

Effect of Stafne bone defect on the adjacent tooth: A review of the literature

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ABSTRACT

Purpose: This report presents a case of an unusual and rare presentation of Stafne bone defect (SBD) with apical resorption extending from the lower right lateral incisor to the right first premolar. A systematic search of the current literature on cases where SBD affected the adjacent teeth was conducted.

Materials and Methods: From 259 identified articles, 114 studies were examined, containing 12 individuals with a mean age of 41.58 years. Ten cases in the anterior mandible and 2 in the posterior mandible were found.

Results: The results of SBD varied from apical blunting to severe root resorption, and some cases showed close apical contact with the lesion or involvement of the root without any effect.

Conclusion: SBD is an unusual incidental finding in the anterior region of the mandible, and unexpected behavior of the lesion, such as root resorption, must be considered. (*Imaging Sci Dent* 2022; 52: 165-70)

KEY WORDS: Root Resorption; Maxillofacial Abnormalities; Mandible; Salivary Glands

Introduction

Stafne bone defect (SBD), also known as mandibular lingual bone depression, is a radiolucent cavity first described in 1942 by Edward Stafne. SBD commonly presents as an asymptomatic, unilocular, round or oval, well-defined lesion, most often located between the mandibular angle and third molar, below the inferior alveolar nerve canal and above the inferior cortical border of the mandible. Other variants have also been reported in the anterior region and the ascending mandibular ramus.^{1,2} The published prevalence of SBD is 0.1-0.48% clinically and 6.06% in cadavers,^{3,4} and SBD mostly affects male individuals in the sixth decade of life.¹

Due to a lack of consensus regarding its etiology, SBD has been referred to using many terms, including “Stafne bone cyst,” “Stafne bone cavity,” “latent bone cyst,” “aberrant salivary gland defect,” “developmental bone defect of the mandible,” “idiopathic bone cavity,” and “cortical man-

dibular depression.”⁵ Aps et al.¹ recently proposed naming SBD a “benign mandibular concavity” due to the lesion’s likelihood of including salivary gland tissue, as well as lymphoid, muscular, adipose, and vascular tissue.⁶

Based on the literature, the effects of SBD on the surrounding bone can range from thinning of the lingual cortex to substantial resorption of all cancellous bone, resulting in an expanded buccal cortex.^{7,8} Complete loss of the inferior border of the mandible related to the SBD has also been reported.⁹ Previous studies found no effects of SBD on the inferior alveolar nerve canal, except in 1 case reported by Friedrich et al., where the SBD interrupted the nerve canal border, and a report by Schneider et al. showing canal displacement by the lesion.^{10,11}

To the authors’ knowledge, there have been few reports of root resorption by SBD. This study aimed to present a rare case of SBD leading to root resorption and to conduct a comprehensive literature review of published studies focusing on how SBD may affect the adjacent teeth.

Materials and Methods

This study included a case report and a related literature review.

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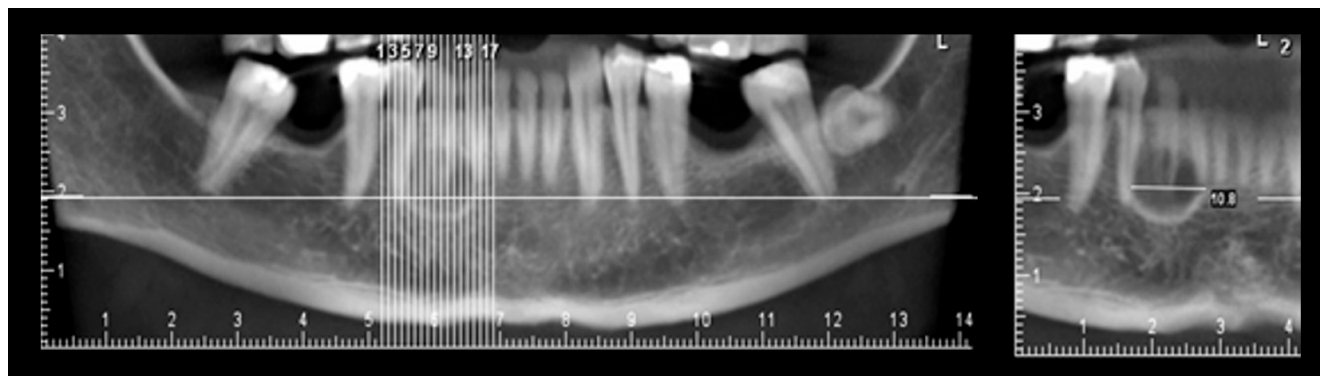


Fig. 1. Panoramic reconstruction and 3-dimensional reconstruction of the lingual aspect of the mandible showing a lesion with a cortical border in the periapical region of the lower right lateral incisor to right first premolar. The apices of the right lateral incisor and first premolar were in contact with the lesion, with no sign of resorption.

Case report

A 35-year-old woman with previous panoramic radiography was referred to the authors' clinic for further imaging. The patient's history contained no significant findings or use of medicine. The lesion presented as asymptomatic, well-defined, unilocular, and corticated extending from the lower right lateral incisor to the right first premolar (Fig. 1). An intraoral examination indicated that the tooth was noncarious and vital. Cone-beam computed tomography (CBCT) showed a lingual bone defect measuring 10.8×7.4 mm in cross-sectional images using 1-mm slice intervals and a panoramic reconstruction. The lesion caused resorption of the lingual cortex and cancellous bone, including a thinning of the buccal cortex. Furthermore, the lower right canine showed asymptomatic severe root resorption (Fig. 2). Based on the radiographic findings, the diagnosis of SBD was confirmed. Unfortunately, despite encouragement, the patient did not seek any treatment or follow-up.

Search of the literature

A systematic search, without time and language limits, was conducted on September 6, 2021 using PubMed, Science Direct, and Google Scholar. "Stafne" and "lingual mandibular bone depression" were the keywords used for article title searches. The articles were reviewed to find cases of SBD with any effect on the tooth, such as close contact with the tooth (e.g., a root without a periodontal ligament related to the SBD or an obscured periodontal ligament) or root resorption. Information on these findings was sought both in the figures and in the text.

All case reports of SBD with tooth involvement (any effect on the tooth, such as close contact, root resorption, or root displacement) were included in this review. Articles

using images of inadequate quality, anthropomorphic cases, and those with inconclusive evidence about tooth involvement of the lesion were excluded.

The proposed classification by Friedrich,¹⁰ which is complementary to Ariji's grading⁷ was used: type 0: limited to the lingual cortex, type 1: limited to the cancellous bone, type 2: reached the buccal cortex, type 3: reached the buccal cortex causing expansion, type 4: no buccal cortex.

Results

Of 114 articles on SBD (1986-2021), 12 cases of SBD (7 men and 5 women) were included (Table 1, Fig. 3). The patients ranged in age from 21 to 77 years old, with a mean age of 41.6 years.

There were 6 cases on the left side, 3 on the right side, and 3 bilateral cases, 1 of which crossed the midline.¹² Ten cases were in the anterior part of the mandible, while 2 were in the posterior mandible.

The cases were reviewed based on the grading systems of Friedrich¹⁰ and Ariji⁷, with the following distribution: type I (3 SBDs), type II (6 SBDs), type III (1 SBDs), type IV (0 SBDs). Due to the absence of an axial view, the types of 2 SBDs could not be determined.

In 4 cases, the effects ranged from apical blunting to severe root resorption, while in the 8 remaining papers, the apex was reported to be in close contact with the lesion or the root was involved without any effect. There were 2 reports of tooth displacement.

Discussion

SBD is an asymptomatic, non-healing, radiolucent le-

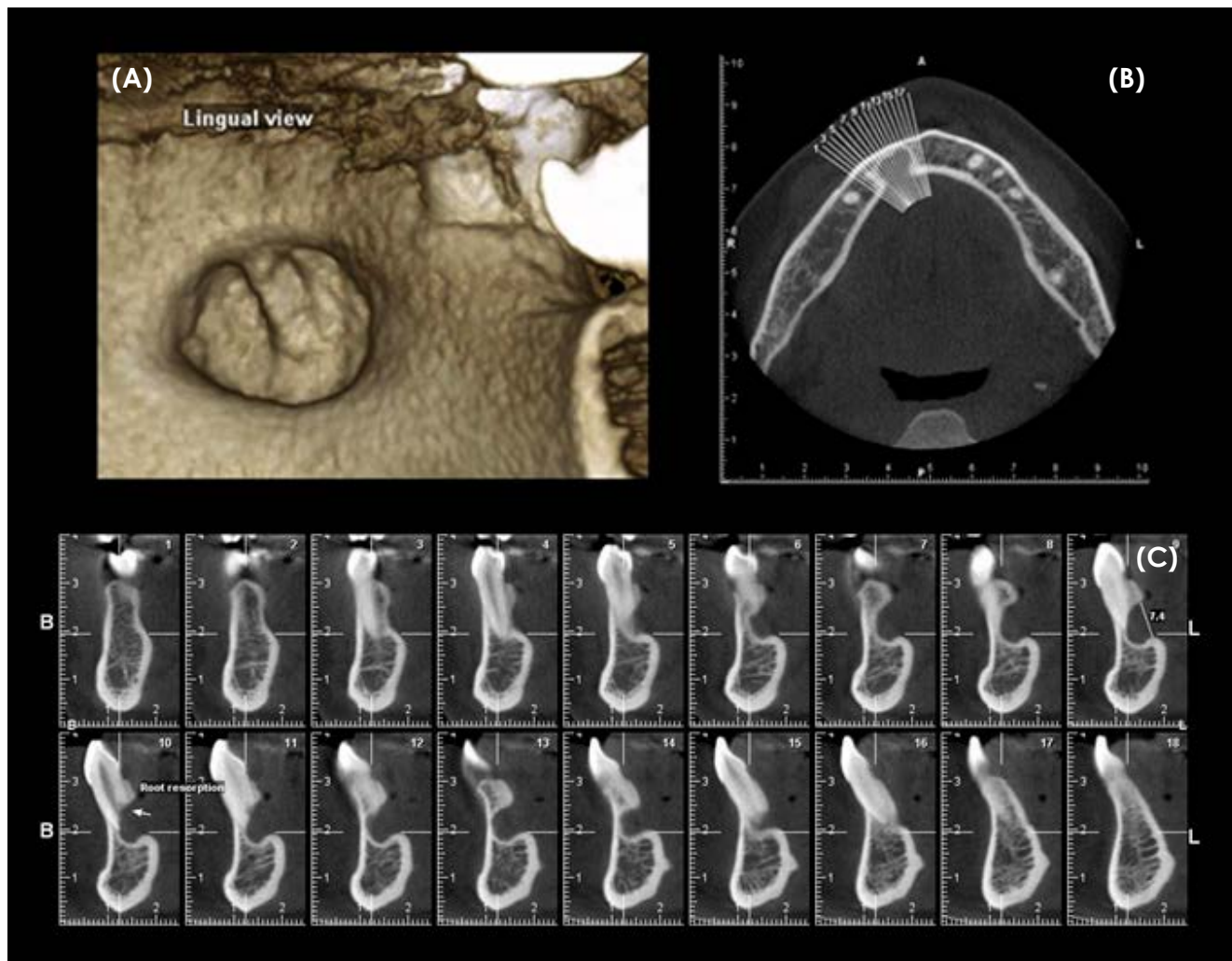


Fig. 2. A. Three-dimensional reconstruction of the lingual aspect of the mandible. B. Axial scout image. C. Cross-sectional image with 1-mm slice interval; the lesion caused resorption of the lingual cortex and cancellous bone and thinning of buccal cortical plate (type II, based on the new classification proposed by Friedrich et al.¹⁰). Furthermore, the lower right canine showed asymptomatic severe root resorption (arrow).

sion,^{1,13} with a reported prevalence ranging from 0.10%-0.48% in the posterior mandible and 0.009% in the pre-molar area.¹⁴ The defect is an invagination of the mandibular lingual cortex and is considered to be a pseudocyst. Multiple proposals for the pathogenesis of SBD have been made. The most widely accepted is the “glandular hypothesis.” According to this theory, consecutive progressive bone resorption caused by pressure from the adjacent salivary gland tissue leads to the formation of SBD; evidence for this proposal is furnished by multiple histopathologic reports of salivary gland tissue accompanied by an inflammatory process.¹⁰ Based on the buccolingual extension of the lesion, an easy-to-use classification for this lesion has been presented by Friedrich et al.¹⁰ In this study, the literature review identified 2 cases that could not be categorized using the men-

tioned classification. These 2 cases were surrounded by the buccal and lingual cortex and caused expansion of the lingual plate. The first case, which was reported by Pintado-Palomino et al.,¹⁵ turned into a type II SBD after 5 years, and the second one was presented by More et al.¹³ A possible explanation for these lesions is the presence of a small connection with the adjacent soft tissue that is not visualized on radiographs. It is also possible that these cases reflect the primary phase of SBD formation, which is an incidental and harmless finding; therefore, a complete series of imaging (including volumetric radiography) would not usually be available or ordered for the patients.

Studies have reported a relationship of SBD with the inferior alveolar nerve canal in some rare cases; for instance, Friedrich et al. reported a case of SBD interrupting the nerve

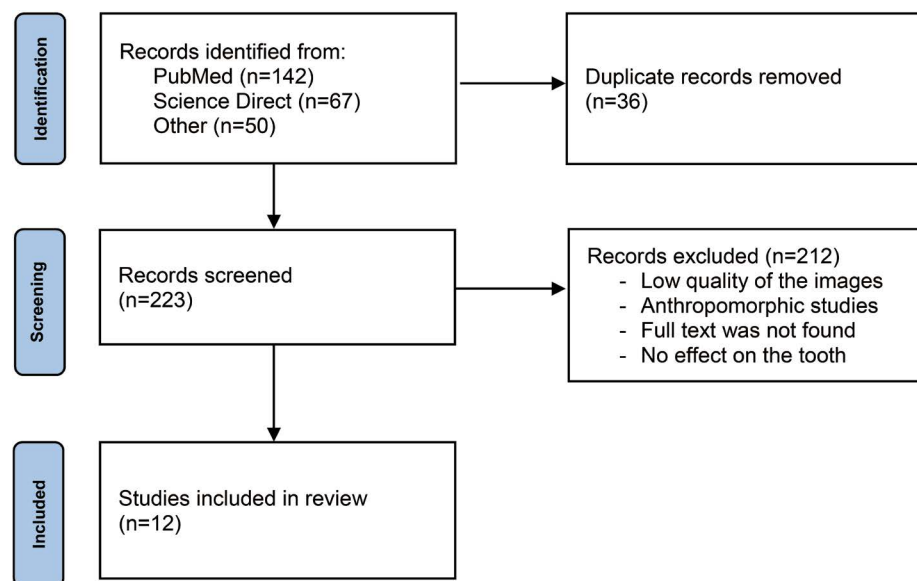


Fig. 3. PRISMA flow chart of the search for studies on Stafne bone defect and data selection.

Table 1. Summary of case reports of Stafne bone defects in close contact with the adjacent tooth

Authors	Imaging modalities	Age/ Sex	Side ¹	Location ²	Type	Apical resorption	Symptom	Vitality test	Tooth displacement	Further
Asgary and Emadi ¹⁴	Panoramic, CBCT	40/M	Left	Anterior	II	-	-			
Gomes et al. ²⁰	Panoramic, periapical, CBCT, MRI	37/F	Left	Anterior	II	+	-			
Atil et al. ²¹	Panoramic, CBCT	22/F	Right	Posterior	I	-	+			Molar root involvement
Bornstein et al. ²²	Panoramic, CBCT, MRI	47/M	Right	Anterior	I	-		Normal		Direct contact of second premolar root tip with lesion
Tsui and Cahn ²³	Panoramic, occlusal	77/M	Left	Posterior	III					Close contact to mesial root
Kim et al. ²⁴	Panoramic	44/F	Bilateral	Anterior	N/A	+	-			Bilateral first premolar root blunting
Silva et al. ¹²	Panoramic, MRI, CT	33/M	Bilateral	Anterior	II	-			+	Inferior alveolar nerve canal involvement
Smith et al. ¹⁷	Panoramic, MRI, CBCT	25/F	Bilateral	Anterior	II				+	Bilateral displacement of the canine's roots Exposure of apices of adjacent teeth
Anehosur et al. ²⁵	Panoramic, CT	52/M	Left	Anterior	II	+		Normal		
Nemati et al. ¹⁶	Periapical, CBCT	42/M	Left	Anterior	II	+		Necrosis		
Altan et al. ²⁶	Panoramic, CBCT, MRI	59/F	Left	Anterior	I		+			
Pellatt et al. ²⁷	Panoramic, CBCT, MRI	21/M	Right	Anterior	II			Normal		
Present case	CBCT	35/F	Right	Anterior	II	+		Normal		

Anterior: canine, incisor, premolar, Posterior: molar, angle, CBCT: cone-beam computed tomography, MRI: magnetic resonance imaging

canal border and Schneider et al. presented a case where the lesion caused canal displacement.^{10,11}

To the authors' knowledge, no comprehensive review has been published on the effect of SBD on the adjacent teeth. There are few reports of close proximity and involvement of root apices and the lesion, and fewer reports of apex blunting or resorption. In this paper, in addition to the novel case presented herein, 4 other SBDs with root resorption were reviewed. Nemati et al. considered the severe apical root resorption caused by the pulpoperiapical lesion of a necrotic canine; it could be questioned in this case whether SBD was the primary cause of pulpal necrosis.¹⁶ In addition, SBDs were associated with tooth displacement in 2 cases, both of which were bilateral.^{12,17}

SBD is an incidental finding and is usually first identified on an orthopantomogram. Based on the location and quality of existing images, additional radiographic examinations may be needed to confirm the diagnosis. For 3-dimensional imaging, preference should be given to cone-beam computed tomography (CT) over multi-slice CT, due to the lower dose of ionizing radiation, reduced costs, and higher availability of the modality. Multidetector CT can help to assess the SBD cavity content based on Hounsfield units. Magnetic resonance imaging also can provide views of the soft tissue prolapsing into a bony defect without exposing the patient to radiation.^{11,18}

Anterior SBDs can be a diagnostic challenge, especially in multilocular lesions, since they mimic radicular or interdental lesions, and in the absence of guiding certain anatomical structures (e.g., the inferior alveolar nerve canal). The effect of SBD on an adjacent tooth is a rare finding that can cause misdiagnosis of the lesion, potentially leading to unnecessary treatment. The differential diagnosis should include odontogenic and non-odontogenic cystic lesions (e.g., radicular, residual or lateral periodontal cyst, traumatic bone cyst, and odontogenic keratocyst), ameloblastoma, and even bone metastases.^{14,19}

Generally, no surgical treatment is necessary since SBD is a benign, developmental bony defect causing no pathological changes. Clinical and radiographical follow-up examinations are recommended to confirm the static nature of the cavity. Of 4 cases with apical root resorption, an excisional biopsy was performed in 1 case, while the other reports did not explicitly describe the treatment or follow-up. In cases of severe root resorption and hopeless teeth, implant treatment can be a challenge due to the bony defect in the area caused by SBD.

In conclusion, root resorption or tooth displacement is a rare characteristic of SBD that can cause misdiagnosis and

unnecessary treatment. Keeping this in mind, advanced imaging should be considered to confirm the diagnosis in questionable cases.

Conflicts of Interest: None

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