later due to a stenotic lesion of the donor subclavian artery. Because of the prior irradiation, extensive groin scarring, recent surgical incisions, and risk of infection, a repeat procedure through the groin was felt to be contraindicated. Therefore, we elected to use the stenotic left iliac artery for inflow to the legs. A small incision was made in the upper thigh, distal to the prior groin incision. The proximal superficial femoral artery was exposed and punctured under

1 From the Departments of Radiology (C.-T.L., C.-F.Y.) and Surgery (C.K.Z., V.S.), University of Chicago, Chicago, Ill. Received Dec. 5, 1980; revision requested March 31, 1981; revision received April 29 and accepted July 16.
Figure 1. Case I.

a. Angiogram taken after failure of right axillo-femoral and femoro-femoral bypass grafts. A 4-cm segment of the left external iliac artery is stenotic. The stump of the thrombosed femoro-femoral bypass graft is visible (arrow). Stenosis is also present at the origin of the right internal iliac artery, and the right external iliac and common femoral arteries and the proximal segments of the right superficial and deep femoral arteries are completely obstructed.

b. The inflated balloon is located in the stenotic iliac segment.

c. After recanalization, the iliac artery is patent. The entrance site of the catheter is 5.5 cm distal to the femoral bifurcation (arrow).

direct vision for insertion of the Grünzig catheter. The stenotic iliac segment was dilated with a 6-mm balloon (Fig. 1, b and c). The femoro-femoral bypass was thrombectomized through a suprapubic incision, avoiding both groins. Circulation to both legs was now provided by the dilated left iliac artery. The above-knee/brachial pressure index on the left rose from 0.79 to 1.0. Ischemic symptoms in both legs were relieved following the procedure.

CASE II: A 59-year-old man was hospitalized with limiting claudication of the left hip and mild claudication of the right calf ten months after an aorto-bifemoral bypass graft. There were prominent bruits in both groins, and pedal pulses were palpable bilaterally. Arteriography via the axillary approach revealed stenosis of the origin of the superficial femoral and profunda arteries at the right femoral anastomosis, as well as of the profunda femoris artery distal to the left femoral anastomosis (Fig. 2, a). We elected to perform transluminal angioplasty of the right superficial femoral anastomotic stenosis. Percutaneous puncture was not possible because of the extensive groin scarring; therefore, the proximal superficial femoral artery was exposed through a small incision 4 cm distal to the previous femoral graft site. The artery was punctured under direct vision and the anastomotic stenosis was dilated with a 6-mm Grünzig catheter (Fig. 2, b), resulting in an increase in the above-knee/brachial systolic pressure index from 0.97 to 1.14 and a rise in the ankle/brachial systolic index from 0.78 to 1.04, with relief of claudication in the right calf. The left profunda stenosis was repaired by profundaplasty, with relief of claudication in the left hip and an increase in the ankle/brachial pressure index from 0.84 to 0.95.

DISCUSSION

Patients with scarring in the axilla or groin or previous bypass grafts present particular problems for transluminal angioplasty. Although it may be possible to perform arteriography using the Seldinger technique, the Grünzig balloon catheter poses additional difficulties. It is larger in diameter than a standard arterial catheter and the shape of the collapsed balloon is irregular, making insertion and withdrawal both difficult and hazardous and threatening intravascular rupture. Rupture within a vessel during dilatation may require surgery for removal of the balloon even if the puncture is not made through a graft (5). The use of intra-arterial sheaths (11) for catheter
Figure 2. Case II.

a. Patency of the Y-shaped aorto-femoral graft. Stenosis is present at the anastomosis of the right limb of the graft and the right superficial femoral artery, and at the origin of the right and left deep femoral arteries.
b. After transluminal angioplasty, the anastomosis between graft and artery is recanalized.

Introduction results in an inordinately large hole which may be difficult to seal, particularly in grafted and scarred areas.

Ipsilateral antegrade puncture of the common femoral artery for dilatation of lesions at the femoral bifurcation, as in Case II, is difficult even if no graft is present, and should be avoided (12). The proximal superficial femoral artery can be punctured percutaneously for transluminal angioplasty, but the risk of complications is greater than for puncture of the common femoral artery. In a previously dissected groin, however, the proximal portion of the superficial femoral artery is usually scarred. Farther distally, the superficial femoral artery lies deep to the sartorius muscle and cannot be easily or safely punctured; however, it can readily be exposed through a small incision under local anesthesia and punctured under direct vision, permitting safe introduction of the Grünzig catheter in either an antegrade or retrograde direction. The proximal superficial femoral artery must be patent for this procedure. Since this vessel is more sensitive to mechanical irritation than the common femoral artery, spasm at the puncture site must be avoided; this is facilitated by periarterial infiltration of lidocaine (8). We recommend that exposure of the superficial femoral artery be performed by a vascular surgeon, who can suture the puncture site if necessary.

Transluminal angioplasty has been carried out via an axillary approach (13), but there is a risk of neural compression due to hematoma formation because of the large arteriotomy left by the Grünzig catheter, and because the patient is receiving anticoagulant therapy during and after the procedure. In addition, the axillary approach requires longer guide wires and catheters, and the great distance may compromise the ability to manipulate the catheter through the lesion (14), especially in patients with diseased iliac vessels.

In selected cases, this technique may also be applicable for diagnostic angiography, or to provide an access route for transluminal angioplasty in patients who have extensive aorto-iliofemoral occlusion or tortuous vessels which preclude introduction of a catheter in the contralateral femoral artery or at a more remote site such as the axillary artery. Direct exposure of the artery permits transluminal angioplasty in both antegrade and retrograde directions from the same puncture site during the same procedure, which should be avoided with percutaneous puncture.

CONCLUSION

Transluminal angioplasty of the ilio-femoral system can be performed successfully despite vascular bypass grafts or femoral scarring. Following surgical exposure, the patent proximal superficial femoral artery is punctured under direct vision. The technique is simple and safe, and bleeding and spasm can easily be prevented. This method can also be applied to diagnostic angiography.

Department of Radiology
University of Chicago
950 E. 59th St.
Chicago, Ill. 60637

Transluminal Angioplasty in Groin Scarring or Vascular Grafts
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