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Case Report *Olgu Sunumu*

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Magnetic Resonance Imaging and Cone Beam Computed Tomography Evaluated Stafne Bone Cavity: Report of Two Cases

Stafne Kemik Kavitesinin MRG ve KIBT ile Değerlendirilmesi: İki Olgu Sunumu

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ABSTRACT

Stafne bone cavity is a rare, asymptomatic, ovoid, or round-shaped radiolucent mandibular defect detected in the posterior region of the mandible and below the inferior alveolar canal. Although Stafne bone cavity can be seen at any age, it is mostly fifth or sixth decade and more common in men. This report presents two cases of Stafne bone cavity and describes their radiologic characteristics. In both cases, cone beam computed tomography and magnetic resonance imaging were used to evaluate the borders and classification of the lesions. Magnetic resonance imaging revealed that both cases had submandibular gland content. Both patients were informed about the nature of the lesions. Clinical and radiographic follow-up of these lesions without clinical symptoms showed no radiographic changes.

Keywords: Mandible, submandibular gland, magnetic resonance imaging, cone beam computed tomography

ÖZ

Stafne kemik kavitesi, inferior alveolar kanalın altında ve mandibula posterior bölgede nadir olarak görülen, asemptomatik, oval veya yuvarlak şekilli olabilen radyolusent bir mandibula defektidir. Stafne kemik kavitesi her yaşta görülebilmesine rağmen çoğunlukla beşinci veya altıncı dekatta ve erkeklerde daha sık görülür. Bu makalede iki Stafne kemik kavitesi olgusu ve radyolojik özellikleri sunulmuştur. Lezyonların sınırları ve sınıflaması konik ışınlı bilgisayarlı tomografi (KIBT) ve manyetik rezonans görüntüleme (MRG) ile belirlenmiş ve MRG'de her iki vakada da submandibular beze ait yapılar olduğu gösterilmiştir. Hastalar lezyonların özellikleri hakkında bilgilendirilmiş ve klinik semptomları olmayan bu lezyonların klinik ve radyolojik takiplerinde herhangi bir değişiklik gözlenmemiştir.

Anahtar Kelimeler: Mandibula, submandibular bez, manyetik rezonans görüntüleme, konik ışınlı bilgisayarlı tomografi

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INTRODUCTION

Stafne bone cavity (SBC) is an asymptomatic mandibular defect and its etiology is still unknown. In 1942, based on the radiographic findings, Stafne described 35 asymptomatic round or oval-shaped radiolucent cases near the angle and the lingual side of the mandible. For the next 5-7 years, he continued the follow-up of 5 cavities and detected no changes both in size or in radiologic characteristics of those defects.[1] Its etiology remained exactly unknown but was described by Stafne as bone depression on the posterior lingual mandible which is inferior to the mandibular canal. Stafne bone cavity's cause was thought to be the ossification failure of Meckel cartilage.[1-3] Later on, it has been recorded that the size of these defects may extend slowly.[2]

Several studies have revealed that Stafne bone cavities are clinically asymptomatic and they are detected as incidental findings during periodic radiographic examinations.[4-7] Previous studies showed that Stafne bone cavity in the posterior mandible was detected in 0.08%-0.48% of panoramic radiographs with a male prediction (60%-90% of the cases) in the fifth and sixth decades.[2]

Stafne bone cavities are commonly described as unilateral, ovoid or round, well-circumscribed radiolucent lesions ranging in diameter from 1 to 3 cm located proximally to the mandibular angle and below the inferior alveolar nerve.[2] Lingual posterior (LP) variations of these defects are most commonly observed in the fossa of the submandibular gland region between the angle of the mandible and the first molar. Rare lingual anterior (LA) defects are associated with lingual salivary glands which are located between incisor and premolar teeth.[3] Several researchers reported that Stafne bone cavities include normal salivary gland tissue and they do not have an epithelial lining. However, many reports showed that they may also contain fat, blood vessels, lymphatic tissue, connective tissue, muscle, nerve bundles, or air.[6,8,9] The location, radiological findings, and the content of the lesions are important for differential diagnosis. Stafne bone cavity-like lesions in the posterior mandibular region above the inferior alveolar nerve are thought to be odontogenic, whereas lesions below the inferior alveolar nerve are non-odontogenic.[2] Although rare, neoplasms may also be developed in that region, particularly in cases with salivary gland contents.[3]

Few studies made an attempt to classify the Stafne lesions. In an earlier computed tomography (CT) report, Ariji *et al* made a detailed classification of 16 SBC cases in terms of their outlines and their associations with the buccal cortical plate. They also made a soft tissue content classification based on the findings of CT or CT-sialography.[9] Several researchers examined the cases using aforementioned classification. In 2016, Chaudhry suggested a modification to the classification of Ariji et al in an editorial note while referring to the report of More et al.[4,10]

This report presents two cases of Stafne bone cavity evaluated by cone beam computed tomography (CBCT) and magnetic resonance imaging (MRI) and describes their radiologic characteristics on the basis of the previous studies.

CASE PRESENTATION

As stated by Ariji et al. and suggested by Chaudry et al., Stafne lesions were assessed as follows: When the lowest part of the cavity concavity did not extend to the buccal cortical plate—*type I*; when the lowest part of the concavity extended to the buccal cortical plate but without showing any distortion or expansion of the plate—*type II*; and when it was characterized by a buccal cortical plate expansion—*type III*.[9] *type IIa*: cavity depth reached the buccal cortical plate and caused its erosion; *type IIb*: it reached the buccal cortical plate and caused its perforation; *type IV:* it reached the buccal cortical plate and caused its expansion and perforation.[10] The following classification was used for the soft tissue contents: *type F:* the concavity was contained just fat density; *type S:* showing the soft tissue structure density indicating any connective tissue, vessel, lymph node, or others; *type G*: submandibular gland was present near to or entrapped in the concavity.[9] Baseline characteristics and classification of the present 2 cases of Stafne bone cavity are summarized in Table 1. Patient consent forms for publication were taken.

Case 1

A 60-year-old male patient was referred to the Faculty of Dentistry for dental and oral examination. The patient's medical history and clinical examination were noncontributory and there was no previous history of trauma to the head and neck region. On viewing the routine panoramic image, a unilocular, ovoid radiolucent lesion was noted in the right posterior mandibula beneath the inferior alveolar canal (Figure 1A).

Subsequently, CBCT imaging revealed a hypodense, non-expansive 1.21 × 0.79 × 0.58 cm sized lesion (Figure 1B-E). It had well-defined cortical borders with an absence of the lingual cortex of the right mandibula (Figure 1B), and the lesion was located beneath the inferior alveolar canal (Figure 1C and D).

Table 1. Baseline Characteristics and Classification of Stafne Bone Cavitiy Cases

	Age	Gender	Side	Location Variant	Lesion Size (cm)	Type of Outline	Content and Type	Treatment
1	60	♂	R	LP	1.21 × 0.79 × 0.58	II	Submand. g., G	Follow-up
2	75	♀	R	LP	2.27 × 1.44 × 0.95	III	Submand. g., G	Follow-up

♂, male; ♀, female; R, right; LP, lingual posterior; Submand. g., submandibular gland.

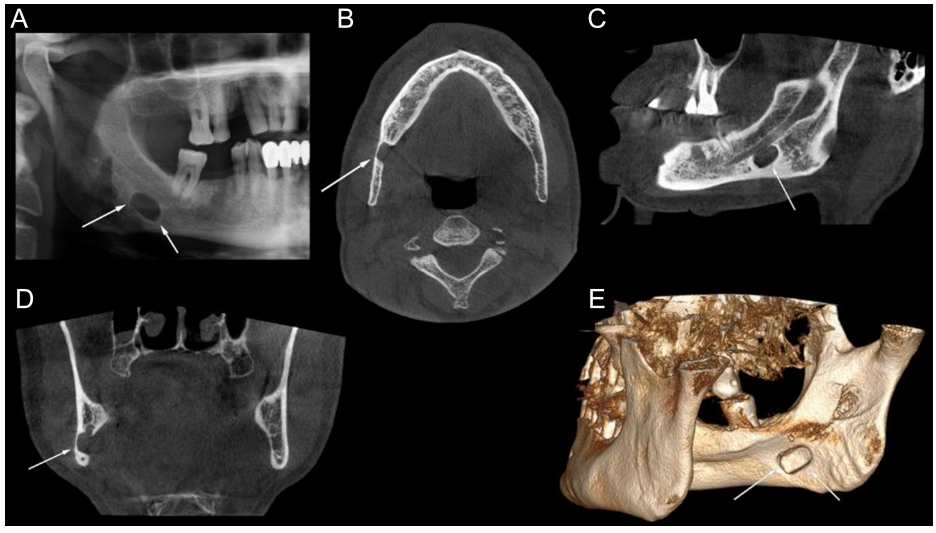

Figure 1. Case 1 is shown with arrows in conventional panoramic and CBCT images: (A) cropped panoramic image, (B) axial section, (C) oblique-sagittal section, (D) coronal section, (E) 3D CBCT reconstruction. CBCT, cone beam computed tomography.

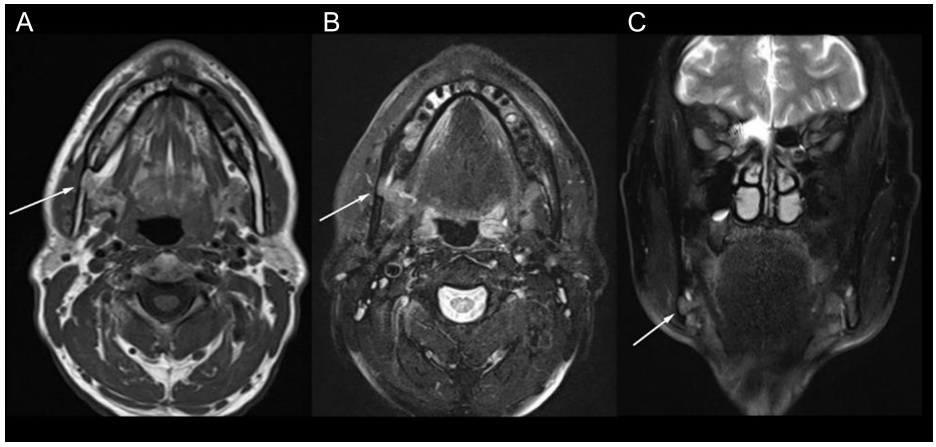

Figure 2. Magnetic resonance images of case 1 shown with arrows: (A) axial T1WI, (B) axial fat-suppression T2WI, (C) coronal fat-suppressed T2WI.

Magnetic resonance imaging was performed with a 1.5-T (Siemens Magnetom Espree, Erlangen, Germany). T1- and T2-weighted images (thickness of the sections: 3.0 mm with a 0.5 mm gap) were evaluated and T1WI showed that the mandibular defect contained isotense soft tissue in continuity with the submandibular salivary gland (Figure 2A). Axial and coronal fat-suppressed T2WI again showed that the bone defect contained the extension of submandibular gland tissue and it was not suppressed (Figure 2B and C).

Based on these findings, MRI verified the diagnosis of Stafne bone cavity. The patient has been on regular follow-up for over 1 year without any change of the lesion.

Case 2

A 75-year-old female patient was referred by her dentist for a further examination regarding the radiolucent cystic lesion detected close to the angle of the mandible. The patient had no complaints referable to the mandible and both her medical and dental history was not contributory. No trauma or any other findings were recorded. The panoramic image showed the ovoid unilocular cavity and CBCT was performed to evaluate the lesion in detail (Figure 3A).

The CBCT showed a hypodense lesion 2.27 × 1.44 × 0.95 cm in diameter (Figure 3B-E). Axial sections showed its well-defined cortical borders, thinned buccal cortex, and also the absence of the lingual cortex (Figure 3B). Oblique sagittal and coronal sections showed the location of the lesion displacing the inferior alveolar nerve to the superior direction (Figure 3C and D).

To evaluate the content of the lesion, a further examination was made by MRI (Siemens Magnetom Espree, Erlangen, Germany) with a 1.5-T. T1- and T2-weighted images (thickness of the sections, 3.0 mm with a 0.5 mm gap) showed that the mandibular defect was continuing with the adjoining submandibular gland having a similar signal intensity to the submandibular gland on both the sequences (Figure 4 A1-2 and B1-2). Axial and coronal post-contrast T1 fat-suppressed sections revealed that the submandibular gland showed diffuse contrast and was not suppressed (Figure 4 C1-2).

Since the defect was again identified as Stafne bone cavity, no further therapy was instituted. Fifteen-month follow-up of the patient showed no radiographic changes.

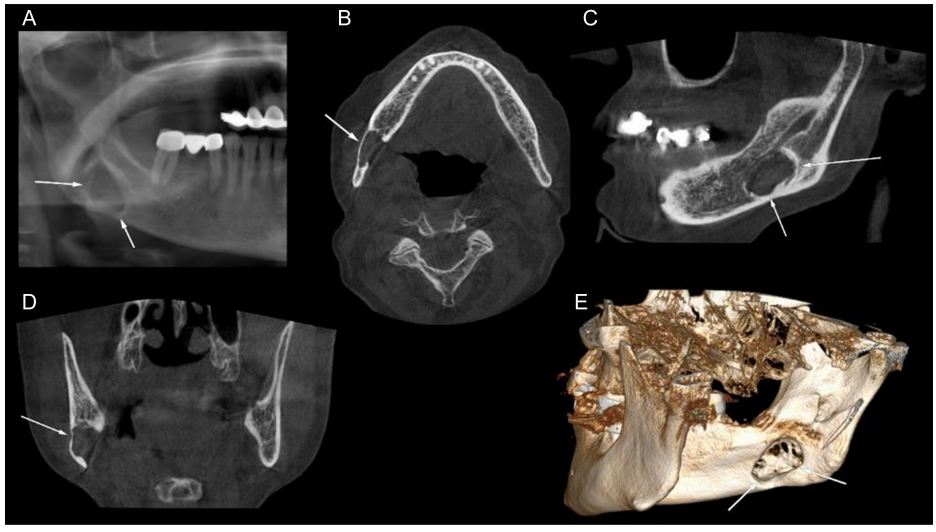

Figure 3. Case 2 is shown with arrows in conventional panoramic and CBCT images: (A) cropped panoramic image, (B) axial section, (C) oblique-sagittal section, (D) coronal section, (E) 3D CBCT reconstruction. CBCT, cone beam computed tomography.

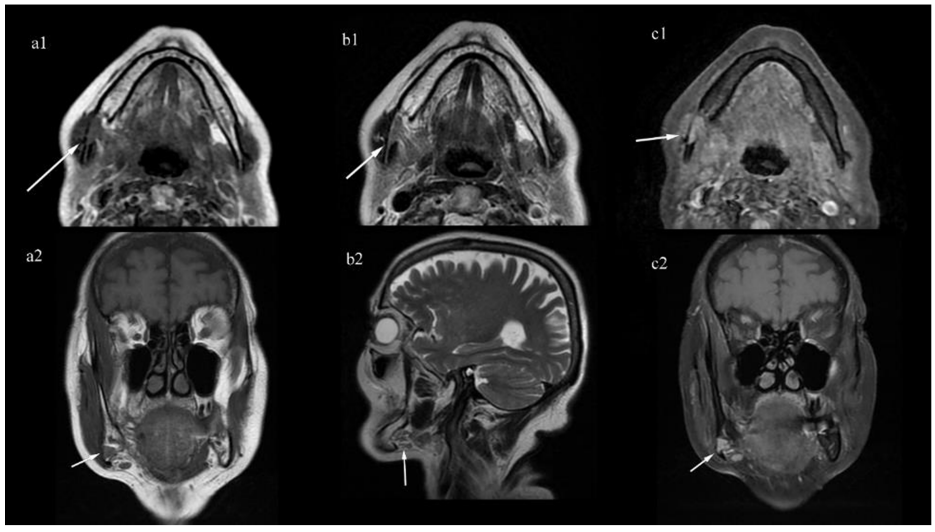

Figure 4. MRI images of case 2, shown with arrows: A (1-axial, 2-coronal) T1WI, B (1-axial, 2-sagittal) T2WI, C (1-axial, 2-coronal) postcontrast T1 fat-suppressed sections.

DISCUSSION

Several terms have been used to identify the specific asymptomatic radiolucencies around the angle of the mandible: Stafne bone cavity, Stafne bone cyst, static bone cyst/cavity, latent bone cyst, developmental bone defect of the mandible, lingual cortical mandibular bone defect, lingual mandibular bone depression, aberrant salivary gland defect, mandibular embryonic defect, etc.[2] Earlier reports of Stafne bone cavities have revealed their findings on conventional intraoral or panoramic radiographs; however, they were not definitive if the lesion was in a nonspecific location and diffuse or lobulated.[1,7,11,12] The differential diagnosis for radiolucencies having proximity to the angle of the mandible includes simple bone cyst, traumatic bone cyst, dentigerous cyst, residual cyst, keratocyst, ameloblastoma, focal osteoporotic bone marrow defect, vascular malformation, the brown tumor of hyperparathyroidism, giant cell tumor, and tumor metastasis. To eliminate the above-mentioned conditions, further investigations with advanced imaging methods are needed to confirm the initial radiological diagnosis. Medical CT and MRI are the most preferred techniques because three different dimensional sections are essential for the extension and size of the lesion and also for its definitive diagnosis.[2,3] When compared to medical CT, CBCT requires a low radiation dose which also provides 3-D data on the shape and size of the lesion. Yet, it is insufficient to give any information about the contents. Previous reports showed that Stafne bone cavity cases may include soft tissues such as lymph nodes, fat, muscle, and blood vessels and some were lacking any content, other than the salivary glands.[7] Therefore, CBCT and MRI examinations were used for the accurate evaluation investigation of the cavities in the present study.

Both cavities were characteristically situated above the angle of the mandible, beneath the inferior alveolar canal without showing any clinical symptoms (i.e., pain, tenderness, or swelling on palpation), and that was in line with previously documented cases.[4-6,13-16]

As in our cases and as stated in the previous reports, the incidence of Stafne bone cavity cases increases with age, particularly in the fifth and sixth decades.[2]

Stafne bone cavities are radiologically observed as oval or round radiolucent cyst-like lesions in the lingual side of the mandibula.[2] *Likewise* present Stafne bone cavity cases had oval well-defined cortical borders, homogeneous radiolucent content, and were located on the right side of the mandibula. The incidence of being in LP and LA locations are reported as 0.10%-0.48% and less than 0.009%, respectively.[2] While the radiological diagnosis of LP cases is simple, it was stated that LA-located cases can easily be confused with odontogenic cysts.[3] In the present report, both cases were LP variants. As stated in the report of Ariji et al.,[9] the most frequent Stafne bone cavity was type II and the majority of the cases contained the submandibular gland. Similarly, our first case was type II and both cases contained the submandibular gland (type G). These findings also match those observed in earlier studies.[5,6]

It is well-known that Stafne bone cavities are asymptomatic and static, hence the surgical treatment of the lesion is usually not indicated. However, it is of great importance to rule out the presence of any neoplastic conditions using various advanced imaging modalities. Prior reports have noted the importance of radiological follow-up to monitor for any changes.[4,8,10,14,16]

Both patients were informed about the nature of the lesions, and since both Stafne bone cavities were quiet and stable, no treatment was required. Radiological continuous monitoring of the cases has been planned to avoid unnecessary surgical interventions that may be associated with complications and other many potential risks.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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REFERENCES

1. Stafne EC. Bone cavities situated near the angle of the mandible. *J Am Dent Assoc*. 1942;29(17):1969-1972. [CrossRef]
2. White SC, Pharoah MJ. *Oral Radiology: Principles and Interpretation*. 6th ed. MO: Mosby Elsevier; 2009:574.
3. Koenig LJ. *Diagnostic Imaging: Oral and Maxillofacial*. 2nd ed. Philadelphia: Elsevier; 2017:350-353.
4. More CB. Stafne's bone cavity: a diagnostic challenge. *J Clin Diagn Res Res*. 2015;9:ZD16-ZD19.
5. Branstetter BF, Weissman JL, Kaplan SB. Imaging of a Stafne bone cavity: what MR adds and why a new name is needed. *AJNR Am J Neuroradiol*. 1999;20(4):587-589.
6. He J, Wang J, Hu Y, Liu W. Diagnosis and management of Stafne bone cavity with emphasis on unusual contents and location. *J Dent Sci*. 2019;14(4):435-439. [CrossRef]
7. Tsui SHC, Chan FFY. Lingual mandibular bone defect. Case report and review of the literature. *Aust Dent J*. 1994;39(6):368-371. [CrossRef]
8. Sandy JR, Williams DM. Anterior salivary gland inclusion in the mandible: pathological entity or anatomical variant? *Br J Oral Surg*. 1981;19(3):223-229. [CrossRef]
9. Ariji E, Fujiwara N, Tabata O, et al. Stafne's bone cavity: classification based on outline and content determined by computed tomography. *Oral Surg Oral Med Oral Pathol*. 1993;76(3):375-380. [CrossRef]
10. Chaudhry A. Stafne's bone defect with bicortical perforation: a need for modified classification system. *Oral Radiol*. 2021;37(1):130-136. [CrossRef]
11. Şahin M, Görgün S, Stafne Kemik Kavitesi GO. Turkiye Klin. *J Dent Sci*. 2005;11:39-42.
12. Hisatomi M, Munhoz L, Asaumi J, Arita E. Stafne bone defects radiographic features in panoramic radiographs: assessment of 91 cases. *Oral Patol Oral Cir Bucal*. 2018;24:12-19.
13. Taysi M, Ozden C, Cankaya B, Olgac V, Yıldırım S. Stafne bone defect in the anterior mandible. *Dentomaxillofacial Radiol*. 2014;43(7):20140075. [CrossRef]
14. Bayrak NB. A rare presentation of stafne bone cyst. *J Stomatol Oral Maxillofac Surg*. 2020;121(1):80-83. [CrossRef]
15. Ünsal G, Karapınar G, Özcan İ, Koca RB, Olgaç V, Orhan K. Stafne Bone Cavity with expansion at posterior mandible: A case report and review of the literature. *Oral Maxillofac Surg Cases*. 2020;6(1):6-10. [CrossRef]
16. Kılınç A, Saruhan N, Ertaş Ü, Sümbüllü M, Kavitesi SK. 2 olgu sunumu. *Atatürk Üniv Diş Hek Fak Derg*. 2015;25:229-232.