

# Vascular Malformation of the Tongue Treated With Transmucosal Nd:YAG Laser

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We describe an interesting case of a 62-year-old white female who presented to our clinic with a vascular malformation of her tongue that had been clinically apparent for approximately 30 years. The area had been surgically excised twice, with recurrence following both procedures; however, surgical treatment was limited owing to fear of potential functional impairment. After obtaining magnetic resonance imaging of the affected area, the patient was treated with one session of transmucosal Nd:YAG laser. The affected area appeared to resolve almost immediately following treatment. The patient had continued resolution at her 5-month follow-up visit and at 18 months by telephone follow-up. This case illustrates an excellent outcome from transmucosal treatment of a vascular malformation of the tongue with Nd:YAG laser. We discuss the various available treatment modalities for vascular malformations of the tongue as well as the risks and benefits of each. We also present a recent review of the literature pertaining to Nd:YAG laser treatment of these lesions.

Vascular anomalies are a relatively common finding in the dermatologic patient population and can be classified into 2 major categories: hemangiomas and vascular malformations. Whereas hemangiomas are benign tumors presenting in infancy that rapidly proliferate then involute over several years, vascular malformations represent structural defects in vascular development without endothelial proliferation.<sup>1</sup> Vascular malformations are often present at birth, although they may not become clinically apparent until later in life. They demonstrate a normal rate of endothelial growth and grow without the patient ever involuting. Vascular malformations may be capillary (port-wine stains),

arterial, venous, or a combination of these different types of vasculature.<sup>2</sup> Arteriovenous malformations are high-flow lesions that must be distinguished from arteriovenous fistulae and other vascular anomalies. Arteriovenous malformations typically present with symptoms such as pain, ulceration, hemorrhage, and dysfunction.<sup>3</sup>

Vascular malformations can be physically debilitating as well as cosmetically disfiguring to patients, depending on their extent and location. Because they do not typically involute, therapy may be required. There are many treatment options available for these lesions, including embolization, steroid therapy, surgical excision, irradiation,<sup>4</sup> intralesional 5-fluorouracil injection,<sup>5</sup> transfixion suture,<sup>6</sup> and CO<sub>2</sub> laser.<sup>7</sup> Additionally, interstitial Nd:YAG laser treatment has been reported.<sup>8</sup> However, in our review of the literature, there are limited studies and reports reviewing transmucosal laser treatment of vascular malformations specifically located on the tongue. Transmucosal Nd:YAG laser treatment offers an advantage over the more widely reported interstitial Nd:YAG laser because it is less invasive, typically does

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Patient with vascular malformation of the tongue before (A) and 5 months after (B) one treatment with 9 pulses of a 1064-nm Nd:YAG laser.

not require anesthesia, offers superior results, and has minimal associated complications. The location of the vascular malformation on the tongue is an important consideration when weighing treatment options since damage to the musculature, nerves, and mucosa surrounding the lesion can cause severe functional impairment. We present an interesting case of a vascular malformation of the tongue that showed immediate and complete response to transmucosal Nd:YAG laser treatment and offer an updated review on recent literature pertaining to this topic.

### CASE REPORT

A 62-year-old white female with a history of asthma presented to our clinic with a vascular malformation of her tongue that had been clinically apparent for approximately 30 years (Figure, A). She reported that the area was easily traumatized by eating, with secondary swelling and occasional bleeding. The area had been surgically excised twice, with recurrence following both occasions. At the time of presentation, the lesion continued to be very symptomatic. On physical examination of the oral cavity, there was a 2.5×1-cm purple and blue vascular lesion that involved less than one half of the tongue. Magnetic resonance imaging was performed and showed no connection to vital structures or extent beyond what was clinically apparent.

The patient was given oral prednisone for several days starting 1 day prior to the procedure. After photographs were taken and written consent was obtained, the area was treated with 9 pulses of a 1064-nm Nd:YAG laser at 175 joules/cm<sup>2</sup>, pulse width 50 msec, spot size 5 mm, 1 Hz with contact cooling. The clinical end point was

vasospasm of the vascular malformation. We noted immediate clearance of the vascular malformation, with resolution of her bleeding, swelling, and discomfort. The patient was continued on the steroid taper for a few days to minimize any posttreatment inflammation and swelling. The patient was seen for follow-up 5 months after treatment, with continued resolution of the area and complete resolution of her symptoms (Figure, B). She was contacted by telephone 18 months after treatment and reported remaining symptom free, with no recurrence of the lesion. She has no impairment in speech or swallowing secondary to the laser treatment.

### DISCUSSION

Vascular malformations of the head and neck range from being minimally noticeable to producing significant cosmetic disfigurement with impairment of function. Because of the location of the lesion in our patient and her symptoms of dysphagia, bleeding, and discomfort with eating, as well as periodic swelling that caused partial airway obstruction, treatment of the vascular malformation was medically necessary. The patient had undergone 2 previous invasive surgical excisions with recurrence after both procedures. The surgeries were limited owing to fear of functional impairment if too much of the tongue musculature were removed.

Surgical resection can be an effective treatment for vascular malformations; however, the potential for large-volume blood loss poses a challenge. Additionally, the inability to identify the surgical margins of the nidus can result in recurrence.<sup>3</sup>

Embolization is another treatment option and is aimed

at the nidus or central feeding vessel of the malformation; this method as a sole treatment for the arteriovenous malformation can result in recruitment of collateral vessels, making further embolization or surgical resection impossible.<sup>3</sup> Embolization represents a promising alternative treatment in cases of surgical inaccessibility or when surgery would cause an unacceptable deformity.

Surgery with embolization can avert large-volume blood loss; however, this method is not always successful and occasionally may cause embolization of unintended vessels, with subsequent complications. Doppler ultrasound, angiography, or both should be performed prior to therapy in large vascular malformations to ensure that the lesion is not of the high-flow type and to prevent potential complications from extensive hemorrhage. Pure venous malformations may be treated with direct percutaneous injection of a fibrosing material, surgical resection, or both.<sup>9</sup>

The Nd:YAG laser consists of an active medium of crystalline yttrium-aluminum-garnet doped with neodymium ions; a krypton arc lamp typically acts as the light source that excites the crystal. The Nd:YAG wavelength (1064 nm) allows for penetration and coagulation of the deeper vessels of the skin and mucosa with minimal absorption within the most superficial aspect of the skin, thereby decreasing epidermal damage. Coagulation is achieved as the laser heats the tissue of the vessel, causing protein denaturation and vessel shrinkage. This heat coagulation optimizes hemostasis during the procedure.<sup>10</sup>

Although treatment of a hemorrhagic lymphatic malformation of the tongue with a pulsed dye laser has been previously reported,<sup>11</sup> the Nd:YAG offers several advantages over the pulsed dye laser since it penetrates deeper while targeting deoxyhemoglobin, whose absorption peaks at 1064 nm<sup>12</sup>; this targets the aberrant vessels while averting damage to the surrounding tissues.<sup>13</sup>

Interstitial Nd:YAG treatment of vascular malformations of the tongue and skin have been previously reported.<sup>8,14</sup> Whereas interstitial Nd:YAG treatment offers an effective treatment option, direct transmucosal laser ablation with the Nd:YAG averts the risk of general anesthesia and bleeding and is less invasive.

Transmucosal Nd:YAG treatment of vascular malformations of the tongue has been previously studied, but the method used direct lesion contact with the laser fiber. Vesnaver and Dovsak<sup>15</sup> studied 111 patients with vascular lesions (including hemangiomas and vascular malformations) of the head and neck treated with Nd:YAG laser; 35 (32%) of these lesions were located on the tongue. Most patients had complete resolution of their lesions without any complications. In the 5 patients with large vascular lesions, sloughing took place in 2 to 3 days, but complete healing took up to 4 weeks. Patients in this group also had a higher incidence of scarring.

The method used in this study differs slightly from the technique used in our patient in that the fiber of the Nd:YAG laser was in direct contact with the surface of the vascular lesion without a cooling tip. Lesions in this study, which were located subcutaneously, were treated with interstitial Nd:YAG to avoid damage to the skin surface.<sup>15</sup>

### SUMMARY

Transmucosal treatment with the 1064-nm Nd:YAG laser is a noninvasive procedure that resulted in almost immediate and lasting resolution of the vascular malformation in our patient with minimal pain or discomfort. This procedure is safe, effective, and avoids many of the complications that may arise with more invasive treatments. This case report exemplifies the excellent results that can be achieved with transmucosal Nd:YAG laser therapy and reviews the most current literature pertaining to this subject.

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