CASE REPORTS

DIGITAL ARTERIOVENOUS MALFORMATION. AN UNCOMMON FINDING: A CASE REPORT

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Abstract

Vascular malformations (VMs) are dysplastic abnormalities of vascular channels, differing from vascular tumors by their slow growth. Arteriovenous malformations (AVMs) arise between weeks 4-10 of intrauterine life, with a prevalence of 1 in 100,000 among Caucasians. Common in the head, neck, and hands, AVMs may be asymptomatic or cause symptoms like pain, deformity, and disability. Treatments range from conservative management to amputation in severe cases. A 28-year-old male with finger trauma was found to have a vascular tumor, later diagnosed as an arteriovenous malformation, surgically removed and confirmed by histopathology. Angiography is the gold standard for diagnosing AVMs, though imaging and physical exams are often sufficient. Conservative management is preferred for minor symptoms, with surgery reserved for severe cases. Surgical intervention carries risks, especially for diffuse lesions. Treatment for hand AVMs is challenging, requiring specialized expertise due to the hand's complex anatomy.

Keywords: *arteriovenous malformation, hand, case report, trauma*

INTRODUCTION

Vascular malformations are dysplastic abnormalities of the vascular channels. Unlike vascular tumors, which exhibit rapid growth and phases of involution, vascular malformations typically grow slowly[1]. Arteriovenous malformations (AVMs) (Figure 1) originate between the 4th and 10th weeks of intrauterine life[2]. It is believed that AVMs develop due to the failure of primitive arteriovenous shunts to undergo apoptosis[3].

The prevalence of AVMs is estimated to be 1 in 100,000 among Caucasians. These malformations can be evident at birth in about 40% of cases. The female-to-male ratio is 1:13. AVMs occur in approximately 0.3% to 0.5% of the population, with a higher incidence in children and adolescents[1].

AVMs are more frequently found in the head and neck, but they can have a variable distribution and clinical presentation, including in the upper extremities[1]. The hand is the second most common site for AVMs[4] after the head and neck, representing about 10% of total cases in the upper limb, with a higher frequency in the hand than the arm. The exact prevalence and incidence of upper limb AVMs remains unknown[3]. However, they are considered the most common mass of skeletal muscle and the second most common soft tissue tumor of the extremities, following lipomas. AVMs may involve connective tissue, tendons, joints, or bones[5].

Clinically, AVMs can be asymptomatic or present with symptoms such as edema, ischemia, itching, pain, thrombosis, deformity, and functional disability[1]. AVMs of the hand can display various symptoms, including a feeling of heaviness, a pulsating mass, warmth, pain, bleeding, ulceration, and necrosis[6]. On physical examination, AVMs typically produce a palpable fremitus and an increase in temperature compared to the surrounding area[1]. Although usually small, these lesions can cause pain, discomfort, disability, and occasionally bleeding, necessitating medical intervention[2]. AVMs may become clinically evident at any point from birth to adulthood, and factors such as trauma, surgery, or hormonal influences may cause the lesions to expand hemodynamically[6], although acquired lesions may be due to trauma or secondary to neoplasm, inflammation, or vascular disease[5].

A form of AVMs are the Acquired Digital Arteriovenous Malformations (ADAVM), these are rare vascular anomalies typically found in acral regions, particularly on the fingers. While these lesions often appear spontaneously, they have

also been associated with trauma, inflammatory conditions, or surgical procedures[7].

Treatment options for AVMs include conservative management, embolization or sclerotherapy, partial excision, and in severe cases, amputation[6].

CLINICAL CASE

We present the case of a 28-year-old male who sought evaluation after sustaining direct trauma to the first finger of his left hand. Upon physical examination, he was found to have swelling in the thenar region, tenderness on palpation, intact flexion and extension, no visible wounds, and normal capillary refill.

Upon surgical exploration a 4x3 cm vascular tumor located in the first interdigital space, between the adductor pollicis brevis and first interossei muscles (Figure 2), was dissected using watchmaker and Castroviejo forceps. Adherent tissue was carefully loosened until the proximal and distal pedicles were identified, which were then ligated with 4-0 Vicryl. After restoring blood flow, capillary refill in the first finger was confirmed. The specimen was sent to pathology. The incision was closed with simple sutures and a flap stitch using 4-0 nylon.

The diagnosis of arteriovenous malformation was subsequently confirmed by histopathology. (Figure 3)

DISCUSSION

Angiography remains the gold standard for diagnosing AVMs[1]. Diagnosis is primarily based on imaging methods such as ultrasonography and magnetic resonance imaging. In about 90% of cases, a thorough anamnesis and physical examination are sufficient for an accurate diagnosis[3]. For patients with minor symptoms, conservative management is typically the preferred treatment. Regular follow-up is essential to monitor any

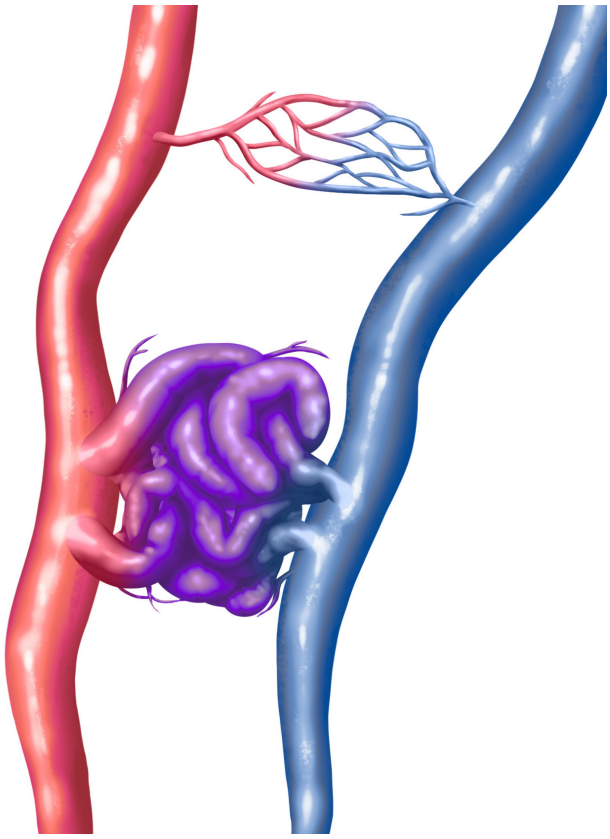

Figure 1 *Schematic drawing of an AVM*

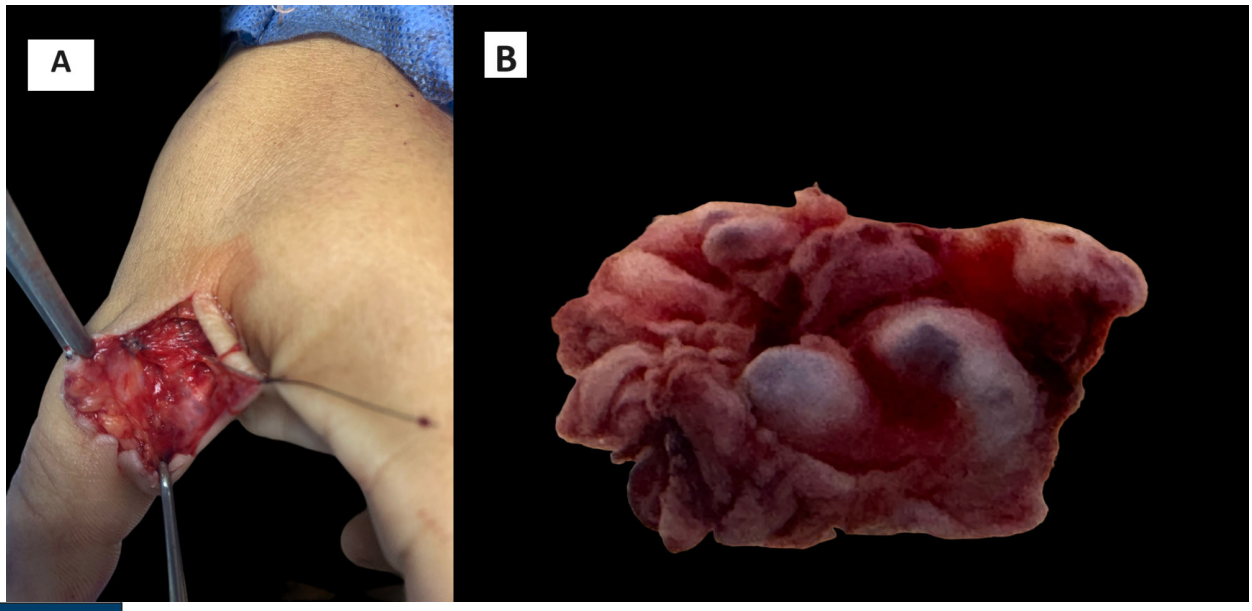

Figure 2 *A shows the mass during the surgical resection.*
B reveals the resected mass.

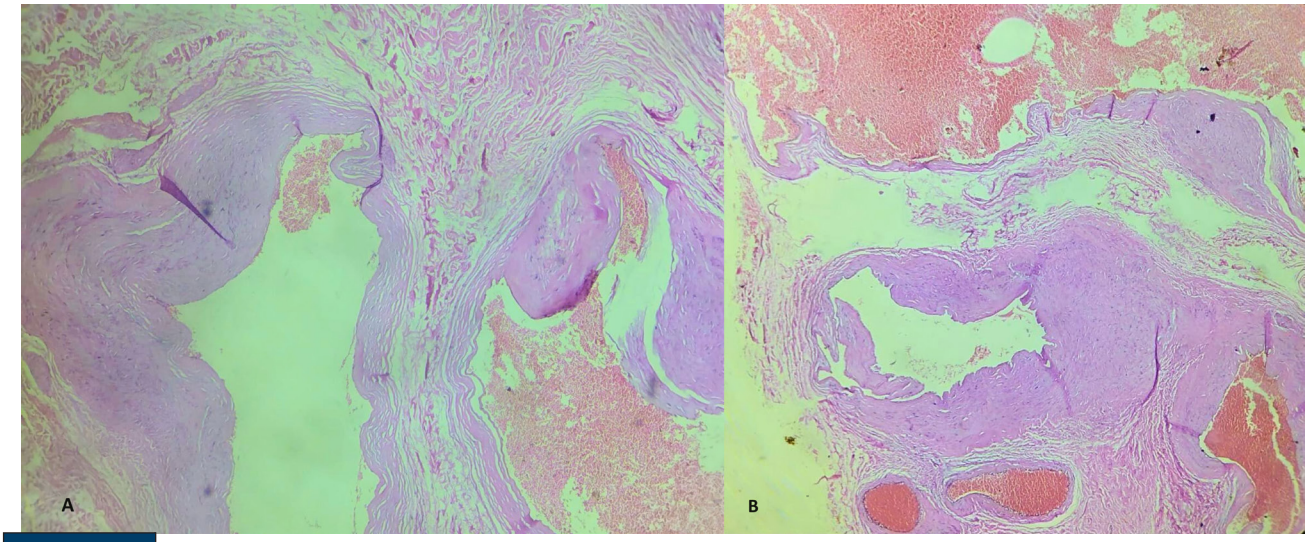

Figure 3 *A and B show histological images at 40x, they reveal arteries and veins with thickened walls. Muscle fibers are scattered among abnormal arteries and veins, with noticeable disruptions in the elastic layer of the arterial walls.*

progression of symptoms. Patients with moderate symptoms may require surgical intervention to alleviate symptoms. However, surgery is generally considered for lesions with arterial ectasia or localized lesions (which present a low surgical risk), and less so for diffuse lesions (which carry a higher surgical risk). Conversely, surgery is strongly indicated for patients with severe symptoms, although it may involve significant risks, including the possibility of amputation. Cardiac decompensation resulting from hand AVMs usually develops gradually over several years. However, acute cardiac failure can occur within hours in cases of small hand lesions present at birth[8]. Surgical resection is curative, as it removes the malformation and all affected tissue[1]. Despite this, established treatment guidelines for hand AVMs are lacking. Consequently, not all hand AVMs require treatment, and in some cases, treatment may not be feasible. Asymptomatic AVM patients are typically managed conservatively, which may include the use of compression garments. Decisions regarding surgery or embolo/sclerotherapy should be carefully considered based on the patient's symptoms and functional status[6]. Hand AVMs are rare and challenging to treat due to the need to preserve hand function, the high complication rates associated with treatment, and the complex anatomy of the hand[6]. Successful surgical treatment requires specific expertise in the approach and management of the hand's fine structures. Key technical skills include choosing the appropriate skin incision, employing skin-sparing techniques, using a tourniquet, and handling delicate structures such as bones, nerves, vessels, muscles, and tendons[9].

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