

Experiences in managing arteriovenous malformations of the head and neck

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Abstract

Arteriovenous malformations of the head and neck are difficult to treat and require a multidisciplinary approach. Interventional radiology can now be used to downgrade previously inoperable lesions to enable ablation, and the use of Onyx® (Covidien, Irvine, CA, USA), which has revolutionised their management by allowing precise obliteration of the nidus, has enabled the aggressive management of lesions in compromised anatomical areas. We report a series of 31 patients with lesions on the head and neck. They all presented with serious symptoms (Schobinger grade 2–3) and had embolisation with Onyx®. Some had additional operations. We describe the outcome including complications, and offer some lessons learned from our experience.

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Introduction

Arteriovenous malformations are rare, and are caused by an abnormal connection between an artery and a vein (the first portion of the distal vein is known as the nidus). They are part of a group of conditions known as vascular malformations as classified by Mulliken and Glowacki (Table 1),^{1,2} and are also known as high-flow vascular malformations because of their rapid blood flow. In normal circulation the capillary bed resists flow and therefore reduces the circulating blood pressure, but in these lesions the capillary bed is bypassed and the pressure remains high. There are several classifications, but the Schobinger system is well recognised and can also be used to direct treatment (Fig. 1).

Lesions can develop in the unborn fetus or after birth,³ and they can be asymptomatic. Patients may describe pain, bleeding, or an abnormal growth in an area of the head and neck, and signs usually include an area of swelling, changes in the skin, warmth, and thrills, in the area affected. Lesions typically increase in size over time but the rate varies, and after rapid growth, some become relatively quiescent. The clinical course also varies, and while some are asymptomatic, others cause life-threatening complications.

Investigation usually follows assessment by the multidisciplinary team. Ultrasound with Doppler can confirm the presence of a lesion, and magnetic resonance angiography (MRA) can demarcate its extent. Angiography is the gold standard method of imaging as it allows detailed assessment of the vascular anatomy, and in most cases, treatment can done at the same time.⁴

There is no universally accepted method of management, and lesions are difficult to treat and have high rates of morbidity and recurrence. Interventional radiology can be used to control them, and in these cases some form of embolisation is

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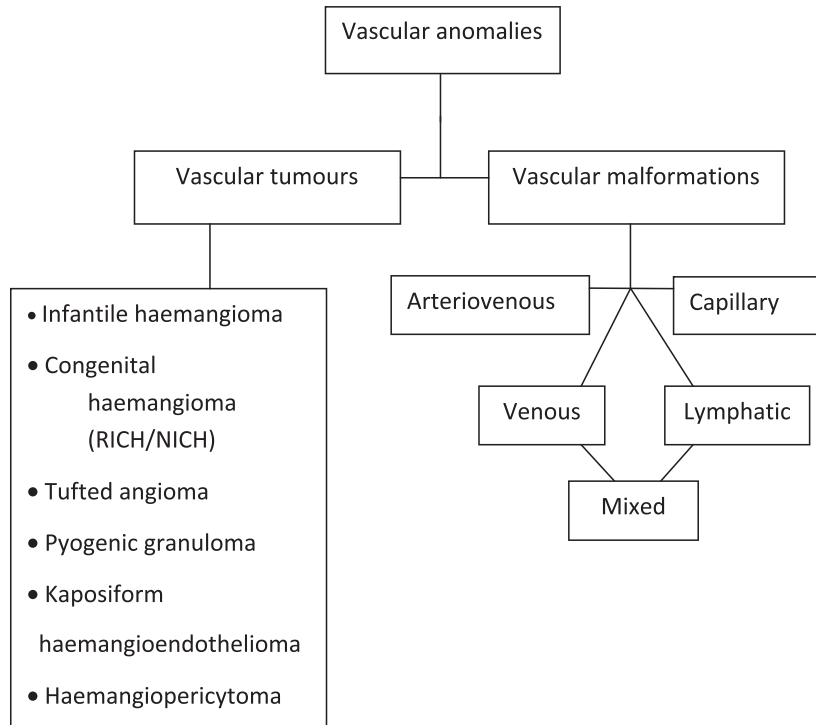


Fig. 1. Schobinger classification.

done. Some can be cured, but often symptoms are palliated. Operation usually follows radiological intervention.⁴

Several techniques for embolisation have been reported, including the use of transarterial coils, ethanol, and n-BCA (*n*-butyl cyanoacrylate), but there is no consensus about which is best. In 2009 we described our experiences with Onyx® ev3 (Covidien, Irvine, CA, USA) embolisation.⁵ Onyx®, an ethylene vinyl alcohol copolymer dissolved in dimethyl-sulphoxide (DMSO) with added micronised tantalum powder to ensure radiopacity,⁵ is licensed for pre-operative embolisation of intracranial lesions, and results of its use in this field are well documented.⁶ The concentration can be varied to alter the physical characteristics. We use Onyx® 18 and Onyx® 34 (the differences indicate the size of the transarterial catheter required for embolisation).

Our initial experiences were favourable. The ability to access high-risk areas in the face seemed to be an advantage over traditional methods, and the controllability of the material and the relative stability of the lesion after embolisation enabled easier excision. Occasionally lesions were cured,

but usually they were downgraded. However, the risks of using Onyx® in the head and neck are well documented,⁶ and reflect the technical difficulty of arterial catheterisation of vessels in the head and neck. Common complications include failure, bleeding, and necrosis.

We review the treatment of 31 patients with high-flow arteriovenous malformations (Schobinger grade 2-3) by our multidisciplinary team over a 6-year period. We describe our strategies, analyse our outcomes, and reflect on lessons learnt.

Method

We retrospectively reviewed all patients who had embolisation of arteriovenous malformations with Onyx® in our unit. We recorded their characteristics, reason for referral, history, and treatment, and analysed the complications. Patients were admitted the day of the procedure for transarterial superselective angiography and embolisation with Onyx® under general anaesthesia. If possible, all feeding vessels were treated, but as this could not always be done without serious morbidity when lesions were large, it may explain the high rates of recurrence in these cases.

Patients stayed in hospital for at least one night post-operatively to check for signs of neurological compromise and bleeding, and to control pain. Most were discharged the following day and were seen routinely in the outpatient department after 6-8 weeks. They were prescribed co-amoxiclav 625 mg 3 times a day for 7 days postoperatively.

Table 1
The Schobinger classification of high-flow vascular malformations.

Schobinger grade	Features
1	Warm/ mildly erythematous skin
2	Expanding lesion / bruit
3	Expanding lesion / bruit with bleeding, pain, or ulceration
4	High output causing cardiovascular compromise

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