OCCLUSION OF THE COMMON FEMORAL ARTERY COMPlicATING TOTAL HIP ARTHROPLASTY

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Vascular injuries after total hip arthroplasty are occasionally reported, but we have found only two cases of major arterial occlusion, and none at all involving the common femoral artery. We report two cases of occlusion of the common femoral artery after Charnley arthroplasties, one of which resulted in a below-knee amputation.

CASE REPORTS

Case 1. In March 1983 a woman of 62 had a left total hip arthroplasty for osteoarthritis. The anterolateral approach between the tensor fascia femoris and gluteus medius muscles was used. After releasing the reflected head of rectus femoris, that muscle and the iliopsoas were retracted forward, using a Lane bone lever inserted in front of the anterior rim of the acetabulum. After removing the capsule and dislocating the hip anteriorly, the lateral rotators were released from the greater trochanter. A routine Charnley-type arthroplasty was then performed without any difficulty or obvious complication.

Eight days after operation the patient noticed, for the first time, numbness on the medial side of her left foot. She was discharged from hospital after 12 days, but on review in the outpatient clinic one month later, her leg was still numb and she had some difficulty in walking. On examination her left foot felt cool and the femoral pulse was absent. There was no obvious source of embolus. Arteriography (Fig. 1), performed seven weeks after the arthroplasty, revealed a localised occlusion at the bifurcation of the common femoral artery. The arteries above and below the occlusion were normal.

Five days later the area was explored. A 3 cm segment of the common femoral artery was found to be very thickened and adherent to the adjacent tissues which were densely fibrotic, particularly in the area immediately posterior to the artery and in front of the hip joint. A localised endarterectomy was performed, and the artery closed with a saphenous vein patch. Postoperatively the dorsalis pedis pulse returned and she made a good recovery. Eighteen months later she could walk well, though with a little discomfort in the left thigh, and the dorsalis pedis pulses remained present.

Case 2. In December 1982 a woman of 72 had a left total hip arthroplasty for osteoarthritis. An approach similar to that described in Case 1 was used, and again no problems were encountered at operation. During the second postoperative week she developed what was thought to be a pressure sore, with skin necrosis on her left heel. This failed to heal and she subsequently developed an area of ischaemic necrosis over the dorsum of the forefoot and ankle.

Two months after the operation she was transferred to our unit. On examination she had an ejection systolic murmur, oedema of both ankles and absent popliteal,
dorsalis pedis and posterior tibial pulses bilaterally. There was no obvious source of embolus. Her left leg was cool, had very poor capillary refilling and there was an area of gangrene at the heel and instep. Arteriography (Fig. 2) showed proximal arterial atheroma and occlusion of the common femoral artery, the superficial femoral artery (which was partly calcified) and the origin of the profunda femoris, with collateral filling of the latter and good distal run-off.

Three months after the arthroplasty the common femoral artery was explored and found to be occluded by thrombus at its bifurcation. The superficial femoral artery was completely occluded and there was severe atheroma in the proximal 4 cm of the profunda femoris, but below this level the artery was quite soft. A reversed saphenous vein graft was inserted, with end-to-side anastomosis to the external iliac artery and end-to-end anastomosis to the profunda femoris distally. A left lumbar sympathectomy was performed at the same operation.

Postoperatively the ulcer failed to heal, despite debridement, and a below-knee amputation was performed eight weeks later. Subsequent mobilisation was delayed by a sacral pressure sore.

**DISCUSSION**

Vascular injuries, though rare, are a recognised complication of total hip arthroplasty and, as these operations are performed more often, are likely to be seen with increasing frequency. Moreover, injury is relatively more frequent in revision operations (Nachbur et al. 1979). Two categories of vascular injury may occur: perforation of vessels—which may be recognised at the time of operation or, if not recognised, may result in a false aneurysm or in an arteriovenous fistula; and obstruction of vessels, either by a torn atherosclerotic plaque or by periarterial fibrosis secondary to the use of cement.

Perforations of vessels have been caused by Hohmann's retractors (Nachbur et al. 1979; Ovrum and Dahl 1979; Aust, Bredenberg and Murray 1981), by sharp spikes of bone or cement (Nachbur et al. 1979; Aust et al. 1981; Ratliff 1981), by an osteotome, by a powered reamer or by a Newman pin retractor (Ratliff 1981). There have been reports of perforations sometimes leading to false aneurysm formation in a number of arteries: the common iliac, external iliac, common femoral, profunda femoris, superior gluteal, medial femoral circumflex and the descending branch of the lateral femoral circumflex (Salama et al. 1972; Dorr et al. 1974; Tkaczuk 1976; Nachbur et al. 1979; Aust et al. 1981; Vanhegan, Sellu and Hopkins 1981; Lozman and Robbins 1983). There has been a report of a common femoral arteriovenous fistula (Nachbur et al. 1979) and of torn atherosclerotic plaques in the external iliac, common femoral, and superficial femoral arteries (Nachbur et al. 1979; Aust et al. 1981). Campbell's operative orthopaedics mentions that "a flow of cement into the pelvis may injure the common iliac artery or superficial iliac vein". It is possible that cement can come into contact with the femoral or iliac vessels either because too much is used, or because one of the drill holes in the acetabulum allows cement through into the pelvis. It is postulated that arterial occlusion may then occur secondary to the exothermic reaction of the methylmethacrylate. There have been reports of occlusion of the external iliac artery ascribed to this mechanism (Hirsch, Robertson and Gorniowsky 1976; Nachbur et al. 1979).

The most likely aetiological factor in our first case would appear to be the cement, since the arteriogram shows it in close proximity to the point of obstruction. Figure 3 shows how this can come about as the common

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**Fig. 2**

Case 2. Arteriogram showing occlusion of left common femoral artery.

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**Fig. 3**

Diagram to show the close proximity of the common femoral artery to the hip.
femoral artery lies immediately anterior to the capsule of the hip. A further possible explanation of the obstruction and fibrosis around the vessel could involve the narrow bone lever placed anterior to the acetabular rim. Although the iliopsoas and rectus femoris muscles should protect the vessels from any pressure effects of the lever, they may not provide a complete safeguard if excess force is used in retraction while the limb is in the flexed, adducted and laterally rotated position.

Our second patient had extensive atheroma, and her pre-operative radiographs showed calcification in the line of the femoral and iliac vessels. She had suffered a thrombotic occlusion of the common femoral artery and it is possible that during manipulation of the leg an atheromatous plaque was disrupted with subsequent dissection of the vessel.

Considering the proximity of the iliac and femoral vessels to the hip joint, it is perhaps surprising that vascular complications following total hip arthroplasty are not seen more frequently. There are three lessons to be learnt from our experience. First, we must emphasise the importance of checking the lower limb circulation before operation so that any changes after operation can be properly assessed. Secondly, if arterial damage is recognised and ischaemia is not complete, then early arteriography and vascular reconstruction may produce a good result, as it did in one of our patients. Thirdly, care is needed in the use of bone levers, particularly those of the narrow-bladed type; if these are placed anterior to the acetabulum the adjacent main vessels may be damaged. It is important also to remove excess cement, particularly in the vicinity of these vessels.

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REFERENCES


