Inflammatory Myofibroblastic Tumor Mimicking Apical Periodontitis

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Abstract

Inflammatory myofibroblastic tumors (IMTs) are rare. IMTs of the head and neck occur in all age groups, from neonates to old age, with the highest incidence occurring in childhood and early adulthood. An IMT has been defined as a histologically distinctive lesion of uncertain behavior. This article describes an unusual case of IMT mimicking apical periodontitis in the mandible of a 42-year-old man. At first presentation, the patient showed spontaneous pain and percussion pain at teeth #28 to 30, which continued after initial endodontic treatment. Panoramic radiography revealed a radiolucent lesion at the site. Cone-beam computed tomographic imaging showed osteolytic lesions, suggesting an aggressive neoplasm requiring incisional biopsy. Histopathological examination indicated an IMT. The lesion was removed *en bloc* under general anesthesia, and the patient manifested no clinical evidence of recurrence for 24 months. Lesions of nonendodontic origin should be included in the differential diagnosis of apical periodontitis. Every available diagnostic tool should be used to confirm the diagnosis. Cone-beam computed tomographic imaging is very helpful for differential diagnosis in IMTs mimicking apical periodontitis. *(J Endod 2015;41:2079–2082)*

Key Words

Apical periodontitis, inflammatory myofibroblastic tumor, jaw tumor, mandible

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Apical lesions such as dental granulomas, radicular cysts, and periapical abscesses are frequently caused by root canal infection and necrosis. However, some periapical lesions of nonendodontic origin can mimic apical periodontitis of endodontic origin in radiolucency (1, 2). Differential diagnoses of periapical lesions should consider nonodontogenic origins such as cysts, anatomic variations, trauma, and tumors because of their decision making for treatments and prognoses (3).

An inflammatory myofibroblastic tumor (IMT) has been defined as a histologically distinctive lesion of uncertain behavior that occurs in patients of various ages and at a variety of anatomic sites. IMTs of the head and neck occur in all age groups, from neonates to old age, but are most common in childhood and early adulthood. The nasal cavity, paranasal sinuses, oral cavity and larynx, and intraoral locations (buccal sites, the mandible, tongue, and gingiva) have been identified as anatomic sites of IMTs (4).

An IMT consists of uncommon spindle cell (fibroblast or myoblast) proliferations with infiltration by plasma cells and lymphocytes (5). IMTs have previously been known as inflammatory pseudotumors, plasma cell granulomas, inflammatory myofibroblastomas, and inflammatory myofibrohistiocytic proliferations. Histologically, IMTs are often similar to sarcomas, but most cases show a benign disorder. The etiology of IMTs remains controversial although various allergic, immunologic, and infectious mechanisms have been postulated (6). The World Health Organization defines an IMT as a space-occupying lesion composed of intermediate soft tissue myofibroblastic spindle cells with infiltration of small lymphocytes, plasma cells, and eosinophils (7). IMTs frequently recur and rarely metastasize. Thus, IMTs are classified as intermediate malignancies.

For the diagnosis of a periapical lesion, routine radiographies are not enough to achieve an accurate diagnosis. However, cone-beam computed tomographic (CBCT) imaging can assist in differential diagnosis for lesions of nonendodontic origin. In this report, we describe an unusual case of a central IMT of the mandible and the management of considerations in the differential diagnosis.

Case Report

A 42-year-old man was referred to Asahi University Hospital, Mizuho, Gifu, Japan, with a 1-month history of spontaneous pain in part of the right mandibular molar.

One month earlier, he had visited his dentist with spontaneous pain, cold water pain, and occlusal pain in tooth #30. The tooth was diagnosed with pulpitis and pulpectomy, and root canal filling was performed. One week later, tooth #29 showed the same symptoms; tooth #29 was diagnosed with pulpitis, and pulpectomy was performed. However, symptoms did not improve after the treatment, and the patient was referred to our hospital.

At first presentation, the patient showed spontaneous pain and percussion pain in teeth #28, #29, and #30. The teeth showed no mobility. Intraoral radiography revealed that the lamina dura was unclear at the apex of tooth #29, and furcation involvement was seen in tooth #30 (Fig. 1*A*). Thus, the origin of the pain was considered to be teeth #29 and #30, and the teeth were diagnosed with acute apical periodontitis with clinical and radiographic findings. Root canal treatment was performed on tooth #29 for drainage of the periapical lesion; however, there was no pus discharge. Two weeks later,

spontaneous pain continued, and buccal gingival swelling had appeared at the site. The patient's body temperature was 36.5°C, and routine hematologic examination revealed a white blood cell count of 8000/mL and C-reactive protein levels of 0.4 mg/dL. The patient's temperature, white blood cell count, and C-reactive protein levels were all within normal limits. Incisional drainage was performed under local anesthesia, and bone defects were identified at the site.

Panoramic radiography showed radiolucency at teeth #29 and #30, with an unclear lesion boundary (Fig. 1*B*). CBCT imaging showed 18 × 11–mm osteolytic lesions with destruction of the lingual and buccal cortical plate at teeth #28 to 30, suggesting an aggressive neoplasm (Fig. 2*A–E*). Magnetic resonance imaging (MRI) showed a mass with low intensity on an enhanced T1-weighted image and an enhanced margin of the lesion on a gadolinium-enhanced T1-weighted image, and high signal intensity on a T1 normal (Fig. 3) and chest x-ray disclosed no occult metastasis.

According to the diagnostic imaging, the lesion was suspected to be of a nonodontogenic origin because of rapid loss of bone, necessitating incisional biopsy of the lesion. The biopsy specimen from the site revealed unclear hypercellular proliferation consisting of mesenchymal and inflammatory cells. The histopathological examination suggested an IMT. Then, the lesion was removed *en bloc* (including teeth #28–30 and alveolar bone with adequate margins) under general anesthesia; the postoperative course was uneventful. The patient manifested no clinical evidence of recurrence for 12 months.

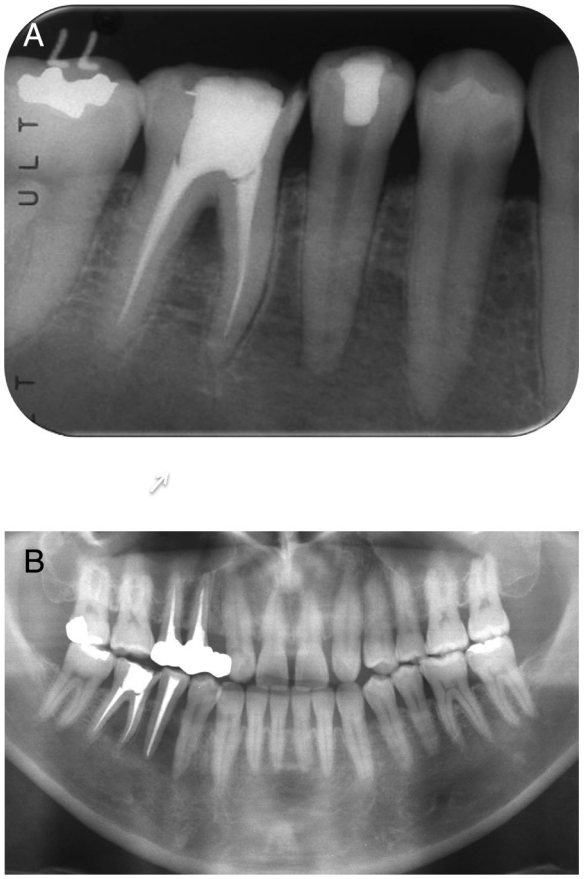

Figure 1. (*A*) Intraoral radiography of tooth #28–30. (*B*) Panoramic radiography showing radiolucency at teeth #29 and #30; the boundary of this lesion was unclear.

Histopathological examination revealed a highly cellular connective tissue stroma with an overlying epithelium. The cellular proliferation was composed of spindle-shaped cells arranged in a fascicular growth pattern admixed with dense inflammatory cell infiltrate that consisted of plasma cells, eosinophils, neutrophils, and lymphocytes. In the immunohistochemistry, alpha-smooth muscle actin (α-SMA) was positive (Fig. 4*A–D*), but anaplastic lymphoma kinase (ALK) was negative. From these morphologic and histologic findings, the lesion was diagnosed as an IMT.

Discussion

An IMT is a rare lesion, and the exact etiology and pathogenesis remain unknown. It is considered to be a morphologic expression of reactive, reparative, infective, and neoplastic processes. In some cases of IMTs, human herpesvirus 8 and Epstein-Barr virus in spindle cells have been reported (8, 9). In our case, there was no definitive evidence of a related traumatic episode or infection.

In this case, the tumor cells showed a positive immunoreactivity with α-SMA protein, suggesting a myofibroblastic differentiation; however, immunoreactivity of ALK was negative. Most spindle cells are positive for both vimentin and α-SMA and have the immunohistochemical profile of myofibroblasts. These cells are usually negative to desmin and cytokeratin expression (10). IMTs of neoplastic origin are based on chromosomal rearrangement at 2p23 in the pathogenesis. (11) Approximately 50% of all IMTs have been associated with ALK positivity (12); however, most of the previous oral IMT cases have been reported to be ALK negative (13). Immunoreactivity of ALK is only significant in patients under 40 years old (14). It has been suggested that dysregulation of the ALK gene plays an important role in tumor genesis by promoting abnormal phosphorylation of cellular substrates (15).

Despite imaging features of IMTs being nonspecific and not characteristic, the role of radiologic diagnosis is to ensure that IMTs are preoperatively suggested as a diagnosis and are differentiated from malignant lesions through a series of specific imaging findings. Both computed tomographic imaging and MRI are required to analyze bone destruction, extra bone invasion, and the structure of the lesion. Enhanced computed tomographic imaging may show homo- or heterogenetic hypo-, iso-, or hyperdensity (16). MRI shows a hypointense lesion on T1- and T2-weighted images and marked gadolinium enhancement (17). In our case, intraoral radiography and panoramic radiography were taken at the first stage. However, these findings were agnostic to comprehension of this lesion. CBCT imaging and MRI are essential to diagnose such lesions. Although the signal intensity of MRI images was different to previous reports, this may be because of periapical inflammation. CBCT imaging, in particular, makes it easy to comprehend the 3-dimensional osteolytic lesions with destruction of the bone.

Surgery is the mainstay of IMT treatment. Surgical approaches to IMT vary based on the extent of the disease, age of the patient, and pathological findings. Complete excision with a free margin is essential to ensure complete removal. The surgical treatment of IMT is controversial; there are several possible treatment options such as surgical excision, curettage corticosteroid therapy, radical surgery, and radiotherapy (18). In the case of incomplete excision, high-dose systemic corticosteroid treatment has been required. Radiotherapy has been required for the treatment of aggressive IMTs (4). In our case, we performed complete surgical resection and considered corticosteroid treatment or radiotherapy unnecessary.

Lesions of nonendodontic origin should be included in the differential diagnosis of apical periodontitis. Kim and Yang (19) presented an IMT of the maxillary sinus associated with pulp necrosis of maxillary

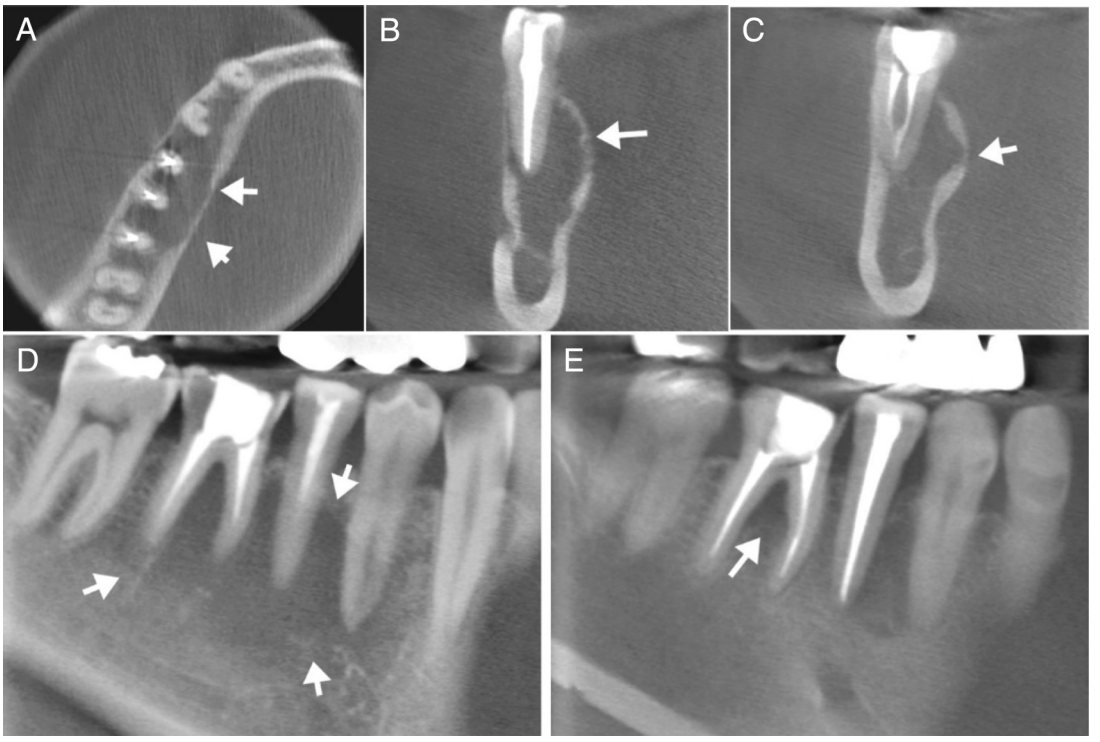

Figure 2. Cone-beam computed tomographic imaging. (*A*) A horizontal slice of the lesion. The lingual cortex of the mandible was absorbed with this lesion (*arrow*). (*B*) A coronal slice of tooth #29. The lesion shows cortical expansion and bone absorption at the lingual alveolar bone (*arrow*). (*C*) A coronal slice of tooth #30. The lesion shows cortical expansion and bone absorption at the lingual side of the mandible (*arrow*). (*D*) A sagittal slice of the lesion. The lesion involved from teeth #29 to #30 and bone absorption were seen in this site. The margins of this lesion were not clearly seen. (*E*) A sagittal slice of the lesion. Bone absorption was seen at the furcation area of tooth #29 (*arrow*).

teeth, and pulp necrosis can be thought to be the origin of IMTs. In our case, pulpectomy was performed on teeth #29 and #30 at the first visit to our hospital. Accurate endodontic examination before endodontic treatment should be performed to avoid misdiagnosis of periapical lesions. In the case presented here, laboratory values of inflammation were not remarkable, which was suggestive of a noninfectious lesion. Blood tests

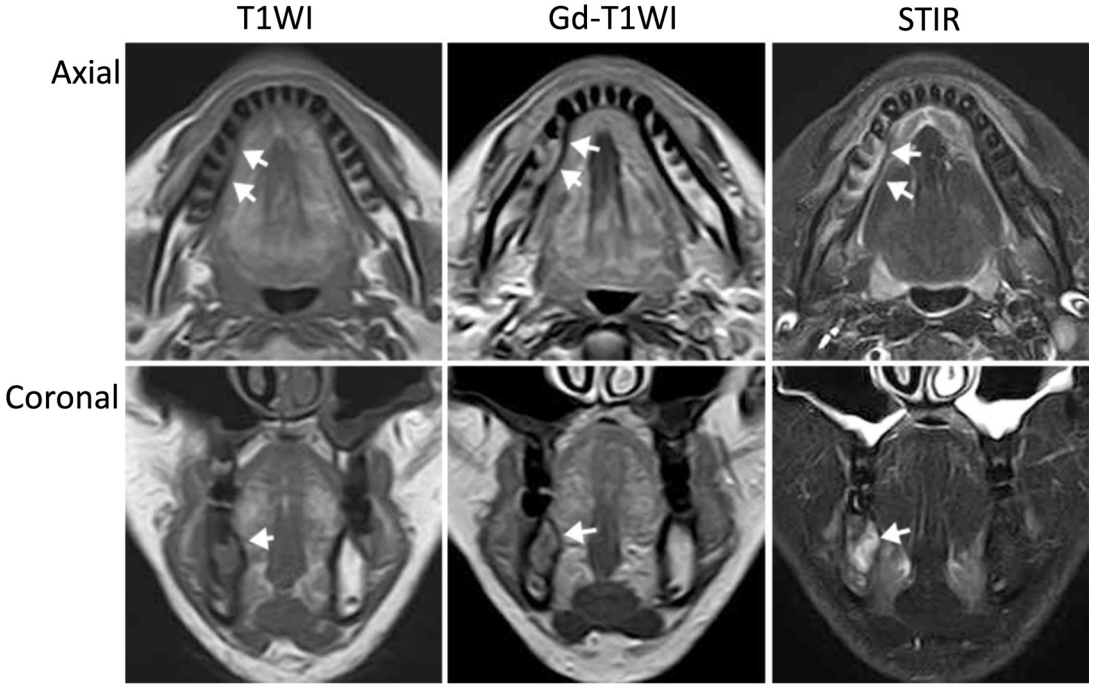

Figure 3. Enhanced T1-weighted MRI showing the mass with low intensity (*arrow*). Short inversion time inversion recovery (STIR) image showing high signal intensity. A solid and ununiformity lesion was seen at this site (*arrow*).

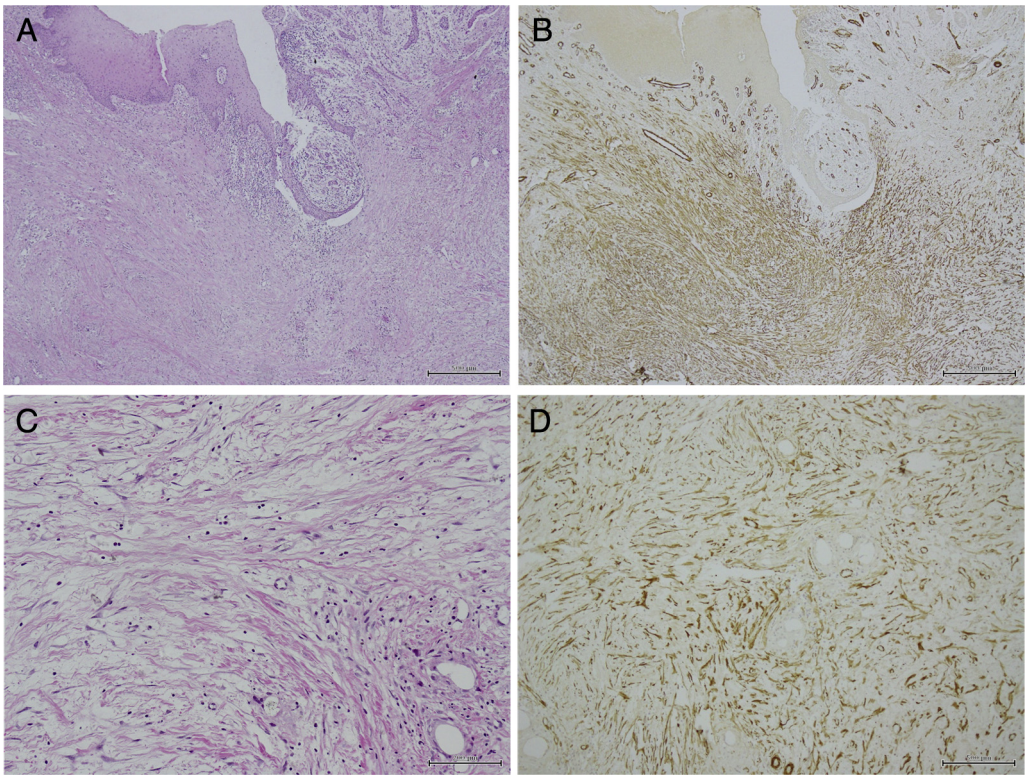

Figure 4. (*A*) Histologic findings indicating an IMT (hematoxylin-eosin stain, weak magnification). (*B*) Immunohistochemistry: positive α-SMA (weak magnification). (*C*) HE stain, higher magnification. (*D*) Immunohistochemistry: α-SMA (higher magnification).

may help by excluding other diagnoses. Every available diagnostic tool should be used in confirming the diagnosis. CBCT imaging is very helpful in the differential diagnosis of a central IMT of the mandible.

Acknowledgments

The authors deny any conflicts of interest related to this study.

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