Management of intramuscular venous malformations of the masseter muscle

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Abstract

Less than 1% of vasoformative tumours throughout the body occur in skeletal muscle and 15% of them arise in head and neck musculature. The masseter muscle is the most frequent site and accounts for approximately 5% of all intramuscular vascular malformations in the head and neck region. Masseteric venous malformations have a typical clinical presentation and imaging characteristics that should allow clinicians to distinguish them from other abnormalities presenting in this area. We present seven cases of these unusual intramasseteric venous malformations and the diagnosis and management of these lesions is discussed. The diagnosis was made on clinical grounds and was confirmed on MRI. All underwent surgical excision through a facelift approach and were successfully removed from within the substance of the masseter muscle with preservation of the facial nerve. Venous malformations within the masseter are rare but are easy to diagnose and can be reliably surgically excised without complications.

Keywords: Vascular malformation, Venous malformation, Masseter, intramuscular malformation, Phlebolith.

Introduction

Vascular anomalies fall within the domain of several specialties and are best managed in a multidisciplinary setting. Several classification systems have been described regarding vascular anomalies. Mulikan,[1] in his landmark paper, categorized these vascular anomalies into two major groups; tumours and malformations. Other authors have proposed sub-classifying vascular malformations based on their flow patterns as either fast-flow or slow-flow.

Venous malformations (VMs) previously referred to as "cavernous haemangiomas," have a propensity for the head and neck region. Although present at birth, they are occasionally not evident until later in life because of a very slow flow with gradual venous dilation.[1] Phlebothrombosis is common and leads to distension, firmness and frequently pain in the affected soft tissues.

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Intramuscular VMs mostly present like swellings, so they are often mistakenly diagnosed as tumours. Their presentation is usually delayed because of lack of obvious deformity or skin involvement. They increase in size when they are usually subjected to trauma, infection or when the involved muscle is used.[2,3] In head and neck region; the common site for intramuscular VM is the masseter.[1] Masseteric VMs have a common presentation pattern.[4] Very few case series of venous malformations of the masseter have been published in literature.

We present seven cases of intramuscular venous malformations of the masseter muscle and the diagnosis and management of these tumours is discussed.

Case Report

We performed a retrospective case review of all patients with intramasseteric venous anomalies managed at the Plastic surgery departments at Shifa international Hospital Islamabad and CMH Rawalpindi over a period of eight years, from June 2003 to June 2011.

The following data was collected: age of onset, age at presentation, sex, anatomic location, signs and symptoms, radiologic studies, operative findings, histopathology and outcome. Magnetic resonance imaging (MRI) was the preferred diagnostic modality used to confirm the clinical diagnosis.

Of the seven patients with isolated VM of masseter muscle, there were 4 males and three females (Table). Age range was 6 to 21 years with a mean age of 14.4±5.4 years. The diagnosis was made on clinical grounds and was confirmed on MRI (Figure-1). Five out of seven patients (71%) had evidence on examination and imaging of phleboliths within the mass. Four patients (57%) presented with pain in the lesion. In two of our patients, the lesions were small but became more pronounced and firm with clenching of the jaw. Some patients also had discomfort with eating and chewing. Three out of seven patients had undergone sclerotherpy in the past, with no significant improvement in symptoms. None of our patients had documented localized intravascular coagulopathy or associated skeletal problems (fracture, deformation, undergrowth, or overgrowth). All treated patients had initial

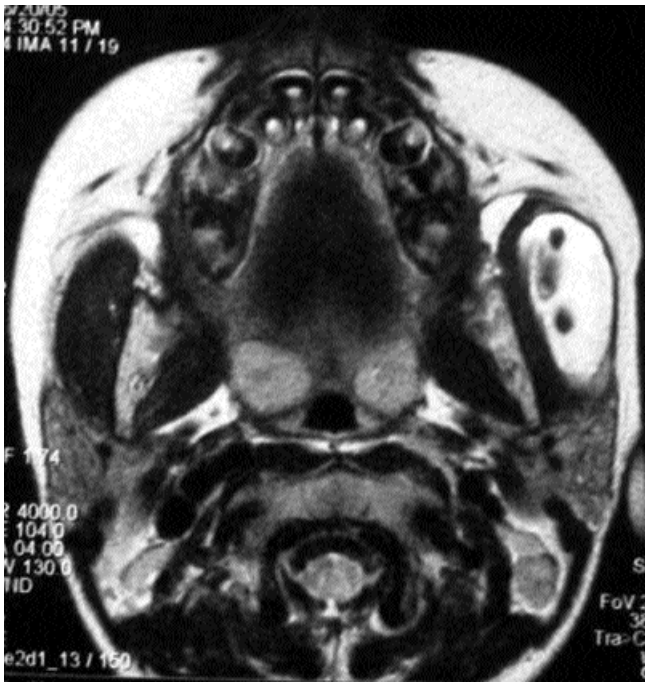

Figure-1: Hyper intense lesion in left masseter on MRI.

improvement in both symptoms and appearance (Figure-3).

Treatment options may include observation, sclerotherapy, surgical removal or debulking.[1]

In our study, surgical resection was preferred for all cases of intra-masseteric venous malformations. All necessary investigations and pre-anaesthesia evaluation were carried out before admission. The patients were admitted on the day of surgery and the procedures were performed under general anaesthesia with endotracheal intubation. The mean operative time was 2±0.33 hours.

We approached the lesion through a preauricular (face lift) incision and the branches of the facial nerve were identified, preserved and gently retracted. The dissection was continued over the masseter muscle and most of the feeding vessels found in and around the muscle were first identified and ligated or coagulated. Part of the muscle, depending upon the extent of involvement, was resected along with the malformation. The normal part of the masseter muscle was sutured, haemostasis secured and the wound was closed over a suction drain. The patient was discharged the next morning. Post procedure imaging was not routinely performed. The patients were followed up on the 5th post operative day, and then on weekly basis for 8 weeks. All patients were advised to wear a chin belt (compressive garments) from 2nd week post

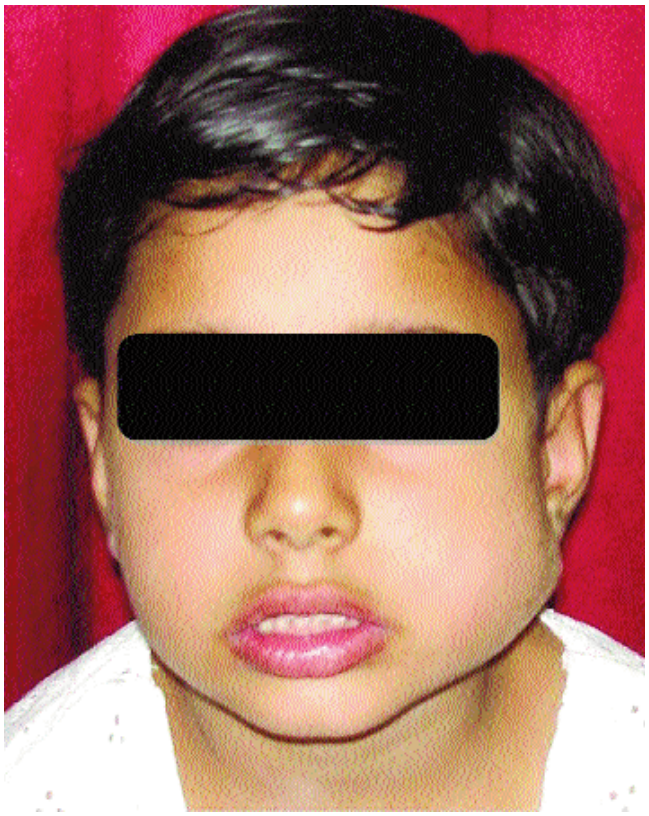

Figure-2: Prominent swelling with jaw clenching.

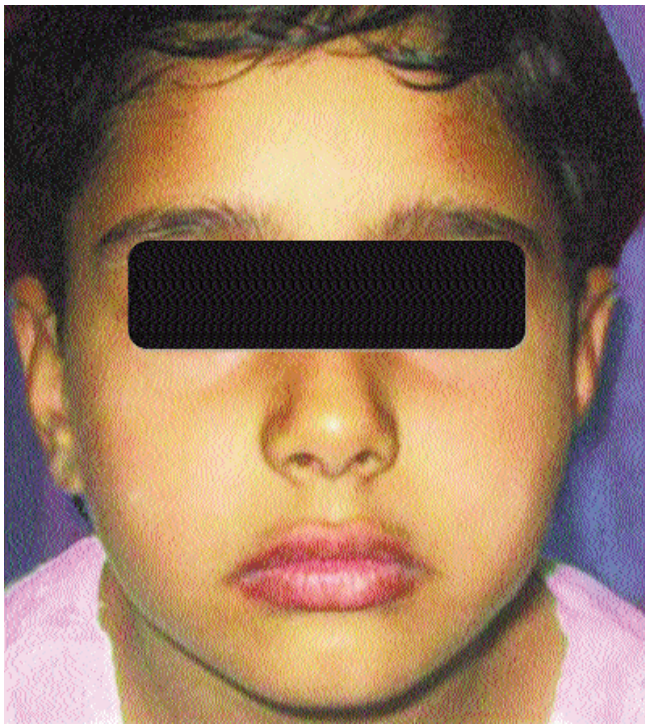

Figure-3: Symmetric face, three months after resection.

Table: Patient's Presentations.

Serial No.	Gender	Age (years)	Pain	Facial Asymmetry	Phleboliths	Previous treatment received
1.	M	14	Yes	At rest	Yes	sclerotherapy
2.	M	21	Yes	At clenching	Yes	NO
3.	F	6	No	At rest	Yes	Sclerotherapy
4.	M	17	No	At rest	No	NO
5.	F	15	Yes	At rest	Yes	NO
6.	F	20	No	At clenching	No	NO
7.	M	8	Yes	At rest	Yes	Sclerotherapy

operatively till the 8th week after surgery. After eight weeks patients were followed at 3months and 6 months. The main outcome measure was alleviation of symptoms (pain and/or facial asymmetry). All seven patients were symptom-free after resection, with a mean follow-up of 31±19 months.

A six years old girl presented with soft tissue swelling of her left cheek. There was marked facial asymmetry even at rest and was aggravated on clenching of jaw (Figure-2). She was referred to us from the interventional radiologist. She had undergone sclerotherapy one year back but there was no improvement in symptoms. After her pre-operative work up, her lesion was resected under general anesthesia. There was no recurrence of symptoms after a follow up of four years (Figure-3).

Discussion

VMs of skeletal muscle can also be clinically mistaken for capillary, lymphatic, arterial, or combined malformations. A soft tissue Sarcoma should also be considered in the differential diagnosis of VM within a skeletal muscle. Intramuscular VMs are more likely to present with phleboliths than malformations of similar size not involving muscle. Phleboliths often present as painful, hard masses.[5]

In our series of seven patients, the male to female ratio was 4:3. Kristina at al. in their study presented 12 patients of masseteric VMs with a male to female ratio of 1:1.[6]

Magnetic resonance imaging is the standard technique for the diagnosis of an intra-masseteric VMs and delineating the anatomic extent of the lesion. We performed MRI with contrast of the head and neck region in all of our patients.

VMs have been treated by a variety of techniques including irradiation, electrocoagulation, cryotherapy, intravascular magnesium or copper needles, surgical excision, lasers, compression, and sclerotherapy.[7] All these techniques have their particular indications and limitations. The most successful and commonly employed are sclerotherapy and surgical excision.

The decision as to whether proceed with sclerotherapy or surgical resection depends upon the severity of symptoms and the extent of involvement of group of the muscles. All sclerosants can have their own complications; most of them can cause cutaneous necrosis and haemolysis.[1] Sodium tetradecyl sulfate, is associated with less toxicity but potentially also, has lower efficacy. Ethanol can cause neural injury and cardiac arrest.[8] The results of sclerotherapy in diffuse intramuscular lesions are less predictable than those in the subcutaneous tissue.[9] Resection may be preferable if the lesion can be completely removed. Three of our patients have had sclerotherapy in the past, but there was no pronounced effect on their symptoms. In our series, none of the seven patients were ready for the staged treatment as they had come from far flung areas and wanted a onetime cure for their problem. As all of them were young with lesions confined to one muscle only sclerotherapy was not offered in any of these deep seated lesions. Kristina et al in their study attempted sclerotherapy in ten out of a total of twelve patients. Seven patients (70%) were symptom free after a follow up of 28 months.[7] In our series all seven patients (100%) who were treated by surgical resection, are symptom free after a mean follow up of 31 months. Partial resection is more often used for VMs in large muscle groups.

Several surgical approaches have been described for masseteric VM including cheek skin incision, peroral incision, parotidectomy incision, modified standard parotidectomy incision and face-lift-type incision. The potential risks of facial nerve deficit and Stensen's duct damage have been noted using the cheek skin and peroral incisions.[9]

The face lift incision, used in our patients, has the advantages of minimal cosmetic deformity, an excellent exposure of the lesion for excision, and visualization of the facial nerve branches as they exit from the anterior edge of the gland. From our experience and the review of the

literature, this approach in most cases offers the best exposure with the least morbidity.[9]

Ichimura et al.[10] noted that complete resection could be performed with less bleeding if a wide surgical field exposing the lesion was obtained. Ligation of feeding vessels also helps to minimize blood loss

The ideal treatment is complete excision of the tumour with a surrounding margin of normal muscular tissue, due to the infiltrative nature of the lesion.[10] We have found that as the masseter is an expendable muscle, it can be resected with malformation completely. It provides complete cure and psychological satisfaction to the patient. We have not found any post-operative morbidity in terms of mastication, swallowing or facial asymmetry. There was some post-operative facial oedema in all patients but it settled completely within 2-3 weeks with compression garment and anti-inflammatory medication. There was no complication such as haematoma, nerve injury, or hypertrophic scar formation. We have not encountered any recurrence of symptoms up to a mean follow up of 31 months.

Conclusion

Venous malformations isolated to the masseter muscle are a very small subset of all vascular malformations. They have a typical presentation that should allow for early identification, patient education, and treatment. Surgical resection can be reliably attempted in patients with masseteric venous malformation without any complication.

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