DOI: 10.37990/medr.1520822 Med Records 2024;6(3):487-90

MEDICAL RECORDS-International Medical Journal

Research Article

Evaluation of Sclerotic Bordered Mandibular Pathologic Lesions with Cone Beam Computed Tomography

Oguzhan Altun, Melike Kiransal, Numan Dedeoglu

İnönü University, Faculty of Dentistry, Department of Oral Maxillofacial Radiology, Malatya, Türkiye

Abstract

Aim: The aim of this study was to evaluate the radiologic features of intraosseous pathologic lesions with radiolucent and cortical borders in the unilateral posterior mandible using cone beam computed tomography (CBCT).
Material and Method: In the study, the largest size, cortical expansion, and relationship of the lesion to the teeth and mandibular canal were evaluated in radiolucent lesions with cortical borders in the posterior mandible on CBCT images of 36 patients. Mandibular cortical bone thickness was compared between the lesion side and the intact side. Mann Whitney U tests were used to compare the data ($p<0.050$).
Results: The mean size of the lesions was 16.41 mm. The lesions showed cortical expansion in 83.3%, relationship with teeth in 86.1%, and relationship with mandibular canal in 58.3%. The mandibular cortical thickness was 3.08 mm on the lesioned side and 3.49 mm on the intact side. There was no statistical difference between these two values ($p>0.05$).
Conclusion: Most of the corticated border mandibular posterior pathologic lesions were found to be associated with teeth and expansion occurred. Care should be taken before surgical procedures as these lesions may be associated with the mandibular canal. There was no change in mandibular cortical thickness on the lesion side.

Keywords: Mandibula pathology, sclerotic border, cone beam computed tomography

INTRODUCTION

Pathologic lesions of the jaws have a wide distribution, including benign, malignant, and locally aggressive. There is also a wide range of odontogenic and nonodontogenic lesions of the jaws. These lesions may be cysts, tumors, or tumor-like lesions. The clinical features of these multispecies lesions may be nonspecific. Radiologic evaluation may lead to a diagnosis of the lesion if a few specific findings are found or a few differential diagnoses can be made (1).

Conventional radiographs are still indispensable methods in the evaluation of the jaws. Intraoral and panoramic radiographs are the most commonly used techniques in the initial evaluation of jaw lesions. Intraoral radiographs provide a more detailed evaluation, while panoramic radiography evaluates larger areas. Intraoral radiographs are insufficient in the evaluation of lesions larger than 3 cm. In large lesions, panoramic radiography can be used to evaluate the relationship between the lesions and surrounding structures and teeth (2). Conventional radiographs allow two-dimensional evaluation of three-dimensional structures, so detailed information such as lesion size, margin characteristics, and extension are missing. For this, advanced imaging is needed. For this purpose, computed tomography (CT), magnetic resonance imaging and cone beam computed tomography (CBCT) can be used (1). The CBCT has widespread use in dentistry. CBCT provides faster imaging with a lower radiation dose than CT, but soft tissue resolution is poorer with CBCT. Jaw lesions can be evaluated in three dimensions and in detail with CBCT (3).

There have been numerous studies in the literature on intraosseous jaw lesions, but most of these studies have evaluated odontogenic or nonodontogenic cysts, odontogenic or nonodontogenic tumors, special cysts and tumors or specific groups such as pediatric groups and some geographical regions (1,4-9). However, to our knowledge, there is no study evaluating intraosseous radiolucent pathologic lesions with sclerotic borders

CITATION
Altun O, Kiransal M, Dedeoglu N. Evaluation of Sclerotic Bordered Mandibular Pathologic Lesions with Cone Beam Computed Tomography. Med Records. 2024;6(3):487-90. DOI:1037990/medr.1520822

Received: 23.07.2024 **Accepted:** 19.08.2024 **Published:** 13.09.2024
Corresponding Author: Numan Dedeoglu, İnönü University, Faculty of Dentistry, Department of Oral Maxillofacial Radiology, Malatya, Türkiye
E-mail: dedenu@gmail.com

in the mandible in the literature. The aim of this study was to evaluate the radiologic features of radiolucent intraosseous pathologic lesions with sclerotic (cortical) borders in the mandible on CBCT images.

MATERIAL AND METHOD

Ethical approval for the study was obtained from the İnönü University's health sciences non-interventional clinical research ethics committee (2024/5897).

In this study, CBCT images of 36 patients with unilateral intraosseous pathologic lesions located in the posterior mandible were retrospectively evaluated. The records with radiolucent pathologic lesions with regular cortical borders on reconstructive panoramic images obtained from CBCT were considered as sclerotic borders and included in the study (Figure 1). Images with artifacts due to motion and dense dental materials, and patients with previous surgical procedures in the relevant region were excluded from the study.

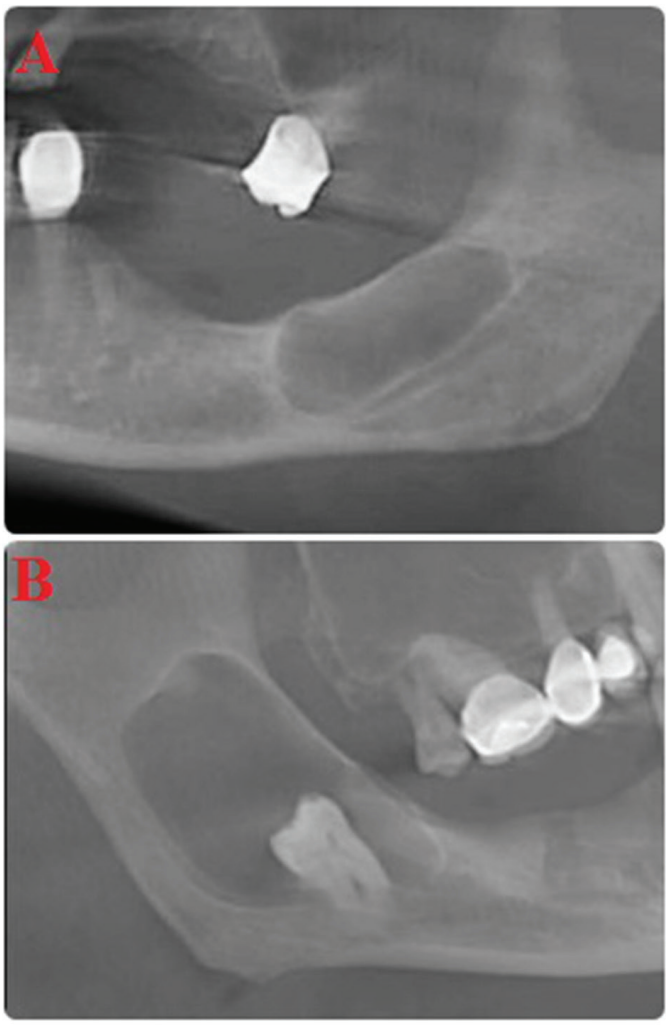

Figure 1. Mandibular posterior intraosseous pathologic lesions (A and B) with cortical borders on reconstructive panoramic images obtained from CBCT

In this study, CBCT images obtained from Newtom 5G (Verona, Italy) device. The device has a field of view (fov) between 8x8 and 18x16 cm, 110 kV, and 1-20 mA exposure factors. The images were evaluated with the NNT (New New Tom) program. Scanning time was 18 s, exposure time was 3.6 s and field of view was 15x12.

In the lesion images size measurements were made from different sections and the largest size was recorded. In axial sections, it was evaluated whether the lesion had cortical expansion or not. Evaluation of CBCT images for the presence of teeth associated with the lesion. The intact, root canal treatment and carious status of the teeth associated with the lesion were evaluated. The thickness of the mandibular basal cortical bone at the position corresponding to the midpoint of the lesion in the antero-posterior direction was measured (Figure 2) and compared with its symmetry on the intact side. In cases where the lesion progressed into the ramus, the cortical measurement corresponding to the middle part of the corpus section was performed.

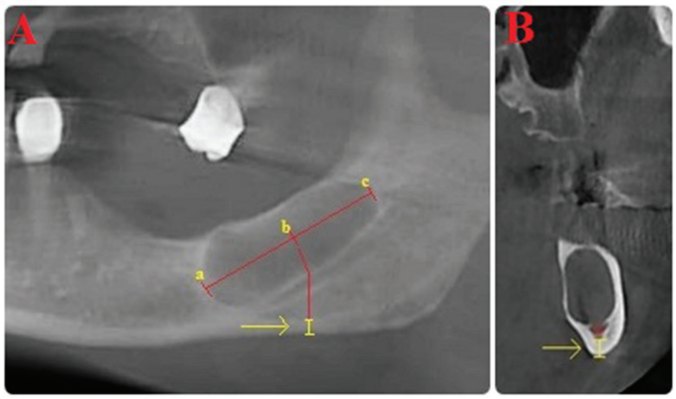

Figure 2. Determination of the cortical measurement region (arrow) in the basis cortex corresponding to the midpoint (ab=bc) of the antero-posterior dimension of the lesion on the reconstructed panoramic image (A); measurement of mandibular cortical thickness (B)

Data were analyzed with IBM SPSS V23. were used. The Mann-Whitney U test was used to compare the basis cortical thickness dimensions between the lesioned and non-lesioned sides. The significance level was accepted as $p<0.050$.

RESULTS

A total of 36 patients were evaluated in the study, 17 (47.2%) females and 19 (52.8%) males. The mean age of the women was 34.75 years (min: 13, max: 60, sd: 13.64) and the mean age of the men was 39.78 years (min: 14, max:69, sd: 16.59), with a total mean age of 37.39 years (min: 13, max: 69, sd: 15.27).

The mean maximum size of the lesions was 16.41 (min:7.9, max: 30.5, sd: 5.48) mm. Pathologic lesions showed cortical expansion in 30 (83.3%) and no expansion in 6 of them. In 21 (58.3%) of the lesions, a mandibular canal relationship was observed, while in 15 lesions there was no relationship with the mandibular canal. In 31 (86%) of the pathologic lesions, there was a relationship with the tooth, while in 5 (14%) lesions there was no tooth associated with the lesion. Of the teeth associated with these lesions, 17 (54.8%) were intact, 10 (32.2%) had root canal treatment and 4 (12.9%) were carious (Table 1).

Table 1. Frequency of radiologic features of mandibular posterior intraosseous pathologic lesions with cortical borders

Characteristics of lesions		Presence		
		Yes N (%)		No N (%)
Cortical expansion		30 (83.3)		6 (16.7)
Related to the mandibular canal		21 (58.3)		15 (41.7)
Related to teeth	Intact	17 (47.2)	31 (86)	5 (14)
	Root canal treatment	10 (27.7)		
	Caries	4 (11.1)		

The mandibular cortical bone thickness was 3.08 mm (min: 0.6, max: 4.8, sd: 0.86) on the side with a pathologic lesion. On the side without lesion, the mandibular cortical bone thickness was 3.49 (min: 1.6, max: 5.3, sd: 0.78). There was no statistically significant difference between these two values (p=0.116) (Table 2).

Table 2: Comparison of mandibular cortical thickness between the side with pathologic lesion and the side without pathologic lesion using Mann Whitney U test

Mandibular cortical thickness	Mean (mm)	Minimum	Maximum	Standard deviation	P value
Pathologic lesion side	3.083	0.6	4.8	0.86	0.116
Intact side	3.489	1.6	5.3	0.78	

DISCUSSION

The role of radiologists has increased not only in diagnosis but also in supporting the treatment process with the increased use of advanced imaging techniques (1). The use of CBCT is very important in the evaluation of radiolucent intraosseous pathologic lesions detected on conventional radiographs. Although these lesions can be inflammatory, developmental, and neoplastic, CBCT can be used to approach the diagnosis to a large extent by evaluating features such as multiple or single, well or ill-defined margins, location in the jaw, relationship with the tooth or crown, presence of septa, expansion, root resorption, and tooth mobility (10).

Radiologic features with other findings should be carefully evaluated in cases of intraosseous pathologic lesions. These features include location, periphery, shape, internal structure, and effects on other tissues. Some of these are important in distinguishing between benign and malignant lesions. The cortical border is a thin bony line at the periphery of the lesion, this type of border is observed in cysts and slow growing tumors (11). In a radiological study evaluating intraosseous benign jawbone lesions, 83.9% of cysts, 83.3% of benign tumors, and 33.3% of tumor-like lesions had good and regular cortical margins (12). According to a study evaluating odontogenic cysts, most of the lesions were found in the mandibular posterior region (13). In our study, unilateral intraosseous pathologic lesions with sclerotic (cortical) borders located in the posterior mandible were evaluated. The purpose of this study was to compare the thickness of the mandibular cortical bone at the bases between the non-lesioned side and the lesioned side. The mean value was 3.08 mm on the lesion side and 3.49 mm on the intact side. Although the mandibular cortical bone on the lesion side was dimensionally less than the intact side, no statistical difference was found. To our knowledge, there are no studies in the literature evaluating this feature in mandibular pathologic lesions.

The average age of patients with intraosseous pathologic lesions in both maxilla and mandible was found to be 36.5 years in a large series study in the Thai population (14). The mean age was found to be 24.59 and 68 years in some studies (15,16). In our study, only individuals with intraosseous pathologic lesions in the posterior mandible with sclerotic borders were evaluated and the mean age was found to be 37.39 years, which is compatible with the literature.

Gender distribution was found to be close to each other in a study evaluating odontogenic cysts and tumors (17). Also in our study, gender distribution was close to each other in males and females.

In a CBCT study performed to evaluate intraosseous pathologic lesions of the maxilla and mandible, the largest size was measured in the mesio-distal direction with a mean of 24.9 mm (3). In our study, the largest of these dimensions was measured in different directions and was found to be 16.41 mm.

It was found in a study that 83.9% of cysts, 83.3% of benign tumors, and 61.1% of tumor-like lesions were associated with teeth (12). In our study, 86.1% of the pathologic lesions were associated with teeth. However, 54.8% of these teeth were intact, 32.2% had root canal treatment and 12.9% were carious.

The frequency of cortical expansion in cyst and tumor-like lesions was found to be 51.6% and 44.4% in some studies (13,18). The frequency of cortical expansion in sclerotic bordered lesions was found to be 83.3% in our study.

CT and CBCT are used in the preoperative evaluation of cysts in the mandible to assess the association of the

lesion with the mandibular canal as well as the integrity of the cortical margin (2). In our study, 58.3% of the lesions were associated with the mandibular canal. Because of the relationship with the mandibular canal, intraosseous lesions located in the posterior mandible should be careful to avoid complications during surgery.

CONCLUSION

Mandibular posterior intraosseous pathologic lesions with sclerotic borders had no effect on the mandibular cortical bone. The majority of these lesions were found to have cortical expansion and relationship with the teeth. In the surgery of this type of pathologic lesion, the possibility that it is related to the mandibular canal should not be ruled out.

Financial disclosures: *The authors declared that this study has received no financial support.*

Conflict of interest: *The authors have no conflicts of interest to declare.*

Ethical approval: *Ethical approval was taken from İnönü University's health sciences non-interventional clinical research ethics committee (2024/5897).*

REFERENCES

1. Kumar J, Vanagundi R, Manchanda A, et al. Radiolucent jaw lesions: imaging approach. Indian J Radiol Imaging. 2021;31:224-36.
2. Avril L, Lombardi T, Ailianou A, et al. Radiolucent lesions of the mandible: a pattern-based approach to diagnosis. Insights Imaging. 2014;5:85-101
3. Bayrakdar IS, Yilmaz AB, Caglayan F, et al. Cone beam computed tomography and ultrasonography imaging of benign intraosseous jaw lesion: a prospective radiopathological study. Clin Oral Investig. 2018;22:1531-9. Erratum in: Clin Oral Investig. 2018;22:1611.
4. Jones AV, Craig GT, Franklin CD. Range and demographics of odontogenic cysts diagnosed in a UK population over a 30-year period. J Oral Pathol Med. 2006;35:500-7.
5. da Silva LP, Gonzaga AK, Severo ML, et al Epidemiologic study of odontogenic and non-odontogenic cysts in children and adolescents of a Brazilian population. Med Oral Patol Oral Cir Bucal. 2018;23:e49-53.
6. Mascitti M, Togni L, Troiano G, et al Odontogenic tumours: a 25-year epidemiological study in the Marche region of Italy. Eur Arch Otorhinolaryngol. 2020;277:527-38
7. Barros CC, Santos HB, Cavalcante IL, et al. Clinical and histopathological features of nasopalatine duct cyst: a 47-year retrospective study and review of current concepts. J Craniomaxillofac Surg. 2018;46:264-8
8. Johnson NR, Savage NW, Kazoullis S, Batstone MD. A prospective epidemiological study for odontogenic and non-odontogenic lesions of the maxilla and mandible in Queensland. Oral Surg Oral Med Oral Pathol Oral Radiol. 2013;115:515-22.
9. Hendra FN, Van Cann EM, Helder MN, et al. Global incidence and profile of ameloblastoma: a systematic review and meta-analysis. Oral Dis. 2020;26:12-21.
10. MacDonald D. Lesions of the jaws presenting as radiolucencies on cone-beam CT. Clin Radiol. 2016;71:972-85.
11. White SC, Pharoah MJ. Oral Radiology: Principles and Interpretation. 7th edition. Elsevier Health Sciences; 2014;271-84.
12. Javadian Langaroodi A, Lari SS, Shokri A, et al. Intraosseous benign lesions of the jaws: a radiographic study. Iran J Radiol. 2014;11:e7683.
13. Sanatkhani M, Hoseini Zarch H, Pakfetrat A, Falaki F. Odontogenic cyst: a clinical and radiographic study of 58 cases. Aust J Basic& Appl Sci. 2011;5:329–33.
14. Dhanuthai K, Chiramanaphan K, Tevavichulada V, et al. Intraosseous jaw lesions: a 25 year experience. J Oral Maxillofac Pathol. 2022;26:595.
15. Silva K, Alves A, Correa M, et al. Retrospective analysis of jaw biopsies in young adults. A study of 1599 cases in Southern Brazil. Med Oral Patol Oral Cir Bucal. 2017;22:e702-7.
16. Silva LP, Serpa MS, Sobral AP, et al. A retrospective multicentre study of cystic lesions and odontogenic tumours in older people. Gerodontology. 2018;35:325-32.
17. Jaeger F, de Noronha MS, Silva ML, et al. Prevalence profile of odontogenic cysts and tumors on Brazilian sample after the reclassification of odontogenic keratocyst. J Craniomaxillofac Surg. 2017;45:267-70.
18. Koseoglu BG, Atalay B, Erdem MA. Odontogenic cysts: a clinical study of 90 cases. J Oral Sci. 2004;46:253-7.