Surgical management of Hypothenar Hammer Syndrome in a patient presented with a true aneurysm of the ulnar artery and hypoplastic deep arterial palmar arch

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Abstract:

Background: Hypothenar Hammer syndrome (HHS) is considered to be a rare entity resulted from repetitive or emerged blunt trauma and microinjury to the ulnar artery which lies in the Guyon's Canal. The vast majority of patients are involved in occupational activities or include athletes which have experienced continued microtraumas in a similar fashion. The aim of the current report is to present our experience of a patient with HSS and hypoplastic deep palmar arch operated to our department.

Case report: A 32 years old male patient, presented to our department with a pulsating mass on the palmar surface of his left hand. The patient reported a fall-related blunt trauma to the hypothenar eminence of his left hand two years ago. Allen's test was positive for the ulnar artery perfusion area, while both the color doppler ultrasound and magnetic resonance angiography revealed a 1,7cm aneurysm to the distal end of the artery. Given the above findings, we performed aneurysmectomy and an end to end anastomosis of the ulnar artery with successful immediate result. During the five-month follow-up there were no post-operative complications.

Conclusion: The anatomic peculiarity over the Guyon's canal leaves the ulnar artery and nerve essentially exposed to injury against the hook of the hamate. Repetitive microtrauma raises the risk for intimal injury and aneurysmal lesion formation which should be treated surgically to protect the perfusion of the arm from possible complications. The choice of treatment for HHS can be rather challenging regarding the plethora of clinical presentations of the disease. Nevertheless, in the presence of an aneurysmal lesion the gold standard remains aneurysmectomy with an end to end anastomosis.

INTRODUCTION

Hypothenar hammer syndrome (HHS) is a disease of uncommon occurrence. The silent nature of this condition and the broad spectrum of differential diagnosis including Berger's disease, Raynaulds disease and others, synthesizes a riddle hard to solve for most clinical practitioners. HHS was first described as a clinical entity by Guttani and Von Rosen in 1772[1]. Conn et al in 1970[2] suggested that repetitive trauma to the hypothenar eminence of the hand can lead to ulnar artery injury and "Hypothenar Hammer Syndrome" was proposed as the appropriate nomenclature for the disease. Most prone to the disease are males over females in their 40's occupied in manual labor[3]. The frequent use of their dominant hand in a striking manner similar to a hammer, results in recurrent microtrauma over Guyon's Canal and subsequent injury to the ulnar artery[4] which can lead to vasospasm and thrombosis of the artery or the formation of a pseudoaneurysm. In rare cases those injuries may happen after an isolated blunt trauma and concern the emergence of a true aneurysm.

The aim of this report is to present our experience of a patient with a fusiform aneurysm of his left ulnar artery, resulted after blunt trauma of the arm and hypoplastic deep palmar arch operated to our department.

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CASE REPORT

A 32 years-old male patient presented to our department with a pulsative mass on the palmar surface of his left hand. The patient reported a fall-related blunt trauma to the hypothenar eminence of his left hand two years ago. Localized pain which alleviated with the use of nonsteroidal anti-inflammatory drugs (NSAIDs) was the only symptom at the time of presentation, while the patient stated a progressive increase in the size of the mass. His past medical history was free, whilst he stated to be an active smoker. Allen's test was positive and

revealed remaining perfusion of the pulsatile radial artery. So, we proceeded in further investigation with color doppler ultrasound and magnetic resonance angiography. Both examinations revealed a 1,7cm true aneurysm to the distal end of his left ulnar artery with hypoplastic deep palmar artery arch (Fig. 1A,B and 2A,B). Given the above findings and the possibility of complications due to the presence of the aneurysm, surgical intervention was decided.

Under local anesthesia a small curvilinear incision over the pulsating mass was performed. After surgical exploration and dissection of the surrounding tissues, control of the proximal and distal necks of the aneurysm was possible using vessel loops (Fig. 3A,B). After blockage of the arterial inflow, a longitudinal incision to the aneurysmal sac was performed with the remaining length of the artery allowing for the creation of an end to end anastomosis. Anastomosis was performed using a supporting angiocath with a 7.0 prolene suture. The procedure was uneventful with evident patency to the proximal and distal part of the artery post-operatively.

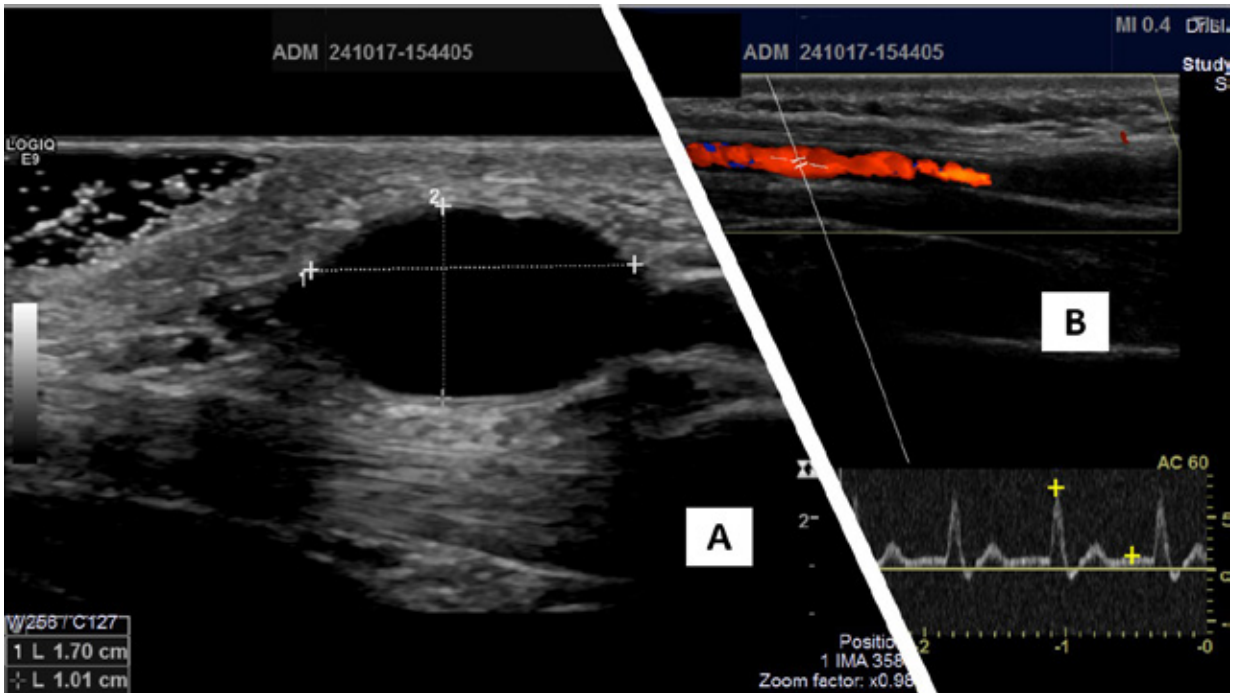

Figure 1. A. Preoperative imaging of the 1,7cm ulnar artery aneurysm using color doppler ultrasound with B. normal waveforms.

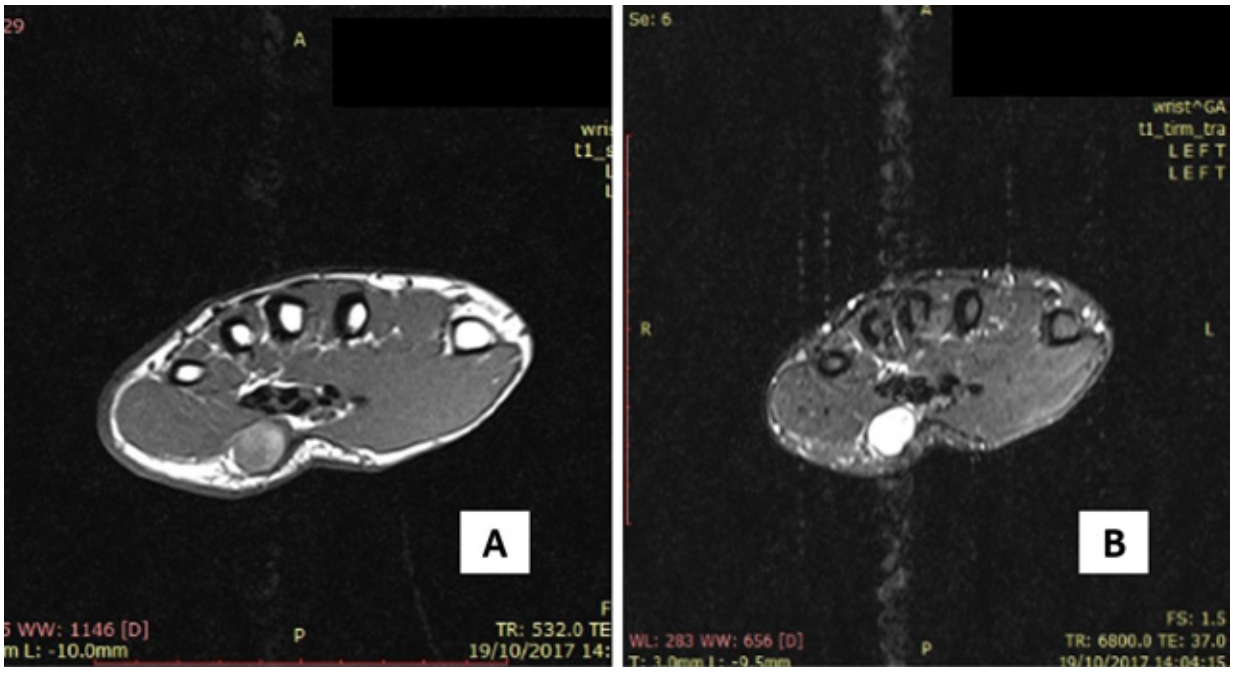

Figure 2. Preoperative magnetic resonance imaging angiography of the 1,7cm ulnar aneurysm in transversal view at A. T1 and B. T2

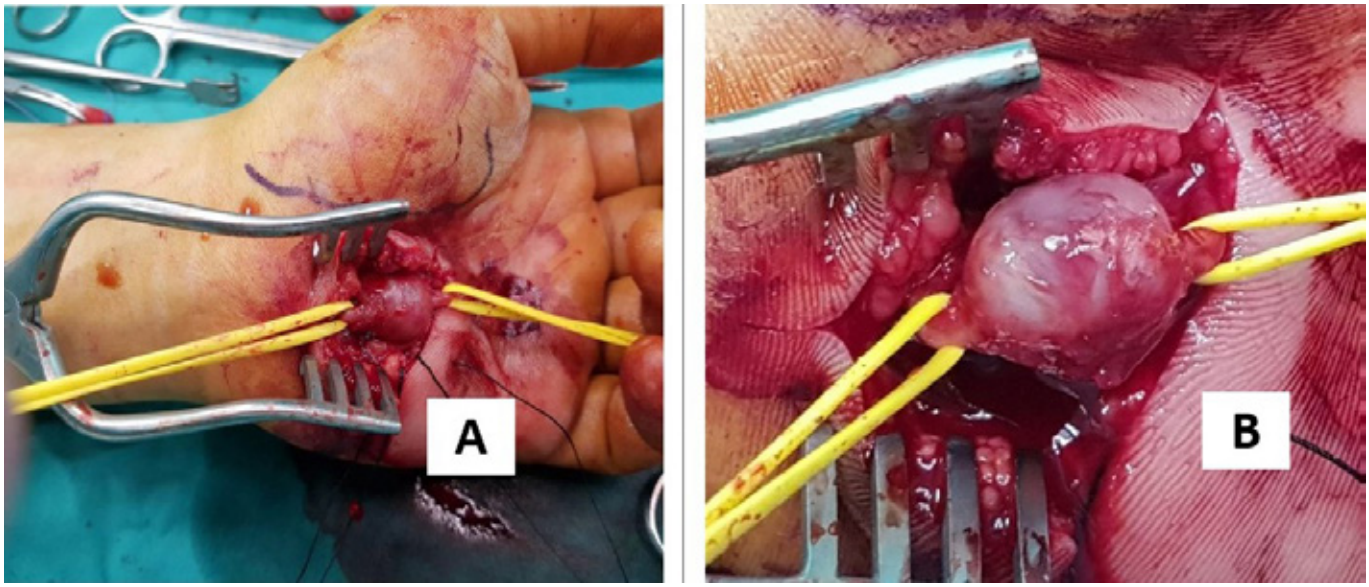

Figure 3. A. After exploration of the left hypothenar area, control of the ulnar artery proximally and distally using vessel loops and B. focusing on the fusiform aneurysmal sac before aneurysmectomy.

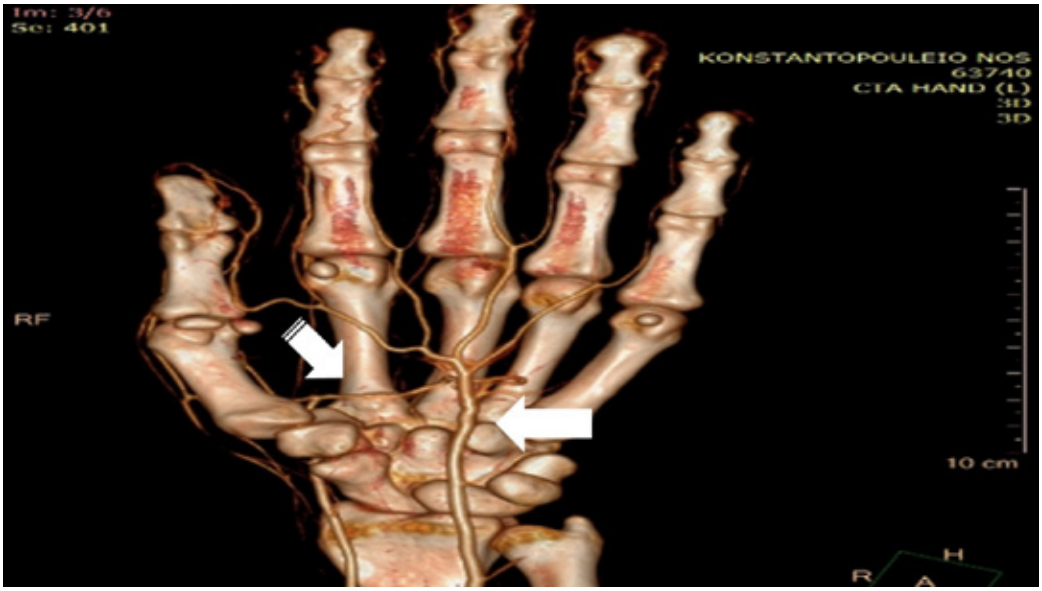

Figure 4. Postoperative CT angiography demonstrating patency of the anastomosis (white arrow) and the hypoplastic deep palmar arch (toothed white arrow).

In the first follow-up five months thereafter, the patient does not report any neurologic or vascular complications. Computer tomography angiography (CTA) showed patency of the anastomosis and good perfusion of the hand from the hypoplastic deep palmar arch (Fig. 4).

DISCUSSION

The pathophysiology of hypothenar hammer syndrome (HHS) is known to be correlated with the anatomy of the hand. The ulnar artery and nerve pass through the ulnar canal (Guyon's canal) before entering the hand. At that point the nerve and artery are merely protected by skin, subcutaneous tissue and the palmar aponeurosis while laterally it borders with the hook of the hamate[4]. The above anatomic peculiarity leaves the artery exposed to trauma over the boney structure of the hamate. Repetitive microtrauma over the Guyon's canal causes intimal injury with subsequent thrombus formation and consequently the formation of an aneurysm. Rarely the process of the disease involves a single blunt trauma to the hypothenar eminence. In asymptomatic patients with a patent aneurysm surgical approach is evidence based for the prevention of thrombosis, emboli and possible decompression of the ulnar nerve[5] . If untreated HHS can lead to ischemia, necrosis and gangrene as the superficial palmar branch is formed predominantly by the ulnar artery and limited contribution from the radial artery. Furthermore in 37% of cases a trans palmar arciform continuation of the ulnar artery with a full comple-

ment of common volar digital branches is the sole source of blood supply to the fingers[6]. Ferris et al. demonstrated the possible underlying presence of ulnar artery fibromuscular dysplasia[7]. In his study, histologic examination of 19 resected ulnar arteries was performed. Hyperplastic proliferation of the intima or media and disruption of the internal elastic lamina were evident, typical signs of fibromuscular dysplasia. The rarity of the disease with fewer than 150 cases reported globally poses an obstacle in formatting clear therapeutic regimes.

Many treatments have been described ranging from conservative management (calcium channel blockers, antiplatelets or anticoagulation, and pentoxifylline to reduce blood viscosity[8]) to surgical[9] or even endovascular procedures[10]. Our decision for the presented case was based on the local extension of the disease and the need to preserve blood supply of the extremity with the end to end anastomosis to be proven efficient without any post-operative complications.

CONCLUSION

The presence of aneurysmal disease to the distal portion of the ulnar artery in the context of the hypothenar hammer syndrome is of utmost clinical significance. Therefore, prompt diagnosis and early treatment of the disease is vital to prevent the survival and functionality of the affected extremity.

No conflict of interest.

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