Obtaining a superficial femoral artery graft in adolescents and children with the deep femoral artery transposition

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Abstract

A new technique to obtain a segment of the superficial femoral artery as an arterial conduit in young patients while an unobstructed peripheral blood flow is maintained by superficial femoral artery-deep femoral artery transposition is illustrated with two clinical examples. The explanted arterial autograft requires no replacement by another graft and provides a conduit of up to 10 cm in length. Excellent results were achieved in both patients at 1 year. This technique is recommended instead of saphenous vein conduits in very young patients because of the risk for late vein degeneration.

Reference


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Obtaining a superficial femoral artery graft in adolescents and children with the deep femoral artery transposition

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A new technique to obtain a segment of the superficial femoral artery as an arterial conduit in young patients while an unobstructed peripheral blood flow is maintained by superficial femoral artery–deep femoral artery transposition is illustrated with two clinical examples. The explanted arterial autograft requires no replacement by another graft and provides a conduit of up to 10 cm in length. Excellent results were achieved in both patients at 1 year. This technique is recommended instead of saphenous vein conduits in very young patients because of the risk for late vein degeneration. (J Vasc Surg 2001;33:429-30.)

The use of the deep femoral artery (DFA) in revascularization of the lower limb has been addressed earlier in numerous publications.1-4 The use of the superficial femoral artery (SFA) as a transposition graft or a patch graft has also been described earlier.3 The search for a suitable arterial bypass graft conduit, particularly in young patients, has led us to adopt a new concept of obtaining a segment of a patent artery, while maintaining an unobstructed blood flow. A segment of the SFA as conduit and transposition of the distal SFA to the DFA were used. In the current article we describe preoperative considerations, the operative technique, and the results in two cases where this technique was used.

CASE REPORT

Case 1. The first case concerns a 14-year-old boy who was operated on for appendicitis. Postoperative evolution was complicated by repeated episodes of mechanical ileus, with intestinal ischemia, due to bowel adhesions. Each event required resection of portions of the small intestine and eventually its complete resection. Weight loss ensued and growth ceased. Fortunately, the patient had a homozygous twin who consented to be a small-bowel donor. Direct implantation of the mesenteric artery onto the aorta was technically unfeasible because of the short length and small size. A saphenous vein graft was not preferred for fear of future degeneration, nor was the right internal iliac artery preferred as a graft because it was too short in length. A preoperative angiography had showed normal central and peripheral arteries. We decided to use an 8-cm segment of the SFA as a graft, and the distal part of the SFA was anastomosed to the DFA. The free SFA graft was then anastomosed to the mesenteric artery (end-to-end anastomoses) and to the aorta (end-to-side anastomosis). The mesenteric vein was directly anastomosed to the inferior vena cava. The postoperative course was uneventful. At 1-year follow-up, all distal pulses were palpable, the patient had regained his normal weight, his growth pattern normalized, and he now had the same height as his twin brother.

Case 2. The second case concerns a 14-year-old girl with a right popliteal entrapment syndrome with a total popliteal artery occlusion. She was operated on with an interposition graft; the ipsilateral long saphenous vein was used. Four years later, the patient was admitted to the emergency department with acute ischemia of the operated limb. Arteriography showed aneurysmal dilatation of the saphenous vein graft, partly thrombosed together with a distal graft anastomotic stricture, as well as embolic occlusion of the peroneal artery. Catheter embolectomy was successfully performed for the peroneal artery. The 12-cm long saphenous interposition graft needed to be replaced, and a vein graft in this young patient was not an option. A 10-cm segment of the SFA was harvested, and the distal SFA was anastomosed to the DFA to obtain continuity. In addition, 3 cm of the right internal iliac artery was harvested and anastomosed end to end to the SFA graft. This 13-cm long arterial conduit was then used as an interposition graft to replace the thrombosed vein graft. The postoperative course was uneventful, and 1 year later, a Doppler echocardiography examination revealed excellent permeability in the arterial graft as well as the SFA-DFA anastomosis.

Preoperative evaluation and technical aspects. Preoperative evaluation includes an aortofemoral arteriography, from which vessel quality, accessibility, and location are determined (Fig 1). The SFA and DFA are exposed directly through an anteromedial approach. The DFA is carefully exposed as distally as possible, but left in place, thus avoiding interference with perforating intramuscular branches. A relative small diameter is not a contraindication, because the DFA tends to be spastic, particularly in young patients. The SFA is then dissected with a no-touch technique. Approximately 2 cm of the SFA must be freed to perform the SFA-DFA anastomosis without tension. For the optimal flow to be achieved,
the DFA should not have a diameter less than 70% of the SFA at the site of the anastomosis. Usually, in these young patients, it is possible to retrieve up to 10 cm of graft material from the SFA (Fig 2). After systemic heparinization, the SFA segment is extracted. Proximally, the SFA is ligated, and the remaining distal part of the SFA is anastomosed end to side to the DFA.

DISCUSSION

The superior long-term results with arterial conduits are well documented.\(^\text{6-8}\) Since Wylie et al\(^\text{9}\) introduced the use of the external and internal iliac arteries as arterial bypass graft conduits, these arteries have been used frequently. The SFA has been used in renal and carotid artery reconstructions.\(^\text{6,10,11}\) The limitation of using the internal iliac artery as a conduit is the length (only a few centimeters), and removal of either the external iliac artery or the SFA requires replacement with polytetrafluoroethylene or saphenous vein grafts. In young patients and children, prosthetic materials should be avoided. Vein grafts have a tendency to degenerate over the years, and aneurysm formation may occur, with risk for thrombotic obstruction or distal embolization,\(^\text{6,7}\) as in case 2. The SFA-PFA transposition allows for retrieval of an SFA graft that is longer than any other arterial graft (10 cm), without the need for an SFA segment replacement with venous or prosthetic graft. This technique is contraindicated in the presence of diffuse atherosclerotic disease of the lower limb and, thus, is most suitable in children and young patients with a normal arterial vascular tree.

CONCLUSIONS

The SFA-DFA transposition provides a valuable means for obtaining arterial autografts. It should be considered instead of saphenous vein conduits in very young patients because of the risk for late saphenous vein degeneration.

Fig 1. Preoperative arteriography (case 2) visualizing the femoral bifurcation, the SFA, and the DFA and revealing perfectly healthy arteries. It allows decision about exact location of the SFA-DFA anastomosis.

Fig 2. An artist’s description of the operation technique. With an anteromedial approach, the distal part of the deep femoral artery (p) is exposed. The SFA (S) is dissected and explanted for use as arterial conduit. The distance from A to B indicates length of obtained conduit. The proximal SFA is ligated (A), and the distal end is anastomosed to the DFA (B) to ensure continuity. a, Common femoral artery; v, common femoral vein.

REFERENCES