

# Popliteal Artery Occlusion in Total Hip Arthroplasty

—A case report and review of the literature—

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Vascular injury is a serious but rare complication of hip arthroplasty procedures. Most of vascular complications reported in the literature occurred in the vessels around hip joint and femoral artery. To date, no report on popliteal artery occlusion during or after total hip arthroplasty has been published.

The present authors have observed one case of popliteal artery occlusion after total hip arthroplasty. We suspect that the cause of this occlusion was an excessive maneuvering of limb during operation and, subsequently atheromatous plaque fracture induced thrombosis in popliteal artery. An angiographic embolectomy was performed using a catheter, and circulation of the limb recovered.

In order to reduce the risk of vascular complications in the total hip arthroplasty procedure, we recommend a thorough evaluation of lower extremity circulation in risky patients. When a vascular insult is suspected either during or soon after the procedure, a vascular consultation with arteriography including popliteal artery should be obtained urgently. A delayed treatment could result in a deleterious outcome. (Ajou Med J 1998; 3(2): 154~158)

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**Key Words:** *Popliteal artery occlusion, Vascular complication, Total hip arthroplasty*

Thrombosis of major artery after total hip arthroplasty is exceedingly rare. In 1984, after reviewing past 20 years' English literature, Reiley et al<sup>1</sup> reported 23 cases of major vascular complication of total hip arthroplasty, excluding venous thromboembolism, and added two cases. Among these 23 cases, however, they found only 6 cases of ipsilateral limb ischemia followed by arterial thrombosis. According to Stubbs and associates' review<sup>2</sup> of the world literature, they could find only two cases of iliofemoral thrombosis up to 1986, to which they added one case of iliofemoral arterial thrombosis. To the best of our knowledge, no report on popliteal artery occlusion during or after total hip arthroplasty has been published. As the numbers of primary and revision surgery are increasing, a surgeon should be aware of recognizing possible vascular accidents and prompt management to save limbs.

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## CASE REPORT

A 67-year-old man was transferred to our hospital for evaluation of an acute vascular insufficiency of left leg and foot which was detected 6 hours after total hip arthroplasty. Patient's left hip was spontaneously fused due to a sequela of pyogenic arthritis about 50 years ago. He had a left intertrochanteric fracture after falling down which occurred 7 days before the operation. He was a heavy smoker (1 pack of cigarette per day for about 30 years) but, before the operation, he denied any symptoms related to peripheral vascular insufficiency. According to transfer notes, the operator could not find any significantly diminished distal pulses of both lower extremities before the operation to suggest vascular insufficiency. Preoperative roentgenogram revealed that the affected hip was fused in the position of 15 degrees of adduction and 30 degrees of flexion. With an usual posterolateral approach and posterior hip dislocation, the hybrid total hip arthroplasty using OPTI-FIX system (Smith & Nephew,



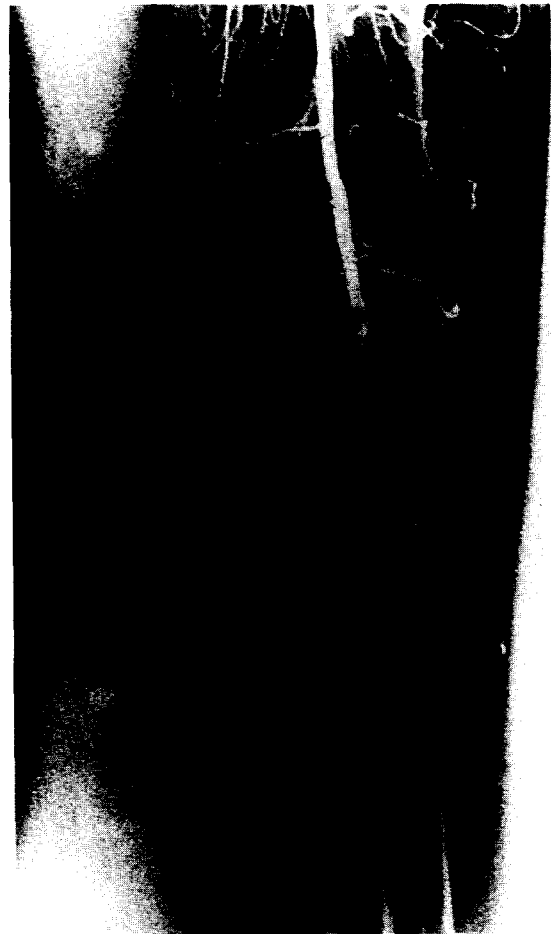
**Fig. 1.** Post operative radiography after left total hip arthroplasty is unremarkable.

Memphis, USA) was performed at local private clinic (Fig. 1). The specifications of prosthesis inserted were as follows:

- 1) Acetabular metal shell; OTI-FIX (54 MM), porous coated, fixed with 2 acetabular screws
- 2) Polyethylene inserts; 20 degree hooded
- 3) Head and neck; 28 mm cobalt-chrome alloy head, long neck.
- 4) Femoral stem; Matrix cemented long revision stem 8S 200 mm

At 6 hours after the operation, however, he showed acute vascular insufficiencies, manifested by findings such as pulselessness, paresthesia, coldness and cyanosis of left leg and foot. During a personal communication with the operator, the authors recognized that the operation was very difficult to perform, because the operator needed an extensive soft tissue dissection, a leg lengthening and an excessive maneuvering. The patient's leg was lengthened about 4 cm without performing osteotomy. On admission of the patient, the authors performed a Doppler test (i mex Pocket-Dop II, EMEX Medical system, Colorado, USA) and found no audible sounds to suggest blood flows in popliteal, anterior tibial, posterior tibial or dorsalis pedis arteries.

The patient revealed ipsilateral sciatic nerve palsy,



**Fig. 2.** Post-operative angiography shows an embolic occlusion of left popliteal artery.

however, this markedly improved on 12 weeks post operative. There was no specific abnormal medical finding. The arteriography was done about 20 hours after the operation, and revealed popliteal artery occlusion just proximal to its bifurcation into the anterior and posterior tibial artery (Fig. 2). But there was no extravasation of angiographic dye, suggesting arterial rupture in the ipsilateral pelvis and extremity. The authors recognized from this arteriography that there were multiple atheromatous plaques on abdominal, iliac and femoral arteries (Fig. 3). At this time, we checked lateral roentgenogram of lumbosacral spine which showed multiple calcified atheromatous plaque along the abdominal aorta (Fig. 4). We tried to proceed embolectomy with catheter (pig-tail high flow cerebral catheter HB 5.0-35-100-M-12S, Cook Co Ltd, Bloomington, IN, USA) and was very successful. The arterial patency was recovered immediately after the

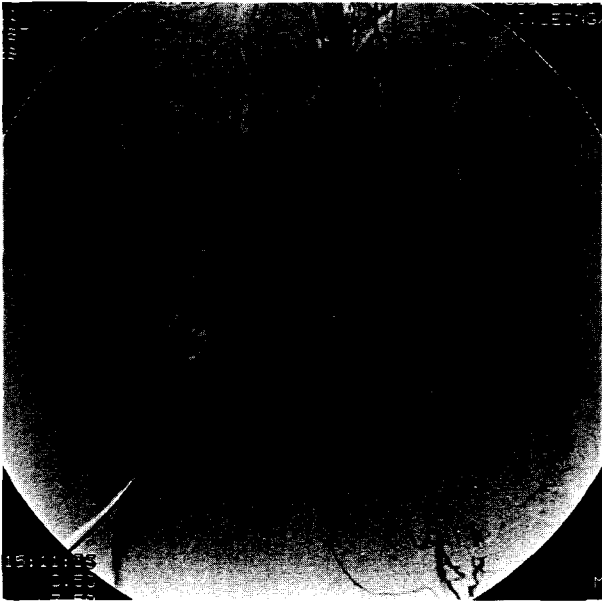


Fig. 3. Pelvic angiography shows marked luminal irregularity of abdominal aorta and iliac arteries due to atherosclerotic plaques.

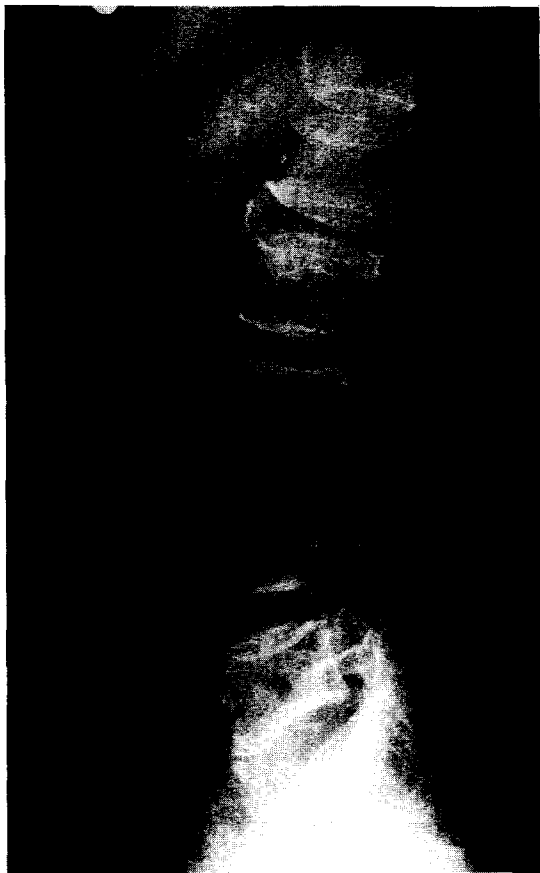


Fig. 4. Lumbosacral plain radiography shows marked atherosclerotic calcification on abdominal aorta.

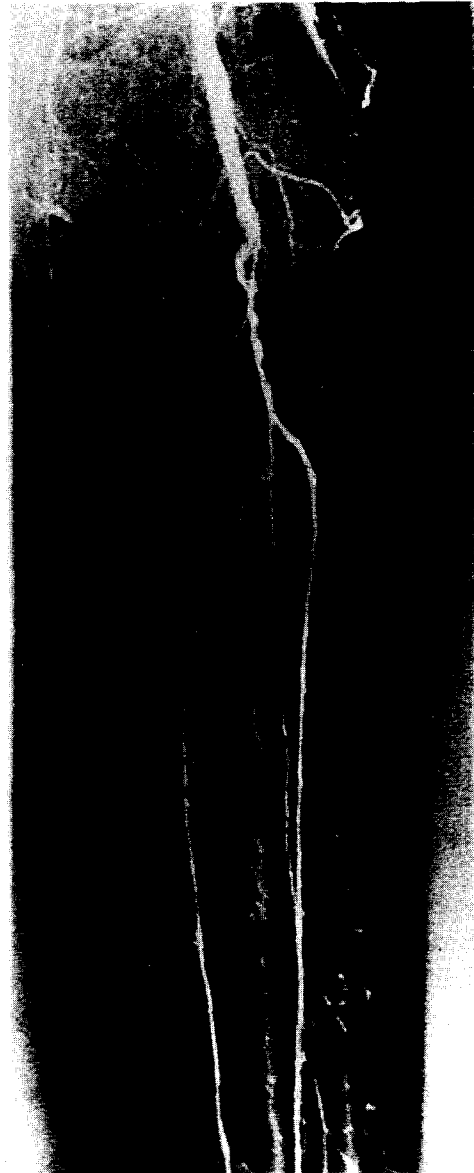


Fig. 5. Embolectomy was performed, and angiography shows restored patency of popliteal, anterior and posterior tibial, and peroneal arteries.

embolectomy (Fig. 5) which was confirmed on arteriographic monitor. The color of leg and foot changed to pinkish, and arterial pulses were immediately recovered. On the 7<sup>th</sup> day of admission, the Doppler test (ATL, UM-9HDI/ESP&CFM sonography, Advanced Technology Laboratories, WA, USA) confirmed the popliteal artery patency with its two main branches (Fig. 6). The patient was discharged 29 days after the admission without any vascular insufficiency on ipsilateral leg. At 8 months after discharge, the patient was still without any vascular

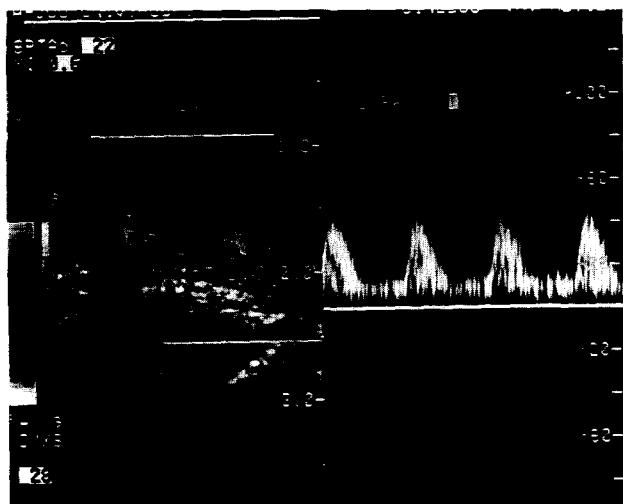


Fig. 6. Follow-up Doppler shows patent well-pulsating popliteal artery.

insufficiency. He has had no pain on left hip and could walk without supportive devices. Presently, his Harris hip score is 92 points, having an excellent result.

## DISCUSSION

Vascular injury is a serious but rare complication of total hip arthroplasty, possibly resulting in the loss of limb or life. Nachbur and co-workers<sup>3</sup> (1979) reported arterial injuries in 15 patients that occurred between 1970 and 1978. Bergqvist and associates<sup>4</sup> (1983) summarized literature (25 cases) and added 4 new cases, and Ratliff<sup>5</sup> (1985) reported on 32 cases, which included 15 cases published previously by Nachbur. According to these cases, vascular complications after total hip arthroplasty may be classified into the following two main categories: (1) direct injuries to major vessels by surgical instruments; (2) occlusion of major vessels by thrombus or atheromatous plaque. The latter category is an exceedingly rare complication. In 1986, on reviewing the world literature, Stubbs et al<sup>2</sup> reported that they could find only two cases of iliofemoral thrombosis, and they added one case of iliofemoral arterial thrombosis. In 1984, in the review of past 20 years' English literature, Reiley et al<sup>1</sup> reported 23 cases of major vascular complication of total hip arthroplasty, in which venous thromboembolism was excluded and two cases of their own were added. Among these 23

cases, however, they found only 6 cases of ipsilateral limb ischemia secondary to arterial thrombosis. Four of these cases occurred following the restoration of leg length or correction of hip flexion contracture. The thrombosed vessels included external iliac arteries in four cases and superficial femoral artery in one case, and there was an incomplete occlusion of iliofemoral artery in the 6 cases.

On the other hand, several etiologic factors seem to be responsible for the reported vascular complications. According to Thomas and Timothy<sup>6</sup> (1994), vascular complications caused by total hip surgery include major bleeding from perforation of vessel, creation of false aneurysms, development of arteriovenous fistulas and thrombus formation. Excessive reaming of the acetabulum, especially in a patient with poor bone quality, in revision surgery or rheumatoid arthritis can result in vascular injury. The heat from polymerization of cement near the major vessels is also an established contributory factor. Two cases of vascular injury due to intense heat of polymerization of methylmethacrylate during total hip arthroplasty has also been reported by Nachbur et al<sup>3</sup> (1979). It remains unknown whether these complications are caused by intimal tear, atheromatous plaque migration with thrombosis of distal artery, or inadequate peripheral vascular supply to the limb due to atherosclerosis.

Tomas and Timothy<sup>6</sup> (1994) reported 2 patients of intraoperative arterial occlusion which developed during total joint arthroplasty. Considering the number of patients with peripheral vascular diseases and total joint operations, they were surprised to find that serious acute vascular complications were not more common.

The present authors are not certain whether the cause of popliteal artery occlusion in this present case was a fresh thrombus which was formed in popliteal artery in situ or a fractured atherosclerotic plaque which was formed and transferred from the proximal large arteries. Retrospectively, however, we became aware of several risk factors specific to this case such as a smoking, a fused hip with ipsilateral leg shortening and atherosclerotic calcification of aorta on lateral roentgenogram of lumbar spine.

## CONCLUSIONS

Postoperative ischemia of the ipsilateral limb caused by

peripheral occlusion of the artery after total hip arthroplasty is now well recognized. To reduce the risk of vascular complications in total hip arthroplasty procedure, the surgeon should be alert to recognize possible types of vascular accident and a prompt management to save limbs. If a vascular insult is suspected either during or soon after the procedure, then a vascular consultation with arteriography including whole arterial systems of ipsilateral leg should be obtained as soon as possible.

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