The Role of Thrombolytics in Acute and Chronic Occlusion of the Hand

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KEYWORDS

• Hand ischemia • Thrombolytics • Thrombolysis • Catheter • Arterial occlusion

KEY POINTS

- Hand and digital artery thrombosis can be poorly tolerated if there is little collateral flow.
- Thrombolytic therapy is more favorable in the setting of acute thrombosis.
- Recombinant tissue plasminogen activator is the most common thrombolytic agent, and carries contraindications resulting from bleeding risks.
- Angiographic improvement should be expected in most cases of acute ischemia, and amputations are infrequent if no tissue necrosis is present.
- Attention to identification of serious hemorrhagic, thrombotic, and access-site complications is mandatory, as they are not uncommon.

INTRODUCTION

Hand ischemia represents a complex surgical problem for even the experienced clinician. The rarity of hand ischemia, the small caliber of the distal vasculature, and the limited surgical options available for treatment all compound the difficulty of intervention. Tissue necrosis and the need for amputation remain prevalent concerns in hand ischemia, even in the setting of prompt identification and treatment. This review discusses the role of thrombolytic therapy as an alternative or adjunctive therapeutic option for hand ischemia.

The upper extremity is less prone than the lower extremities to vascular compromise and limb-threatening ischemia, owing to the lower atherosclerotic disease burden seen in the upper extremities and the robust collateral blood supply. The hand is supplied by the continuation of the radial and ulnar arteries into the deep and superficial palmar arch collateral network that are dominated by radial and ulnar inflow, respectively (Fig. 1).[1] Distal to this, terminal common and proper digital vessels become end arteries with little ability to receive collateral flow. Although isolated radial or ulnar occlusion is well tolerated, occlusions more distal to this are poorly tolerated, and these occlusions are the focus of this article. Thrombosis and embolization to the palmar arch and digital arteries are prone to result in ischemic insults and tissue loss because of the end-organ nature of these vessels.

The natural history of hand and digital ischemia is difficult to describe because of the vast number of causes (acute and chronic) and tailored treatments for each. In addition, there is inconsistency in the literature regarding outcomes, making comparisons and description of outcomes difficult. In general, mild and moderate ischemia has a favorable prognosis, whereas severe ischemia, ulceration, and the presence of connective tissue

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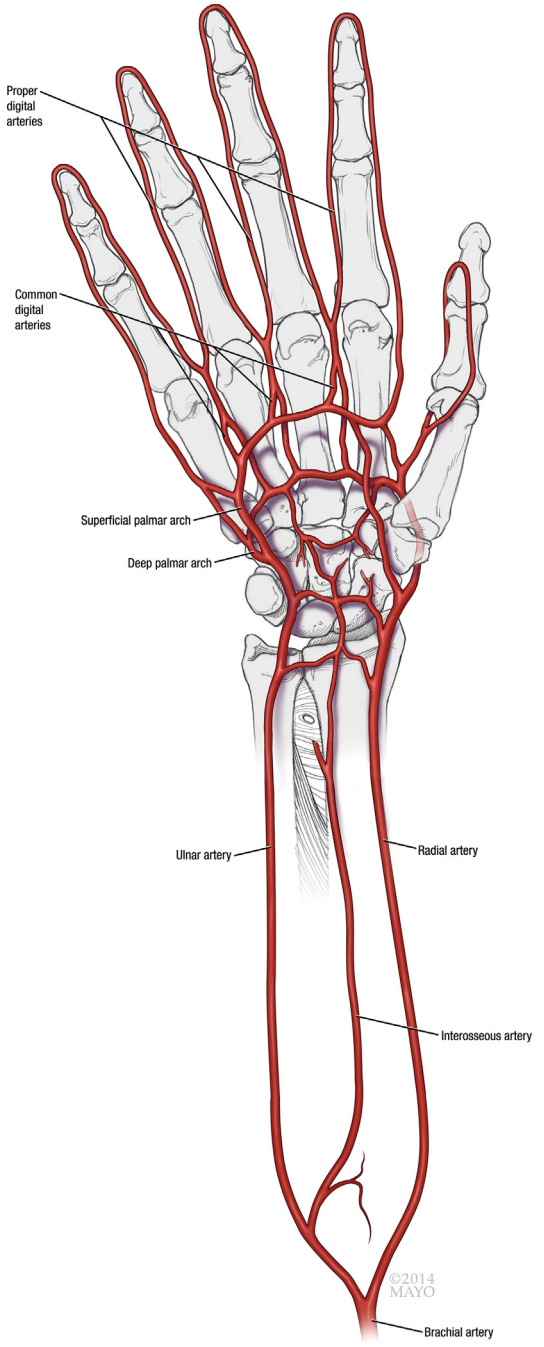

Fig. 1. Arterial anatomy of the hand. (*Courtesy of* Mayo Foundation for Medical Education and Research, Rochester, MN, all rights reserved; with permission.)

disease have higher rates of recurrent ulcers or need for amputation.[2]

ETIOLOGY

Upper extremity ischemia can be a result of numerous causes, and a description of all of these is outside the scope of this discussion. The etiology of more distal hand and digit ischemia, particularly those treated with thrombolysis, is more focused. The conditions listed in **Box 1** comprise the breadth of conditions encountered with hand ischemia. A good history and physical examination will help differentiate most of these. More narrowly, risk factors and causes for hand ischemia include smoking and atherosclerosis, connective tissue disease, occupational exposure to repetitive trauma, and hypercoagulable states.[3]

Differentiating between acute and chronic hand ischemia is important in planning for favorable outcomes to thrombolytic therapy. Situations of acute

Box 1
Causes of hand ischemia

Systemic

Atherosclerosis

Immune-mediated/inflammatory

- Scleroderma
- Rheumatoid arthritis
- Sjögren syndrome
- Systemic lupus erythematosus
- Hypersensitivity angiitis
- Henoch-Schönlein purpura
- Buerger disease

Myeloproliferative disorders

- Thrombocytosis
- Leukemia
- Polycythemia

Thrombotic

Hypercoagulable states

In situ thrombosis

Embolism

Traumatic

Iatrogenic injury

- Arterial catheterization
- Trauma
- Arterial drug injection

Cold injury

Vibration injury

Cytotoxic drugs

Other

Fibromuscular disease

Dialysis steal syndrome