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# Large mandibular central odontogenic fibroma documented over 20 years: A case report



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## ABSTRACT

**INTRODUCTION:** Central odontogenic fibroma (COF) is a rare, benign, slow-growing intraosseous odontogenic tumor, and accounts for 0.1% of all odontogenic tumors. It is often confused with other entities, such as keratocysts, ameloblastomas, and odontogenic myxomas. Complete enucleation followed by curettage is the treatment of choice for COF to ensure the lowest possible chance of recurrence.

**CASE PRESENTATION:** We report the case of a young Caucasian woman with COF that went undiagnosed for several years despite repeated radiologic examinations. Finally, a massive tumor was surgically removed and the wound was curetted. The specimen was histologically confirmed to be a COF. The patient remains under regular follow-up, and thus far there have been no clinical or radiologic signs of recurrence.

**DISCUSSION:** This rare case of COF, which was documented over a period of 20 years, has helped us to describe the features of this tumor. It also confirms that adequate surgical treatment can lead to impressive bone regeneration in healthy individuals, as evident from the radiologic findings acquired before, during, and after enucleation of the COF in our patient. Our findings also confirm the view that COF has a favorable prognosis regardless of its final size.

**CONCLUSION:** Early diagnosis is key to successful treatment of COF. The slow but steady increase in the size of a COF with no accompanying symptoms has not been reported previously. To our knowledge, this is the only documented case of a COF that has been under continuous radiologic observation for over 20 years.

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## 1. Introduction

Central odontogenic fibromas (COFs) are rare benign neoplasms that have been reported to account for 0.1% of all odontogenic tumors [1–3] and 6.1% of all central odontogenic tumors [4]. These lesions can appear very similar to endodontic lesions and other odontogenic tumors, such as ameloblastomas, odontogenic myxomas, keratocysts, and central giant-cell tumors [5,6]. They occur with almost identical frequency in the lower and upper jaw [7], and are usually located in the posterior region of the mandible and the anterior region of the maxilla [1,3,8]. The slow growth rate of this tumor results in painless and continuous cortical expansion, which makes early diagnosis nearly impossible. These tumors are believed to be derived from mesenchymal tissues of dental origin, such as periodontal ligaments, dental papilla, and dental

follicles. They consist of collagenous fibrous connective tissue containing varying amounts of odontogenic epithelium [9]. Wesley et al. [10] defined certain criteria for a diagnosis of COF, including slow persistent growth with painless cortical expansion and a varying radiologic appearance. Radiologically, smaller lesions (average size, 2.2 cm) tend to appear as unilocular radiolucencies, whereas larger lesions (average size, 4.2 cm) typically appear as multilocular radiolucent areas [11]. A mixed radiolucent/radiopaque appearance can be observed in rare cases [1].

Several attempts have been made to classify these rare tumors definitively. In 1968, Bhaskar [12] investigated a large series of biopsy specimens, erroneously classified all enlarged dental follicles as odontogenic fibromas, and reported that odontogenic fibromas were the most frequently encountered odontogenic tumors. In 1980, Gardner [13] classified the previously described odontogenic fibromas into three histologic categories: hyperplastic dental follicles; fibrous tumors with histologic features similar to those of dental follicles; and more complicated lesions consisting of fibrous connective tissue with varying amounts of odontogenic epithelium, dentin, and/or a material resembling cementum. Similarly, the first [14] and second [15,16] editions of the World Health Organization (WHO) classification of odontogenic tumors did not

**Abbreviations:** COF, central odontogenic fibroma; CT, computed tomography; DTE, delayed tooth eruption; MRI, magnetic resonance imaging; WHO, World Health Organization.

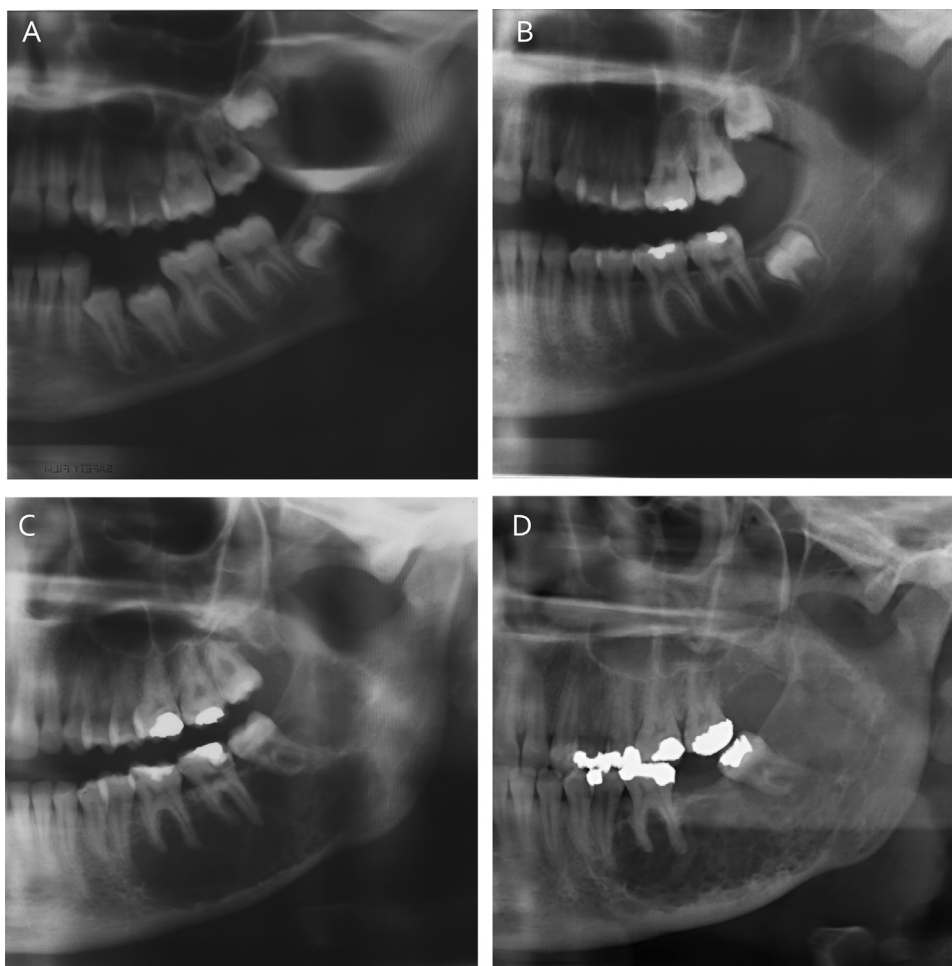
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**Fig. 1.** A, Panoramic radiograph acquired over 12 years before surgery. Note the delayed eruption of the first and second left premolars relative to the corresponding teeth on the contralateral side. B, Panoramic radiograph acquired over 9¼ years before surgery. Note the emerging radiolucency in the left lower jaw (regions 35–38). C, Panoramic radiograph acquired approximately 3¾ years before surgery. The radiolucency in the left lower jaw is now clearly visible. D, Preoperative panoramic radiograph. The multilocular radiolucency extends from region 35 far into the left mandibular ramus.

preclude a diagnosis of COF in the absence of odontogenic epithelium. However, in the third (2005) edition of the WHO classification of odontogenic tumors [17], the presence of odontogenic epithelium was regarded as a requisite for supporting sub-classification of COF as either epithelium-poor (the so-called “simple” type) or epithelium-rich (the so-called “complex” or “WHO” type). However, in the current (2017) edition of the WHO classification of head and neck tumors, the sub-classification of epithelium-poor COF has been abandoned [18].

The available literature on COF almost exclusively focuses on the diagnosis of this slowly progressing tumor and its surgical removal by enucleation and subsequent curettage. Long-term follow-up of treated patients is limited and ranges from a few months to a few years. Current knowledge suggests that regular follow-up visits are needed in patients with tumors such as COF, even when the risk of recurrence is very low, so that a potential recurrence can be addressed in a timely manner.

The purpose of this report is to illustrate the slow-growing behavior of a COF by means of a series of consecutive orthopantomograms starting 12 years preoperatively and thorough radiologic documentation by orthopantomography and computed tomography (CT) for at least 8 years postoperatively. Few cases of COF with comparable long-term postoperative follow-up have been described in the literature. Brazão-Silva et al. [11] reported a case of COF with no recurrence over 13 years of follow-up after curettage,

while Heimdal et al. [19] documented recurrence after 9 years in a patient who was treated with enucleation alone. Our experience in the case reported here also supports the use of curettage as the gold standard treatment for COF. To the best of our knowledge, there is no case report in the existing literature that has documented the development, treatment, and follow-up of this rare tumor over such a long period of time. The patient was managed in our academic institution. We report the present case in accordance with the SCARE criteria [20].

## 2. Case presentation

The patient was a 22-year-old Caucasian woman who was referred to us by her dentist for further diagnostic workup and treatment of a giant radiolucent lesion located in the body and ramus of the left mandible (Fig. 1D). She had an unremarkable drug, family, and psychosocial history (apart from 2.5 pack-years of smoking) and had not experienced pain or other symptoms in the left mandibular region at any time. Teeth 35, 36, and 38 were positive for vitality, and there was no impairment of sensitivity in the left inferior alveolar nerve.

The first orthopantomogram (Fig. 1A) had been acquired during investigation for suspected aplasia of teeth 34 and 35 in 1997 when the patient was about 10 years of age. She had not suffered any pain and her medical history was unremarkable at that time.



**Fig. 2.** A, Preoperative CT image acquired in 2009 (axial view). B, Postoperative CT image acquired in 2009, clearly showing the whole extent of the bony defect after removal of the central odontogenic fibroma. C, Postoperative CT image acquired in 2014. D, Postoperative CT image acquired in 2015. Note the good bony regeneration. CT, computed tomography.

However, the radiograph revealed missing premolars and a diagnosis of delayed tooth eruption (DTE) was made. There was no clear sign of an emerging COF at that time, and a radiolucent appearance was difficult to visualize. During the ensuing 3 years, the patient was healthy and only required a few occlusal fillings; the third molars had started to erupt, and the previously delayed premolars had developed. However, a routine orthopantomogram acquired in 2000 (Fig. 1B) revealed the start of an osteolytic process involving the left mandibular body from positions 36–37, which was unfortunately missed by the attending dentist. Because of the clinically inconspicuous behavior of the lesion, no orthopantomograms were acquired over the next 6 years. As in the earlier years, only a few fillings were extended or newly placed; teeth 28 and 38 had appeared, and tooth 18 had partially appeared, while tooth 48 was partially impacted.

Orthopantomograms acquired in 2006 (Fig. 1C) revealed a further increase in the size of the radiolucency, which now extended from region 35 to region 38 and almost reached the coronoid process. There was no sign of root resorption or cortical breakthrough. Surprisingly, the patient was still not experiencing any pain or discomfort. All teeth remained vital, even those directly involved in the radiolucent body of the lesion. Surprisingly, the need for an immediate definitive diagnosis and treatment remained unmet.

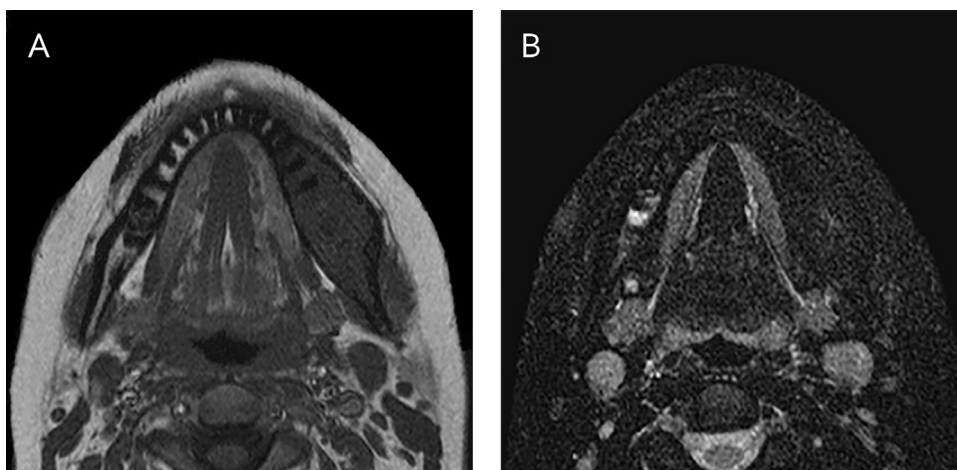
Three years later, in 2009, the patient was finally referred to our clinic because of pain and swelling in the left mandibular region. Radiologic findings (Fig. 1D) revealed a massive radiolucent

lesion extending from the left mandibular body to the ascending ramus, and almost into the coronoid process, as well as a missing tooth at position 37. CT revealed a large hypodensity affecting the left mandibular body and ramus, while the expanding cortical bone appeared intact (Fig. 2A). Magnetic resonance imaging of the lower jaw did not reveal infiltration of the surrounding soft tissue (Fig. 3), suggesting a diagnosis of COF. Biopsy specimens were collected under local anesthesia for histopathologic examination. The specimens were embedded in paraffin, sliced into 5- $\mu$ m-thick sections, and stained with hematoxylin and eosin. Histologic analysis revealed scant inactive-appearing odontogenic epithelium embedded in mature fibrous connective tissue (Fig. 4). In accordance with the latest WHO classification, the lesion was diagnosed as COF.

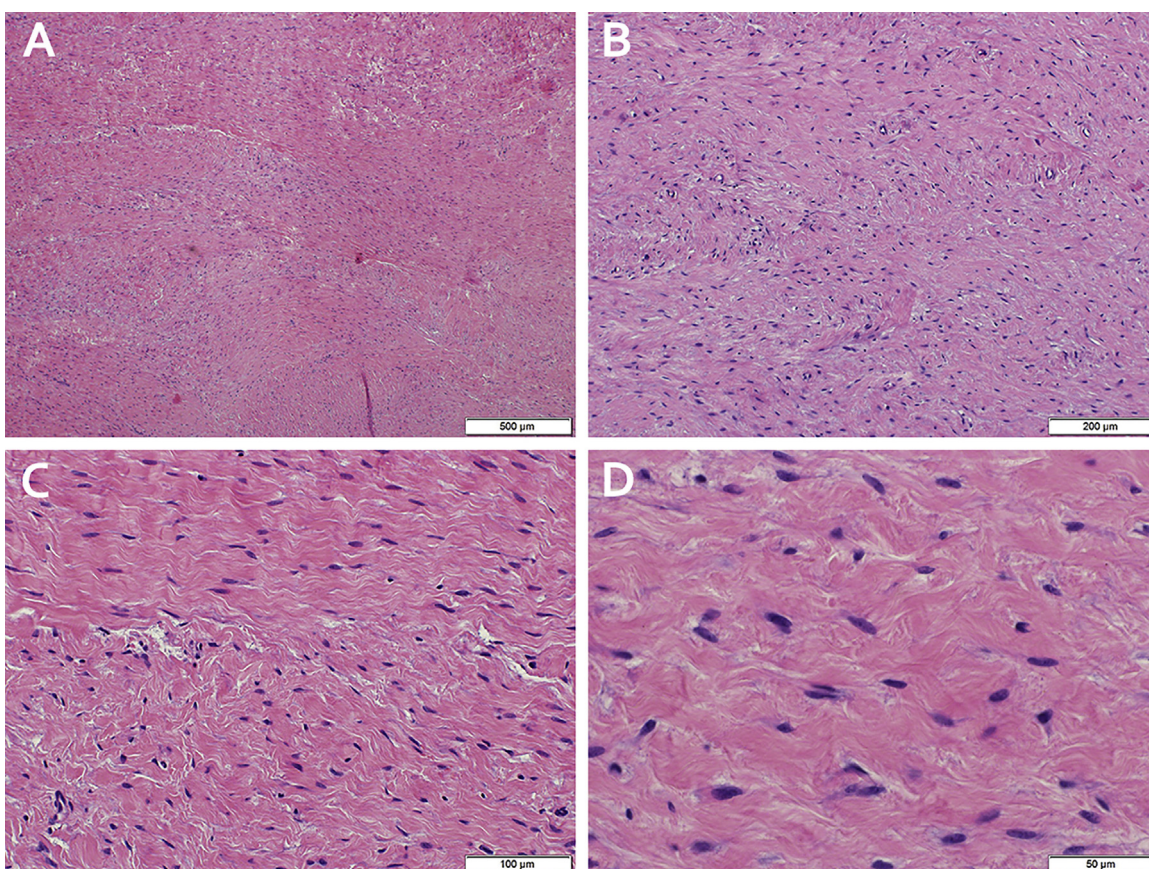
The patient then underwent surgery under general anesthesia performed by our head of department. Using an intraoral approach, a mucoperiosteal flap was raised in region 38–35 to expose the mental nerve. The tumor was identified as a homogenous whitish solid mass, which was removed in fragments (Fig. 5). During surgery, teeth 35, 36, and 38 were extracted because their roots were almost fully involved in the pathologic process. The bony defect was not filled with autologous or other material at that time. The patient received postoperative antibiotics, a nonsteroidal anti-inflammatory agent, and a proton pump inhibitor, and was discharged home in a stable cardiorespiratory condition 5 days later.

The patient refused endodontic treatment as an alternative to tooth extraction, and 2 months later underwent removal of a





**Fig. 3.** Preoperative magnetic resonance images (axial view). A, T1-weighted. B, T2-weighted.



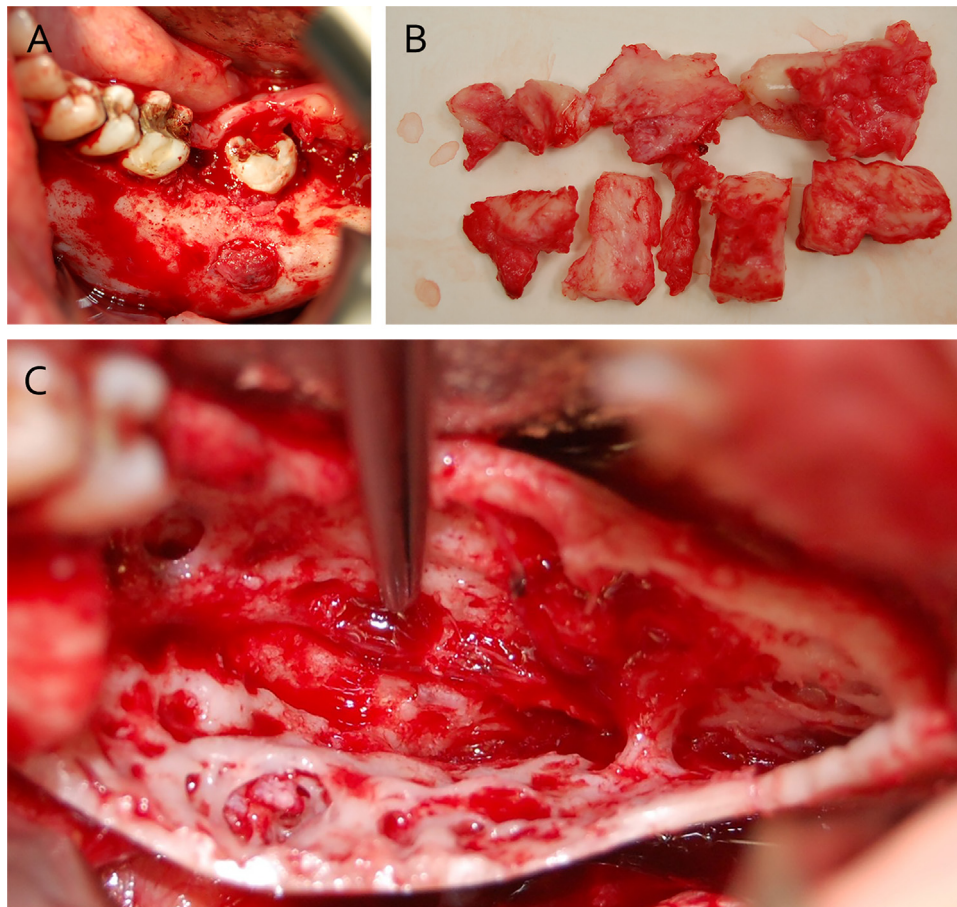
**Fig. 4.** Odontogenic fibroma. Scant inactive-appearing odontogenic epithelium embedded in mature fibrous connective tissue (H&E).

radicular cyst in the right lower jaw as well as teeth 46 and 47. Histopathologic analysis of the excised specimen confirmed it to be a radicular cyst. The patient was fitted with partial upper and lower dentures to resolve the gaps left by the extractions.

Since her surgery, the patient has attended our institution for annual follow-up orthopantomography (Fig. 6) and CT (Fig. 2B–D). To date, almost 8 years after surgery, there has been no evidence of recurrence and the patient remains symptom-free and satisfied with her treatment. Radiographs acquired at the most recent visit show blistered ossification at the site of removal of the COF in the

left mandibular body along with well-remodeled bone and absence of tooth 27 (Figs. 2 C–D and 6). Small cystoid-like lesions were seen in the body of the mandible. However, when compared with the penultimate images, there was no sign of an increase in size or suspicious degeneration. These changes are more likely to represent partial or irregular bone healing than recurrence of the tumor. However, the patient has not yet consented to another biopsy to confirm this assumption, so we have increased the frequency of follow-up so that we can react promptly and appropriately to any sign of recurrence.





**Fig. 5.** A, Intraoperative view after mucoperiosteal flap formation. B, Intraoperative view after tumor removal, with the forceps pointing to the left inferior alveolar nerve. C, Homogenous whitish solid tumor, which had to be removed in fragments.

### 3. Discussion

COF is a rare neoplasm of mature fibrous connective tissue, with variable amounts of inactive-looking odontogenic epithelium with or without evidence of calcification [18]. Reviews by Svirsky et al. [21] and Handlers et al. [22] have reported the frequency of this entity to be 0.007% and 0.024%, respectively. In a case series of 1088 central odontogenic tumors, Buchner et al. [23] reported 16 cases of COF, corresponding to 1.5% of all specimens investigated, with a nearly equal distribution between the mandible and maxilla. According to Mosqueda-Taylor et al. [24], only 92 cases of COF have been published in the international literature to date. Simultaneous appearance of COFs and odontogenic cysts or giant-cell granuloma-like lesions is also very rare, according to recent reports by Murgod et al. [25] and Upadhyaya et al. [26]

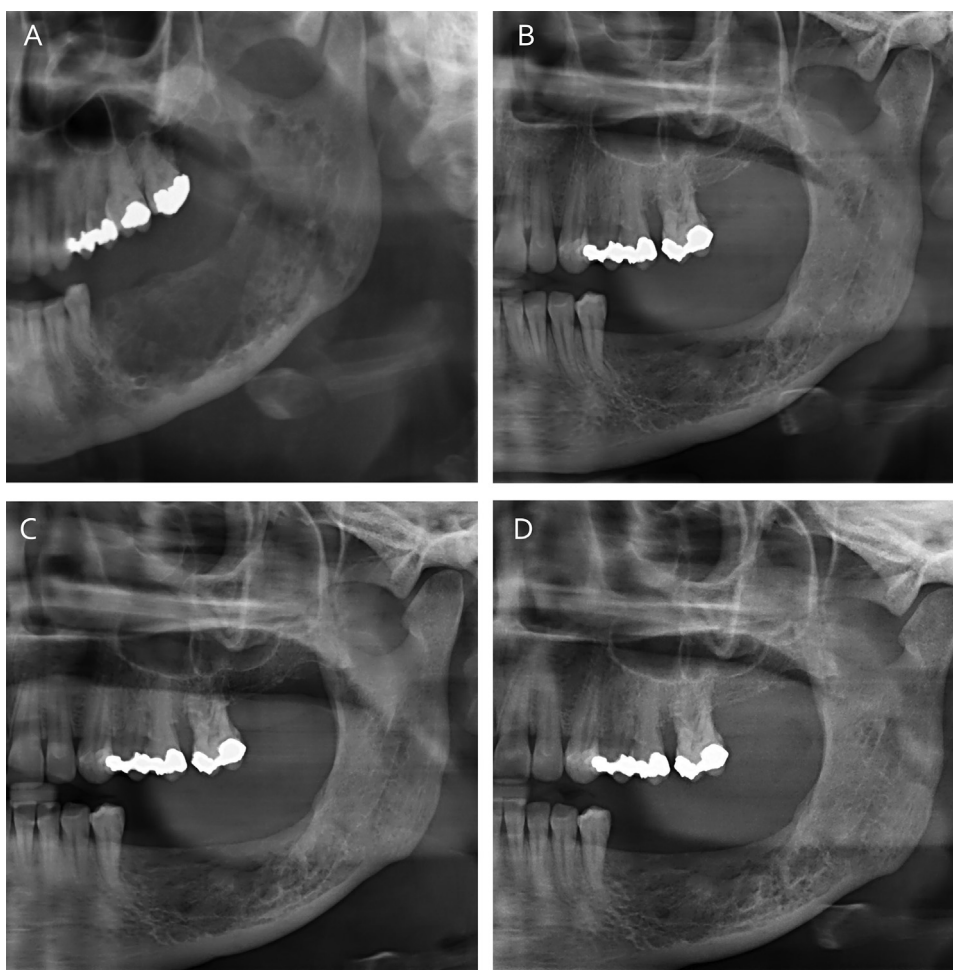
The etiology of COF remains unclear, and no obvious causative environmental factors have been identified. Diniz et al. speculated that some odontogenic tumors, including COF, probably arise because of developmental defects in normally quiescent genomes, which then trigger oncogenic mutation pathways [27].

Given the general lack of preoperative radiologic documentation of the growth and development of COF, we have attempted here to demonstrate the slow and progressive increase in size of this tumor by presenting several consecutive orthopantomograms. The normal radiographic findings and missed diagnosis in our patient are consistent with the general view regarding the slow-growing behavior of COF. However, while COF is benign in nature and does not infiltrate the surrounding tissues even after years of development (Fig. 3), a conservative approach to treatment

of such tumors is unacceptable. Therefore, early diagnosis must be attempted to prevent continuous and disproportionate tumor growth, which often results in multiple tooth loss and a long recovery. Further, adequate postoperative prosthetic care, especially if involving dental implants, is made considerably more difficult in that augmentation is needed, or even impossible when the lesion reaches a certain size. In addition to the radiographic methods mentioned above, preoperative biopsy of degenerated tissue is one of the more common diagnostic methods.

Pippi et al. suggested that accurate preoperative biopsy of all tumors (excluding cysts) is necessary when planning an appropriate surgical procedure [28]. However, the two main differential diagnoses, i.e., tumor vs. cyst, must be clarified in presumed cases of COF. It thus follows that the decision to perform a biopsy is difficult and should be considered carefully. Unfortunately, histologic examination is the only definitive way to confirm a diagnosis of COF. However, even considering histologic findings, the diagnostic criteria for COF remain controversial in view of the numerous attempts to subclassify the lesion on the basis of its spectrum of histologic features [26]. Additionally, given the lack of a characteristic radiologic appearance, the final preoperative diagnosis of COF remains a diagnosis of exclusion.

Lin et al. [29] reported that the average time interval between initial recognition of the lesion as COF and definitive therapy was 12.7 (range, 1–36) months in their study. None of the tumors in that study were correctly diagnosed initially. Similarly, in the present case, the COF remained unrecognized for a long time, i.e., over 12 years, and the initial diagnosis differed from the final diagnosis of COF. In addition, the first orthopantomogram (Fig. 1A) revealed



**Fig. 6.** A, Postoperative panoramic radiograph clearly showing the whole extent of the bony defect after removal of the central odontogenic fibroma. Postoperative panoramic radiographs acquired in (B) 2013, (C) 2014, and (D) 2015 (note the remodeled bone structure).

a suspicious delay of eruption of the left mandibular premolars. Given the reports of several odontogenic tumors associated with DTE [30–33] and that the premolar region corresponded to the mesial border of the tumor that subsequently evolved in our patient (Fig. 1B–D), DTE may be interpreted as the first sign of a potential emerging COF before its radiologic appearance. In patients with COF, tooth eruption is delayed but is still possible. It is interesting that the growing tumor mass does not necessarily hinder the final tooth eruption, which then conceals the painless growing pathology. Therefore, clinicians should note any abnormalities in tooth eruption. Shorter recall intervals are also recommended for early diagnosis of COF. Fig. 1B shows the first radiologic view of the abnormality (an evolving radiolucency in the left mandibular body), which progressed to a more distinctive multilocular radiolucent lesion over the years, as illustrated in subsequent consecutive orthopantomograms (Fig. 1C–D). Diagnostic delay allowed the tumor to expand massively from the left mandibular body well into the ramus and to even affect the coronoid process. The occurrence of a COF of such great size is extremely rare and even more so in the literature [34,35]. The present follow-up radiography findings underscore the slow-growing, expanding, and non-infiltrative nature of COF. Without treatment, growth of this tumor seemed to continue in an unlimited manner.

In the present case, the COF was finally surgically removed via an intraoral approach under general anesthesia. The patient has been under regular observation in the years since. At the latest clinical and radiologic follow-up (Fig. 6D), almost 10 years after surgery, the

patient showed no sign of recurrence. Remarkably, bone regeneration after tumor removal is nearly complete in this patient. These findings highlight the fact that a well-planned surgical procedure is appropriate and adequate for treatment of COF and that even large bone defects have the capacity to regenerate. Achieving the level of bone remodeling seen in our patient requires precise and complete removal of the tumor. It is also the only way to ensure long-term healing and remission.

We observed some cystoid structures at the former location of the COF in our patient during long-term follow-up, which might have originated from potentially incompletely resected or overlooked parts of the tumor. Such an event/complication could be observed in many cases of COF several years after treatment when there is an equivalent long-term follow-up period. Nevertheless, in the present case, we achieved clinically uneventful remission accompanied only by radiologic abnormalities. Such a positive outcome is attributable at least in part to the expansive but non-infiltrative behavior of COF, which can still be treated successfully even when massively advanced. Although recurrences of COF have been described [9,21,36,37], the recurrence rate is low, and it can be assumed that our patient has a favorable prognosis.

Our findings suggest that COF may be a local causative factor for DTE. To the best of our knowledge, the present case is the first report of a COF presumably being responsible for unilateral DTE. Our hypothesis needs to be confirmed by an extensive review of preoperative radiography findings in patients with COF. As a precaution, clinicians should pay attention to any conspicuous DTE,

especially when tooth eruption on the contralateral side is normal, since this peculiarity could point to an emerging COF prior to its radiologic appearance. In such situations, we recommend performing orthopantomographic evaluation more frequently than usual in order to detect any radiologic abnormalities in a timely manner.

#### 4. Conclusion

This case report highlights the slow-growing behavior of COF, as described in the literature. Unfortunately, in the present case, lack of early treatment, as well as the expansive nature of COF, caused growth of the tumor to a remarkable size, which resulted in a concurrent bone defect. This rare case of COF has helped us to describe the features of COF and confirms that adequate surgical treatment can lead to impressive bone regeneration in healthy individuals, as evident from the radiologic findings acquired before, during, and after enucleation of the tumor. Our findings also confirm the assumption that COF has a favorable prognosis, regardless of the final tumor size. Further, preoperative magnetic resonance imaging can aid in the differential diagnosis, in particular as to whether a biopsy is indicated. Our long-term findings, recorded over 20 years, also support the prevailing assumption regarding the very low recurrence rate of COF. The asymptomatic nature of tumor growth with concurrent bone destruction underscores the importance of early diagnosis. Therefore, evidence of DTE, and especially unilateral DTE, should prompt a patient recall, because this abnormality may be the first sign of an emerging COF prior to its radiologic appearance.

#### Conflicts of interest

The authors declare that there is no conflict of interest.

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#### Ethical approval

The ethical approval has been exempted by our institution.

#### Consent

The patient received a thorough explanation of this report gave her oral and written informed consent to be included in this report as well as for publication of these case, anonymous data, and pictures. A copy of the written consent is available for review on request.

#### Author contribution

Patrick Bandura and Walter Sutter: study concept and design, writing the paper.

Marius Meier and Sebastian Berger: data collection, analysis and discussion of data.

Dritan Turhani: final approval of the version to be published.

#### Guarantor

The corresponding author is the guarantor of submission.

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