Lingual Artery Ligation: Strategy for Bleeding from Artery Injury at the Base of the Tongue: Report of Two Cases

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ABSTRACT

The bleeding caused by injury to the lingual artery at the base of the tongue due to surgery or tumors is infrequent.

The increased frequency in the indication of transoral approaches to treat different pathologies affecting the oropharynx requires the surgical team to have experience in managing this complication.

Ligation of the lingual artery in the neck is a very effective surgical technique to solve the bleeding; however, it is essential to be aware of the possible anatomical variants the artery may have in its cervical trajectory.

Due to its low incidence, we propose to describe two clinical cases of patients who had severe bleeding due to a lesion of the lingual artery at the base of the tongue, produced by surgical damage and erosion due to a tumor.

Key words: lingual artery, base of tongue, bleeding, external ligation

Ligadura de la arteria lingual: estrategia para hemorragias por lesión de la arteria en la base de la lengua: informe de dos casos

RESUMEN

La hemorragia producida por lesión de la arteria lingual en la base de la lengua por cirugías o por tumores es infrecuente.

La mayor frecuencia en la indicación de abordajes transorales para tratar diferentes patologías que afectan la orofaringe requiere que el equipo quirúrgico tenga experiencia en el manejo de esta complicación.

La ligadura de la arteria lingual en el cuello es una técnica quirúrgica muy eficaz para solucionar la hemorragia, pero es importante conocer las posibles variantes anatómicas que puede tener la arteria en su trayecto cervical.

Debido a su baja incidencia se propone como objetivo describir dos casos clínicos de pacientes que tuvieron hemorragias graves por lesión de la arteria lingual en la base de la lengua, producidas por daño quirúrgico y por erosión por tumor.

Palabras clave: arteria lingual, base de la lengua, hemorragia, ligadura externa.

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INTRODUCTION

Bleeding due to injury to the lingual artery (LA) at the base of the tongue is uncommon.

With the increasing use of transoral surgeries to resect oropharyngeal tumors or to reduce lingual collapse in patients with obstructive sleep apnea, the frequency of damage to the lingual artery at the base of the tongue has risen.

Tumors located at the base of the tongue can also cause artery erosion, leading to severe bleeding that jeopardizes the patient's life.

The surgical team should have expertise in transoral surgery and external approaches, or the hospital should have otolaryngologists skilled in these techniques to address this rare and severe complication.

Due to its low incidence, the objective is to describe two clinical cases of patients who experienced severe bleeding due to lingual artery injury at the base of the tongue caused by surgical damage and tumor erosion.

CLINICAL CASES

Case 1

Male patient, 48 years old.

He experienced a moderate degree of obstructive sleep apnea (apnea/hypopnea index of 27), as diagnosed by overnight polysomnography with oximetry.

Somnoendoscopy revealed lateral and anteroposterior collapse of the pharynx and base of the tongue, leading to the recommendation of pharyngoplasty with barbed sutures and volumetric reduction of the base of the tongue using interstitial radiofrequency.

During the radiofrequency procedure on the base of the tongue under general anesthesia, significant bleeding occurred due to injury to the lingual artery.

Immediate consultation was sought with a specialized Head and Neck Otolaryngology (ENT) team.

An attempt was made to cauterize the artery transorally using a laryngoscope and a monopolar microscope, employing suction and protected straight and angled forceps.

Bleeding was successfully controlled initially, but 30 minutes later, during the pharyngoplasty, the hemorrhage recurred.

The decision was made to perform a lateral right external cervical approach involving a 3 cm horizontal incision in the skin located between the thyroid cartilage and the hyoid bone.

The patient was positioned with neck hyperextension. The anterior edge of the sternocleidomastoid muscle was dissected, exposing the primitive and external carotid artery, identifying the emergence of the lingual artery after dissection and preservation of the greater hypoglossal nerve (Fig. 1)

We performed arterial ligation using non-absorbable sutures. A cervical drain was left in place, and the wound was sutured layer by layer. The surgery was completed, concluding the pharyngoplasty.

The patient stayed in the Intermediate Care Unit for three days and did not experience recurrent bleeding.

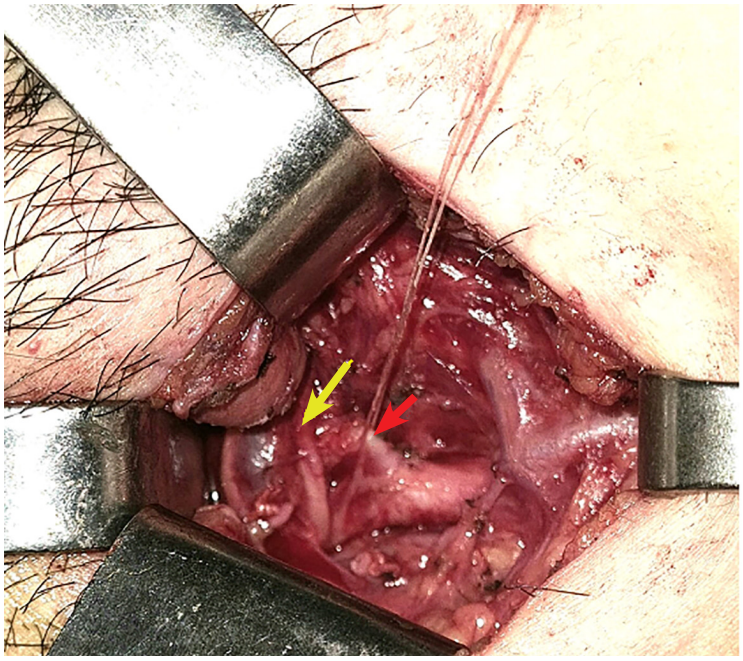

Figure 1. Ligation of the lingual artery as a single branch at its emergence from the external carotid artery. Red arrow: lingual artery, yellow arrow: hypoglossal nerve.

Case 2

66-year-old male.

He consulted for odynophagia of 4 months of onset. Rhinofibrolaryngoscopy diagnosed an ulceroinfiltrative tumor at the base of the left tongue.

Neck computed tomography with intravenous contrast showed a tumor at the base of the left tongue that did not exceed the midline. There were no cervical adenopathies.

We performed transoral microsurgery and obtained a biopsy of the tumor.

The evaluation was completed using positron emission tomography.

The histopathological diagnosis indicated squamous cell carcinoma with staging as T3N0M0 p16 negative.

Forty days after the biopsy, while undergoing studies to begin chemoradiotherapy treatment, he visited the emergency room due to severe hemoptysis. Emergency orotracheal intubation was carried out, and the patient was admitted to the Intensive Care Unit.

The hospital did not have endovascular therapy, so we decided to perform an external cervical ligation of the left lingual artery.

We made a left horizontal cervical incision at the level of the hyoid bone, dissected the tissues, displacing the submaxillary gland superiorly, and searched for the lingual artery in Pirogoff's triangle, limited posteriorly by the posterior belly and intermediate tendon of the digastric muscle, superiorly by the hypoglossal nerve and anteriorly by the posterior border of the mylohyoid muscle. In this sector, we dissected the fibers of the hyoglossus muscle but identified the LA above Pirogoff's triangle.

The artery was ligated with non-resorbable material (Fig. 2).

The patient remained in Intensive Care for 15 days and was intubated for 10 days because he presented pneumonia as a complication.

He had no recurrent bleeding and was able to start his oncological treatment afterward.

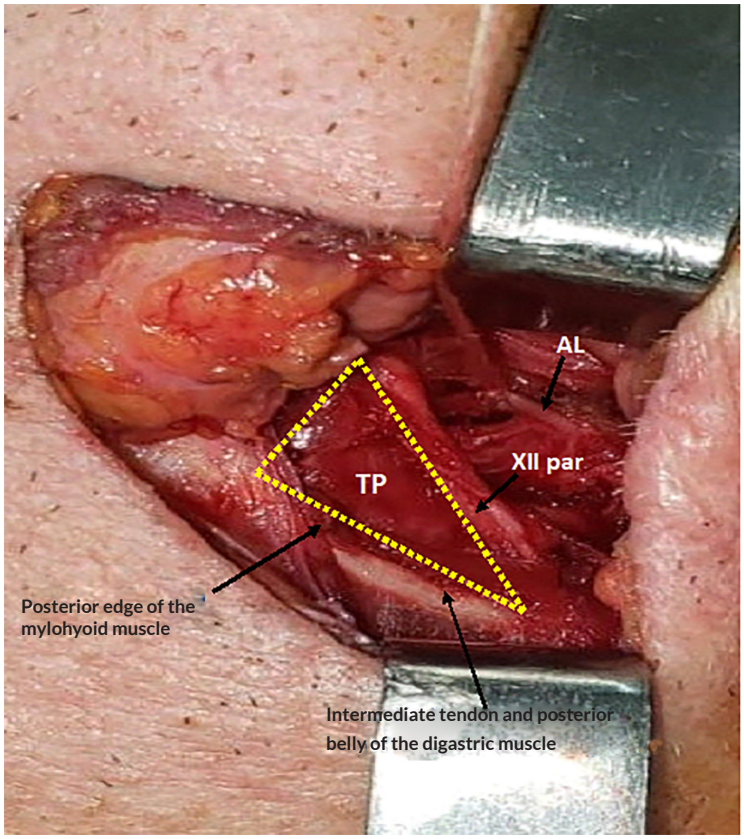

Figura 2. Ligadura de la arteria lingual en el cuello: se observa la arteria lingual (AL) ligada, localizada por encima del nervio hipogloso y por fuera del triángulo de Pirogoff (TP).

DISCUSSION

The lingual artery originates from the external carotid artery at the level of the hyoid bone, either as a single branch or as part of a linguofacial trunk. It is closely associated with the hypoglossal nerve and courses through the submandibular space beneath the mylohyoid muscle, which separates it from the twelfth cranial nerve. At the level of the anterior border of the hyoglossus muscle, the artery ascends and divides into the sublingual and deep lingual arteries.

A study of anatomical specimens found that the lingual artery originated from a linguofacial trunk in 25% of cases. It was located inferior to the intermediate tendon of the digastric muscle in 97.92% of cases, and in 89.52% of cases, the LA appeared superior to the hyoid bone.

In 72.92% of cases, the artery was situated inferior to the hypoglossal nerve; in 12.50%, above the nerve; and in 14.58%, positioned superiorly.

Another cadaveric study[2] dissected 91 necks and found that the Pirogoff triangle was present in 53 dissections (58.2%) but not in the remaining 38 (41.8%) due to the hypoglossal nerve not being located above the intermediate tendon of the digastric muscle.

The lingual artery (LA) was identified as inferior to the intermediate tendon of the digastric muscle in 67% of cases and positioned 6.3 mm above the hyoid bone. It was inferior to the hypoglossal nerve in 84.6% of cases and superior in 4.4%.

Other locations where the LA can be dissected include Beclard's triangles (bounded superiorly by the posterior belly of the digastric muscle, posteriorly by the posterior edge of the hyoglossus muscle, and inferiorly by the hyoid bone) and Lesser's triangle (bounded above by the greater hypoglossal nerve, posteriorly by the posterior belly of the digastric muscle, and anteriorly by the anterior belly of the digastric muscle).

Krishan Sarna and colleagues reported that in 70 cadaveric neck dissections, they found Beclard's triangle in 64 dissections (91.42%), Lesser's triangle in 46 dissections (65.71%), and Pirogoff's triangle in 39 dissections (55.71%).

It is essential to consider the course of the artery in the tongue. At the base of the tongue, the artery lies laterally and courses medially at the level of the V of the tongue; in the oral tongue, it stands 1 cm from the midline. This anatomical relationship is relevant as it establishes a safer zone for performing surgeries at the base of the tongue, with a greater distance between the lingual arteries 4 (Fig. 3).

The incidence of postoperative bleeding in transoral robotic oropharyngeal surgeries is 5 to 10%[5].

In transoral surgeries for squamous cell carcinomas at the base of the tongue, it is usual to perform neck dissection simultaneously with tumor resection due to the high frequency of cervical metastases. In these cases, it may be advisable to perform prophylactic ligation of the lingual artery (LA) in the neck during the dissection[6,7].

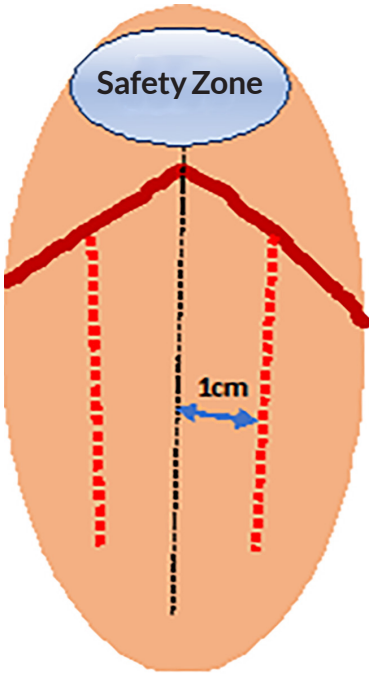

Figure 3. Trajectory of the lingual artery at the base of the tongue (safe zone) and in the oral tongue (distance of 1cm between the artery and the midline).

Bleeding from LA injury can jeopardize the patient's life not only due to blood loss but also because of the potential aspiration leading to asphyxiation. When the patient is awake, it is advisable to intubate him until the hemorrhage resolves or, if intubation is difficult, to perform a cricothyrotomy or emergency tracheostomy [8,9]. Another option to address bleeding is LA embolization [8,9].

In the first case described, the patient was under anesthesia. Therefore, we opted for external ligation after the failure of transoral cauterization to avoid transferring an anesthetized and bleeding patient to the angiography suite.

In the second case described, we treated the patient at a facility without endovascular therapy.

We had performed the biopsy and knew the tumor's laterality.

In cases of central tumors or those crossing the midline at the base of the tongue, external ligation of the artery is not advisable as the laterality of the bleeding's vascular supply is unknown. It is essential to perform angiography with embolization to identify the bleeding site and proceed to obliterate the damaged artery.

Some important considerations

Knowledge of the anatomy and surgical technique to ligate the LA in the neck is important because it allows this grave complication to resolve during the same surgical procedure.

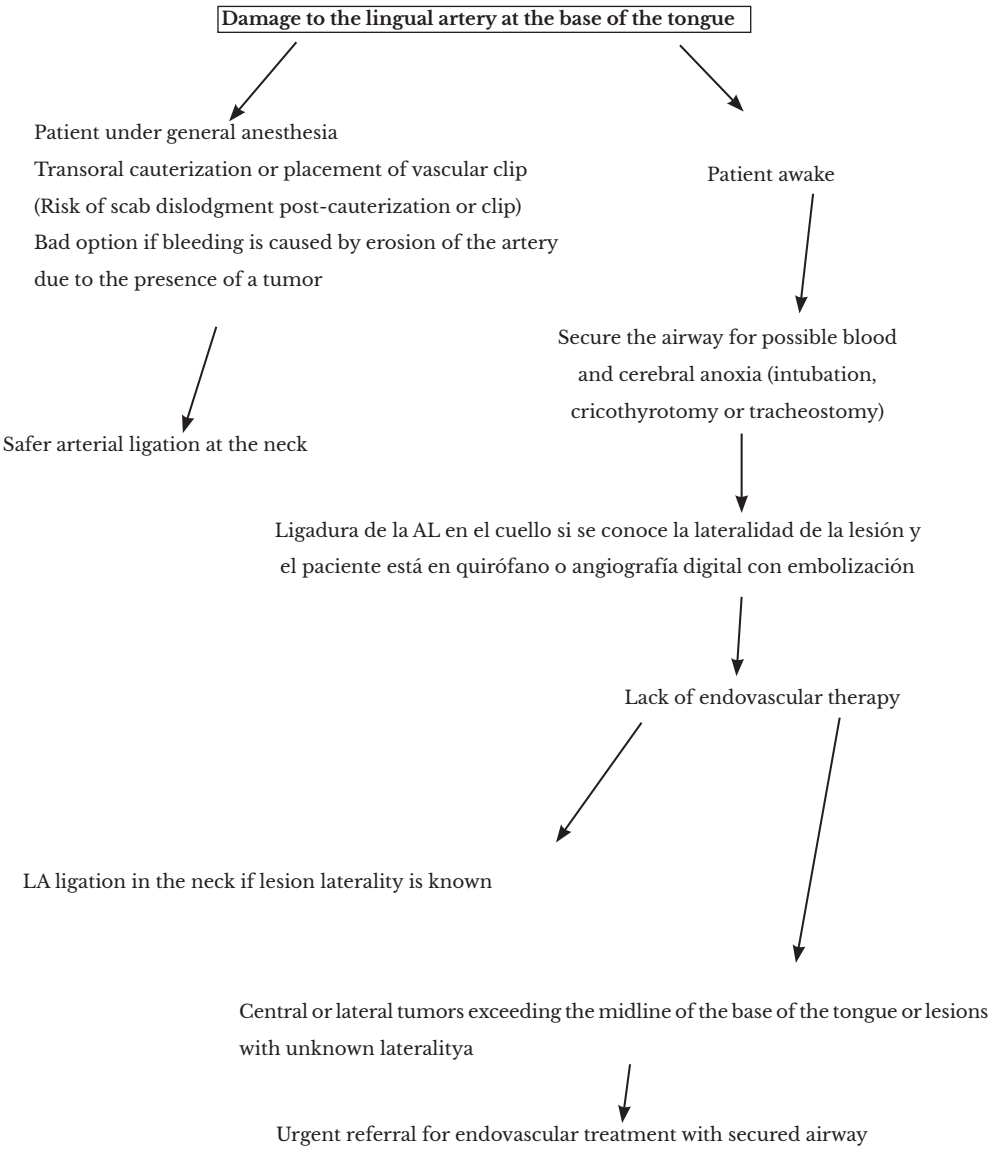

Figure 4. Management of bleeding caused by lesion of the lingual artery at the base of the tongue

The cervical site of the lingual artery (LA) ligation does not affect the outcome of the bleeding resolution, whereas identifying the artery in Pirogoff's triangle in Pirogoff triangle may be more challenging due to a higher incidence of anatomical variations.

If endovascular therapy is available, the patient is not under anesthesia, or the tumor at the base of the tongue extends beyond the midline or is central, it is advisable to occlude the LA through embolization, ensuring airway management beforehand.

Figure 4 depicts a proposed treatment approach for hemorrhages originating from the lingual artery based on our experience.

Conflicts of interest: The authors declare no conflicts of interest.

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