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CASE REPORT

# A rare case of inflammatory myofibroblastic tumor of the mandible mimicking a malignant tumor

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**KEYWORDS**

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**Abstract** Inflammatory myofibroblastic tumor (IMT) of the head and neck is a rare benign proliferative lesion of unknown etiology that mimics malignant lesions clinically and radiographically. I report the case of a 27-year-old woman who presented with a mass in her left mandible associated with restricted mouth opening that had developed over the preceding 7 months. The mass was resected completely with 5 mm margin under general anesthesia. The mass was extending to the floor of the mouth and impinging on the masseter and temporalis muscles. Given its characteristics of being localized and aggressive, complete surgical resection is the best treatment modality for IMT.



## 1. Introduction

Inflammatory myofibroblastic tumor (IMT) is a rare, benign soft-tissue lesion characterized by aggressive proliferation. It is characterized by its unique histopathological presentation wherein heterogeneous groups of proliferating myofibroblastic spindle cells are found along with infiltrating inflammatory cells which include plasma cells, histiocytes, fibroblasts, eosinophils and lymphocytes (Cho et al., 2008; Ong et al., 2012). The pathogenesis and etiology of IMT have not been elucidated clearly (Cho et al., 2008). Typically, IMTs are most commonly observed in the lungs followed by the abdomen, retroperitoneum and extremities (Xavier et al., 2009; Ma et al., 2009). IMTs of the head and neck are rare and represent 14–18% of all extra-pulmonary IMTs (Ong et al., 2012). Nevertheless, they are known to affect the aero-digestive tract, major salivary glands and the soft tissues of the neck (Xavier et al., 2009). IMTs in the oral cavity are exceedingly rare, but cases of IMTs in the retromolar area, pterygopalatine area, tongue, maxilla, hard palate, mandible, floor of the mouth and buccal cheek have been reported (Ong et al., 2012).

Appropriate management of IMTs can be delayed due to a challenging differential diagnoses. The lesion has a nonspecific clinical and radiographic presentation and exhibits aggressive growth, giving rise to clinical suspicions of malignancy (Cho et al., 2008; Xavier et al., 2009). Indeed, before a consensus for the name was established in 1994 by the World Health Organization (Coindre, 1994), IMT was also known as inflam-

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matory pseudo tumor because of its malignant tumor like presentation (Ong et al., 2012). Histopathology and immunohistochemistry (IHC) are critical in the diagnosis of IMT (Ma et al., 2009). Presently, I report a rare case of IMT involving multiple maxillofacial anatomical sites, which was misconstrued as a malignant tumor upon initial presentation.

## 2. Case report

A 27-year-old woman came to the oral and maxillofacial surgery clinic at College of Dentistry, King Saud University, Saudi Arabia complaining of an extraoral swelling in the left mandibular region associated with limitation in mouth opening for the last seven months. The patient reportedly had a history of several episodes of dental pain related to the left mandibular second premolar and first molar teeth which were extracted 5 months ago following failed endodontic treatment. Medical history revealed a diagnosis of anemia and peptic ulcer for which the patient was under medical treatment. The patient also reported losing weight in the preceding six months and attributed it to the difficulty in eating as a result of limited mouth opening. The patient's lesion was previously biopsied at another Oral Surgery clinic and the result was in-conclusive. Physical examination revealed extra-oral swelling in the left lower third of the face extending from the angle of the mouth to the mandibular angle. Intraoral examination revealed a severe restriction in mouth opening (8 mm of inter-incisal distance) along with bucco-lingual expansion of the left mandibular body. Upon palpation, the mandibular swelling was hard and all remaining mandibular posterior teeth were mobile (grade 3 mobility) with loss of sensation in the left side of her lower lip and chin area.

Bilateral cervicofacial lymphadenopathy was observed in the sub-mental and sub-mandibular lymph nodes presented as firm, tender and movable lymph nodes. In addition the left axillary and right inguinal lymph nodes were also palpable. A CAP (chest-abdomen-pelvis) computed tomography examination revealed modest (sub-centimeter) enlargement of the axillary and inguinal lymph nodes bilaterally, but no bony lesions indicative of metastasis. Panoramic radiograph (OPG) of the maxillo-mandibular region showed severe bone loss extending from the left mandibular para-symphysis up to the angle along with complete loss of bone surrounding the mandibular posterior teeth (Fig. 1). A clinical differential diagnosis of Mandibular Ameloblastoma, Myxoma, Langerhans Cell Histiocytosis, or Lymphoma were suspected.

Magnetic resonance imaging (MRI) revealed a focal area of solid homogeneous tissue, measuring approximately 5 cm × 4 cm × 3 cm, associated with bone tissue destruction in the left mandibular region. The lesion extended anteroposteriorly from the left mandibular canine tooth back to the retromolar trigone area and the angle of the mandible. Furthermore, bone tissue destruction was also evident within the left mandibular ramus. The roots of the intervening teeth were embedded within the tumor mass and perforation of the lingual and buccal cortices of the mandible were evident along the premolar and molar extraction sites. Multiple enlarged lymph nodes were observed in the neck (notably 15 × 7 mm right level 1A; 14 × 15 mm bilateral level 1B; 15 × 15 mm and 14 × 9 mm left level 2A; and 16 × 6 mm right level 2A). All the observed lymph nodes exhibited homogeneous enhancement and diffuse restriction. There was no evidence of central necrosis or peri-nodal fat stranding, indicative of metastatic disease and peri-capsular spread respectively. According to the radiologist's report, the MRI findings were suggestive of an aggressive mandibular lesion such as lymphoma or osteomyelitis (Figs. 2–4).

Fine-needle aspiration biopsies of the mandibular lesion and a left sub-mandibular lymph node were performed under local anesthesia in our outpatient clinic. Although the aspirated specimen from the mandibular lesion was inconclusive upon histological examination, the lymph node specimen was characterized by the presence of reactive lymphoid follicular hyperplasia and the absence of malignant cells.

While ruling out metastatic lymph node disease, the pathologist recommended a second incisional biopsy of the mandibular lesion. Subsequently multiple incisional biopsies were done under local anesthesia and turned out to be Florid Reactive Follicular Lymphoid Hyperplasia, Immunohistochemical staining and gene rearrangement were done to rule out hematologic malignancy such as lymphoma or plasmacytoma, The results for this specimen showed that this of reactive nature

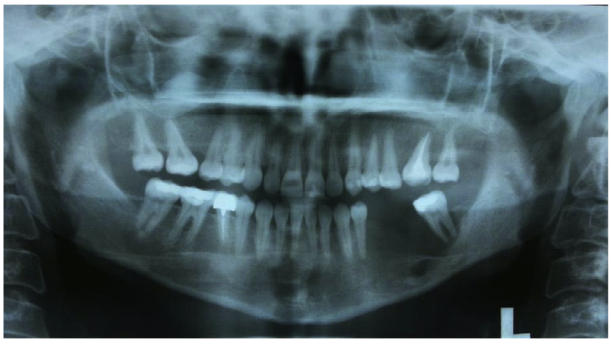

**Figure 1** Pre-operative orthopantomogram (OPG).

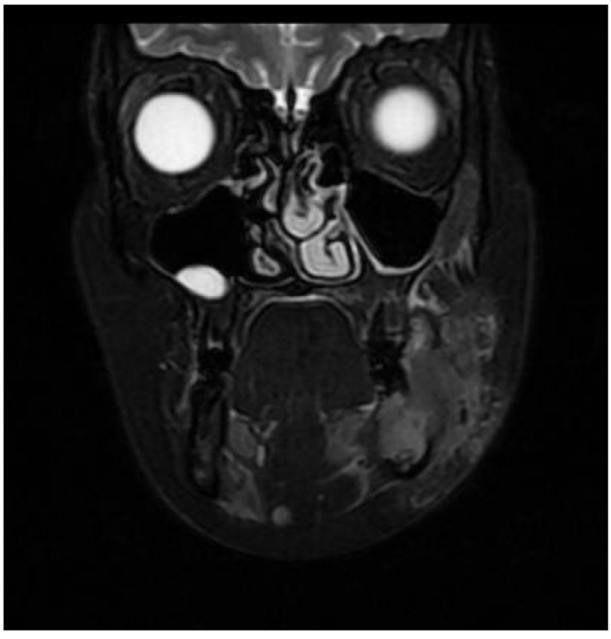

**Figure 2** Coronal MRI (T2 weighted).

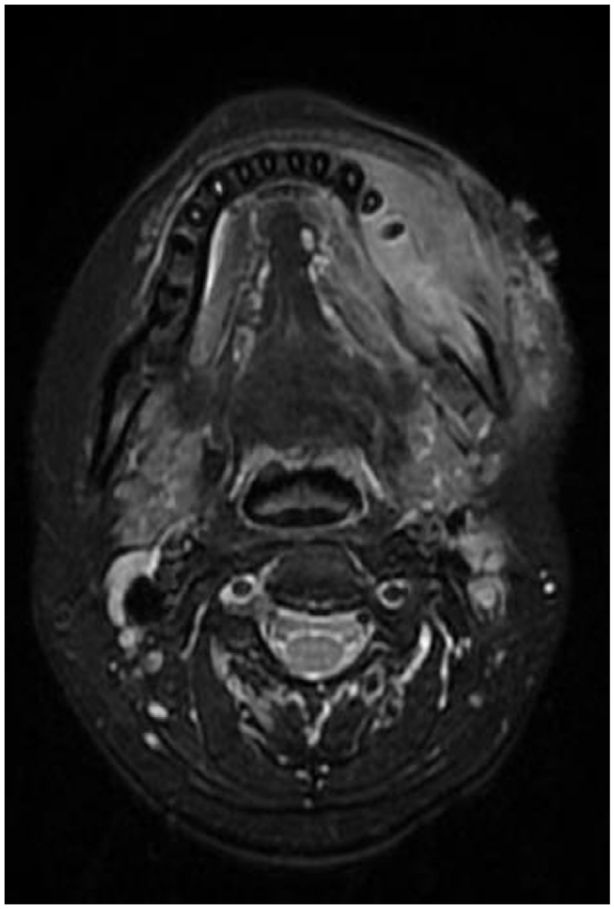

**Figure 3** Axial MRI (T2 weighted).

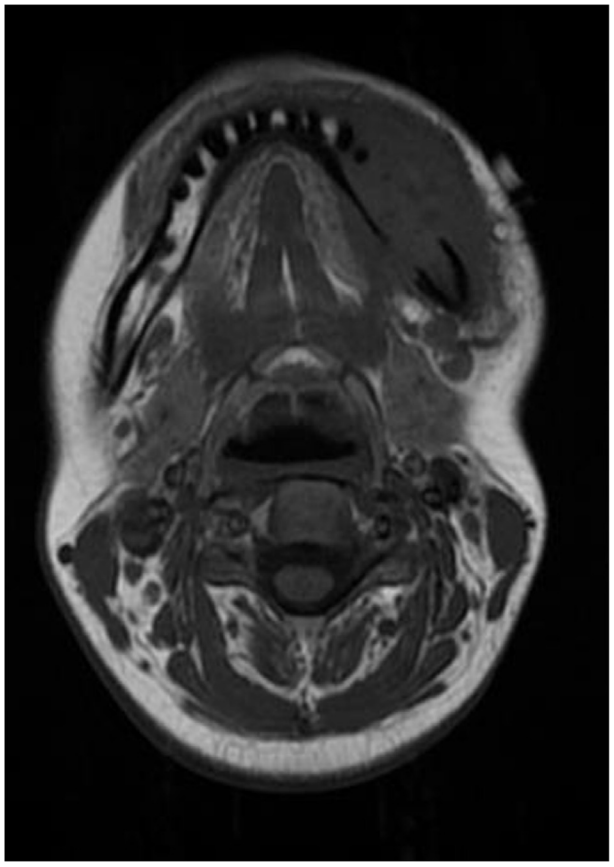

**Figure 4** Axial MRI (T1 weighted).

rather then neoplastic and It is recommended that the whole lesion to be excised to confirm the results. In addition, lymph node biopsy (not only FNA) is advised to get more clear picture of any systemic/neoplastic underlying disease.

Hence, an excisional biopsy of the lesion along with a 5 mm clearance margin on all sides was planned under general anesthesia.

The left mandible was exposed through intra-oral and submandibular approaches. Intra-operative examination revealed the mandibular lesion extending on to the floor of the mouth on the left side and impinging upon the left masseter and temporalis muscles. A segmental resection of the left mandible extending from the parasymphysis to the ramus of the mandible was done along with adjoining soft tissues. Mandibular continuity was maintained with the help of a reconstruction plate and intra-oral and extra-oral soft tissues were approximated and closed primarily in layers (Fig. 5). Primary reconstruction of the mandible was electively ruled out due to the possibility of the lesion turning out to be malignant. Immediate post-operative period was unremarkable. Two weeks after surgery, the patient had a passive mouth opening of 27 mm inter-incisal distance and weakness of facial muscles supplied by the left buccal branch of facial nerve could be elicited. The patient was advised active mouth physiotherapy and regular follow up with maxillofacial surgery out-patient clinic.

Postoperative histopathology of the excised specimen revealed a non-encapsulated myofibroblastic proliferation

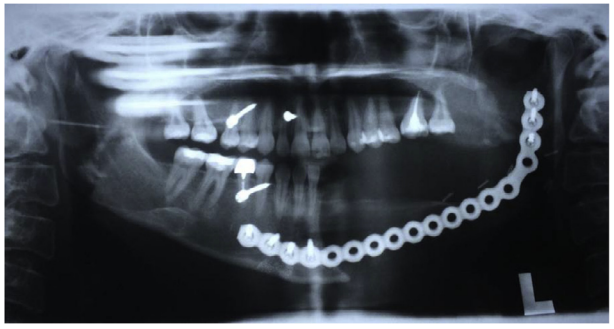


**Figure 5** Post-operative orthopantomogram (OPG).

admixed with chronic inflammatory cellular infiltrate. The tumor consisted of spindle and polygonal cells with inconspicuous mitotic activity along with evidence of infiltration on to adjacent muscles and adipose tissue. The inflammatory cellular infiltrate was composed of a mixture of eosinophils and focal lymphoid follicles. Immuno-histochemistry (IHC) demonstrated immuno-positive reaction of the tumor cells for CD68, smooth muscle actin (SMA) and calponin and negative for anaplastic lymphoma tyrosine kinase-1 (ALK-1), S100 and desmin. The histopathological profile of the lesion correlated its clinical findings were suggestive of IMT. Nevertheless, the

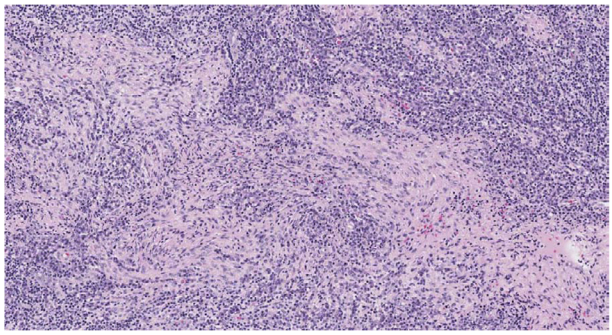

**Figure 6** A spindle cell proliferation admixed with chronic inflammatory infiltrate. (H&E, X100).

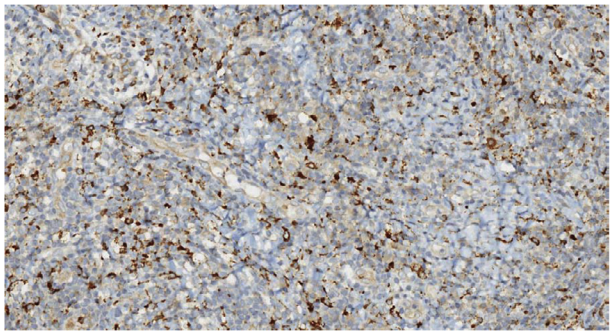

**Figure 7** The tumor cells exhibited positive cytoplasmic staining for CD68. (H&E, X200).

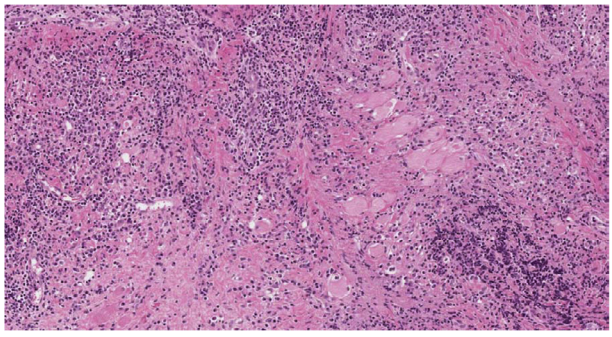

**Figure 8** Section showing spindle and polygonal cells infiltrating adjacent muscles. (H&E, X100).

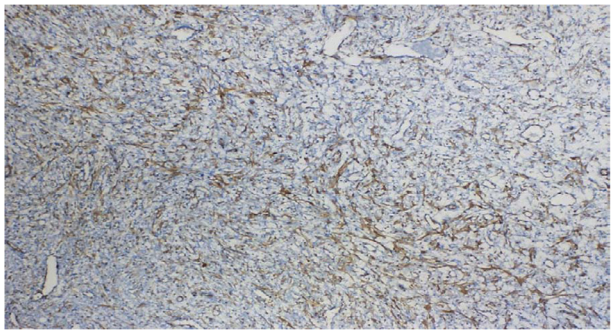

**Figure 9** The tumor cells exhibited positive cytoplasmic staining for SMA. (H&E, X100).

IHC findings aided in the confirmation of the diagnosis as IMT (Figs. 6–9).

## 3. Discussion

IMT is an extremely rare tumor in the head and neck region with only few cases that have been reported in different oral cavity sites including intra and extra-osseous sites (Binmadi et al., 2011). Differential diagnoses of IMT are broad and extensive. Most significant among them include lesions presenting with spindle cells such as nodular fasciitis, solitary fibrous tumor and fibrosarcoma (Dayan et al., 2005). Although the presence of infiltrate gave rise to the suspicion of a malignant lesion, fibrosarcoma was excluded due to the absence of the characteristic herring bone pattern upon histological examination and other malignant features. Similarly, the prominent inflammatory nature of the infiltrate and absence of mucinous stroma which appears feathery helped in ruling out solitary fibrous tumor and nodular fasciitis respectively.

While the histological features of oral IMT are variable, they are generally described as being composed of spindle cell fascicles mixed with acute and chronic inflammatory cells (Dayan et al., 2005). In the present case, the diagnosis of IMT was confirmed based not only on the histopathologic findings, but also based on the IHC profile of the lesion. The IHC findings in the present case (immune-positive for CD68, SMA and calponin) were consistent with that of myofibroblastic differentiation. Neoplastic behavior of IMT has been attributed in some cases to the cytogenetic aberrations involving ALK-1 receptors (Nikitakis et al., 2004; Coffin et al., 2001).

ALK-1 expression has been suggested as a potential marker for IMT, in spite of it being not 100% sensitive. Nevertheless, ALK-1 immuno-negativity as observed in the present case has been reported in a subset of IMT. Interestingly, ALK-1 negative IMT could be histopathologically indistinguishable from ALK-1 positive tumors and the expression of ALK-1 has not been linked with any clinical or prognostic significance in IMT (Al-Sindi et al., 2007).

Complete surgical resection of the lesion has been reported as the principal treatment choice for IMT (Xavier et al., 2009). Although there are no prospective studies reported in the literature specifying treatment protocols for IMT, the best prognoses have been documented following radical surgical resection with negative margins (Ong et al., 2012). Ong et al. (2012), based on a retrospective study of 28 patients with IMT treated by surgical resection, reported that negative surgical margins were associated with 87% reduction in mortality and considered it as the most important prognostic indicator for local relapse.

In addition to surgical resection, radiotherapy has been reportedly used for non-resectable lesions, non-responsive IMT and as an adjunctive therapy for IMT with ALK-1 and Ki-67 expression. When used as an adjunct, radiotherapy has been prescribed in the dose ranges of 50–54 Gy, 60–64 Gy and 66–70 Gy for low, moderate and high risk IMT patients respectively. Wherein, the risk was stratified based on the degree of positive margins following tumor resection. Nevertheless, radiotherapy especially in the low dose ranges has been associated with a risk of sarcomatous transformation or could lead to a secondary *de novo* malignant tumor (Ong et al.,

2012). Corticosteroids, administered locally, have also been reported to produce a good response in a small number of cases of IMT, with the possible mechanism of action targeted against the inflammatory cellular infiltrate (Segawa et al., 2014).

Notwithstanding the conservative treatment options of radiotherapy and corticosteroid injection, surgical resection remains the most curative therapy for IMT (Xavier et al., 2009). Moreover, close imaging follow up (monthly or bimonthly CT/MRI) of patients treated for IMT is recommended for the first 2 years, followed by at least quarterly follow up for the following year, and semi-annual follow up in the fourth and fifth years post treatment (Ong et al., 2012). Complete surgical resection was the only treatment modality employed in the present case. Negative surgical resection margins were confirmed in the post-operative histopathology examination. During 24 months of close post-operative follow up, our patient developed no clinical or radiographic signs of recurrence. More specifically, follow-up imaging with MRI scans have shown postsurgical defects in the left mandible and masticator space without any obvious foci of recurrence or abscess formation.

## 4. Conclusion

In the present case, histopathology of biopsied specimens ruled out malignancy and subsequent histopathology and IHC of the resected mass enabled differential diagnosis of a very rare case of IMT of the orofacial region. The lesion was seen affecting the left mandible, the floor of the mouth, and the masseter and temporalis muscles. Complete resection of the lesion appears to have been curative with no signs of recurrence over 24 months of close post-operative follow up. Physicians and maxillofacial surgeons should be aware that inflammatory aggressive tumors of the head and neck, including the oral cavity, that exhibit extrinsic signs of potential malignancy could be IMT, which could only be confirmed by histopathology and IHC.

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None.

## Disclosure section

The author declares no conflict of interest regarding the work carried out in this study.

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## References

Cho, S.I., Choi, J.Y., Do, N.Y., Kang, C.Y., 2008. An inflammatory myofibroblastic tumor of the nasal dorsum. J. Pediatr. Surg. 43.

Ong, H.S., Ji, T., Zhang, C.P., Li, J., Wang, L.Z., Li, R.R., et al, 2012. Head and neck inflammatory myofibroblastic tumor (IMT): evaluation of clinicopathologic and prognostic features. Oral Oncol. 48, 141–148.

Xavier, F.-C.-A., Rocha, A.-C., Sugaya, N.-N., dos Santos-Pinto, D., de Sousa, S.-C.-O.-M., 2009. Fibronectin as an adjuvant in the diagnosis of oral inflammatory myofibroblastic tumor. Medicina oral, patologia oral y cirugia bucal, 635–639.

Ma, L., Wang, K., Liu, W.K., Zhang, Y.K., 2009. Is radical surgery necessary to head and neck inflammatory myofibroblastic tumor (IMT) in children? Child's Nerv. Syst. 25, 285–291.

Coindre, J.M., 1994. Histologic classification of soft tissue tumors (WHO, 1994). Ann. Pathol. 14 (6), 426–427.

Dayan, D., Nasrallah, V., Vered, M., 2005. Clinico-pathologic correlations of myofibroblastic tumors of the oral cavity: I. Nodular fasciitis. J. Oral Pathol. Med., 426–435

Nikitakis, N.G., Brooks, J.K., Frankel, B.F., Papadimitriou, J.C.S.J., 2004. Inflammatory myofibroblastic tumour of oral cavity: review of literature and presentation of an ALK positive case. Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod. 98 (2), 197–198.

Coffin, C.M., Patel, A., Perkins, S., Elenitoba-Johnson, K.S., Perlman, E., Griffin, C.A., 2001. ALK1 and p80 expression and chromosomal rearrangements involving 2p23 in inflammatory myofibroblastic tumor. Mod. Pathol. 14, 569–576.

Al-Sindi, K., Al-Shehabi, M.H., Al-Khalifa, S.A., 2007. Inflammatory myofibroblastic tumor of paranasal sinuses. Saudi Med. J., 623–627

Segawa, Y., Yasumatsu, R., Shiratsuchi, H., Tamae, A., Noda, T., Yamamoto, H., et al, 2014. Inflammatory pseudotumor in head and neck. Auris Nasus Larynx 41 (3), 321–324.

Binmadi, Nada O., Packman, Harold, Papadimitriou, John C, Scheper, Mark, 2011. Oral inflammatory myofibroblastic tumor: case report and review of literature. Open Dent. J. 5, 66–70.