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CASE REPORT

Symptomatic ischemia resulting from late upper extremity venous graft occlusion

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Summary Reconstruction of traumatic or occluded vessels with vein grafts to treat ischemia of the hand is common in current upper-extremity surgery. Late symptomatic occlusion of the venous graft, however, has seldom been reported. We report two cases involving patients who developed acute symptomatic ischemia in their hands from occlusion of their vein grafts > 15 years after their initial surgery. Our management strategy was additional arterial reconstruction. An extensive review of the literature on late vein graft occlusion in the upper extremity was performed to compare presentations, management strategies, and outcomes for this disease. In both cases, computed tomography angiogram results confirmed clinical suspicions of late venous graft occlusions. Conservative management was attempted first with no resolution of symptoms. Repeated arterial or venous grafting was performed to bypass the diseased segments. PubMed searches with the separate key phrases "late graft occlusion", "late vein graft occlusion", and "late vein graft occlusion hand" were entered. Titles and abstracts were filtered and relevant full texts were reviewed. Limited studies have been reported on symptomatic late vein graft occlusions of the upper extremity. Experimental studies have shown that intra-arterial microvenous grafts undergo the same vessel remodeling as macrovenous grafts in animal models. The same mechanism of neointima proliferation and subsequent atherosclerotic events were considered the main causes of graft occlusions in these cases. After regrafting, their symptoms subsided during follow-ups at 1 year and 6 years, respectively. We present two rare clinical case reports of patients who suffered ischemic symptoms in their hands from late (> 15 years) occlusion of vein grafts. Both patients were assessed with preoperative computed tomography angiograms and successfully treated with regrafting. In cases of late occlusion with ischemic symptoms, a repeat arterial reconstruction with venous or arterial grafting is recommended.

Conflicts of interest: The authors have no conflicts of interest to declare.

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1. Introduction

Providing an alternative conduit to bypass a segmental occlusion is a fundamental surgical principle in the revascularization of ischemic tissue. This principle has been widely applied in cardiac and vascular surgery. One of the most commonly used materials for bypass is the autologous vein. Long-term patency rates in lower extremity and cardiac surgery range from 40% to 60% at 10 years.[1,2] Despite its frequent use, the long-term patency rate for upper extremity reconstruction is unknown. In addition, the effect of late occlusion has not been studied in depth.

We present two cases of symptomatic hand ischemia resulting from late venous graft occlusions. Both patients presented with ischemic symptoms $>$ 15 years after their previous bypass procedures. Their clinical presentations, management strategies, and postoperative courses are described in detail. An extensive review of the literature on upper extremity vein grafting and the late occlusion of grafts was performed to search for similar clinical scenarios.

2. Case reports

2.1. Case 1

J.H., a 50-year-old man, sustained a motor vehicle crash in 1994 with near amputation of the left thumb. The thumb was successfully revascularized with a reversed cephalic vein graft from the distal radial artery to the ulnar digital artery of the thumb. In 2011, 17 years later, he presented with a 2-month history of sudden onset of cold intolerance and blanching of the thumb. He denied any recent trauma and was a nonsmoker. On physical examination, it was determined that the capillary refill of the thumb was 2 seconds and turgor was diminished. A Doppler signal was observed at the palmar arch and in the radial artery to the level of the snuff box but was absent at the thumb metacarpophalangeal joint near the scar. A weak signal was present over the ulnar digital artery at the interphalangeal joint level and was lost when the thumb radial digital artery was compressed. An angiogram confirmed occlusion of the radial to ulnar digital artery bypass graft with collaterals supplying the thumb (Fig. 1). The previous graft was resected, and a new reversed vein graft from the forearm was used to bridge the gap. Two months after surgery, the patient's preoperative symptoms had resolved, and a palpable pulse was found over the graft site with normal turgor and capillary refill. A cross section of the previous venous graft showed intima and media proliferation with atherosclerosis and complete occlusion of the lumen (Fig. 2). One year later, the patient revisited our clinic for acute cold intolerance. A repeat angiogram again showed occlusion of the recent vein graft. The serratus branch of the thoracodorsal artery was used as the interposition graft between the radial artery and the ulnar digital artery at the interphalangeal level because of its similar diameter (Fig. 3). Six months later, because of incomplete resolution of his cold intolerance, the patient had a repeat arteriogram, which demonstrated a patent arterial graft. Capillary refill and turgor were normal with an excellent Doppler signal along the entire graft.

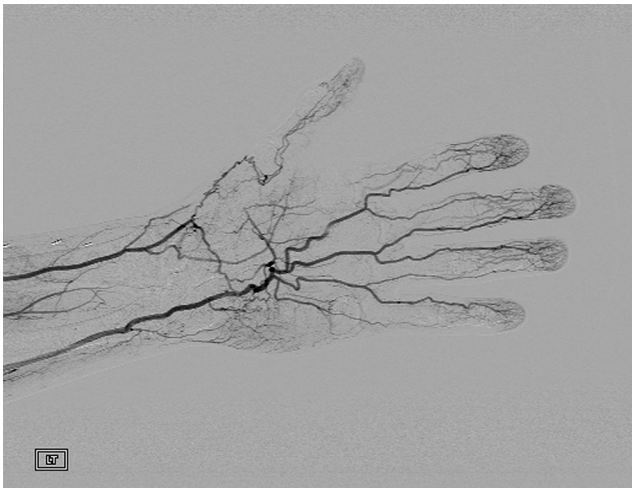

Figure 1 Case 1. An angiogram reveals occlusion of the previous bypass graft. The thumb is only supplied by collaterals from the radial artery. Complete deep and superficial arches are lacking.

2.2. Case 2

T.W., a 51-year-old male laborer, presented with progressive pain and paresthesia of the left ring finger and small finger in 1991. Past medical history was significant for chronic obstructive pulmonary disease (COPD) and a history of cigarette smoking. On physical examination, ischemic ulcerations were found on the pulp of the ring finger. An Allen test showed no ulnar artery refill. An angiogram revealed a thrombosed ulnar artery from the distal one-third of the forearm to the superficial arch, confirming a diagnosis of hypothenar hammer syndrome. A reversed saphenous vein graft was used to revascularize the hand from the distal forearm ulnar artery to the bifurcation of digital arteries to the ring finger and small finger with complete resolution of symptoms. In 2007, 16 years after his first procedure, the patient presented to the emergency room with a recent onset of intermittent pain and cold intolerance in his ring finger and small finger. A physical examination revealed the absence of an ulnar pulse. A computed tomography angiogram and ultrasound showed complete occlusion of the previous ulnar vein graft (Fig. 4). A contralateral saphenous vein graft was used as a bypass from the distal ulnar artery to the palmar arch after resection of the occluded graft (Fig. 5). The patient last visited 6 years after revision and was noted to be symptom-free with a palpable pulse and normal capillary refill and skin turgor.

2.3. Literature search

A PubMed search was performed with separate key phrases: "late graft occlusion", "late vein graft occlusion", and "late vein graft occlusion hand". Titles, abstracts, and references were filtered, and relevant full texts were reviewed.