

Case report of intra-osseous fibroma: a study on odontogenic and desmoplastic fibromas with a review of the literature

Atsushi Ikeshima¹⁾ and Tadahiko Utsunomiya²⁾

Departments of ¹⁾Radiology and ²⁾Oral Pathology,
Nihon University School of Dentistry at Matsudo, Chiba, Japan

(Received 4 March and accepted 2 September 2005)

Abstract: Intra-osseous fibromas of the jaw are classified by origin. Intra-osseous odontogenic fibromas have odontogenic epithelia, while desmoplastic fibromas do not. However, it is often difficult to determine the odontogenic origin for central fibromas. Three subjects with a diagnosis of intra-osseous fibroma were examined. Case 1 was a 35-year-old man found to have a panoramic radiograph from the right premolar to the mandibular ramus in the mandible that exhibited multilocular radiolucency. Within the radiolucency, small-radioopaque bodies were observed. Case 2 was a 13-year-old female, in whom a panoramic radiograph from the left premolar to the molar in the mandible showed multilocular radiolucency. Case 3 was a 51-year-old female who exhibited a heart-shaped radiolucency in the panoramic radiograph of the left first molar area in the mandible. We also reviewed the literature for previously reported cases of intra-osseous odontogenic and desmoplastic fibroma. In 64 cases of intra-osseous odontogenic fibroma and 68 cases of desmoplastic fibroma we extracted data on age, sex, location, and radiographic findings. Based on the analysis of the reported literature cases, re-evaluation of the patients in our study revealed that case 1 could be classified as desmoplastic fibroma, while cases 2 and 3 were intra-osseous odontogenic fibromas. (*J. Oral Sci.* 47, 149-157, 2005)

Keywords: intra-osseous odontogenic fibroma; desmoplastic fibroma; radiographic findings; CT image findings.

Introduction

Fibromas (WHO type) often occur in the oral mucosa, but certain rare cases have been reported to involve the jawbone (intra-osseous fibroma). Depending on the presence or absence of odontogenic epithelia, intra-osseous fibroma cases can be classified into two respective categories: odontogenic fibroma or non-odontogenic fibroma (desmoplastic fibroma) (1-4). The clinical findings for intra-osseous odontogenic fibroma are similar to those seen with desmoplastic fibroma in the jaws. However, desmoplastic fibroma is generally believed to be more aggressive than odontogenic fibroma(1-3).

In this paper, we describe three cases of intra-osseous fibroma. In addition, we also reviewed the literature for cases of intra-osseous odontogenic and desmoplastic fibroma. Clinical findings from these cases were extracted in order to determine the difference, if any, between clinical findings for intra-osseous odontogenic and desmoplastic fibroma.

Materials and Methods

Three patients were diagnosed with intra-osseous fibroma at a hospital affiliated with the Nihon University School of Dentistry at Matsudo. The age and sex, as well as the location and radiographic findings for the fibromas were obtained for each of the patients. CT image findings were also added to the patient profiles.

Our literature review found 64 cases of intra-osseous odontogenic fibroma (29 reports) (5-33) and 69 cases of

Correspondence to Dr. Atsushi Ikeshima, Department of Radiology, Nihon University School of Dentistry at Matsudo, 2-870-1 Sakaecho-nishi, Matsudo, Chiba 271-8587, Japan
Tel: +81-047-360-9530
Fax: +81-047-360-9418
E-mail: aikeshima@mascat.nihon-u.ac.jp

desmoplastic fibroma (43 reports) (34-76). After extracting the data for age, sex, location, and radiographic findings, we attempted to determine if differences existed in the clinical findings between the odontogenic and desmoplastic fibroma groups. After analysis of the data obtained from the literature, we then re-evaluated our three cases and attempted to determine if there was an odontogenic or non-odontogenic origin, i.e., whether the cases were intra-osseous odontogenic or desmoplastic fibromas.

Case Presentation

Case 1

A 35-year-old male was originally seen at the hospital affiliated with Matsudo Dental College on October 7, 1990, and found to be suffering from swelling and pain in the right buccal region and was unable to fully open his mouth. A panoramic radiograph (Fig. 1) from the right mandibular premolar region to the ramus area showed an irregular margin of multilocular radiolucency and expansion of the lower border of the mandible. The lamina dura periphery 44 was not visible in the dental radiograph (Fig. 2). The CT image (Fig. 3) showed remarkable bone expansion from the mandibular premolar region to the ramus, along with a somewhat unclear and irregular margin. The mandibular canal ran through the lesion. The inner density was equal to muscle, and there were numerous small-radiopacified bodies visible.



Fig. 1 Panoramic radiography.



Fig. 2 Dental radiography.

Under general anesthesia, the patient underwent surgery on November 13, 1990. The excised specimen measured 8.2 cm × 2.5 cm × 1.3 cm, and the cut surface appeared grayish-white in color. The specimen consisted of proliferating fibroblastic spindle cells with oval or spindle nuclei. Collagen bundles were observed intermingled with the fibroblastic cells (Fig. 4). A diagnosis of intra-osseous fibroma was made.

Case 2

A 13-year-old female began reporting toothache at 36. She was referred by the practicing physician at the hospital associated with Matsudo Dental College to our dental hospital on March 2, 2000.

A panoramic radiograph (Fig. 5) showed a well-defined radiolucent area at the root apex of 35 and 36, demonstrating osteosclerosis around the periphery of the region. The mandibular canal was dislocated downward, and lamina dura periphery 36 was not visible in the dental radiograph (Fig. 6).

Axial CT scans (Fig. 7) showed a low-density area under the muscle, including the root apex of 36. Other findings in the CT image included thinning of the cortical bone and peripheral osteosclerosis. The mandibular canal was found to be dislocated downward as well.

Under local anesthesia, the patient underwent surgery on March 23, 2000. Several portions of the specimen,

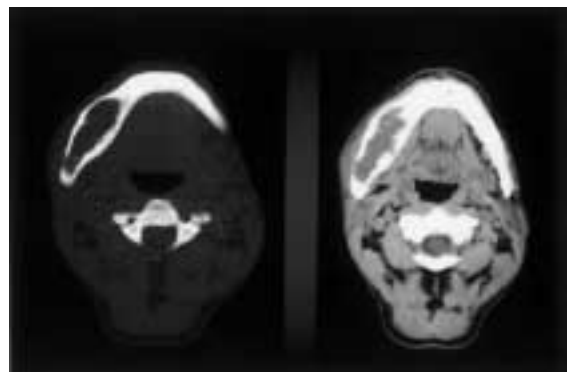


Fig. 3 CT image (Axial scan).

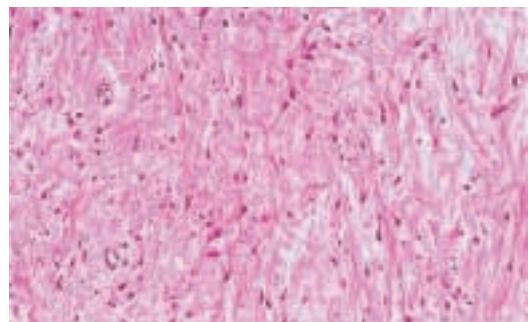


Fig. 4 Hematoxylin-Eosin stain (× 200).

measuring up to 0.5 cm × 0.4 cm × 0.4 cm, were extirpated. Proliferating, fibroblastic spindle cells with collagen bundles were evident, and hyalinization and overgrowth of the capillary vessels was observed (Fig. 8). Based on the data collected, a diagnosis of intra-osseous fibroma was made.

Case 3

A 51-year-old female, who reported pain and swelling in the left maxillary molar region, underwent a dental examination during an earlier visit with her personal care provider. The panoramic radiograph showed radiolucent area of 46. On June 21, 2001 she was referred by the practicing physician to Matsudo Dental College Hospital.

A panoramic radiograph (Fig. 9) taken at the hospital

demonstrated entirely clear regions and a heart-shaped area of radiolucency that appeared to overlap the mandibular canal and mental foramen. An axial CT scan (Fig. 10) showed a low-density area under the muscle with an irregular margin, which included the apex of 46 and 47. The lesion reached the lingual cortical bone, and the mandibular canal ran through its center. There was swelling of the submandibular lymph node with a size of 2.0 cm × 1.0 cm.

Under general anesthesia, the patient underwent surgery on March 14, 2002. The excised specimen measured 1.7 cm × 1.5 cm × 0.7 cm, and the cut surface demonstrated a grayish-white color. The specimen consisted of proliferating fibroblastic spindle cells with oval or spindle nuclei and additionally, collagen bundles were observed

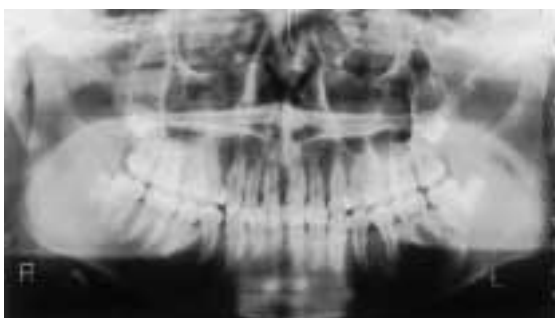


Fig. 5 Panoramic radiography.

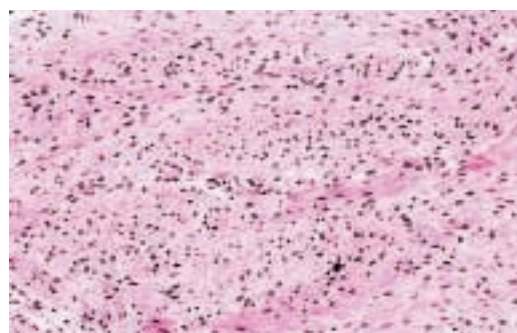


Fig. 8 Hematoxylin-Eosin stain (×200).



Fig. 6 Dental radiography.



Fig. 9 Panoramic radiography.

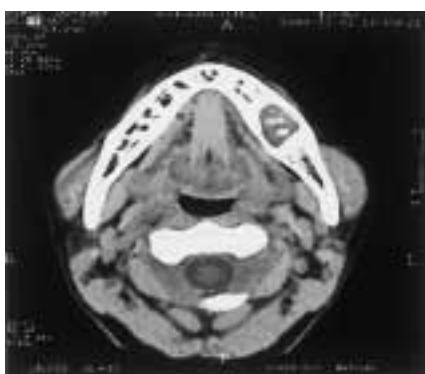


Fig. 7 CT image (Axial scan).

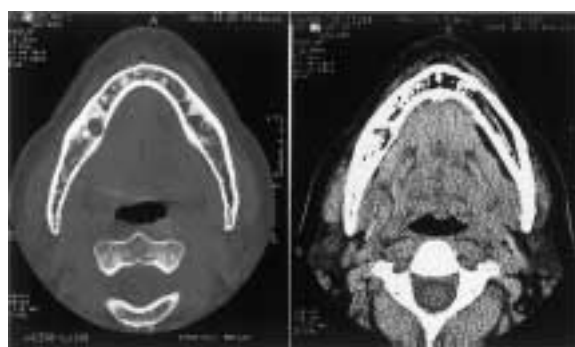


Fig. 10 CT image (Axial scan).

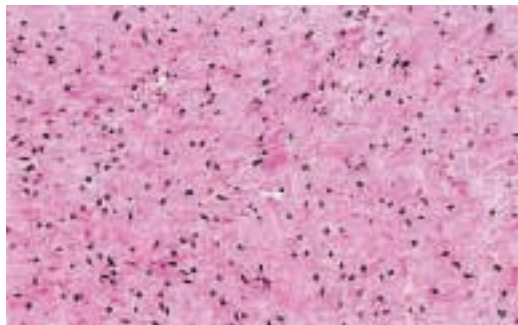


Fig. 11 Hematoxylin-Eosin stain (× 200).

Table 1 Comparison of odontogenic and desmoplastic fibroma (age and sex)

	Odontogenic fibroma	Desmoplastic fibroma
Age (No. of cases)	(64)	(68)
Mean	34.9 years	15.1 years
Standard deviation	19.6 years	12 years
Sex		
Male	19 cases	31 cases
Female	45 cases	38 cases

Table 2 Comparison of odontogenic and desmoplastic fibroma (location)

	Odontogenic fibroma	Desmoplastic fibroma
Maxilla (No. of cases)	(30)	(11)
Left	11 cases	3 cases
Right	17 cases	7 cases
Unclear	2 cases	1 case
Mandible (No. of cases)	(32)	(57)
Left	21 cases	28 cases
Right	10 cases	17 cases
Median	1 case	1 case
Unclear	0 case	11 cases

intermingled with the fibroblastic cells. Partial hyalinization and mucoid degeneration was also observed in the tumor (Fig. 11). A diagnosis of intra-osseous fibroma was made.

Case Analysis

To examine our hypothesis that intra-osseous fibroma can be classified as either central odontogenic or desmoplastic fibromas, we reviewed the literature and found 63 cases of intra-osseous (central) odontogenic fibroma reported from 1954 to 2002 and 69 cases of the desmoplastic fibroma reported from 1965 to 2001. The data from these cases are summarized in Tables 1-4.

Table 1 lists the age and gender distribution for both the intra-osseous odontogenic and desmoplastic fibroma groups and Table 2 indicates the location of occurrence of the intra-osseous odontogenic and desmoplastic fibromas. As indicated by the radiographic findings, Table

Table 3 Comparison of odontogenic and desmoplastic fibroma (size)

	Odontogenic fibroma	Desmoplastic fibroma
Under 1.0 cm	1 case	0 case
Over 1.0 cm under 1.5 cm	1 case	2 cases
Over 1.5 cm	19 cases	31 cases

Table 4 Comparison of odontogenic and desmoplastic fibroma (radiographic findings)

	Odontogenic fibroma	Desmoplastic fibroma
Shape		
Multilocular	15 cases	19 cases
Unilocular	12 cases	6 cases
Inner lesion		
Radiolucenct	48 cases	42 cases
Radiopaque	0 case	3 cases
Mixed	2 cases	1 case
Boundary		
Well-defined	9 cases	14 cases
Destructive	2 cases	8 cases
Bone expansion		
Presence	17 cases	22 cases
Root resorption		
Presence	7 cases	4 cases
Calcification		
Presence	3 cases	1 case

Table 5 Differential diagnoses between central odontogenic and desmoplastic fibroma (including our 3 cases)

	Central odontogenic fibroma	Desmoplastic fibroma	Case 1	Case 2	Case 3
Age	34.9±19.6y	15.1±12y	35y	13y	51y
Location	Max. and. Mand	Almost Mand.	Mand.	Mand.	Mand.
Destruction boundary	3.1%	11.8%	Irregular	Well-defined	Well-defined
Root resorption	10.9%	5.9%	NA	NA	NA
Calcification	4.7%	1.5%	NA	NA	NA

Max. = maxilla
Mand. = mandibular

3 presents the dimensions of the intra-osseous odontogenic and desmoplastic fibromas, while Table 4 lists the other characteristics such as shape, inner lesion, boundary, bone expansion, resorption of adjacent tooth root, and whether or not there was enclosed calcification for both intra-osseous odontogenic and desmoplastic fibroma cases.

There was only one report of intra-osseous odontogenic fibroma (29) that referred to CT images in contrast to ten reports for desmoplastic fibroma (51,54,60,63,65,67,69,72-74). Cases of desmoplastic fibroma were often observed

to involve the destruction or perforation of cortex bone. In the one report in which there was a MRI image of the desmoplastic fibroma, erosion of the right hard palate was observed (76).

Table 5 shows the differences between intra-osseous odontogenic and desmoplastic fibromas and includes the data from our three cases. Based on the differences we found in the reported cases in the literature, we were able to establish appropriate criteria for categorical guidelines. The differential diagnosis criteria were based on patient age, location of the lesion, boundary destruction, and calcification. For lesions that occurred in the maxilla, there was a high degree of probability that the correct diagnosis was intra-osseous odontogenic fibroma. However, in all three of our cases the lesions occurred in the mandible, which based on location alone suggested a diagnosis of either intra-osseous odontogenic or desmoplastic fibroma. Tooth root resorption was excluded as a criterion, since the differences observed from patient to patient were minimal. The resulting degree of resemblance calculations indicated that both cases 1 and 2 exhibited a 62.5% similarity to the desmoplastic fibroma cases, while case 3 exhibited a 62.5% similarity to the intra-osseous odontogenic fibroma cases. The major factor determining classification for case 2 was boundary destruction, which appears to be a decisive trait for the indication of desmoplastic fibroma.

Discussion

Fibromas of odontogenic origin are referred to as intra-osseous odontogenic fibroma (1-3) while lesions of non-odontogenic origin are known as desmoplastic fibroma (1-3). Although odontogenic or non-odontogenic origin can be determined by the presence of odontogenic epithelium, in cases where there is an absence of odontogenic epithelium it is not possible to make similar clear-cut conclusions (77,78).

Kramer et al (77) have reported that odontogenic fibroma is a fibroblastic neoplasm that contains varying amounts of apparently inactive odontogenic epithelium. Safer et al (2) characterized such lesions as having the most poorly defined parameters. On the other hand, Regezi et al (3) described desmoplastic fibroma as being benign, locally aggressive lesions of the bone that share many features with soft tissue desmoid tumors and fibromatoses.

Three types of intra-osseous odontogenic fibromas have recently been proposed (1-3). The first type, (simple type), is a lesion around the crown of an unerupted tooth resembling a small dentigerous cyst. The second type, (WHO type), is a lesion described by the World Health Organization as a fibroblastic neoplasm with varying

amounts of odontogenic epithelium and calcified material resembling dysplastic dentin or cement-like material. The third type, (granular cell type) (1), is a lesion that exhibits variable numbers of cells with an acidophilic granular cytoplasm. These three types are the recurring types that are encountered in the literature (13,31).

Desmoplastic fibroma is a locally aggressive lytic benign tumor of bone (1,53), with numerous cases involving children (34,38,43,45,57,59,60,70,73-75). Five such cases were found in the literature (56,62,68,79).

In the three cases from our institution, the apparent absence of odontogenic epithelium led to an original diagnosis of intra-osseous fibroma in all of the patients. Generally, such diagnoses are determined entirely by the presence of odontogenic epithelium. In other words, if odontogenic epithelium is present, a diagnosis of intra-osseous odontogenic fibroma is made, while if it is absent there is a diagnosis of desmoplastic fibroma. As odontogenic epithelium was not found in all three of our cases, a diagnosis of intra-osseous fibroma was summarily made. Using the approach previously outlined, we set out to find another way of determining a diagnosis of intra-osseous odontogenic fibroma or desmoplastic fibroma. Therefore we re-evaluated our three cases based on diagnostic data criteria that were determined from our analysis of the previously reported cases in the literature.

Desmoplastic fibroma tended to involve younger patients than that seen for intra-osseous odontogenic fibroma cases. The mean age for cases of desmoplastic fibroma was 15.1 years, while that for cases of intra-osseous odontogenic fibroma was 34.9 years (Table 1). Cases of intra-osseous odontogenic fibroma involved twice as many women as men, while cases of desmoplastic fibroma showed nearly equal sex ratios (Table 1). The cases of intra-osseous odontogenic fibroma occurred at locations nearly equidistant to the maxilla and mandible. On the other hand, desmoplastic fibroma occurred almost exclusively in the mandible (Table 2). The dimensions of both intra-osseous odontogenic and desmoplastic fibromas were generally over 1.5 cm in diameter (Table 3).

Radiographic findings showed varying characteristics for points such as shape, inner lesion, boundary, bone expansion, and root resorption. Cases of intra-osseous odontogenic fibroma were nearly evenly divided between multilocular and unilocular patterns. On the other hand, cases of desmoplastic fibroma were three times more likely to show a multilocular than unilocular pattern. The inner portion of both lesion types tended to be radiolucent. The well-defined boundary of intra-osseous odontogenic fibroma was 4.5 times that of uncleared boundaries. The ratio for desmoplastic fibroma was just under 2 and the

cases of desmoplastic fibroma were more likely to involve bone expansion than cases of intra-osseous odontogenic fibroma. Cases of intra-osseous odontogenic fibroma were more likely to involve adjacent root resorption than cases of desmoplastic fibroma (Table 4).

The surgical techniques that are applied are different between intra-osseous odontogenic and desmoplastic fibromas, as desmoplastic fibroma is more aggressive than intra-osseous odontogenic fibroma. An ostectomy is normally performed for intra-osseous odontogenic fibroma, while fundamental resection is done for desmoplastic fibroma (80).

With respect to the histo-pathological findings, intra-osseous odontogenic fibroma has classically been divided into two distinct variants (1). The first variant is referred to as the simple type and resembles the dental follicle. It consists of a very bland connective tissue mass, and therefore can be described due to the many plump fibroblasts appearing equidistant from each other. Such lesions feature a few small islands of odontogenic epithelium scattered throughout the lesion. The second variant is designated as the WHO type and contains mineralized material variously interpreted as osteoid, cementum-like, or dysplastic dentin. Dysplastic dentin is usually found close to the odontogenic epithelium. The WHO type also features more islands of odontogenic epithelium (1-3). Recently a third type has been proposed and can be described as a granular cell variant of intra-osseous odontogenic fibroma (1). These types of lesions are known as granular cell ameloblastic fibromas, central granular cell tumors of the jaw, granular cell odontogenic fibromas, and spongiocytic adamantinomas(1,28). In contrast, desmoplastic fibromas consist of interlaced bundles and whorled aggregates of densely collagenous tissue containing uniform spindled and elongated fibroblasts. Some areas may exhibit hypercellularity with plumper fibroblast nuclei. However, cytologic atypia and mitotic figures are not found and bone is not produced by this lesional tissue(1,3,47).

In conclusion, the findings of this study indicate an apparent significant difference between the factors found in subjects with intra-osseous odontogenic and desmoplastic fibromas. An analysis of data from previously published reports on 64 cases of intra-osseous odontogenic fibroma and 68 cases of desmoplastic fibroma found that factors such as age and gender distributions, location, and radiographic findings (boundary, root resorption, and calcification) were indicative of the specific type of fibroma. Based on this literature analysis, we re-evaluated the data from the three patients at our institution that were initially diagnosed as having intra-osseous fibroma. This re-

examination resulted in cases 1 and 2 being classified as desmoplastic fibroma, and case 3 as intra-osseous odontogenic fibroma.

References

1. Langlais RP, Langland OE, Nortje CJ (1995) Multilocular radiolucencies. In Diagnostic imaging of the jaws, Williams & Wilkins, Baltimore, 370-376
2. Shafer WG, Hine MK, Levy BM (1983) A textbook of oral pathology. 4th ed, W.B. Saunders, Philadelphia, 172-173, 294-295
3. Regezi JA, Sciubba JJ (1999) Odontogenic tumors, benign nonodontogenic tumors. In Oral pathology: clinical pathologic correlations, 3rd ed, W.B.Saunders, Philadelphia, 344, 363
4. Slootweg PJ, Muller H (1983) Central fibroma of the jaw, odontogenic or desmoplastic. Oral Surg Oral Med Oral Pathol 56, 61-70
5. Pincock LD, Bruce KW (1954) Odontogenic fibroma. Oral Surg Oral Med Oral Pathol 7, 307-311
6. Dixon WR, Ziskind J (1956) Odontogenic fibroma. Oral Surg Oral Med Oral Pathol 9, 813-816
7. Silverman LM (1958) Odontogenic fibroma of the maxilla: report of a case. Oral Surg Oral Med Oral Pathol 11, 128-131
8. Hamner JE 3rd, Ganble JW, Gallegos GJ (1966) Odontogenic fibroma. Report of two cases. Oral Surg Oral Med Oral Pathol 21, 113-119
9. Mallow RD, Spatz SS, Zubrow HJ, Kline SN (1966) Odontogenic fibroma with calcification. Report of a case with a review of the literature. Oral Surg Oral Med Oral Pathol 22, 564-568
10. Hanley JB Jr, Looby JP, Duncan J (1971) Odontogenic fibroma: report of case. J Oral Surg 29, 52-54
11. Knight WO, Caulfield JJ (1972) Odontogenic fibroma. Oral Surg Oral Med Oral Pathol 34, 381-383
12. Wesley RK, Wysocki GP, Mintz SM (1975) The central odontogenic fibroma. Clinical and morphologic studies. Oral Surg Oral Med Oral Pathol 40, 235-245
13. Heimdal A, Isacson G, Nilsson L (1980) Recurrent central odontogenic fibroma. Oral Surg Oral Med Oral Pathol 50, 140-145
14. Dahl EC, Wolfson SH, Haugen JC (1981) Central odontogenic fibroma: review of literature and report of cases. J Oral Surg 39, 120-124
15. Schofield IDF (1981) Central odontogenic fibroma:

- report of case. *J Oral Surg* 39, 218-220
16. Schwimmer AM, Ginsberg JM, Barr CE (1983) Incidental finding of odontogenic fibroma: case report. *Pediatr Dent* 5, 85-86
 17. Dunlap CL, Barker BF (1984) Central odontogenic fibroma of the WHO type. *Oral Surg Oral Med Oral Pathol* 57, 390-394
 18. Janssen JH, Blijdorp PA (1985) Central odontogenic fibroma. A case report. *J Maxillofac Surg* 13, 236-238
 19. Sepheriadou-Mavropoulou T, Patrikiou A, Sotiriadou S (1985) Central odontogenic fibroma. *Int J Oral Surg* 14, 550-555
 20. Doyle JL, Lamster IB, Baden E (1985) Odontogenic fibroma of the complex (WHO) type: report of six cases. *J Oral Maxillofac Surg* 43, 666-674
 21. Svirsky JA, Abbey LM, Kaugars GE (1986) A clinical review of central odontogenic fibroma: with the addition of three new cases. *J Oral Med* 41, 51-54
 22. Zachariades N (1986) Odontogenic fibroma. *Int J Oral Maxillofac Surg* 15, 102-104
 23. Hirshberg A, Dayan D, Horowitz I, Littner MM (1987) The simple central odontogenic fibroma. A case report. *J Craniomaxillofac Surg* 15, 379-380
 24. Watt-smith SR, Ell-Labban NG, Tinkler SM (1988) Central odontogenic fibroma. *Int J Oral Maxillofac Surg* 17, 87-91
 25. Sandler HJ, Nersasian RR, Cataldo E, Pochebit S, Dayal Y (1988) Multiple dental follicles with odontogenic fibroma-like changes (WHO type). *Oral Surg Oral Med Oral Pathol* 66, 78-84
 26. Shiro BC, Jacoway JR, Mirmiran SA, McGuirt WF Jr, Siegal GP (1989) Central odontogenic fibroma, granular cell variant. A case report with S-100 immunohistochemistry and a review of the literature. *Oral Surg Oral Med Oral Pathol* 67, 725-730
 27. Jones GM, Eveson JW, Shepherd JP (1989) Central odontogenic fibroma. A report of two controversial cases illustrating diagnostic dilemmas. *Br J Oral Maxillofac Surg* 27, 406-411
 28. Lukinmaa PL, Hietanen J, Anttinen J, Ahonen P (1990) Contiguous enlarged dental follicles with histologic features resembling the WHO type of odontogenic fibroma. *Oral Surg Oral Med Oral Pathol* 70, 313-317
 29. Handlers JP, Abrams AM, Melrose RJ, Danforth R (1991) Central odontogenic fibroma: clinicopathologic features of 19 cases and review of the literature. *J Oral Maxillofac Surg* 49, 46-54
 30. Gunhan O, Gurbuzer B, Gardner DG, Demiriz M, Finci R (1991) A central odontogenic fibroma exhibiting pleomorphic fibroblasts and numerous calcifications. *Br J Oral Maxillofac Surg* 29, 42-43
 31. Allen CM, Hammond HL, Stimson PG (1992) Central odontogenic fibroma, WHO type. A report of three cases with an unusual associated giant cell reaction. *Oral Surg Oral Med Oral Pathol* 73, 62-66
 32. Kaffe I, Buchner A (1994) Radiologic features of central odontogenic fibroma. *Oral Surg Oral Med Oral Pathol* 78, 811-818
 33. Orsini M, Benlloch D, Lezzi G, Piattelli A (2002) Zebra XXIII, Part 2. Odontogenic fibroma. *J Endod* 28, 127-128
 34. Griffith JG, Irby WB (1965) Desmoplastic fibroma: report of a rare tumor of the oral structures. *Oral Surg Oral Med Oral Pathol* 20, 269-275
 35. Marlette RH, Gerhard RCB (1968) Intraosseous "fibroma" and "fibromyxoma" of the mandible. Report of three cases. *Oral Surg Oral Med Oral Pathol* 25, 792-799
 36. Rabhan WN, Rosai J (1968) Desmoplastic fibroma. Report of ten cases and review of the literature. *J Bone Joint Surg Am* 50, 487-502
 37. Hinds EC, Kent JN, Fechner RE (1969) Desmoplastic fibroma of the mandible: report of case. *J Oral Surg* 27, 271-274
 38. Dehner LP (1973) Tumors of the mandible and maxilla in children. I. Clinicopathologic study of 46 histologically benign lesions. *Cancer* 31, 364-384
 39. Hovinga J, Ingenhous R (1974) A desmoplastic fibroma in the mandible. *Int J Oral Surg* 3, 41-44
 40. Badger GA, Syed AA, Malby FC (1974) Desmoplastic fibroma of the mandible. *Can J Otolaryngol* 3, 605-610
 41. Cunningham CD, Smith RO, Enriquez P, Singleton GT (1975) Desmoplastic fibroma of the mandible. A case report. *Ann Otol Rhinol Laryngol* 84, 125-129
 42. Sood VP, Chatterjee AK (1975) Desmoplastic fibroma of maxilla. *J Laryngol Otol* 89, 329-333
 43. Calatrava L, Donado M (1976) Desmoplastic fibroma of the mandible: case report. *J Maxillofac Surg* 4, 238-241
 44. Fisker AV, Philipsen HP (1976) Desmoplastic fibroma of the jaw bones. *Int J Oral Surg* 5, 285-291
 45. Nussbaum GB, Terz JJ, Joy ED Jr (1976) Desmoplastic fibroma of the mandible in a 3-year-old child. *J Oral Surg* 34, 1117-1121
 46. Wagner JE, Lorandi CS, Ebling H (1977)

- Desmoplastic fibroma of bone. A case in the mandible. *Oral Surg Oral Med Oral Pathol* 43, 108-111
47. Freedman PD, Cardo VA, Kerpel SM, Lumerman H (1978) Desmoplastic fibroma (fibromatosis) of the jawbones. Report of a case and review of the literature. *Oral Surg Oral Med Oral Pathol* 46, 386-395
 48. Lagacé R, Delage C, Bouchard HL, Seemayer TA (1979) Desmoplastic fibroma of bone. An ultrastructural study. *Am J Surg Pathol* 3, 423-430
 49. Taguchi N, Kaneda T (1980) Desmoplastic fibroma of the mandible: report of case. *J Oral Surg* 38, 441-444
 50. Bertrand JC, Plautier D, Chanterelle A, Mazza (1981) Maxillary and mandibular desmoid fibromas. *Rev Stomatol Chir Maxillofac* 82, 127-131 (in French)
 51. Osguthorpe JD, Adkins WY Jr, Rawe SE (1981) Combined extracranial-intracranial resection of a maxillary desmoid tumor. *Otolaryngol Head Neck Surg* 89, 392-397
 52. Eisen MZ, Butler HE (1984) Desmoplastic fibroma of the maxilla: report of case. *J Am Dent Assoc* 108, 608-609
 53. Siemssen SJ, Anagnostaki T (1984) Aggressive fibromatosis (extra-abdominal desmoids) of the head and neck. *Br J Plast Surg* 37, 453-457
 54. Addante RR, Laskin JL (1985) Case 55: large right mandibular mass. *J Oral Maxillofac Surg* 43, 531-536
 55. George DI Jr, Gould AR, Miller RL, Strull NJ (1985) Desmoplastic fibroma of the maxilla. *J Oral Maxillofac Surg* 43, 718-725
 56. Bertoni F, Present D, Marchetti C, Bacchini P, Stea G (1986) Desmoplastic fibroma of the jaw: the experience of the Istituto Beretta. *Oral Surg Oral Med Oral Pathol* 61, 179-184
 57. Ayala AG, Ro JY, Goepfert H, Cangir A, Khorsand J, Flake G (1986) Desmoid fibromatosis: a clinicopathologic study of 25 children. *Semin in Diagn Pathol* 3, 138-150
 58. Hietanen J, Lukinmaa PL, Caloni PEB, Kassila O (1986) Desmoplastic fibroma involving the mandible. *Br J Oral Maxillofac Surg* 24, 442-447
 59. Makek M, Lello GE (1986) Desmoplastic fibroma of the mandible: literature review and report of three cases. *J Oral Maxillofac Surg* 44, 385-391
 60. Schultz E, Hermann G, Irwin GAL, Shih H (1986) Case report 380. *Skeletal Radiol* 15, 560-564
 61. Hashimoto K, Kawashima S, Arai Y, Mase N, Shinoda K, Sairenji E (1987) Desmoplastic fibroma of the mandible -case report-. *Oral Radiol* 3, 71-73
 62. Rubin MM, Cozzi GM, Shih HJ (1987) Recurrent desmoplastic fibroma of the mandible: report of case. *J Am Dent Assoc* 115, 705-707
 63. Green MF, Sirikumara M (1987) Desmoplastic fibroma of the mandible. *Ann Plast Surg* 19, 284-290
 64. Kwon PHJ, Horswell BB, Gatto DJ (1989) Desmoplastic fibroma of the jaws: surgical management and review of the literature. *Head Neck* 11, 67-75
 65. de Vito MA, Tom LWC, Boran TV, Quinn PD (1989) Desmoplastic fibroma of the mandible. *Ear Nose Throat J* 68, 553-556
 66. Valente G, Migliario M, Bianchi SD, Vercellino V (1989) Desmoplastic fibroma of the mandible: a case with an unusual clinical presentation. *Oral Surg Oral Med Oral Pathol* 47, 1087-1089
 67. Vally IM, Altini M (1990) Fibromatoses of the oral and paraoral soft tissues and jaws. Review of the literature and report of 12 new cases. *Oral Surg Oral Med Oral Pathol* 69, 191-198
 68. Christiansen RL (1990) Desmoplastic fibroma of the ramus and body of the mandible. *Cranio* 8, 271-275
 69. Hashimoto K, Mase N, Iwai K, Shinoda K, Sairenji E (1991) Desmoplastic fibroma of the maxillary sinus. Report of a case and review of the literature. *Oral Surg Oral Med Oral Pathol* 72, 126-132
 70. Cranin NA, Gallo L, Madan S (1994) Desmoplastic fibroma. A rare oral tumor in children. *NY State Dent J* 60, 34-39
 71. Miyamoto Y, Satomura K, Rikimaru K, Hayashi Y (1995) Desmoplastic fibroma of the mandible associated with tuberous sclerosis. *J Oral Pathol Med* 24, 93-96
 72. Hopkins KM, Huttula CS, Kahn MA, Albright JE (1996) Desmoplastic fibroma of the mandible: review and report of two cases. *J Oral Maxillofac Surg* 54, 1249-1254
 73. Iwai S, Matsumoto K, Sakuda M (1996) Desmoplastic fibroma of the mandible mimicking osteogenic sarcoma: report of a case. *J Oral Maxillofac Surg* 54, 1370-1373
 74. Templeton K, Glass N, Young SK (1997) Desmoplastic fibroma of the mandible in a child: report of a case. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 84, 620-623
 75. Bakaeen G, Rajab LD (1999) Desmoplastic fibroma of the mandible: report of a case. *Int J Paediatr Dent* 9, 117-121
 76. Cupero TM, Thomas RW, Manning SC (2001)

- Desmoplastic fibroma of the maxillary sinus.
Otolaryngol Head Neck Surg 125, 661-662
77. Kramer IRH, Pindborg JJ, Shear M (1992) Definitions and explanatory notes. In *Histological typing of odontogenic tumours*, 2nd ed, Springer-Verlag, Berlin, 22
78. Sasaoka K, Mogi K, Ishii H (1999) Central fibroma in the ascending ramus of the mandible. Case report. *Aust Dent J* 44, 131-134
79. Summers L, Matz LR (1976) Recurrent desmoplastic fibroma. *Int J Oral Surg* 5, 100-103
80. Flynn TR, Lieblich SE, Topazian RG (1992) Odontogenic cysts and tumors. In *Atlas of oral and maxillofacial surgery*, Keith DA ed, W.B. Saunders, Philadelphia, 94-95, 102-105