Oral intramuscular myxoma: case report and brief review of the literature

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Objective. Myxomas are rare benign mesenchymal soft tissue tumors that seldom affect the head and neck area. The present report describes a rare case of intramuscular myxoma of the oral cavity and briefly reviews the literature regarding the occurrence of these lesions in the maxillofacial area.

Study Design. A 59-year-old patient was referred for the development of a slow-growing tumefaction in the right buccal mucosa in the previous 12 months. Magnetic resonance imaging was performed to characterize the lesion's dimensions and its relationship with the surrounding structures, and it revealed intramuscular localization in correspondence with the medial pterygoid muscle. Incisional biopsy was carried out to aid in the final diagnosis.

Results. Histology revealed the presence of an intramuscular myxoma, characterized by discontinuous margins and locally infiltrating muscular fibers. A second surgery was performed to totally remove the lesion. Follow-up at 6 months did not show any signs of recurrence. A literature search was performed to retrieve data on the incidence of oral intramuscular myxomas.

Conclusions. To the best of our knowledge, this is the first case of intramuscular myxoma of the medial pterygoid muscle reported in the literature. Although rarely encountered, intramuscular myxomas should be considered when performing differential diagnoses of soft tissue masses at the level of the masticatory muscles. (Oral Surg Oral Med Oral Pathol Oral Radiol 2021;131: e52−e58)

The term *myxoma* was first used by Virchow in 1871 to characterize tumors resembling the mucinous substance of the umbilical cord.[1,2] However, it was not until 1948 that the diagnostic criteria for these neoplasms were described by Stout, who recognized the resemblance to primitive mesenchyme as a peculiar histologic characteristic of myxomas.[3] In fact, myxomas were defined as nonmetastasizing lesions of mesenchymal origin, specifically composed of undifferentiated stellate cells in a myxoid stroma of loose, mucoid matrix consisting of mucopolysaccharides and reticulin and collagen fibers.

Myxomas most frequently occur in the myocardium, although they are also found in soft tissue and intrabony locations.[3,4] In particular, myxomas are reported to account for 0.12% of soft tissue tumors, with an overall occurrence of 0.13 per 100 000 individuals.[5,6]

The occurrence of myxomas in muscles is rare, and the first case was described by Enzinger in 1965.[7] Intramuscular myxomas (IMs) generally affect skeletal muscles and represent an approximate incidence of 1:1 000 000 of population per year.[5]

Such lesions occur more frequently in women (female-to-male ratio 14:3) age greater than 40 years.[5,8,9] IMs are often found in the large muscle groups, such as the quadriceps (65%), hip adductors (35%), gluteus muscles (20%), gastrocnemius, and upper arm.[10] A diagnosis of Mazabraud syndrome is rendered in cases that exhibit an association between at least 1 IM and the presence of bone fibrous dysplasia.[11-13] In this particular case, a genetic mutation in the guanine nucleotide α-stimulating binding protein seems to be responsible for the development of IMs, as reported also for fibrous dysplasia.[14,15]

Computed tomography (CT) and magnetic resonance imaging (MRI) are the most frequently used imaging techniques for the diagnosis of IMs. On CT scans, these lesions are generally characterized by the presence of well-defined margins, homogeneity, and hypodensity. In particular, tissue density is characterized by attenuation higher than that of water, and lower than that of surrounding muscle when contrast enhancement is employed. Myxomas can be characterized either by mild, diffuse enhancement or peripheral and septal enhancement.[16]

MRI has been extensively applied to the study of soft tissue tumors, and in particular, Luna et al. reported its application in their study of IMs. MRI of IMs shows well-delimited lesions, characterized by homogeneity or slight inhomogeneity on T2-weighted images, occasionally surrounded by edema on short tau inversion recovery or fat-saturated fast spin-echo T2-weighted sequences. When using contrast enhancement, different patterns of peripheral and internal enhancements can be encountered.[16,17]

Statement of Clinical Relevance

We report here a rare case of intramuscular myxoma localized in the medial pterygoid muscle. We also provide a brief revision of the literature on oral myxomas.

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Received for publication Nov 29, 2019; returned for revision Mar 13, 2020; accepted for publication Mar 31, 2020.

2212-4403/$-see front matter
https://doi.org/10.1016/j.oooo.2020.03.053

With regard to histologic appearance, IMs are characterized by hypocellularity, absence of mitotic activity, and hypovascularity, although hypercellular and hypervascular variants have been described in the literature. Histology shows focal presence of histiocytes and spindle cells with oval nuclei in a slightly basophilic matrix. Peripheral striated muscle infiltration can be observed, rarely associated with muscular atrophy.[18,19]

In the head and neck area, both bony and soft tissue localizations are reported. Although intrabony localization in the jaws is frequently encountered[1)], such lesions are considered to be of odontogenic origin.[20,21] With regard to soft tissue involvement, head and neck soft tissue myxomas have been seldom described in the literature. In particular, head and neck intramuscular localization appears to be quite rare, with the masseter muscle being the most common site.[22-25] To the best of our knowledge, only a few cases of IM localization in the masticatory muscles have been reported in the literature.

Here, we report a case of IM of the medial pterygoid muscle and provide a brief review of the literature on head and neck IMs.

CASE PRESENTATION

A 59-year-old Caucasian male was referred to the Unit of Dentistry and Oral Surgery, University Hospital of Pisa (Pisa, Italy), for treatment of a soft tissue swelling in the buccal mucosa. The slow-growing mass had developed in the posterior area of the right buccal mucosa and had appeared in the previous 12 months. The patient did not present relevant comorbidities or chronic diseases requiring pharmacologic treatment.

On physical examination, the lesion appeared as a nontender mass of approximately 2 × 1.5 cm in the right buccal mucosa. Clinically, the lesion was nonmobile, well delimited, firm, and associated with mild painful symptoms. The overlying mucosa had an erythematous aspect, with a focally ulcerated area, probably related to occlusal trauma (Figure 1). The patient did not exhibit any limitations in mouth opening.

Diagnostic imaging

Head and neck MRI examination was performed to better characterize the lesion in terms of dimensions and relationship to surrounding anatomic structures. MRI was carried out with a 1.5-T system (MAGNETOM Aera; Siemens, Erlangen, Germany) with use of axial T1-weighted (T1W) Turbo Spin-Echo (TSE), 2 plane T2-weighted (T2W) TSE, diffusion-weighted imaging sequences with large b-value (b-value = 800), and 2-D T1W dual echo in and opposed phase chemical shift imaging, and gadolinium enhancement.

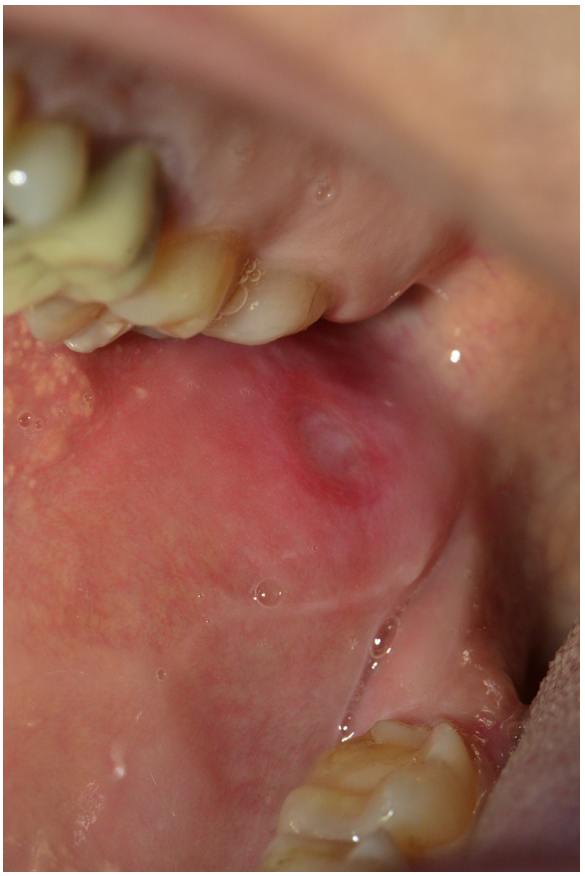

Fig. 1. Clinical aspect of the lesion. A reddish area can be seen in the right buccal mucosa, with inflammation of the surrounding tissue.

The T1 images revealed a hypointense lesion compared with muscle, which tended to become less evident in the fat-saturated images. T2 images highlighted a hyperintense lesion of 1.75 × 1.36 × 0.71 cm at the level of the medial pterygoid muscle. On contrast-enhanced images, the lesion showed peripheral and linear internal enhancement, with characteristics of homogeneity (Figure 2). MRI features of the lesions were suggestive of soft tissue myxoma, with intramuscular localization in the pterygoid muscle. At this stage, several pathologic conditions, including lipoma, rhabdomyoma, leiomyoma, chondroma, neurofibroma, and myxoid liposarcoma, were considered in the differential diagnosis. These lesions usually arise from the intermuscular layer, rather than being intramuscular in origin. However, it might be difficult to differentiate them clinically and radiologically.

Surgical procedure

Surgical biopsy was performed to obtain confirmation of the diagnosis by means of bioptic sampling and

[1)] Leiberman A, Forte V, Thorner P, Crysdale W Maxillary myxoma in children. Int J Pediatr Otorhinolaryngol. 1990;18:277−284.

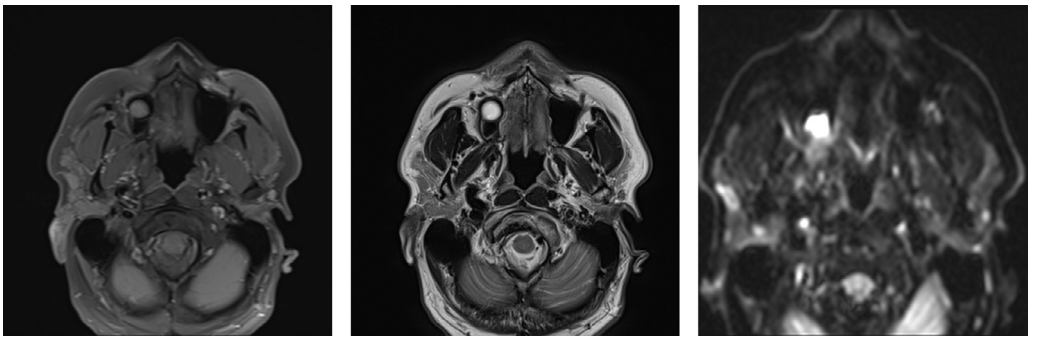

Fig. 2. Magnetic resonance imaging (MRI) examination. **A,** Axial T1-weighted MRI scan shows a heterogeneous hypointense mass in the right lobe of the liver. **B,** Axial T2-weighted MRI scan shows again the heterogeneous hyperintense mass with a clear boundary. **C,** Diffusion-weighted imaging shows that the mass is hyperintense.

histology. The procedure was carried out with the patient under local anesthesia (mepivacaine/epinephrine 1:100,000; 3.6 mL in total). Incision with a #15 scalpel blade was performed at the point of major convexity of the lesion, and the mass was isolated through blunt dissection. Incisional biopsy of the lesion was performed, and samples were sent for histology (Figure 3). Surgery was completed with a suture performed with 5-0 resorbable suture thread, obtaining a primary intention wound closure (see Figure 3). After histologic diagnosis, a second surgery was performed to totally remove the lesion. Follow-up at 6 months revealed complete healing, with no signs of recurrence.

Histology

The surgically excised mass (2 × 1.5 cm diameter) was grossly myxoid and soft. All the mass was histologically examined after formalin fixation and paraffin embedding. Routine hematoxylin and eosin staining was performed. Histology showed a hypocellular and hypovascular myxoid mass, without fibrous capsule and delimited by fibromuscular tissue. Partial infiltration of the fascicles of the adjacent muscle was observed. On formalin-fixed, paraffin-embedded serial sections of the mass, the scattered cells within the myxoid stroma appeared slender and elongated with a stellate shape, pyknotic nucleus, and absence of atypia, mitotic figures, or necrosis (Figure 4). These findings were consistent with the benign nature of the lesion. Immunohistochemistry was performed on the adjacent sections. Briefly, sections were deparaffinized, and antigen retrieval was performed in buffer citrate solution (pH 7.6). The sections were then immunostained for smooth muscle actin, desmin, Sox10, S100, vimentin, CD34, pan-cytokeratins, and proliferating index MIB1 by using the immunoperoxidase technique and an automated immunostainer, according to manufacturers' instructions (Ventana Medical Systems Inc., Oro Valley, AZ). The cells showed immunoreactivity for vimentin and CD34 only (Figure 5, Figure 6). These histologic and immunohistochemical findings were consistent with the diagnosis of IM.[26,27]

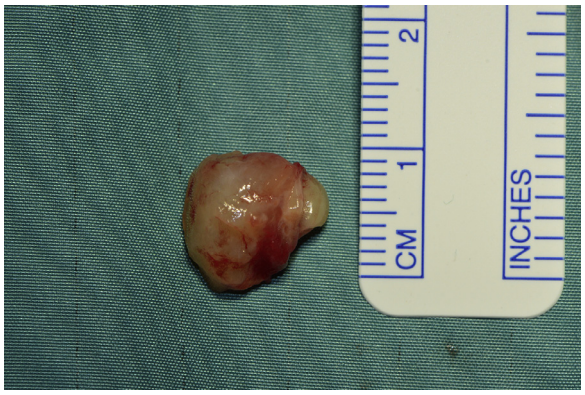

Fig. 3. Bioptic sample from incisional biopsy.

Brief review of the literature

Table I provides a list of the articles reporting cases of oral myxomas. In the majority of cases, oral soft tissue myxomas were reported to affect the palate and the buccal mucosa, followed by the gingiva and the lip. Other localizations are rarer, with few articles describing intramuscular localization in the head and neck area. In the articles retrieved from the literature, it is apparent that the temporalis muscle and the masseter muscle are the most affected. In the case reported here, the lesion occurred in the medial pterygoid muscle, suggesting the tendency of these lesions to affect the mandibular elevator muscles.

DISCUSSION

IMs most commonly occur in the large muscles of the arms and legs and are characterized by asymptomatic development. On diagnostic imaging, these lesions appear as well-defined masses with clear boundaries and, in some cases, surrounded by fat tissue. Histopathology may reveal discontinuity in the lesion's

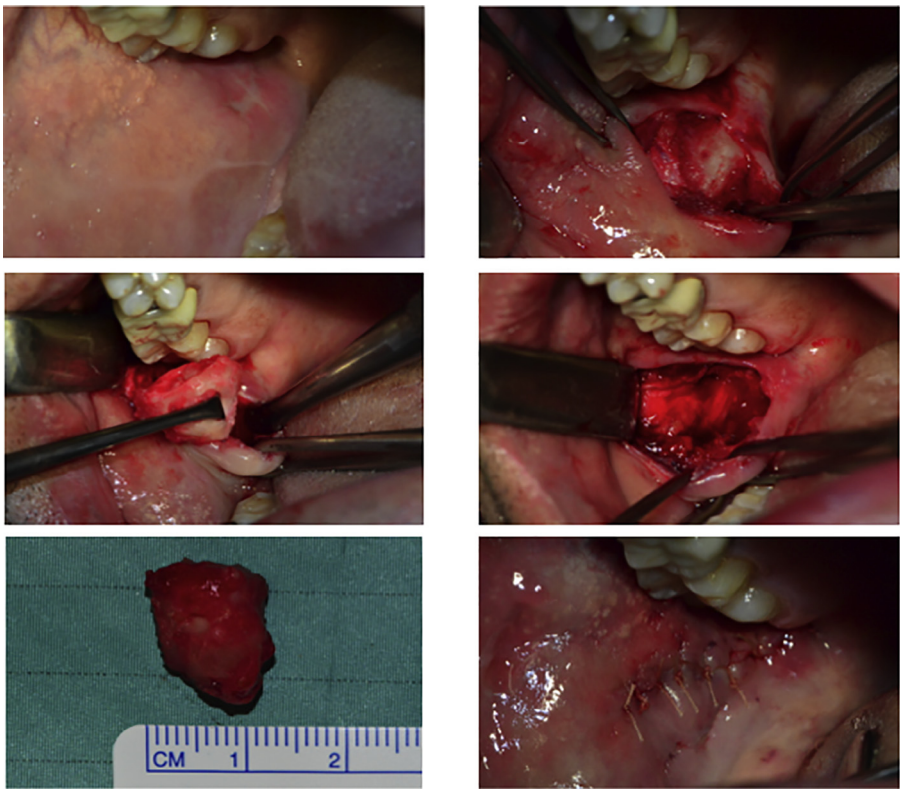

Fig. 4. Surgical enucleation of the lesion: Operative sequence.

capsule, which causes intramuscular spread of the lesion. Microscopically, IMs are characterized by a hypocellular mass in a myxoid stroma, in absence of cell pleomorphism and mitotic figures. These characteristics support the performance of a differential diagnosis with other benign and malignant lesions affecting skeletal muscles.

Only a few cases describing head and neck localization of IMs, mostly occurring in the masticatory muscles, have been previously reported in the literature. Clinical presentation of head and neck IMs is often characterized by the development of a painless, palpable mass and absence of pathognomonic signs. Several pathologic conditions, including benign muscular tumors (rhabdomyoma and leiomyoma) and salivary gland neoplasms (pleomorphic adenoma, oncocytoma, Warthin tumor), the latter especially in cases of development in the masseter muscle, are considered in the differential diagnosis.[23]

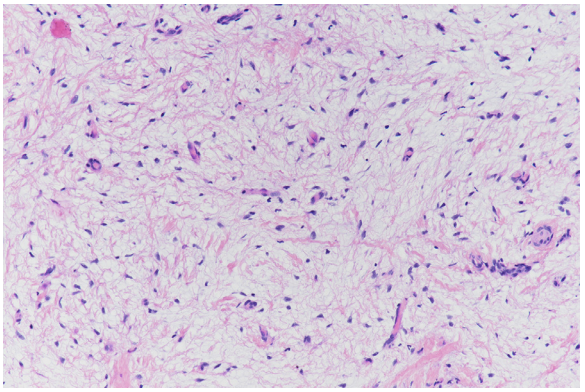

Fig. 5. Histology. Scattered stellate cells within a myxoid stroma show no atypia and no mitotic figures (hematoxylin and eosin [H&E] staining; original magnification ×20).

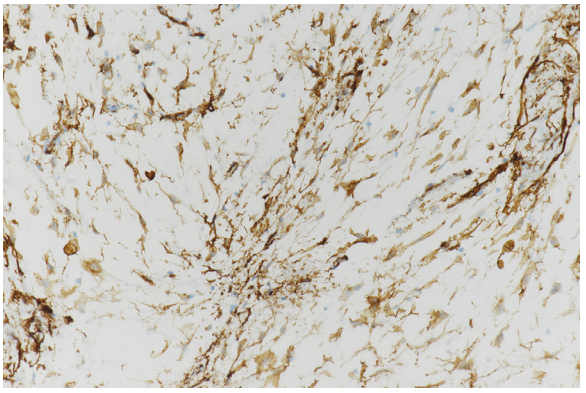

Fig. 6. Histology. The scattered stellate cells of the myxoma show CD34 immunoreactivity (immunoperoxidase technique; hematoxylin counterstaining; original magnification ×20).

Table I. Review of the literature

Author	Year	Gender	Age	Location
Daniels[28]	1908	–	–	Gingiva
Tholen[29]	1936	–	–	Palate
Babbit & Pfeiffer[30]	1936	F	14	Palate
Sealey[31]	1948	–	–	Palate
Salama & Hilmy[32]	1951	M	45	Palate
Louvel[33]	1957	M	74	Buccal mucosa
Bernier[52]	1959	F	–	Lip
Bernier[53]	1960	M	54	Palate
Dutz & Stout[34]	1961	M	15	Buccal mucosa
Spengos & Schow[35]	1965	M	72	Buccal mucosa
Traiger & Lawson[36]	1969	M	54	Lip
Pradhan et al.[37]	1972	F	32	Palate
Tahsinoglu et al.[38]	1976	F	34	Gingiva
Lucas[39]	1976	–	–	Palate
Matsumura et al.[40]	1977	M	2 weeks	Floor of the mouth
Swart et al.[41]	1977	F	56	Floor of the mouth
Elzay & Dutz[42]	1978	F	35	Palate
		M	35	Buccal mucosa
		M	48	Lip
		F	28	Gingiva
Rapidis & Triantafyllou[43]	1983	M		Palate
Tse & Vander[10]	1985			
Ferrari Parabita et al.[44]	1986	–	–	Lip
Siar et al.[45]	1986	M	50	Palate
Quintal et al.[46]	1994	M	15	Palate
Andrews et al.[47]	2000	F	61	Neck
		M	47	Sphenoid sinus
		F	62	Parotid gland
		F	32	Mandible
		F	12	Buccal mucosa
		F	38	Mandible
		F	53	Maxillary sinus
Shimoyama et al.[66]	2001	M	51	Gingiva
Chang et al.[48]	2001	M	37	Gingiva
Kumar et al.[27]	2002			
Mishra[54]	2003	M	22	Buccal mucosa/ Lip
Ramaraj[55]	2003			
Perrotti et al.[49]	2006	F	46	Gingiva
Epivatianos et al.[50]	2007	M	73	Buccal mucosa
Shenoy et al.[2]	2014	M	22	Buccal mucosa
Ye[56]	2015	F	57	TMJ
Singhota[57]	2016	F	47	Lip
Choe[a]	2019	M	58	Palate
Intramuscular myxoma				
Enzinger[7,9]	1965	M	55	Sternocleidomastoid muscle
Rosin[58]	1973	M	44	Geniohyoid muscle
Kindblom et al.[6]	1974	F	42	Forehead
Canalis[59]	1976	F	46	Lateral part of the neck
Feidman[60]	1979	F	62	Posterior part of the neck
Bedrosian et al.[22]	1984	M	79	Masseter muscle
Nishijima[61]	1985	F	16	Neck
Shugar[62]	1987	F	68	Trapezius muscle
Serrat[63]	1998	M	62	Temporalis muscle
Robin et al.[23]	2004	F	43	Temporalis muscle
Papadogeorgakis et al.[24]	2009	M	74	Masseter muscle
Kalsi et al.[25]	2013	F	70	Sternocleidomastoid muscle
Higashida[64]	2014	M	51	Temporalis muscle
Li[65]	2014	M	74	Hyoglossus muscle
Custodio et al.[51]	2019	F	60	Masseter muscle
Nisi et al. (current case)	2020	M	59	Medial pterygoid muscle

[a]We kindly ask whether the line in Table 1 reporting: "Choe - 2019 - M - 58 - palate" can be removed, as by mistake this article was included in the table although reporting a case of myxoma occurred in the eyelid.

When a diagnosis of IM is suspected, it is advisable to perform screening for the presence of fibrous dysplasia to exclude Mazarbaud syndrome.[11-13]

As for other soft tissue masses, diagnostic imaging is fundamental in accurately delineating the margins of the lesion and evaluating its relationship with surrounding anatomic structures. However, histology is mandatory for diagnosis because these lesions are extremely difficult to diagnose clinically and/or by means of diagnostic imaging. Histologic differential diagnosis is performed in cases of benign myxoid lesions and malignant tumors rich in myxoid tissue. Among benign lesions, nerve sheath myxoma, myxoid variants of fibrous histiocytoma and neurofibroma, and oral focal mucinosis are considered in the differential diagnosis, whereas liposarcoma, rhabdomyosarcoma, chondrosarcoma, fibrosarcoma, myxofibrosarcoma, and low-grade fibromyxoid sarcoma must be considered when suspecting the presence of malignancy. Moreover, in cases of invasion of maxillary bones, odontogenic myxoma should be suspected.[11-13]

Bedrosian et al.[22] described the case of an IM of the masseter muscle, characterized by rapid growth and absence of infiltration of the nearby structures. In this case, differential diagnosis included myxoid neurofibroma, myxolipoma, and myxochondroma. Another case of IM of the masseter muscle was reported by Papadogeorgakis et al., who described a close relationship between the lesion and the muscle, but absence of actual infiltration of the masseter muscle. This finding

was consistent with previous studies, where direct involvement of the muscle was not detected.[24] A particular case of masseter muscle IM reported by Custodio et al. was characterized by the presence of muscular infiltration, similar to our findings.[51]

The surgical approach (from conservative surgery, such as curettage or enucleation, to radical surgery with wider margins[2)]) appears to be effective, although total excision of the lesion may be hindered by the lack of defined boundaries and the infiltrative pattern.[9] The recurrence rate is reported to be extremely low (3%–8%), with higher risk present in the first 2 years after surgery. It is, therefore, advisable to maintain close follow-up to detect early signs of recurrence.

To the best of our knowledge, this is the first report to describe localization of IM in the medial pterygoid muscle. Moreover, we found an infiltrative pattern of the lesion, with involvement of muscular fibers. However, at the 6-month follow-up, no signs of recurrence were detected after surgery.

CONCLUSIONS

Myxomas are quite rare pathologic entities, and the intramuscular variant, in particular, in the head and neck area has rarely been reported. Therefore, clinical diagnosis is often complex and requires the use of diagnostic imaging and histology for confirmation.

Prognosis after surgical excision is good because of the benign nature of the lesion. However, follow-up is recommended to detect early signs of recurrence.

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