

# Brachial to Distal Hand Artery Bypasses for Finger Gangrene: A New Horizon for Vascular Surgeons and How to Perform Them

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Distal occlusive disease of the upper extremities, although relatively uncommon when compared with the incidence of lower extremity occlusive disease, may present with very painful and disabling ulcerations and digital gangrene that may be more disabling than its lower extremity equivalent. Unfortunately, such upper extremity disease is often regarded by both the vascular surgeon and the referring physician in a nihilistic light; primary amputation without bypass is often an accepted form of management, even if the amputations themselves do not heal. In an effort to improve the care offered to these patients and to try to extend the indications for distal bypass, patients presenting with evidence of digital ischemia have been uniformly evaluated both with noninvasive and angiographic techniques over a 20-year period. Patients who were felt to be candidates for distal reconstruction were offered this as a primary option, with cervical sympathectomy being offered to those with no bypass options. Over time, and with increased clinical experience and confidence, more distal outflow tracts and more diseased arteries were bypassed.

In all, 48 such bypasses were constructed in 41 patients; all patients presented with critical ischemia, with the large majority having actual ulceration and/or gangrene (43 of 48, 89.6%). The etiology for the occlusive disease was calciphylaxis in the largest group, with scleroderma or other connective tissue disease being the second most common etiology.

The brachial artery at the elbow was the most common inflow used (29 of 48, 60%), whereas the remainder originated from the radial or ulnar arteries. The conduit used was excised vein in all cases; some were placed in a reversed configuration whereas some were used in a retrograde fashion with valve incision. The outflow tracts used initially were the radial and ulnar arteries at the wrist. With greater experience, more distal outflow tracts were employed in 20 instances. These included the use of the palmar arch vessels and common digital vessels in the palm in 6 cases (12.5%).

One patient died in the immediate postoperative period. Bypass patency has been quite good, with 3 preoperative occlusions and 2 late occlusions. Pain relief with successful bypass has been the most useful result for this patient group, with slow but gradual healing of ulcers and gangrene also benefiting these patients. Furthermore, persistent infections have either been eradicated or controlled. Late patient mortality in the calciphylaxis group, however, is quite high owing to intercurrent disease; average patient survival in the chronic renal failure group was 13 months.

Bypasses to open arteries at the wrist and palmar levels can be successfully accomplished using conventional techniques. Pain relief and tissue healing are facilitated by improved blood flow, but long-term patient survival must be taken into account when evaluating these cases.