Experimental Microvascular Autografting

Technical Note

R. M. CROWELL, M.D., AND M. G. YASARGIL, M.D.
Neurochirurgische Universitätsklinik, Kantonsspital Zürich, Switzerland

Since Jacobson and Suarez adapted the operating microscope to the surgery of small vessels in 1960-1962, it has become clear that microvascular surgery is rich in research possibilities and clinical applications. We are reporting the successful application of microsurgical techniques to problems of small vessel autograft transplantation.

Received for publication September 3, 1968. Revision received February 17, 1969.

Methods and Materials

Microvascular procedures were carried out under a Zeiss binocular operating microscope. Instruments included "spring handle" needle holders and scissors, fine jeweler's forceps, and a Buncke counter-pressor. The Malis bipolar coagulator was used for hemostasis, and flexible silastic tubes (outer diameter 1 mm) served as intraluminal splints. Monofilament 8-0 nylon swaged on a 5 mm stainless steel needle (Davis and Geck) was...

Fig. 1. Schematic representation of operative techniques of arterial autografting. A & B. Stripping adventitia. Adventitia is opened longitudinally and removed as a single sheet. C. Placement of initial sutures. Silastic tube splint and Buncke counter-pressor are used. Sutures are spaced at 120° intervals, as indicated in cross-sectional view. D. Suture technique, front wall. Fine hemostat holds stay suture b to muscle. Forceps fixes stay suture a. Simple interrupted sutures are placed at 0.4 mm intervals from a to b. E. Suture technique, side walls. Stay sutures are used to rotate and fix vessel. F & G. Removal of splint. H. Result. Small sheet of rubber dam is used to aid external hemostasis at anastomosis sites.
Fig. 2. Left: Arteriography of femoral artery autograft 3 months after operation. Graft site (arrow) shows patency with slight narrowing. Right: Arteriography of venous autograft in rabbit carotid artery 7 weeks after operation. Graft (arrow) is patent and shows no narrowing or dilatation.

Fig. 3. Histologic section of venous autograft in carotid artery 3 months after operation. New intima (IN) now covers sutures originally placed within the lumen; artery (A) is to the left, view (V) to the right. New intima is about 250 μ thick and consists of hyaline connective tissue and collagenous connective tissue. New endothelium (E) is probably also present. Note granulomatous reaction to suture material (G). Van Gieson, ×83.