SCIENTIFIC LETTER

RESECTION OF PERIPHERAL ARTERIOVENOUS MALFORMATION IN THE ARM WITH DELTOID MUSCLE AND BASILIC VEIN

ABSTRACT

Arteriovenous malformations are potentially the most aggressive and difficult type of vascular malformations to treat. We report the case of a 25-year-old female patient who underwent surgery for recurrence of arteriovenous malformation in the right upper limb at the level of the pulsatile arm that caused pain on movement (Schobinger Stage II) and Cho-Do angiographic stage IIIb. with a history of resection of arteriovenous malformation in the same location in the previous 6 years. It was resolved with bloc resection of the angioma, the deltoid muscle, and the basilic vein.

Key words: *arteriovenous malformations, vascular surgical procedures, vascular malformations, angiography, brachial artery*

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THE CASE

We report the case of a 25-year-old patient who presented a malformation in the upper right limb at the level of the arm with progressive growth of 6 years of evolution *(Figure 1A)* that caused pain with movement, with a history of resection of arteriovenous malformation in the same limb (6 years earlier).

The physical examination revealed a malformation in the arm with the presence of pulsation and thrill (Schobinger Stage II). Laboratory at admission: leukocytes: 800 cells/ml (neutrophils 55%), hemoglobin 12.5 gr/dl, red cells 38%, urea 0.46 mg/dl, creatinine 79 mg/l, glucose 88 mg/dl, prothrombin time 17 sec., prothrombin concentration 72%. Angiotomography of the upper right limb was performed with multiplanar reconstruction, which revealed, at the level of the external mid-third of the right arm, in the thickness of the muscular plane and the subcutaneous cellular tissue, a malformation with multiple serpinginous and dilated vascular images measuring approximately 128 x 71 x 65 mm *(Figure 1B)*. The axillary artery is presented as afferent vessel and the cephalic vein as efferent.

TREATMENT AND RESULTS

An incision is made of the internal aspect of the arm from the elbow fold to the axilla. Dissection by planes and trans arterial angiography of the afferent vessel are performed *(Figure 1C)*. The humeral and axillary arteries are skeletonized *(Figure 2A)*, maintaining vascular control and en bloc resection of the angioma *(Figure 2B)* along with the deltoid muscle and the basilic vein with ligation of the arterial collaterals. Two drains are inserted in the axillary cavity and the deltoid bed. Closure by planes, hospital discharge on day five and postoperative control at 14 days *(Figure 2C)*.

DISCUSION AND CONCLUSIONS

Vascular malformations, based on an angiogenesis and vasculogenesis dysplastic disorder, are always present at birth (even if asymptomatic) and never resolve spontaneously. These disorders may remain inactive during a long time, even before mechanical or hormonal influences promote their growth. With the increase in size, vascular malformations may cause pain and functional deterioration that

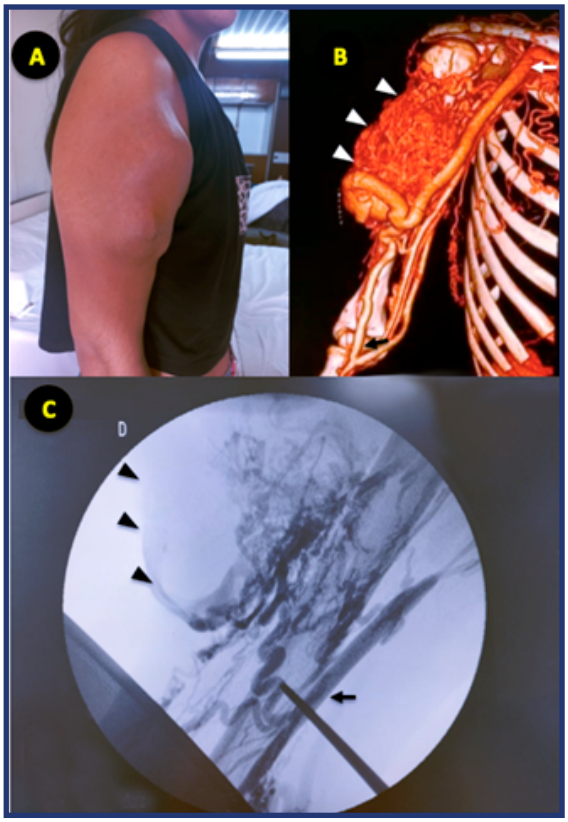

FIGURE 1. A. Preoperative image of the right arm. **B.** Angiotomographic reconstruction showing the axillary artery as afferent vessel (white arrow) of the angioma (white arrow tip) and the cephalic vein (black arrow) as efferent vessel. **C.** Intraoperatory transarterial angiography: the humeral artery marked (black arrow) and shadow of the angioma (black arrow tips).

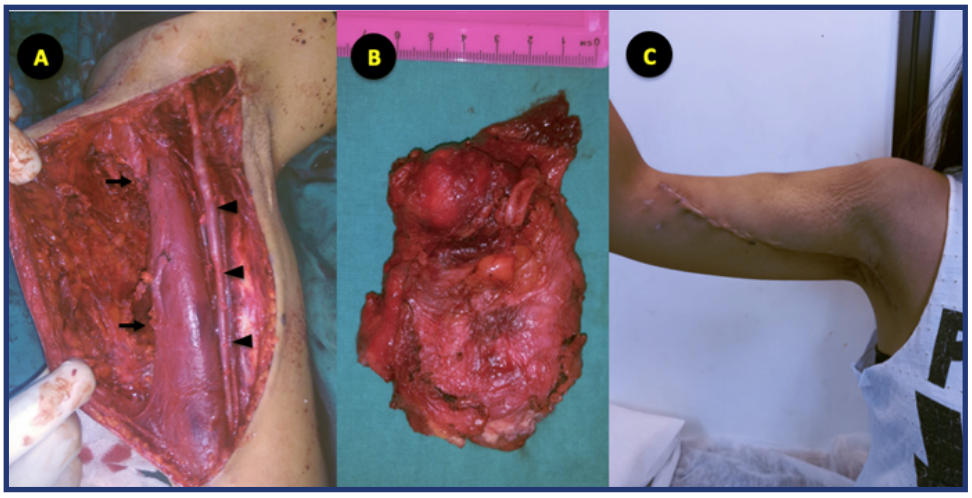

FIGURE 2. A. Skeletonization of the deep humeral artery (black arrow tips). Section site of the distal portion of the deltoid muscle (black arrows). **B.** Surgical specimen: angioma. **C.** Postoperative photograph of the right arm.

require treatment. The diagnosis must approach the morphology, lesion extension, type of dominant vessel and possible complications, considering dermal, orthopaedic, neurological and organic manifestations of the lesion. Vascular malformations may be comprised of a single type of vessel, combined vascular components and malformations with additional non-vascular anomalies, therefore they are classified as "simple or combined vascular malformations", as well as "vascular malformations associated to other anomalies"[1].

Arteriovenous malformations (AVM) are fast-flow vascular anomalies. With the increase in size, it becomes more and more difficult to localize the area of connections of direct arteriovenous shunts, the so-called AVM nest, and differentiate the feeding arteries and the outflow drainage veins. Diagnostic images must provide information on the location, extension, composition and diameter of the feeding and drainage vessels, all of them essential elements for a successful minimally invasive approach of AVMs[2].

AVMs are potentially the most aggressive type of vascular malformations. They comprise malformations in arteries, veins and capillaries, with direct arteriovenous communications that give way to an arteriovenous shunt. These malformations may present themselves as capillary pseudomalformations with pulsation to palpation or a murmur, as a red, warm and painful lesion that enlarges[3-4]. AVMs are difficult to treat successfully, since they invariably progress due to the rapid flow in arteriovenous connections. AVMs may lead to serious clinical problems. Schobinger´s classification for AVMs is established and is valuable for the clinical evaluation of the real status of vascular anomalies. It also helps in the risk stratification for possible therapeutic indications. Schobinger distinguishes four stages, namely, Stage I (inactive AVM with local cutaneous hyperthermia), Stage II (increased arteriovenous shunt, presence of pulsation and murmur), Stage III (destructive AVM, ulcerations, bleeding and pain), and Stage IV (decompensated AVM, cardiac insufficiency or failure[1].

Embolization, sclerotherapy or a combination of them is the first-choice therapy in vascular malformations as they offer a treatment modality with low morbidity and acceptable results, but it is prone to a greater number of complications in AVM[5].

The publication by Ranieri et. al[6] presents 46 cases of vascular malformations, most of them (95.7%) treated with this interventional therapy. In 14 patients (34%) with AVM, embolization was performed with EVOH, the majority (58.8%) required one to three embolizations; however, 22 patients (47.8%) required a surgical approach following embolization therapy; further, in one third of these (14 patients, 30.4%), it was necessary to proceed to total resection of the vascular malformation. Six patients were reported to require primary partial amputation as a result of complications.

In our published case, with a IIB Cho-Do angiographic stage, the angioma infiltrated the fibers of the deltoid muscle, which was an indication for total en bloc resection. Embolization with EVOH could have been performed for the purposes of cytoreduction, but his option was not taken due to the risk of hand ischemia caused by distal embolization.

Conflicts of interest
The authors have no disclosures to declare.

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