Technical note

Percutaneous sclerotherapy for arteriovenous malformations of the face in the outpatient clinic

Scleroterapia percutanea ambulatoriale per le malformazioni artero-venose del volto

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SUMMARY

Sclerotherapy for arteriovenous malformations has to be performed under general anaesthesia because of the pain during injection and the need of careful monitoring. Two cases with arteriovenous malformations of the face regions are presented in whom percutaneous sclerotherapy was performed under local anaesthesia in the outpatient clinic. The sessions were uneventful and there was a visible decrease in the overall size and an improvement in skin colour of the lesion could be seen. Sclerotherapy can be used in the outpatient clinic to treat arteriovenous malformations that have a slow flow or a venous outflow that can be compressed to artificially slow the flow during injection.

KEY WORDS: Face • Arteriovenous malformations • Percutaneous sclerotherapy

RIASSUNTO

Generalmente la scleroterapia per le malformazioni artero-venose necessita di essere eseguita in anestesia generale a causa del dolore provocato dall'iniezione e della necessità di accurato monitoraggio del paziente. In questo articolo presentiamo due casi di malformazioni artero-venose del volto trattate ambulatoriamente con scleroterapia percutanea eseguita in anestesia locale. Le sessioni di trattamento sono state prive di complicanze, e sono risultate in una notevole riduzione delle dimensioni e miglioramento della colorazione delle lesioni. In conclusione, la scleroterapia ambulatoriale può essere utilizzata per il trattamento delle malformazioni artero-venose che presentano un basso flusso venoso o un flusso venoso che può essere compresso al fine di ridurne l'entità durante l'iniezione.

PAROLE CHIAVE: *Volto • Malformazioni artero-venose • Scleroterapia percutanea*

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Introduction

Arteriovenous malformations (AVMs) are characterized by an arteriovenous shunt through a nidus. They present as a pulsatile mass that is frequently associated with signs of venous congestion in the skin, with possible skin breakdown and massive bleeding [1]. AVMs have rapid flow and are, therefore, not usually candidates for percutaneous sclerotherapy alone. They are usually better treated by a combination of endovascular embolization with liquid adhesives or other embolic agents, with or without surgical excision of the remaining malformation [1-3].

Herewith a technique of percutaneous sclerotherapy is presented for AVMs employing artificial flow control during the injection under local anaesthesia in an outpatient clinic.

Case report 1

A 45-year-old female presented with a 2-year history of a pulsatile swelling on her left temporal region (Fig. 1a). There was no history of previous trauma. The Schobinger Stage at presentation was II. Preoperative Magnetic Resonance Angiography (MRA) revealed an arterial feeder and a draining vein around the mass, the diagnosis of AVM was later confirmed. The main blood supply was from the superficial temporal artery (Fig. 1b). We treated the patient using percutaneous sclerotherapy under local anaesthesia in the outpatient clinic. Ultrasonographic guidance was used, before and during the approach, to puncture the lesion. Aspiration was performed and whenever a good blood inflow was visualized, the afferent artery and drainer vein was manually compressed, and 1% polidocanol was infiltrated. Ultrasound is performed to ensure that there were no extravasations into the normal skin. The injection was given very slowly to fill the closed vascular lesions. The dose was 1 ml per one treatment session. When injected into the abnormal vessels, the agent

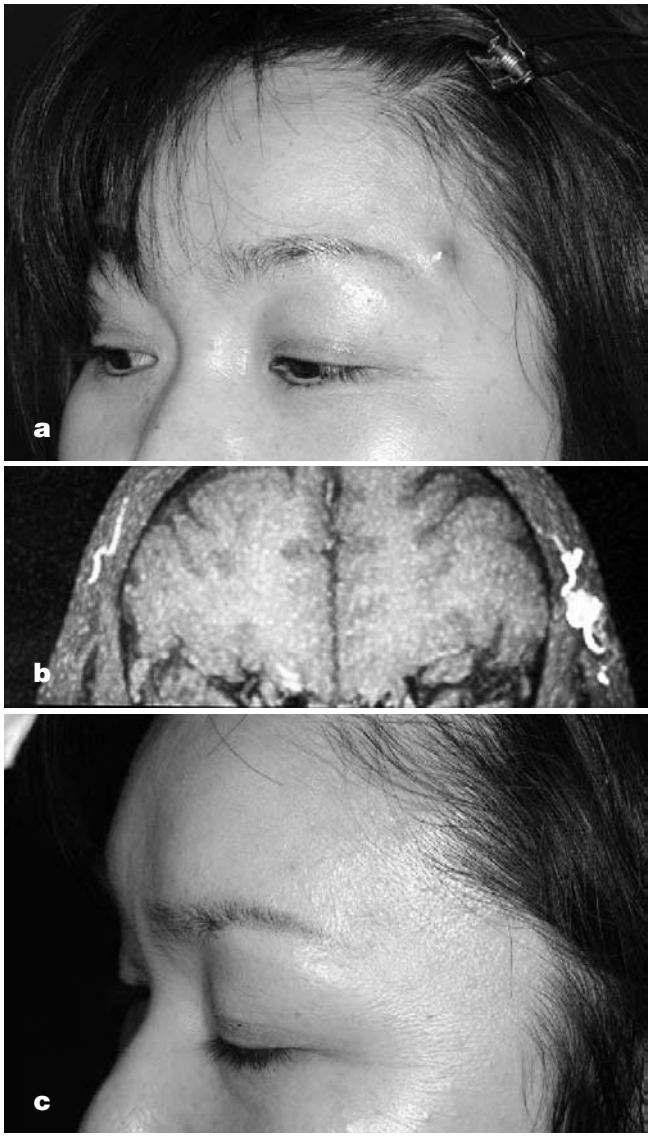

Fig. 1. Before the start of treatment (a) and pre-operative MRA scan imaging (b). At 12 months after 2 sessions of the polidocanol sclerotherapy (c). No significant recurrence was found at follow-up for 2 years.

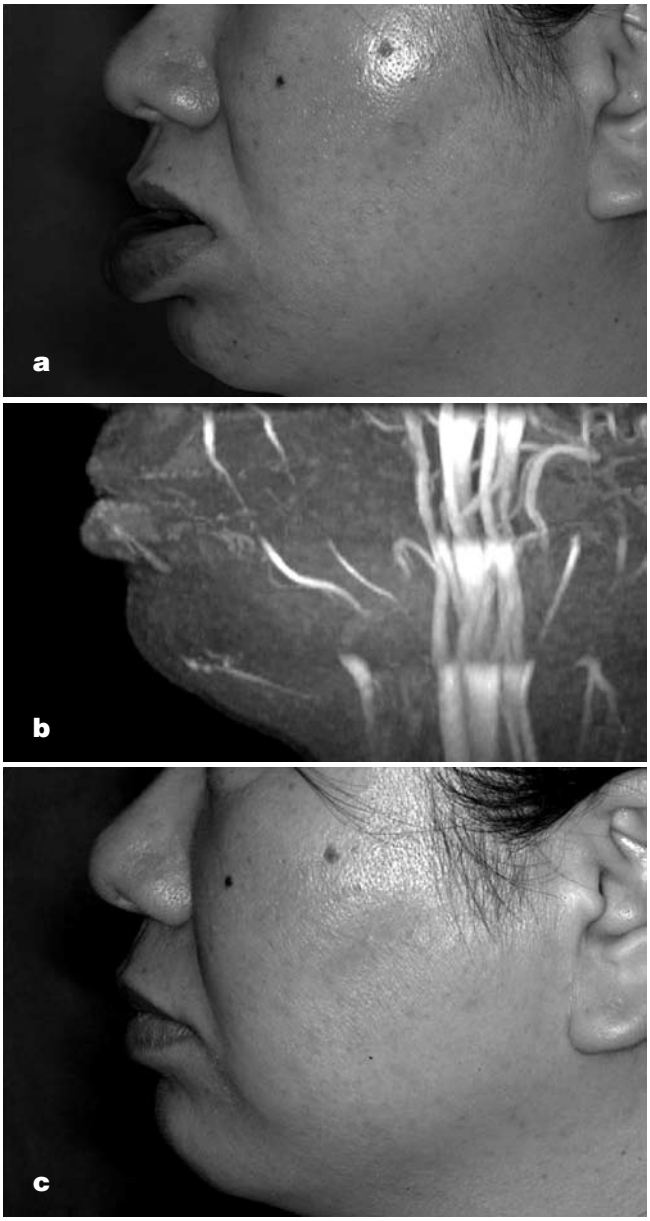

Fig. 2. Before the start of treatment (a) and pre-operative MRA scan imaging (b). At 8 months after 5 sessions of the ethanol and polidocanol sclerotherapy (c). No significant recurrence was found at follow-up for 3 years.

destroys the cellular lining of the vessels [4], and induces scar formation and shrinkage of the lesion.
It was injected at a 1-month interval and repeated twice. A clinical improvement in the overall size on the duplex scan and MRA, and in the colour of the lesion could be seen, thus achieving the desired cosmetic result without any side-effects (Fig. 1c).

Case report 2

A 43-year-old female presented with a 20-year history of a pulsatile swelling on her lower lip (Fig. 2a). The Schobinger stage was II. There was no history of any preceding trauma. Pre-operative magnetic resonance imaging (MRI) confirmed the diagnosis of AVM. The blood supply was from the inferior labial artery (Fig. 2b), and we performed percutaneous sclerotherapy using absolute ethanol or 1% polidocanol under mental nerve block. The dose was 0.5-1.5 ml per one treatment session. It was injected at 3-month intervals and repeated 5 times. A clinical improvement in the overall size on the duplex scan and MRA, and discoloration of the lesion could be seen, thus achieving the desired cosmetic result with no side-effects (Fig. 2c).

Discussion

Percutaneous sclerotherapy has been developed as a minimally invasive treatment modality and usually employed in low-flow venous malformations and macrocystic lymphatic malformations [5]. On the other hand, AVMs have a rapid flow and are, therefore, not usually candidates for

percutaneous sclerotherapy. They are usually better treated by a combination of endovascular embolization with liquid adhesives or other embolic agents, with or without surgical excision of the remaining malformation [1-3]. Radiological interventional embolization alone is rarely curative and it is commonly used before surgery, whereas preoperative embolization, within 24 hours of surgery, can significantly reduce the risk of excessive bleeding [6]. However, if the arterial feeder and the venous drainage can be temporarily compressed during the injection of the scrolosant to ensure exposure of the nidus to the agent for a sufficient time, the arterial feeder, the nidus, or the draining vein can be punctured and those cases may be candidates for percutaneous sclerotherapy. When AVMs are treated by direct puncture, it may be more effective than a sclerosing agent for occluding these lesions [7]. We planned percutaneous sclerotherapy for the cases of AVMs in order to be able to control the flow by manual compression under local anaesthesia in the outpatient clinic.

Preoperatively, we performed MRI, MRA scan and ultrasound. They are helpful in planning the best mode of treatment: surgery, interventional radiology or to puncture the lesion. We defined the selection criteria for the patients as follows: 1) the Schobinger stage should be I or II (Table I), 2) the diameter of the abnormal vessels should be below 30 mm, 3) ease of flow control by compression, or 4) the lesion is localized only to the subcutaneous region. The cases of Schobinger stage III and IV are difficult to treat using sclerotherapy alone because of the risk of massive bleeding. Originally, alcohol sclerotherapy has to be performed with the patient under the general anaesthesia, with careful monitoring of the cardiovascular status, intra-operatively [8]. Systemic complications include haemolysis, potential renal toxicity and cardiac arrest. Local complications include blistering, full thickness skin necrosis, and damage to local nerves especially in the head and neck region [9 10]. We selected these small and localized lesions to optimize the safety of the treatment.

Table I. Schobinger classification of AVMs.

Stage	Features
I	Cutaneous blush/warmth
II	Bruit, audible pulsations, expanding lesion
III	Pain, ulceration, bleeding, infection
IV	Cardiac failure

The sclerosing agents, we commonly use, are ethanol and polidocanol. Absolute ethanol sclerotherapy is accepted as an effective treatment method because the lowest recurrence rate has been observed in the relatively long-term observation period [11 12]. However, there is the risk of complications of the treatment including acute blistering, deep ulceration, and nerve injury. Skin blistering and ulceration are most likely when the vascular malformation extends into the superficial dermis [8]. Polidocanol has been used in the treatment of varices [13]. Recently, the outcome of foam sclerotherapy using polidocanol for venous insufficiency has been reported in several clinical series. The advantages of this treatment include the possibility of reducing volume and concentration of the sclerosant liquid with few side-effects [14-16]. To the best of our knowledge, very little has been reported about the effectiveness of foam sclerotherapy for AVMs. The small AVMs that can be compressed, to artificially decrease the flow during injection, are curable with sclerotherapy using 1% polidocanol liquid.

Percutaneous sclerotherapy can be used in the outpatient clinic to treat AVMs that have a slow flow or have a venous outflow that can be compressed to artificially decrease the flow during the injection.

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