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Original article

Aneurysms of the hand: Imaging and surgical technique

Anévrismes de la main : imagerie et technique chirurgicale

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ABSTRACT

Hand aneurysms are a rare entity only described as case reports in the literature. The aim of our study was to describe a series of four cases and the surgical technique using an arterial bypass. We also wanted to define an algorithm for the imaging of this pathology. We have operated on four patients with hand aneurysms in the past decade or so. One patient had an aneurysm in the thumb proper palmar digital artery, one in the superficial palmar arch and the two others in the ulnar artery. All patients had an excision surgery with direct arterial bypass; no patient had a venous graft. All patients were seen a few years after the surgery and underwent an ultrasonography to check the anastomosis permeability. All anastomoses were permeable 2 to 8 years after surgery. Through a review of the literature we discuss the best algorithm for imaging a hand aneurysm. Direct arterial suture by proximal and distal mobilization allows for long-term permeability. If a graft is necessary, a graft of arterial origin should be preferred. The additional first-line examination is ultrasonography, followed by arteriography if acute ischemia is present; otherwise, CT angiography or MR angiography is performed.

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R É S U M É

Les anévrismes de la main sont une entité rare, uniquement décrite sous forme de rapport de cas dans la littérature. Le but de notre travail était de décrire la technique chirurgicale appliquée chez 4 patients utilisant une suture artérielle directe. Nous avons aussi, à travers une revue de la littérature, voulu établir un algorithme concernant la démarche diagnostique radiologique préopératoire. Quatre patients ont été opérés dans notre service pour un anévrisme de la main ces dernières années. Un patient présentait un anévrisme d'une artère digitale palmaire propre du pouce, un sur l'arcade palmaire superficielle et deux patients sur l'artère ulnaire. Tous les patients ont bénéficié d'une résection chirurgicale avec une suture artérielle directe. Aucun patient n'a eu de pontage veineux. Tous les patients ont été suivis des années après la chirurgie et nous avons documenté la perméabilité de leur anastomose à l'aide d'une échographie-Doppler. Toutes les anastomoses étaient perméables au suivi au long terme (de 2 à 8 ans postopératoires). Après une revue de la littérature, nous avons proposé un algorithme pour l'imagerie préopératoire. La suture artérielle directe après excision d'un anévrisme de la main grâce à une mobilisation proximale et distale permet une perméabilité au long terme. Si une greffe est nécessaire, une origine artérielle doit être privilégiée. Le premier bilan radiologique doit être réalisé avec une échographie, suivi d'une artériographie dans le cas d'une ischémie aiguë. Sans ischémie, l'arthroscanner ou l'arthro-IRM est privilégié.

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1. Introduction

Aneurysms of the hand are a rare entity that is poorly described in the literature. Aneurysms develop in various circumstances like infections such as mycotic aneurysms, [1] and repeated micro-trauma in an area like that of the ulnar artery [2]. The described risk factors are atherosclerosis, congenital diseases, and metabolic disorders.

Mycotic aneurysms correspond to an infection of the arterial wall. The dissemination may be hematogenous as in endocarditis [3,4] or exogenous as in toxicomania. The most commonly found bacteria are Staphylococcus aureus [4], Streptococcus [5], Salmonella, Escherichia coli, and Pseudomonas aeruginosa. In most cases, the areas concerned are the aorta and the cerebral arteries. The extremities are only rarely affected. Clinically, there is a pulsatile mass. Additional radiological tests can be used to define and plan a surgical procedure. Given the risk of rupture due to weakening of the wall by infection, surgical treated is required [1].

Hypothenar hammer syndrome corresponds to repeated trauma on the hypothenar compartment [2], typically in manual laborers. Repeated microtrauma on the ulnar artery at its junction with the superficial palmar arch cause damage to the adventitia, media, and intima. Additional imaging can be used to locate and quantify the aneurysm. Given the risk of rupture and embolization, surgical treatment is required.

Hand aneurysms in the radial artery, ulnar artery, and their branches have been described in the literature, often as isolated cases [6-8]. Their diagnosis and treatment are a function of the circumstances of discovery, the availability of the technical platform, and the surgeon's habits. The continued development of imaging modalities makes it possible to offer a wide selection for the diagnosis, but a strategy is required to better standardize the management of the entity. After a review of the literature (National Library of Medicine, Bethesda, MD), no randomized or controlled studies were identified related to treating arterial aneurysms in the hand or their diagnosis or treatment strategy.

Our study sought to describe four cases of hand aneurysm with surgical management by arterial bypass. We also wanted to determine, through a review of the literature, the best diagnostic approach.

2. Methods

We collected data on four patients treated in our department between 2005 and 2013: aneurysm type, additional tests performed, and description of the surgical procedure. The surgery consisted of arterial mobilization of the aneurysm to allow for direct suture. All patients were reviewed over the long term. At that time, patients underwent a Doppler ultrasound to document the permeability of the anastomoses. Our study was conducted in collaboration with the radiology department.

3. Case reports

Case 1 was a 39-year-old patient, normally in good health, who had a history of thumb trauma three years earlier. He presented with a subcutaneous abscess that was treated locally with a good outcome. For several months, the patient had swelling on the ulnar edge of the flexion crease at the interphalangeal joint of the right thumb. Additional tests by ultrasonography and MRI showed an aneurysm in the ulnar proper palmar digital artery with a maximum diameter of 4 mm. Due to the abscess history and because the mass was sometimes painful, we decided to remove the aneurysm by surgical resection. A lateral digital approach was used. Once the aneurysm had been resected, the proximal and

distal ends of the artery were mobilized with a direct arterial suture (Ethilon 10-0). The pathology results showed a mycotic aneurysm of the thumb ulnar proper palmar digital artery. The patient was reviewed 5 years after the surgery. Clinically, he had no complaints and the Doppler ultrasonography showed permeable anastomosis.

Case 2 was a 45-year-old female who came to the emergency room for a painful pulsatile mass of the palm of her hand. There was no history of trauma, but the patient had endocarditis as a child. The mass was present for several years but given the onset of pain and paresthesia on the patient's median nerve area, she decided to come to the emergency room. Ultrasonography showed a 2.4 x 2-cm aneurysm at the superficial palmar arch with a mass effect on the median nerve. The assessment also included an MRI and an arteriography. Three arteries came from the aneurysmal sac: the common palmar digital arteries 2-3-4. Surgical treatment was performed. A curved incision on the palm of the hand was made with a Brunner split in the web spaces. The superficial palmar aponeurosis was resected. The aneurysmal sac with the 2nd, 3rd and 4th common palmar digital arteries were dissected. The ulnar artery was exposed. The aneurysm was clamped on the ulnar side. The aneurysm was gradually excised with reconstruction of the superficial palmar arch as shown in Fig. 1. The pathology report concluded a mycotic aneurysm was present. The patient was reviewed 8 years after the surgery. She no longer had

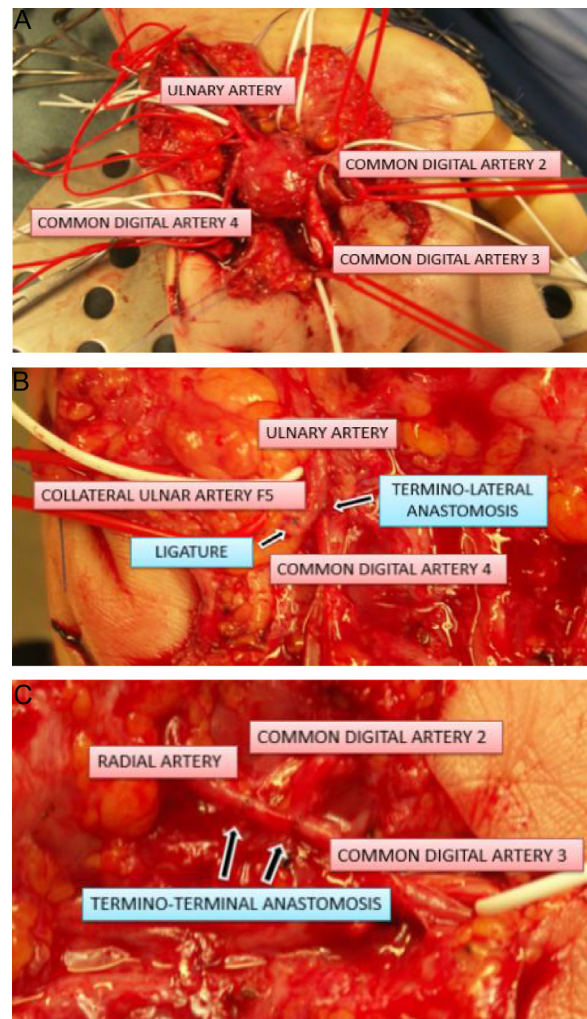


Fig. 1. Case 2: Mycotic aneurysm of the superficial palmar arch. Exposure of the aneurysm (A). Reconstruction of the palmar arch (B and C).

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