Revascularization for Upper Extremity Ischemia

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Autogenous saphenous vein grafts remain patent in a high percentage of cases, even when anastomosed to a relatively small distal artery. This principle has been used in the case reported to revascularize an upper extremity in which chronic ischemia produced incapacitating symptoms.

INTRODUCTION

The use of the saphenous vein as an autogenous arterial graft has proven to be a valuable and versatile procedure in vascular surgery, and the procedure has a wide variety of applications for both acute and chronic processes. The long-term patency and functional results have been gratifying. Recently, we had the opportunity to care for a patient with severe chronic ischemia of the hand, which occurred following cardiac catheterization via a brachial arteriectomy. This report describes the successful revascularization of this patient’s arm and hand utilizing the saphenous vein as a graft between the axillary and radial arteries.

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CASE REPORT

A 59-year-old Caucasian female with rheumatoid arthritis and compensated myxedematous congestive heart failure underwent cardiac catheterization on May 31st, 1968, approximately six months prior to admission on the Surgical Service. Six hours after catheterization via a right brachial arteriotomy, acute ischemia necessitated brachial artery thrombectomy with improvement of circulation. Over the intervening months, she slowly developed pain in the forearm and hand with intermittent claudication of the forearm. One month prior to admission, a non-healing, painful ulceration occurred on the distal tip of the right index finger.

On examination, the right hand was pale and cool. Rheumatoid arthritic deformities with ulnar deviation of the fingers of both hands were present. No pulses were palpable below the right axillary artery. Hypesthesia was noted over the lateral one-half of the forearm and fourth and fifth digits. There was a one centimeter ischemic ulceration on the tip of the right index finger.

Right retrograde percutaneous femoral aortogram, performed on November 15th, 1968, demonstrated complete occlusion of the brachial artery with filling of a small radial artery by collateral circulation (Figure 1). On November 18th, 1968, exploration of the brachial, radial, and ulnar arteries was
performed utilizing a transverse hockey stick incision in the antecubital fossa. The brachial artery was a fibrous cord extending down to the bifurcation. The ulnar and radial arteries were quite small, measuring two millimeters in external diameter, but arteriography of the radial artery revealed pulsatile blood flow. Through a small transverse axillary incision, a normally pulsating axillary artery was exposed. A bypass graft was performed, extending from the distal axillary artery to the proximal portion of the radial artery, utilizing a reversed autogenous saphenous vein. Excellent pulsatile flow was present in the graft at the termination of the procedure.

The patient’s postoperative course was uncomplicated. Pulsations in the graft were always present and at one week, a faint radial pulse was palpable. The ischemic ulceration was completely healed by the end of one month. Presently, five months postoperatively, all forearm pain is gone and the patient is able to do housework without claudication. Sensation in the hand and forearm has returned to normal. Arteriography, one month postoperatively, demonstrated the graft to be widely patent with filling of the radial and interosseous arteries.

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FIGURE 1. X-ray and drawing of a late phase in preoperative arteriography showing reconstitution of a small radial artery in the forearm.

DISCUSSION

This patient demonstrated incapacitating forearm ischemic symptoms due to chronic arterial occlusion from arterial catheterization. The reported incidence of occlusive complications in brachial artery catheterizations range from 0.3 percent to 65 percent. Indeed, Baker, et al., feel that the rate of thrombosis is sufficiently high to warrant routine Fogarty embolectomy following brachial arteriography. In their series, thrombosis was found in 56 percent of arteries so explored. Fortunately, occlusion of the brachial artery usually does not result in ischemic symptoms. In those cases in which chronic ischemia is present, a surgical approach is indicated.

Autogenous saphenous veins have been utilized extensively for bypass arterial reconstruction. Recent evidence indicates that autologous vein bypass grafts will remain patent in a high percentage of instances even when the distal anastomosis is to a very small patent artery. This important concept has been useful not only in the upper extremity, as illustrated in our case, but in the lower extremity, myocardium and kidney. The saphenous vein may be suitable in only 65 percent to 75 percent of patients and
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a substitute must be found if the vein is unacceptable. Synthetic materials to date appear to have a higher rate of thrombosis when used as bypass grafts in vessels the size of the brachial artery. Kakkar recently reported on the use of the cephalic vein as a bypass graft in femoropopliteal occlusive disease. The cephalic vein, because of its proximity, may prove to be valuable in upper extremity revascularization procedures.

Herman reported the first successful brachioradial graft in a patient with acute brachial artery thrombosis following percutaneous catheterization. Garrett, et al., reported 13 cases of elective revascularization of the arm with the cases divided approximately equally between traumatic and atherosclerotic lesions and involving mostly the brachial artery. This experience indicates that attempts at vascular reconstruction should not be discouraged when small vessel anastomosis is involved. Often, the only alternative is amputation. The use of autologous vein grafts and application of small vessel techniques, as advocated by Linton and Stahl, permit greater limb salvage than has been generally considered possible.

SUMMARY

Vascular lesions producing ischemia in the upper extremity can occur after arterial catheterization, other types of trauma, or from a disease process such as atherosclerosis. Emphasis is placed on utilizing reversed saphenous vein grafts to revascularize ischemic upper extremities. A case report of successful revascularization of a chronically ischemic upper extremity with an axillo-radial bypass graft is presented.

REFERENCES


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