

## Intramuscular Lipoma in the Tongue and Surgical Removal with Diode Laser. Case-Supported Literature Review \*

**Lipoma intramuscular en la lengua y remoción quirúrgica con láser de diodo. Revisión de la literatura apoyada en un caso**

**Lipoma intramuscular na língua e remoção cirúrgica com laser de diodo. Revisão de literatura com suporte de caso**

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### ABSTRACT

**Background:** Lipoma is a benign mesenchymal tumor formed by subcutaneous adipose tissue. Lipomas grow without presenting clinical signs, although they can cause compression and displacement of surrounding anatomical structures. It is unlikely to find a lipoma intramuscularly in the oral cavity. However, it can be located in the mucosa and floor of the mouth or tongue. **Purpose:** To analyze relevant literature and support it with a clinical case on the laser surgical approach to an intramuscular lipoma in the tongue of unusual appearance. **Methods:** The analysis included scientific articles published in English, Spanish, and Portuguese in electronic format, which were available in digital repositories and the databases of PubMed, LiLACS and Google Scholar. Case descriptions and series and other reviews were included. The case was of an adult patient who underwent surgery with a diode laser (Wiser 3®) with 3 wavelengths. **Findings:** From 30 articles selected from the databases that were registered in PRISMA or CARE, four titles were selected that allowed us to learn that lipomas in the oral cavity predominate in the female sex and that they appear between 50 and 80 years of age. The most frequent

lipomas in the mouth are simple and fibrolipomas. **Conclusions:** The reviewed literature confirms that intramuscular and tongue lipomas are unusual in terms of their histological identification and their site of appearance.

**Keywords:** dentistry; diagnosis; laser; lipoma; oral medicine; oral pathology; oral semiology; stomatognathic system

## RESUMEN

**Antecedentes:** El lipoma es un tumor mesenquimal benigno formado por tejido adiposo subcutáneo. El lipoma crece sin presentar signos clínicos aunque puede ocasionar compresión y desplazamiento de estructuras anatómicas circundantes. Es poco probable encontrar un lipoma en la cavidad oral intramuscularmente. Sin embargo, sí puede estar localizado en la mucosa y el piso de la boca o la lengua. **Objetivo:** Analizar la literatura relevante y apoyarla en la descripción de un caso sobre el abordaje quirúrgico con láser de un lipoma intramuscular en la lengua de aparición inusual. **Métodos:** El análisis incluyó artículos científicos publicados en inglés, español y portugués en formato electrónico, que estaban disponibles en repositorios digitales y las bases de PubMed, LiLACS y Google Académico. Se incluyeron descripciones y series de casos y otras revisiones. El caso era de un paciente adulto a quien se le realizó una cirugía con láser de diodo (Wiser 3<sup>®</sup>) con 3 longitudes de onda. **Resultados:** De 30 artículos seleccionados de las bases que estaban registrados en PRISMA o CARE, se seleccionaron cuatro títulos que permitieron aprender que los lipomas en la cavidad oral predominan en el sexo femenino y que aparecen entre los 50 y 80 años. Los lipomas más frecuentes en boca son el simple y los fibrolipomas. **Conclusiones:** La literatura analizada confirma que los lipomas intramusculares y de lengua son inusuales en cuanto a su identificación histológica y su sitio de aparición.

**Palabras clave:** diagnóstico; láser; lipoma; medicina oral; odontología; patología oral; semiología oral; sistema estomatognático

## RESUMO

**Antecedentes:** Lipoma é um tumor mesenquimal benigno formado por tecido adiposo subcutâneo. Os lipomas crescem sem apresentar sinais clínicos, embora possam causar compressão e deslocamento de estruturas anatómicas circundantes. É improvável encontrar um lipoma intramuscularmente na cavidade oral. No entanto, pode estar localizado na mucosa e assoalho da boca ou língua. **Objetivo:** Analisar literatura relevante e apoiá-la com um caso clínico sobre a abordagem cirúrgica a laser de um lipoma intramuscular na língua de aparência incomum. **Métodos:** A análise incluiu artigos científicos publicados em inglês, espanhol e português em formato eletrônico, que estavam disponíveis em repositórios digitais e nas bases de dados PubMed, LiLACS e Google Scholar. Foram incluídas descrições e séries de casos e outras revisões. O caso foi de um paciente adulto submetido à cirurgia com laser de diodo (Wiser 3<sup>®</sup>) com 3 comprimentos de onda. **Resultados:** De 30 artigos selecionados nas bases de dados registradas no PRISMA ou CARE, foram selecionados quatro títulos que nos permitiram conhecer que os lipomas na cavidade oral predominam no sexo feminino e que aparecem entre 50 e 80 anos de idade. Os lipomas mais frequentes na boca são os simples e os fibrolipomas. **Conclusões:** A literatura revisada confirma que os lipomas intramusculares e de língua são incomuns em termos de sua identificação histológica e seu local de aparecimento.

**Palavras-chave:** diagnóstico; laser; lipoma; medicina oral; odontologia; patologia oral; semiologia oral; sistema estomatognático

## INTRODUCTION

Lipoma is a benign tumor that is formed by subcutaneous adipose tissue. Lipomas have a mesenchymal origin and grow slowly. They usually do not present clinical signs, although they can compress and displace surrounding anatomical structures, such as blood vessels or nerves. Lipomas can be lobulated or isolated. Diagnostic procedures to confirm a lipoma include ultrasound, magnetic resonance imaging, and tomography, from which it is possible to evaluate the best approach for surgical excision. Once removed, they will not grow back if they have been encapsulated (1). Lipomas are located in deep areas and their growth is sometimes infiltrating, which can make the surgeon's maneuvers for their removal difficult. Histopathological study is essential in diagnosing lipomas because they can resemble sarcomas due to their size (2).

In the mouth, lipoma is histologically classified into simple and variants such as fibrolipoma, chondrolipoma, osteolipoma, angiolipoma, myolipoma, myelolipoma, benign lipoblastoma, chondroid lipoma, spindle cell lipoma, pleomorphic lipoma, and sialolipoma. Lipomas can also be classified

according to their location, into subcutaneous, intramuscular, related to abdominal organs, oral cavity, thorax, etc. Simple lipomas are the most frequent in older people without distinction of sex (3-5).

This article presents a review of the literature on intramuscular lipomas in the tongue and describes a clinical case that serves to support what has been identified in the literature. A review of the literature was carried out to learn about aspects such as the frequency of intramuscular lipomas in the tongue, their histopathological variants, and the most frequent sites of appearance in the mouth. The case involves an unusual, voluminous intramuscular lipoma in the tongue in a patient who already had a histopathological diagnosis of lipoma. After the first appointment, the patient suffered from a stroke. One year after the patient's recovery, he was seen for a second time. The lipoma had increased considerably in size. Due to the patient's comorbidities, laser surgery was a viable option. In laser dental surgery, the optical characteristics of the tissue to be treated, the specific equipment for the procedure, and the wavelength of the laser are evaluated because they are essential for the physical behavior of the tumor. In this case, a Wiser 3® triple-wavelength diode laser was used to remove the tumor. For the selection of the procedure and the laser equipment, its effects on soft tissues, photobiomodulation, and its decontamination effect (bacterial inhibition) were considered (6).

## **MATERIALS AND METHODS**

A review of original research and systematic reviews of the literature published in electronic format was conducted. The PubMed, LiLACS, and Google Scholar databases were used for the search. Articles in English, Spanish, and Portuguese that had been published between 2017 and 2022 were included. The search terms and connectors used were “oral cavity lipoma” [AND] “tongue lipoma.” From that first search, 15 titles on “oral cavity lipoma” and 3 on “tongue lipoma” were obtained from PubMed. From LiLACS, 16 articles on “oral cavity lipoma” and 4 on “tongue lipoma” were collected. In Google Scholar, 844 articles on “oral cavity lipoma” and 522 on “tongue lipoma” were identified. From these titles, 30 articles were selected that corresponded to systematic reviews, literature reviews, and clinical cases. The inclusion criteria were applied by title, abstract, and similarity in terms of the variables studied. The PRISMA statement (for systematic reviews) and CARE guidelines (for clinical cases) were used. Duplicated articles and non-open access were eliminated, resulting in a sample of 4 articles (Figure 1). The PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) statement compiles the minimum evidence-based items that should be included when writing a meta-analysis or systematic review. The CARE (Case Reports) guidelines are specific guidelines that allow the development of a clinical case report.

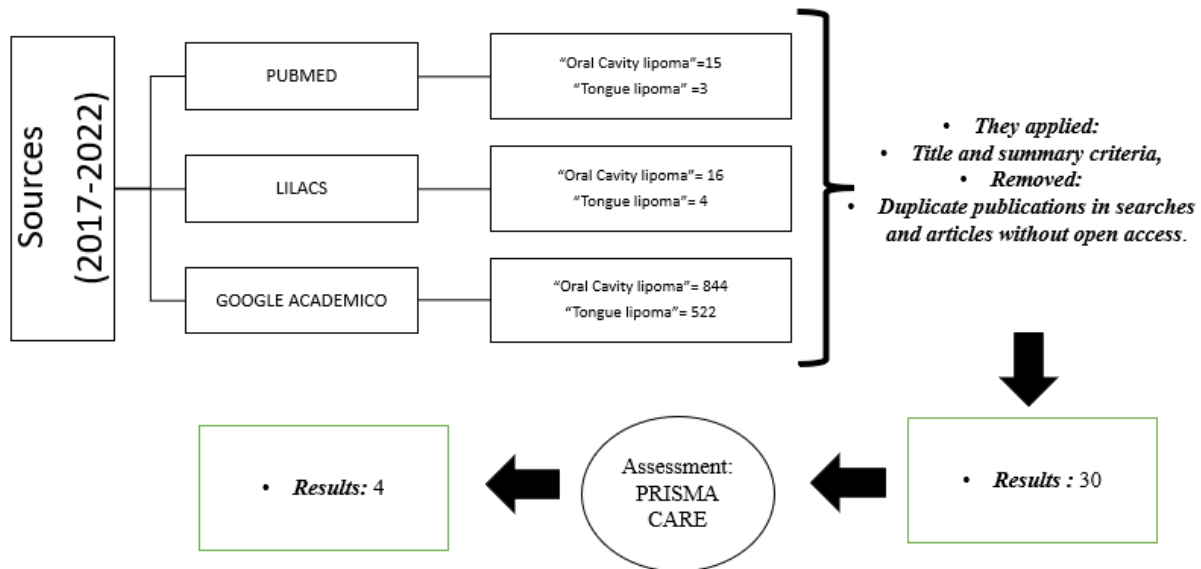


Figure N° 1: Article selection flowchart. Source: self made.

FIGURE 1  
Article Selection Flowchart  
Source: the authors.

## RESULTS

The four articles in the sample were all systematic reviews that met the PRISMA statement criteria. Each article discussed findings of lipomas in the oral cavity, their anatomic location, and their histology. Three articles reported the age of diagnosis of oral cavity lipomas as 50 to 60 years. The fourth reported an average age of 77 years. All papers reported a female predominance of 55% or more and, regarding the most common anatomic site, 7 to 15 cases of tongue lipomas were listed. Two articles histologically confirmed intramuscular lipoma as the most common.

Osterne, *et al.*, (5) evaluated 101 cases of lipomas in Brazil. Biopsies showed that lipomas in the mouth only account for 1.01% morbidity. Those authors classified lipomas histologically as fibrolipoma, sialolipoma, angiolipoma, chondrolipoma, myxolipoma, and intramuscular lipoma. In the tongue they only diagnosed 7 cases and only one case was an intramuscular lipoma without specifying anatomical site. On the other hand, Pérez-Sayáns, *et al.*, (7) reported 97 cases of which 75 had a diagnosis of simple lipoma and described findings of 15 lipomas in the tongue without specifying histological type (7). The third article, by Linares, *et al.*, (8) reports 43 cases that were defined histologically. Most were simple lipomas, and they identified one as intramuscular lipoma, although they did not specify its anatomical site (8). Finally, the fourth article, by Pires, *et al.*, (9) reports that, out of a sample of 91 lipomas 56 were histologically differentiated as 56 simple lipomas. 14 were identified in the tongue, although their diagnosis was not specified. It can be seen that in these publications no findings of intramuscular lipomas in the tongue are recorded.

Table 1 lists the demographic variables sex, age, and country. The observation of more cases among women and people over 50 years of age is confirmed. All the papers report findings in Brazil and only one article, Perez-Sayáns, *et al.*, (7) includes the population in Spain. Table 2 shows the most common anatomical sites of lipomas in the four articles included in this review. In all studies the most frequent sites are oral mucosa and tongue. Table 3 summarizes the histological findings described in the 4 articles reviewed. The most common findings were simple lipoma and fibrolipoma. Two papers (8,9) reported findings of spindle cell/pleomorphic lipoma, angiolipoma, and intramuscular lipoma.

TABLE 1  
Demographic Variables

Source: the authors.

| Variable        | Osterne, <i>et al.</i> ,<br>(2019) (5) |      | Pérez-Sayáns, <i>et al.</i> ,<br>(2019) (7) |       |      | Pires, <i>et al.</i> ,<br>(2021) (9) |      | Linares, <i>et al.</i> ,<br>(2019) (8) |      |
|-----------------|--|------|---|-------|------|--------------------------------------|------|--|------|
|                 | Brazil                                 | (%)  | Brazil                                      | Spain | (%)  | Brazil                               | (%)  | Brazil                                 | (%)  |
| Number of cases | 101                                    | 100  | 66  | 31    | 100  | 91                                   | 100  | 43                                     | 100  |
| Gender: Female  | 62                                     | 64   | 36  | 19    | 56.7 | 52                                   | 57,1 | 24                                     | 55.8 |
| Gender: Male    | 38                                     | 35.7 | 30  | 12    | 43.3 | 39                                   | 42.9 | 19                                     | 44.2 |
| Age (media)     | 56.8                                   |      | 56.4  |       |      | 62,2                                 |      | 77,5                                   |      |

TABLE 2  
Most Common Anatomical Site by Number of Cases

Source: the authors.

| Variables          | Osterne, <i>et al.</i> ,<br>(2019) (5) |      | Pérez Sayáns, <i>et al.</i> ,<br>(2019) (6) |       |      | Pires, <i>et al.</i> ,<br>(2021) (9) |    | Linares, <i>et al.</i> ,<br>(2019) (8) |      |
|--------------------|--|------|---|-------|------|--------------------------------------|----|--|------|
|                    | Brazil                                 | %    | Brazil                                      | Spain | %    | Brazil                               | %  | Brazil                                 | %    |
| Oral mucosa        | 45                                     | 44.5 | 31  | 10    | 42.3 | 33                                   | 41 | 22                                     | 51.1 |
| Tongue             | 7                                      | 6.93 | 9   | 6     | 15.5 | 13                                   | 16 | 8                                      | 18.6 |
| Lip                | 0                                      | 0    | 9   | 4     | 13.4 | 0                                    | 0  | 0                                      | 0    |
| Upper lip          | 1                                      | 0.99 | 0   | 0     | 0    | 0                                    | 0  | 0                                      | 0    |
| Lower lip          | 12                                     | 11.8 | 0   | 0     | 0    | 16                                   | 20 | 7                                      | 16.4 |
| Vestibule          | 0                                      | 0    | 5   | 3     | 8.2  | 0                                    | 0  | 0                                      | 0    |
| Palate             | 5                                      | 4.95 | 5   | 3     | 8.2  | 5                                    | 6  | 4                                      | 9.3  |
| Gum                | 0                                      | 0    | 4   | 3     | 7.2  | 3                                    | 4  | 0                                      | 0    |
| Floor of the mouth | 5                                      | 4.95 | 3   | 2     | 5.2  | 3                                    | 4  | 0                                      | 0    |
| Retromolar area    | 10                                     | 9.9  | 0   | 0     | 0    | 0                                    | 0  | 0                                      | 0    |
| Others             | 11                                     | 10.8 | 0   | 0     | 0    | 8                                    | 10 | 0                                      | 0    |
| Unknown            | 5                                      | 4.95 | 0   | 0     | 0    | 0                                    | 0  | 2                                      | 4.6  |

TABLE 3  
Most Common Histological Diagnoses by Number of Cases

Source: the authors.

| Variables                            | Osterne, <i>et al.</i> ,<br>(2019) (5) |      | Pérez -Sayáns, <i>et al.</i> ,<br>(2019) (6) |       |      | Pires, <i>et al.</i> ,<br>(2021) (9) |      | Linares, <i>et al.</i> ,<br>(2019) (8) |      |
|--------------------------------------|--|------|--|-------|------|--------------------------------------|------|--|------|
|                                      | Brazil                                 | %    | Brazil                                       | Spain | %    | Brazil                               | %    | Brazil                                 | %    |
| Simple                               | 64                                     | 63.3 | 48   | 27    | 77.3 | 56                                   | 61.5 | 23                                     | 53.5 |
| Fibrolipoma                          | 29                                     | 28.7 | 15   | 4     | 19.6 | 30                                   | 33.0 | 14                                     | 32.5 |
| Sialolipoma                          | 3                                      | 3    | 0  | 0     | 0    | 0                                    | 0    | 0                                      | 0    |
| Angiolipoma                          | 2                                      | 2    | 0  | 0     | 0    | 2                                    | 2.2  | 0                                      | 0    |
| Chondrolipoma                        | 1                                      | 1    | 0  | 0     | 0    | 1                                    | 1.1  | 0                                      | 0    |
| Myxolipoma                           | 1                                      | 1    | 0  | 0     | 0    | 0                                    | 0    | 0                                      | 0    |
| Intramascular lipoma                 | 1                                      | 1    | 0  | 0     | 0    | 0                                    | 0    | 1                                      | 2.3  |
| Others                               | 0                                      | 0    | 3  | 0     | 3.1  | 0                                    | 0    | 0                                      | 0    |
| Spindle cell /<br>pleomorphic lipoma | 0                                      | 0    | 0  | 0     | 0    | 2                                    | 2.2  | 4                                      | 9.4  |
| Salivary gland lipomas               | 0                                      | 0    | 0  | 0     | 0    | 0                                    | 0    | 1                                      | 2.3  |

## DESCRIPTION OF CLINICAL CASE

A 57-year-old male patient attended the dental clinic in early 2022. The patient's health history included diabetes and hypertension, no allergies, and a cerebrovascular accident (CVA) a year earlier, which resulted in motor sequelae. Clinically, he had a lipoma located on the left side of the tongue, which

is why two magnetic resonance images (MRIs) were ordered, one with and one without contrast. The patient had attended a consultation the previous year, but due to the CVA, the management of his tongue lesion was postponed. From the first consultation, there were photographs of the lipoma, the results of a biopsy, and measurements of the lesion, which were 3.5 cm x 2 cm x 3 cm. In 2022, the lipoma had increased in size (5.4 cm x 5 cm x 4.5 cm) (Figure 2).

## Histopathological Analysis

A biopsy sample was obtained at the first appointment. Histopathological examination showed an intramuscular lipoma that consisted of mature adipose tissue with fibrous septa of variable thickness and bundles of interposed skeletal striated muscle with the presence of blood vessels with ectasia and congestion (Figure 2).

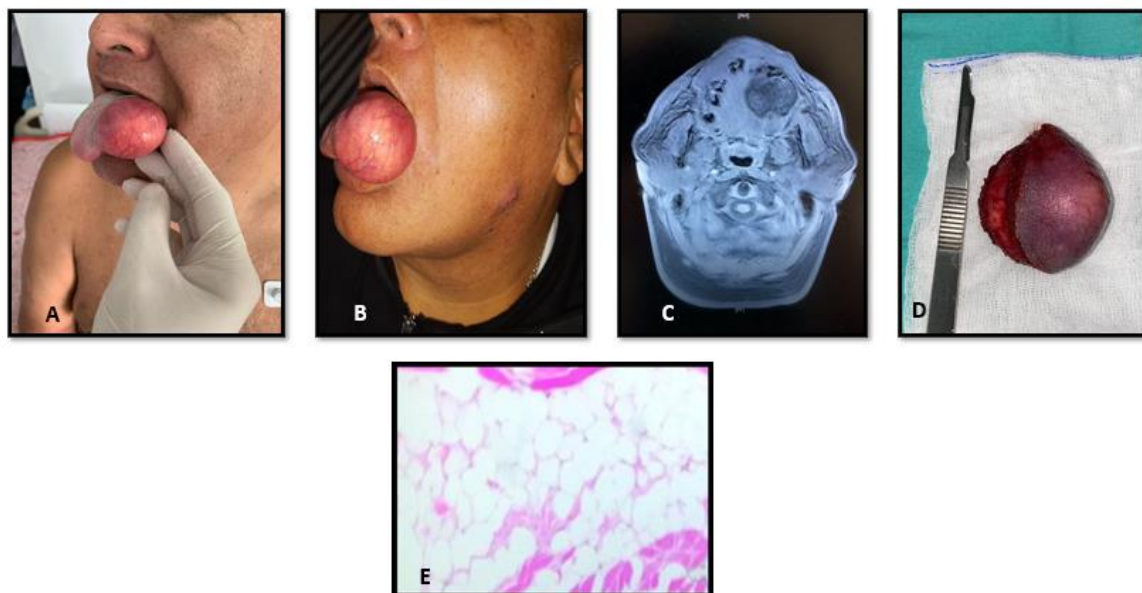


FIGURE 2

### Clinical Appearance, MRI, and Histopathological Image of the Lipoma

A. Clinical image at the first appointment. B. Augmented clinical appearance one year later. C. MRI without contrast. D. Intramuscular lipoma removed. E. Histopathology of intramuscular lipoma with hematoxylin-eosin stain shows adipocytes infiltrating the tongue muscle and trapping muscle fibers (magnification: 40X). Source: the authors.



FIGURE 3

Presurgical preparation of patient for removal of the lipoma (E, F)

Source: the authors.

## Procedure

After obtaining the signed authorization from the patient, Mouth antisepsis was performed with 0.12% chlorhexidine gluconate. Due to the type of procedure and equipment used, infiltration anesthesia was not applied. A linear incision was made following the longitudinal axis of the dorsum of the tongue and making a deep plane at its base to remove the lingual tissue covering the lipoma. For this purpose, a diode laser (Wiser 3®) with 3 wavelengths was used: 808 nm, with a combination of 3 W power in continuous mode; 450 nm, with a power of 0.7 W in continuous mode; and 635 nm with a power of 100 MW. The wavelengths were combined in a single discharge to obtain greater effectiveness. 400 micron tips were activated for cutting and vaporizing soft tissue (Figures 3 and 4).

During the surgical procedure and after the incision, blood vessels were exposed and photocoagulated with the same laser equipment. Once the excision of the lesion was completed, suture was performed in the deep plane with polyglactin 910 4.0 and 3.0 in the superficial plane.

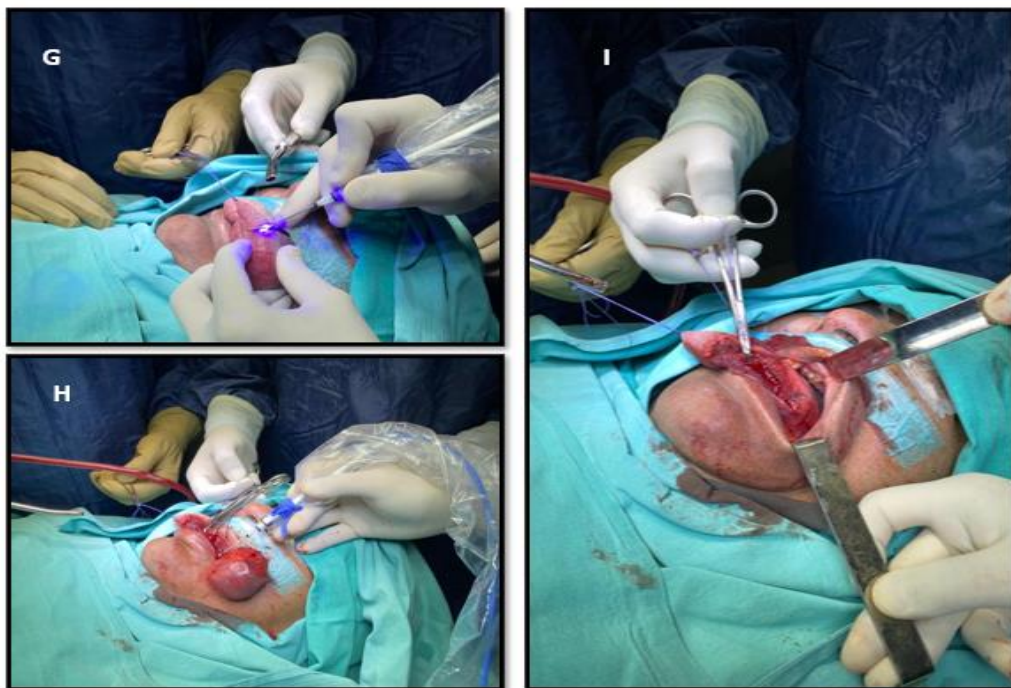


FIGURE 4  
Surgical Removal of Lipoma

Source: the authors.



FIGURE 5

#### Healing Process in the Surgery Site

J. Immediately after the procedure. K. First control at 24 h. L. Second control after 7 days. M. Control after 17 days.

Source: the authors.

The patient was instructed not to touch the wound and routine postoperative instructions were given to the person accompanying him. Follow-up controls were performed at 24 hours, 7 days and 17 days. The evolution was favorable and no adverse events such as paresthesia, hematomas or infection were reported (Figure 5).

## DISCUSSION

In this paper we analyze the types of lipomas that are frequently diagnosed in clinical practice based on their anatomical location and histology. As mentioned by Fletcher (3), the recurrence of benign tumors found in the head and neck has a low (2.2 % to 4.4 %). Likewise, Coelho, *et al.*, (10) state that the etiology of lipoma is unknown but that heredity, the development of chronic diseases, some hormonal alterations, trauma, and infection are recognized as possible causal factors.

Computed tomography, ultrasound and magnetic resonance imaging are commonly used for diagnosis. These methods allow the detection of images corresponding to soft tissue of adipose origin. Histopathological analysis by means of a biopsy also allows the diagnosis to be confirmed (11).

Lipomas in the oral cavity were found to be predominantly female and the most frequent ages were 50 to 80 years. The most frequent diagnoses reported were simple lipomas and fibrolipomas. This article describes the case of a male patient who fits the age range described and whose clinical diagnosis was an intramuscular lipoma in the tongue. These lipomas are generally characterized by being benign (despite this patient's location in the intramuscular layer) and it is unusual to find them in the tongue. The patient had no symptoms although the slow growth could have caused pressure, chronic pain, and obstruction in the area (11-13).

This literature review reinforces the unusual nature of the finding and hence its relevance. In the 4 articles reviewed, the most frequent diagnosis was simple lipoma (63.9%), followed by fibrolipoma (28.5%), pleomorphic lipoma with spindle cells (3%), angioliipoma (2.2%) and intramuscular lipoma (1%) (5,7-9). Osterne, *et al.*, (5) analyzed 101 cases of lipomas in the oral cavity, and Linares, *et al.*, (8) studied 43 cases. Both groups report in their reviews on the most frequent anatomic sites, that is, 7 and



8 cases of lipomas in the tongue, respectively, but only one case of intramuscular lipoma. The case presented here had a good prognosis and recurrence would not be expected. Even so, wide excisions are necessary to remove a lesion entirely (14,15).

The usual protocol for removing benign mature adipocyte neoplasms consists of an incision above the tumor and enucleation of its capsule from the adjacent tissues. The mass is then excised and sutured in layers. Hemostasis must be monitored, and precautions must be taken when the lesion is located under the muscle or infiltrated into other anatomical structures. Recovery from surgery depends on proper adherence to surgical protocols, the skill of the surgeon, and the patient's comorbidities (16,17).

Regarding the case described in this study, the surgical procedure required designing a specific protocol by photobiomodulation. This involved stimulating cells by means of lasers (diodes) with the purpose of reconstructing deteriorated or damaged tissues (18,19). The result depends on the absorption of photons by chromophores within cells or tissues, which can be determined by the irradiation mode, wavelength (400-1100 nm), and energy density, among other factors. Photobiomodulation is a new and more precise term for what was previously known as low-level laser therapy. This non-thermal process involves endogenous chromophores that cause photophysical and photochemical events at various biological scales. Thus, it can promote or suppress cellular processes related to growth factor activity and cellular metabolism (6,20). The benefits of this therapy are a faster approach and incision without complications due to hemostasis; it does not require infiltrative anesthesia in the area, since the anesthetic liquid causes strong vasoconstriction, therefore, local ischemia. Also, the laser, as it does not have its chromophore in the tissue to be treated (hemoglobin and melanin), the cutting and vaporization occur inefficiently by having to increase the power of the equipment with the risk of producing necrosis due to the increase in temperature in the surrounding tissues. This means that, the greater the presence of chromophores, the greater the absorption and vaporization of the photonic light in the tissues. It also favors a quick recovery and ensures the optimization of the antimicrobial effect of the lasers (21).

Due to the health conditions of the patient treated (hypertension and diabetes), a tailored technique was used with a laser with 3 wavelengths. These wavelengths were combined, and the equipment was parameterized according to the treatment, increasing the chances of success and minimizing post-surgical adverse mediate and immediate events. A power of 8 W and a wavelength of 808 nm were used for deep cutting since the absorption coefficient is at a midpoint between water and hemoglobin. The same occurs for the wavelength of 450 nm at 0.8 W, which cuts and vaporizes tissue, its chromophore being hemoglobin. However, for the wavelength of 635 nm the power is 0.1 W, which allows stimulating angiogenesis.

## **CONCLUSIONS**

The most frequently diagnosed lipomas in the reviewed studies are simple lipomas, and the most common anatomical site is the oral mucosa. In this context, the case described here was unusual.

The protocol used to remove the tumor by laser surgical approach was less traumatic, compared to a traditional surgical approach, since it did not require anesthetic infiltration. For this reason, access and removal of the lipoma was easier and the desired antimicrobial effect was ensured. The patient benefited from a rapid, uncomplicated postoperative period and recovered all the functions of his stomatognathic system.

## **RECOMMENDATIONS**

For future studies, it would be useful to determine whether there is a link between cortisol levels in these patients and the growth of lipomas.

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