Case Report

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Endovascular embolization of a muscular symptomatic arteriovenous malformation with Glubran 2 acrylic glue

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Abstract

Objective: Few cases of muscle arteriovenous malformations have been reported in literature to date.

Case report: We report the case of a 32-year-old man presenting a muscle arteriovenous malformation involving the vastus lateralis muscle with recurrent episodes of pain. The patient was treated by transcatheter embolization with Glubran 2 acrylic glue. There were no periprocedural or subsequent clinical complications, the glue resulted in successful selective occlusion and the patient showed resolution of symptoms at the six-months follow-up.

Conclusions: Endovascular therapy has been shown to be beneficial in patients with high surgical risks and is the treatment of choice for arteriovenous malformation lesions that extend beyond the deep fascia and involve muscle, tendon, and bone. Glubran 2 constitutes a useful tool to attempt embolization of the muscle arteriovenous malformation nidus, with easier handling and promising results.

Keywords

Vascular malformations, arteriovenous, embolotherapy, endovascular treatment

Objective

Arteriovenous malformations (AVMs) are uncommon vascular lesions formed by multiple abnormal communications between the arterial and venous system (without a normal capillary network). The AVMs has been shown to be the most challenging of all the vascular malformations due to its wide range of clinical presentations, unpredictable clinical course, complicated anatomical, pathophysiological, and haemodynamic status, and high morbidity related to treatment.[1]

The management of AVMs is challenging, and complete eradication of the lesion may not be possible. Therapy is aimed at the complete closure of the arteriovenous communications using traditional surgery or endovascular techniques. However, partial treatment, such as partial surgical excision or embolization, may result in a recurrence that is more problematic than the initial lesion.[2] Endovascular catheter-based therapy with selective embolization appears to be very useful for the treatment of many of these conditions.

As the clinical course of these symptomatic AVM is undefined, open surgical or endovascular treatment is generally warranted because of the potential risk of significant complications. Significant pain, bleeding, or ulceration and enlargement of the malformation are often indications for treatment. Surgical repair is associated with significant morbidity. Endovascular treatment is a safe and effective method for treating AVM.[1,2] Percutaneous endovascular embolization of the AVM with glue offers a new option, especially because it is less traumatic and allows precise and selective occlusion of only the abnormal fistulous vessels.

We describe our technique of using Glubran 2 as occlusive agent for a symptomatic muscle AVM and report the 1-year outcome.

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Patient

A 32-year-old man presented with a progressively growing swelling and pain in the external right thigh region. There was no history of previous trauma or surgical treatment in the thigh region. Physical examination was negative, there was no audible bruit, visible or palpable pulsations, or hyperemic overlying skin. Plain and contrast enhanced CT scan showed enhancing serpiginous channels in the thigh, suggestive of a vascular malformation. Digital substraction angiogram (DSA) performed through the left transfemoral route showed feeding branches originating from the second and third perforating arteries, branches of the right profunda femoris artery. The nidus of the mAVM involved the vastus lateralis muscle (Figure 1).

The left common femoral artery was punctured using the Seldinger technique and a 6-Fr introducer sheath (Boston Scientific, Boston Scientific Corporation, Natick, MA, USA) was positioned. The contralateral common iliac artery was then catheterized using a 5-Fr "Sim 1" angiographic catheter (Bard Angiomed, Germany). After an introducer change (6 Fr Flexor Over Contralateral Sheath, Cook Inc, Bloomington, IN), the right profunda femoris artery was catheterized using a 5-Fr catheter multipurpose (Angiopass plus multipurpose 5 F, Bard Angiomed, Germany). Angiography confirmed the presence of a mAVM with multiple feeding arteries originating from the second and third perforating arteries of the right profunda femoris artery (Figure 2a). The nidus of the mAVM drained into the right profunda femoris vein.

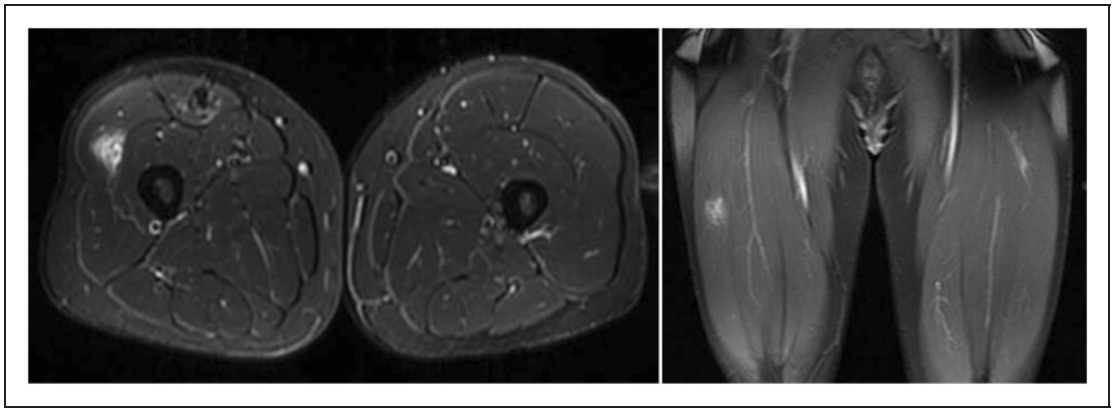

Figure 1. Preoperative angioRMN demonstrates an AVM involving the vastus lateralis muscle.

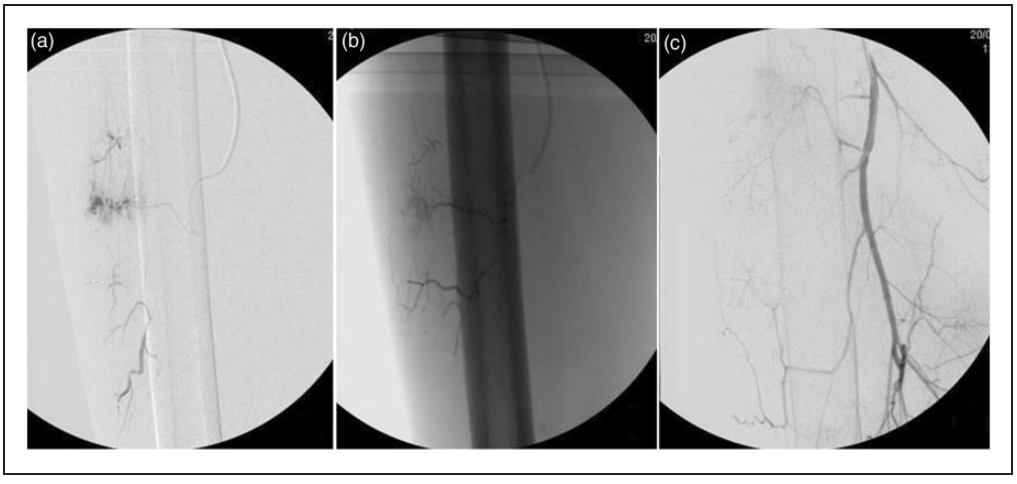

Figure 2. (a) Arteriogram showing the mAVM, which is fed by multiple perforanting branches of the profunda femoris artery. (b) Embolization of the feeding branches with Glubran 2 and lipiodol after selective catheterization using a microcatheter (Progreat, Terumo). (c) Post-embolization arteriogram shows the occlusion of all embolized branches with complete devascularization and thrombosis of the nidus.

A 2.7-Fr microcatheter (Progreat, Terumo, Japan) was introduced through the angiographic catheter and a major feeding branch of the nidus was superselectively catheterized. The nidus was then embolized by injecting 1 ml of Glubran 2 acrylic glue (GEM, Viareggio, Italy), mixed with 2.5 ml of lipiodol (1:2.5 ratio) to enable its fluoroscopic visualization (Figure 2b). We used the push technique, which involves injecting a volume of glue smaller than the capacity of the microcatheter, ranging from 0.1 to 1.0 cm^3, followed by an injection of 5% dextrose in sterile water solution, which expels the glue from the microcatheter and flushes it forward into the circulation. In this case, we perform five flush injections of 0.5 ml each (2.5 ml total volume). DSA performed after the procedure confirmed the complete devascularization and thrombosis of the nidus (Figure 2c).

Three, six, and twelve months duplex ultrasound follow-up confirmed the persistent thrombosis of the mAVM. Since successful embolization of the mAVM, he has been free of symptoms.

Discussion

The prevalence of vascular malformations is estimated to be 1.5% in the general population.[3,4] The management of AVMs is a big challenge. Surgical resection has long been the gold standard for the treatment of AVMs for many decades[5] despite high rates of complications, morbidity, and recurrence.[1,4]

Transcatheter embolization has been suggested as the primary therapeutic modality or as a presurgical intervention to reduce bleeding and maximize successful resection.[6,7]

Glubran is an acrylic glue (N-Butil-Cyanoacrylate) which polymerizes immediately upon contact with any ionic surface (blood, endothelium), which makes necessary the use of a coaxial technique with microcatheters.[8] It is a permanent occlusive agent, and is not radio-opaque, so it needs ethiodized oils or tantalum powder to be opacified.[9,10] The introduction of Glubran 2 has improved the control over the polymerization. The advantages include the injection of an uniform mixture, adjustable only in concentration and the control of flow.[11] Their use in peripheral embolization has become more extensive, including the embolization of pelvic[12] and intercostal[13] arteriovenous malformations, and the treatment of iliac aneurysms.[14]

There are two principal techniques of deposition: injecting continuously the agent and the push technique. The advantages of the push technique include good penetration of the nidus, preservation of the microcatheter lumen to allow more than a single deposition, and reduction of the likelihood of glue adhering to the catheter tip. Although the volume of glue sounds quite small, especially to a large AVM, a small amount of glue creates a much larger cast because of the incorporation of blood elements. However, forward studies are necessary to compare both Glubran infusion techniques.

Conclusion

The AVMs may cause complications due to pain, hemorrhage, mass effect, high-output heart failure, or local ischemia due to vascular steal. Endovascular therapy has been shown to be beneficial in patients with high surgical risks and is the treatment of choice for AVM lesions that extend beyond the deep fascia and involve muscle, tendon, and bone. The continous development and improvement of materials and techniques in recent years has led to a wide spectrum of methods for transcatheter occlusive therapy. Glubran 2 constitutes a useful tool to attempt embolization of the AVM, with easier handling and promising results. The real benefit of the push technique is the great penetration through the MAV nidus.

Patient consent: Obtained.

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Conflict of interest

None declared.

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