



**FIGURE 1.** (A) Initial aspect of lip wound after Weimaraner attack. (B) Lip reconstruction after saline irrigation and suture. (C) Final aspect of the reconstructed lip after 2 months.

## CLINICAL REPORT

Patient DPO, female, 51 years old, was victim of a dog bite in the right region of the face, involving the superior lip. The aggressor was the victim's domesticated dog, of Weimaraner breed. The clinical aspect of the lesion was a laceration of the lip, with penetration lesions in several tissue planes (Fig. 1A).

The treatment consisted of local anesthesia, abundant irrigation with saline solution followed by antiseptics of the lesion with iodopovidone. At that time, fragments, dirt, and foreign bodies were removed to prevent future infections. After the antiseptics, the debridement of the borders and the suture by planes were performed, using internal resorbable suture, Vycril 5-0, followed by closure of the most superficial skin layer with Nylon 5.0 suture (Fig. 1B).

The prescribed drug treatment was Amoxicillin 875 mg + Potassium Clavulanate 125 mg, 12/12 hours, for 7 days, and Nimesulide 100 mg, 12/12 hours, for 3 days. The patient was instructed to perform the anti-rabies and tetanus vaccine, to carry out the accident notification and continued to be followed up on an outpatient basis. The patient returned on the 7th postoperative day for evaluation; on the 15th day, the sutures were removed and at 2 months of postoperative, there can be observed tissues well scarred and without functional damage (Fig. 1C).

## DISCUSSION

Facial wounds caused by dog bites require quick care and a thorough examination of the head and neck. It is recommended to perform immediately cleaning of the wound, abundant irrigation with saline solution, debridement, and suture in the first 24 hours of the injury. In this way, infections and unfavorable aesthetic and functional scars could be prevented, with a better psychologic result for the patient, who can often present post-traumatic stress, anxiety attacks, insomnia, phobia of dogs, and not acceptance of their own image.<sup>1,4,6</sup> In the case reported, the patient received urgent treatment and had her surgery performed a few hours after the trauma, which allowed a safe primary closure and a lower probability of secondary contamination, making healing efficient and with better esthetics result.

Wounds in critical areas should be rapidly stabilized and lesions in extremely vascularized tissues, such as the scalp, should be addressed as soon as possible to bleeding control, and structures such as tear ducts, facial nerve, eyes, and parotid duct need redoubled care. In big avulsions, some authors consider lesion replantation, preparing donor vessels for further debridement, or like a secondary option, the defect coverage with local flaps or skin substitutes.<sup>7-9</sup>

It is important to emphasize that the best method of infection prevention for these patients is through antirabies and antitetanus pre- and postexposure prophylactic vaccination. In addition, various bacteria are present in the oral cavity of dogs, like *Staphylococcus*, *Streptococcus*, *Pasteurella*, and *Capnocytophaga canimorsus* can be observed. Many symptoms of infection, which include flushing, heat, edema, and presence of suppuration at the injury must be observed. Systemic symptoms include fever greater than 38°C, chills, tremors, and hypertrophy of glands. If these symptoms become present, it is necessary to use antibiotics to combat

infection, with the combination of Amoxicillin + Clavulanic acid, 12/12 hours, for 7 days is considered the gold standard in the treatment of this type of lesion.<sup>1,10</sup>

The breeds and location of the animal are essentials for diagnosis of clinical aspect of the wound. The literature show that young children around age 5 and high-risk dogs, like Pit Bull Terrier, and Rottweiler, are a high-risk combination considered conclusively a preventive standpoint (Barry L. Eppley, MD, DMD, and Arno Rene Schleich). However, in this case, a Weimaraner dog, a docile and domestic animal, that is rarely associated with attack, and without adult victims reported in the literature, bit its owner, a female adult that had her lip lacerated and almost avulsioned, what makes this case a really original report.

## CONCLUSION

In conclusion, facial traumas caused by animal bites need special and immediate care. The principles of antiseptics, debridement, and sutures in the first 24 hours of injury are essential for the patient's final outcome. In the case reported, the patient was attended soon after the trauma, which allowed good prevention of postoperative infection and a satisfactory result, without physical or psychologic damages.

## REFERENCES

- Porto GG, Souza BL, Sampaio DO, et al. Animal bite wound management: case reports [in Portuguese]. *Rev Cir Traum Buco-Maxilo-Facial* 2013;13:39-44
- Fonseca RF, Walker RV, Barber HD. Oral and maxillofacial trauma. In: Mark RS, Hany A, Emam, Larry LC, eds. *Management of Human and Animal Bites*. 4th ed. St Louis: Missouri; 2012:615-625
- Elizabeth G. Examining evidence on dog bite injuries and their management in children. *Nurs Child Young People* 2017;29:35-39
- Touré G, Angoulangouli G, Méningaud J, et al. Epidemiology and classification of dog bite injuries to the face: a prospective study of 108 patients. *J Plast Reconstr Aesthet Surg* 2015;68:654-658
- Foster MD, Hudson JW. Contemporary update on the treatment of dog bite: injuries to the oral and maxillofacial region. *J Oral Maxillofac Surg* 2015;73:935-942
- Zielińska-Kazmierska B, Wieczerek L, Koziół A, et al. Damage of facial soft tissues as a result of being bitten by a dog. *Pol Przegl Chir* 2014;86:364-369
- Ng ZY, Eberlin KR, Lin T, et al. Reconstruction of pediatric scalp avulsion injuries after dog bites. *J Craniofac Surg* 2017;28:1282-1285
- Makiguchi T, Yokoo S, Miyazaki H, et al. Combined bilateral hatchet and nasolabial advancement flaps for a large defect of the lower lip. *J Craniofac Surg* 2013;24:e588-e590
- Konofaos P, Kashyap A, Wallace RD. Total scalp reconstruction following a dog bite in a pediatric patient. *J Craniofac Surg* 2014;25:1362-1364
- Goldstein EJ, Citron DM, Wiold B, et al. Bacteriology of human and animal bite wounds. *J Clin Microbiol* 1978;8:667-672

## Minimally Invasive Approach for Resection of Masseteric Vascular Malformations

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**Objective:** Vascular malformations (VMs) in the head and neck region often cause esthetic as well as functional problems for

patients. Intramuscular VMs (IVMs), such as those in the masseter, can cause severe facial asymmetry and typically are excised transcutaneously to facilitate wide exposure and safe dissection from the facial nerve. This requires extensive dissection, prolonged healing, and can lead to suboptimal facial scarring.

**Methods:** We describe the technique of resecting large IVMs of the masseter muscle in 3 patients using an entirely intraoral approach with continuous nerve monitoring and without visible facial scarring or secondary deformity. Preoperative injection of sclerotherapy was performed to reduce intra-operative bleeding and optimize resection.

**Results:** Successful excision was performed without complication in 3 patients to date. Total average operating room time was 120 minutes (range 95–145 minutes). Estimated blood loss was 213 mL (range 180–240 mL). The patients were discharged home either post-operative day (POD) 1 or 2, with 1 returning to work POD 4. Facial nerve function was normal postoperatively and no hematoma developed. Subjective masticatory function was equivalent to preoperative levels in all patients.

**Conclusions:** Intraoral excision of VMs of the masseter muscle can be safely performed without added risk or complication. Continuous facial nerve monitoring allows minimally invasive approaches to be considered with less risk of iatrogenic facial nerve injury. We purport that this is a safe and effective method with substantially better esthetic outcomes compared with traditional transcutaneous approaches.

**Key Words:** Intraoral resection of masseteric malformation, intraoral, intraoral, masseter, masseteric vascular malformation, minimally invasive resection of masseteric vascular malformation, minimally invasive resection, minimally invasive, resection masseteric malformation, vascular malformations, venous malformation

Intramuscular vascular malformations (IVMs) represent <1% of vascular anomalies that occur in skeletal muscle, 15% of which occur in the musculature of the head and the neck.<sup>1</sup> Of all IVMs of the head and neck, those of the masseter are the most common.<sup>1</sup> IVMs occur most commonly in the first 3 decades of life.<sup>2</sup> History and physical may not be enough for diagnosis of these malformations as reports of less than 8% to 15% have been accurately diagnosed preoperatively.<sup>3</sup> The most common findings are painful, subtle masses of the cheek in 50% to 60% of cases as well as facial asymmetry.<sup>4</sup> As such, adjunctive imaging, such as magnetic resonance imaging (MRI), is critical in determining the extent of anatomic involvement and the nature of the IVM. Complete surgical excision is a treatment option for these patients and can be performed without facial nerve injury or excessive bleeding. Previous authors have described an intraoral approach for masseter reduction for the contouring of the Asian mandibular angle.<sup>5–7</sup> The aim of this manuscript is to describe a safe surgical technique for

excision of three isolated masseteric venous malformations in both an adult and pediatric patient performed by an intraoral approach.

## METHODS

Patients were selected based on the size and location of their IVMs. MRI with contrast of the face was performed before surgical intervention on all 3 patients. Immediately (<24 hours) before surgical intervention, the patients were sent for sclerotherapy with sodium tetradecyl sulfate (STS) in an attempt to reduce the size of the lesion and control the risk of bleeding to optimize surgical conditions.

## Case Report

A 24-year-old otherwise healthy male presented with a complaint of facial asymmetry and swelling in the left anterior angle of his mandible region that had been gradually increasing in size during the previous 7 years. There was no history of trauma or previous operation. On physical examination, a 3 x 1.5 cm firm, round, mildly compressible mass, was palpable over the angle of the mandible that became apparent during mastication and valsalva (Fig. 1). The mass could not be definitively separated from the parotid gland by palpation and there were no discolorations of the overlying skin, pulsations, bruits, or adenopathy, suggesting the presence of a deep venous malformation. Magnetic resonance imaging (MRI) of the maxillo-facial region revealed a circumscribed lesion, hyperintense to the masseter muscle and hypointense to the parotid gland on T1-weighted images. On T2-weight imaging, the mass was markedly hyperintense to both the masseter muscle and parotid gland (Fig. 1B) with a rounded area of signal hypointensity on both T1- and T2-weighted images. These findings were strongly suggestive of an intramuscular venous malformation of the masseter muscle.

After careful review and analysis of the imaging, the attending surgeon (N.B.) felt that an intraoral incision would be most beneficial



**FIGURE 1.** (A) Preoperative image of an exemplary patient with a left-sided intra-masseteric venous malformation. (B) Magnetic resonance imaging of the intramuscular vascular malformations (IVM). (C) Intraoperative image of the isolated IVM. (D) Patient 6 months postoperatively demonstrating restored facial symmetry.

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to the patient functionally and esthetically. Intraoperatively, facial nerve monitoring leads were placed in the distal muscles for continuous monitoring of the buccal, zygomatic, and marginal mandibular nerves. An incision was then made intraorally in the buccal mucosa down to the buccal fat. Careful, blunt dissection readily exposed the venous malformation, which had clearly infiltrated the masseter. Dissection continued anteriorly underneath the masseteric fascia (below the plane of the facial nerve). Once the lesion had been freed anteriorly, the posterior aspect of the lesion was dissected out and demarcation of the mass was complete (Fig. 1C). Dissection continued toward the origin of the muscle at the level of the zygomatic arch. Under direct visualization with the LigaSure (Covidien, Dublin, Ireland), the IVMs were removed from the surrounding local tissue. Local tissue transposition with buccal fat was performed to reduce dead space and prevent a contour deformity produced by removal of the space-occupying lesion.

## RESULTS

Successful intraoral excision was performed without complication in three patients to date. Total average OR time was 120 minutes (range 95–145 minutes). Estimated blood loss was 213 mL (range 180–240 mL). The patients were discharged home either on postoperative day (POD) 1 or 2, with one returning to work on POD 4. Facial nerve function was normal postoperatively. Subjective masticatory function was equivalent to preoperative levels.

Microscopic examination showed the tumors to be composed of large, thin-walled, vascular channels surrounded by fibrous tissue, confirming the diagnosis of intramuscular venous malformations. Follow-up at 6 months revealed fully healed intraoral incisions, preserved facial nerve function, and completely symmetrical cheeks in each patient (Fig. 1D).

## DISCUSSION

IVMs often do not always have typical VM presentations, making them difficult to diagnose clinically.<sup>8</sup> On physical examination, a firm and nontender mass may be palpated when the jaw is clenched; however, MRI is considered the criterion standard for delineating IVMs.<sup>9</sup>

Sclerotherapy is currently the primary or adjunctive treatment for venous malformations.<sup>10,11</sup> However, even with success rates as high as 82% to 94% with particular sclerosants, it is not without risks.<sup>12</sup> Many of the veins of the middle face lack valves, all of which communicate directly with the cavernous sinus, posing the risk of cavernous sinus thrombus and infection. Furthermore, complications such as pain, mucosal blistering and necrosis, as well as nerve damage ranging from transient facial neuropraxia to visual loss are also possible.<sup>12</sup> Furthermore, large VMs often require several sclerotherapy sessions, leading to additional exposure to anesthesia each session, and a heavy burden of treatment for patients.<sup>13</sup> In our patient, we used STS (an agent with minimal side effects) as an adjunct to surgery to help reduce intraoperative bleeding.

In many cases, even after sclerotherapy, which may reduce or obliterate the VM, surgical excision is often still required for optimal cosmesis. Conventional surgical treatment of IVMs of the head and neck uses a transcutaneous approach.<sup>4</sup> However, this approach requires extensive facial and facial nerve identification and possible branch dissection. The intraoral approach introduced in this article allows for excision of the IVMs in a dissection plane deep to the facial nerve branches with improved safety when using continuous facial nerve monitoring.<sup>4</sup> In addition, the limited dissection that the intraoral approach offers, allows for a significant reduction in postoperative healing.

Patients are often hesitant to pursue surgery given the risk of potential disfigurement but our minimally invasive intraoral

approach offers the benefit of leaving no visible facial scars with the possibility of faster healing. Furthermore, this technique allows for a faster, one-stage, long-term solution for patients, eliminating the burden of several sessions of sclerotherapy. Our 3 patients were able to return to work/school within the first week postoperatively, had no postoperative sequelae, and had uneventful operations and recoveries with subjectively less discomfort and swelling over traditional surgical techniques. We advocate consideration of a minimally invasive intraoral approach for large, well-defined IVMs, specifically of the masseter, as an alternative to sclerotherapy and traditional transcutaneous surgical resection.

## REFERENCES

- Bucci T, De Giulio F, Romano A, et al. Cavernous haemangioma of the temporalis muscle: case report and review of the literature. *Acta Otorhinolaryngol Ital* 2008;28:83–86
- Hein KD, Mulliken JP, Kozakewich HPW, et al. Venous malformation of skeletal muscle. *Plast Reconstr Surg* 2002;110:1625–1635
- Shallow TA, Eger SA. Primary hemangiomas of skeletal muscle. *Ann Surg* 1944;119:700–740
- Wolf GT, Daniel F, Krause CJ, et al. Intramuscular hemangioma of the head and neck. *Laryngoscope* 1985;95:210–213
- Yuan J, Zhu QQ, Zhang Y, et al. Influence of partial masseter muscle resection along with reduction of mandibular angle. *J Craniofac Surg* 2013;24:1111–1113
- Satouh K, Mitsukawa N. Mandibular marginal contouring in oriental aesthetic surgery: Refined surgical concept and operative procedure. *Ann Plast Surg* 2014;72:498–502
- Satouh K. Mandibular marginal contouring in oriental aesthetic surgery. *Plast Reconstr Surg* 2004;113:425–430
- Kim JH, Lew BL, Sim WY. Intramuscular vascular malformation of the temporalis muscle: a case report and review of the literature. *Ann Derm* 2014;26:428–430
- Hyodoh H, Hori M, Akiba H, et al. Peripheral vascular malformations: imaging, treatment approaches, and therapeutic issues. *Radio Graphics* 2005;25:S159–S171
- Uehara S, Osuga K, Yoneda A, et al. Intralesional sclerotherapy for subcutaneous venous malformations in children. *Pediatr Surg Int* 2009;25:709–713
- Blaise S, Charavin-Cocuzza M, Riom H, et al. Treatment of low-flow vascular malformations by ultrasound-guided sclerotherapy with polydocanol foam: 24 cases and literature review. *Eur J Vasc Endovasc Surg* 2011;41:412–417
- Zhao JH, Zhang WF, Zhao YF. Sclerotherapy of oral and facial venous malformations with use of pingyangmycin and/or sodium morrhuate. *Int J Oral Maxillofac Surg* 2004;33:463–466
- Goyal M, Causer PA, Armstrong D. Venous vascular malformations in pediatric patients: comparison of results of alcohol sclerotherapy with proposed MR imaging classification. *Radiology* 2002;223:639–644

## Changes in Cervical Lordosis After Orthognathic Surgery in Skeletal Class III Patients

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**Abstract:** The purpose of this study was to evaluate cervical lordosis and head posture changes using lateral cephalographs after