

36 **1. INTRODUCTION**

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38 Solitary bone cysts are rare mandibular cavities lacking epithelial coating [1] and that
39 are more common in the posterior region of the lower jaw [2]. These cysts, that were
40 previously described [3], exhibit various names including traumatic bone cyst, hemorrhagic
41 bone cyst, extravasation cyst, progressive bone cavity and single chamber bone cyst [2].

42 Solitary bone cysts were found to be more prevalent in young patients aged between 20
43 and 30 years [4] with males (60%) being most affected [5]. Moreover, these cysts were
44 found to be present in different locations including lower jaw (75% in the body of the
45 mandible), mandibular symphysis, condyles, ramus and upper jaw [6;7].

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47 Clinically, the lesion is asymptomatic without any inflammation [8]. Moreover, it was
48 shown that lesion size can cause displacement of the cortical plates thus leading to bone
49 deformities in the affected region in addition to its ability to cause teeth displacement as well
50 as pathological fractures of the lower jaw [9].

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52 Bone cysts are usually discovered accidentally during routine maxillary-mandibular
53 region radiographic examinations [9]. Generally, radiographic findings show osteolysis areas
54 with irregular unilocular or multilocular appearance with well-defined borders and without
55 sclerotic lining [10]. Moreover, these cysts were found to appear as horizontal or vertical
56 cone when located between teeth whilst in larger lesions, a festoon/scalloping pattern was
57 observed in interdental spaces in conjunction with cortical bone plates expansion [5;11]. On
58 the other hand, tomography and magnetic resonance studies showed that simple bone cysts
59 can be filled with liquid, gas or even be empty [8;12].

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61 The etiology of simple bone cysts is still controversial. However, the theory of the
62 mediated trauma is one of the preponderant theories [8;13]. Actually, different treatment

63 modalities were suggested and prognosis and recurrence of the lesion were found to be
64 different according to the treatment done [14;15].

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66 The following case report presents a 7-year follow up of a simple bone cyst in the body
67 of the mandible at the right site of canine and first premolar, managed by enucleation and
68 surgical curettage in a 14-year-old boy.

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86 **2. PRESENTATION OF CASE**

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88 A 14-year-old boy was referred by his orthodontist to our private clinic, located in Beirut-
89 Lebanon, due to the presence of a radiolucent lesion at the right side of the body of the
90 mandible. The latter was discovered during a radiographic examination prior to the

91 orthodontic treatment of the agenesis in the maxillary lateral incisors. At the time of his visit,
92 the patient was asymptomatic, lacking any systemic diseases, and with no facial asymmetry.
93 The patient had only a dental agenesis of the maxillary lateral incisors.

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95 The clinical examination revealed normal oral structures and did not detect any intraoral
96 bony swelling in the vestibule of the right mandibular area. The overlying mucosa did not
97 show any inflammatory signs. On palpation, there was no evidence of cortical bones'
98 expansion. There was no history of trauma of the jaws. The patient was in his early
99 permanent dentition. Resin composite restorations were evident on the occlusal surfaces of
100 the second premolars and first molars in both quadrants of the mandibular jaw.

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102 An extensive range of investigations were carried out. An orthopantomography (OPG)
103 was carried out 2 weeks before the surgery to confirm the extent of the cystic lesion. It
104 revealed a well-circumscribed, unilocular, radiolucent area located in the body of the
105 mandible at the right site of the canine and first premolar with a typical scalloped shape
106 between the roots of the concerned teeth and with a diameter of approximately 2.0x2.0 cm
107 (Fig. 1). The lesion was asymptomatic with no cervical lymphadenopathy being observed.
108 The involved teeth showed no mobility and responded positively to electric and thermal pulp
109 vitality tests. A cone beam computed tomography (CBCT) confirmed a well-defined
110 hypodense cystic lesion in the alveolar cortex of the mandible in the region of the right
111 canine and first premolar, measuring approximately 2.0x2.0 cm and including the mental
112 nerve (Fig. 2). Differential diagnosis included central giant granuloma of traumatic or
113 endocrinological etiology, aneurysmal bone cyst, and hemangioma.

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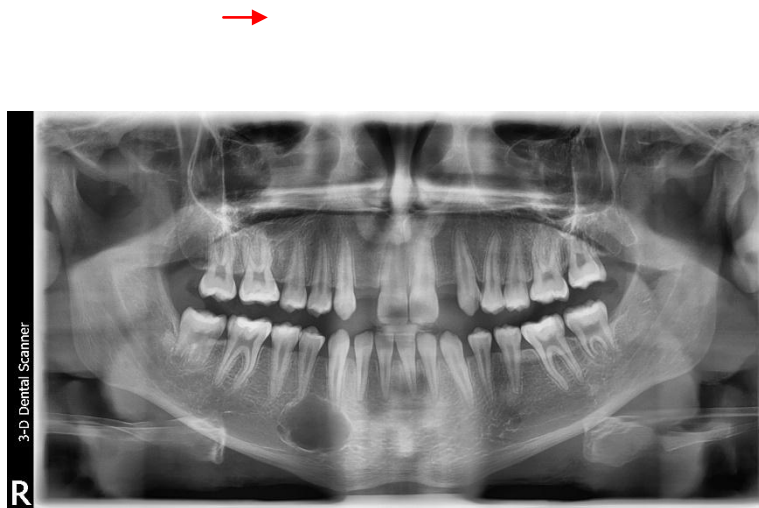
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130 Figure 1: Pre-operative orthopantomography taken in 2014, showing a well-defined
131 unilocular radiolucent lesion (red arrows) approximating the root of the mandibular right
132 canine and first premolar.
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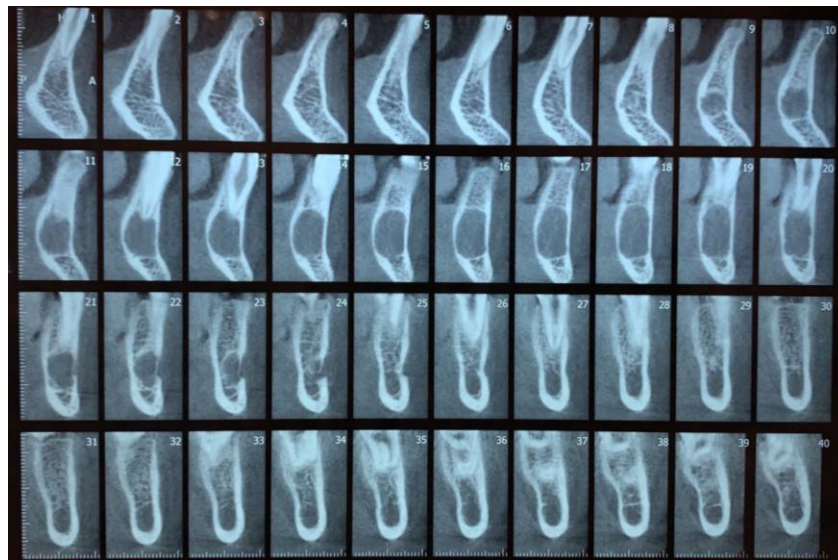
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Figure 2: Pre-operative CBCT taken in 2014 confirming a well-defined hypodense cystic lesion in the alveolar cortex of the mandible at the site of the right premolar measuring approximately 2.0x2.0 cm (red arrow) and including the mental nerve (green arrow).



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2.1 Treatment

194 With informed consent, and under local buccal and lingual infiltration using articaine
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196 with epinephrine 1/100000, an intrasulcular incision was made extending from the mesial
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198 side of the first permanent molar to the mesial side of the lateral of the same quadrant. A
199 vertical discharge was done at the level of the lateral tooth with an elevation of the
200 mucoperiosteal flap which allowed the exposure of the mental nerve foramen as well as the
201 buccal bone which appeared fragile and thinned out. No evidence of bony expansion was
202 noted. A window was made with a surgical piezo (EMS) and a round diamond bur to access
203 the lesion (Fig. 3A). The bony cavity was filled with liquid content of bloody appearance,
204 devoid of epithelial lining. Cavity walls' surgical curettage was performed using Lucas curette
205 #85-85 excluding the roof to preserve the vitality of the involved teeth. Copious irrigation
206 using normal saline was done and the surgical site was closed and sutured using 4.0 simple
207 interrupted silk sutures (Silkam, Broun) (Fig. 3B).



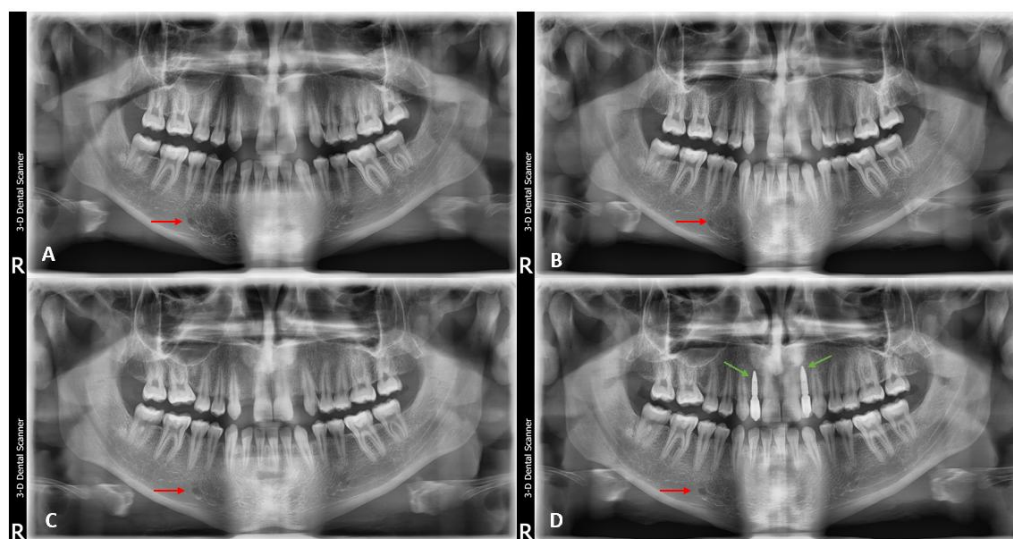
208 Figure 3: (A) Per-operative clinical photograph showing a window (green arrow) done in the
209 buccal cortex to gain access to the lesion. (B) Post-operative clinical photograph taken after
210 suturing the flap with simple interrupted sutures (blue arrow).
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2.2 Outcome and follow-up

220 Postoperatively, antibiotics (amoxicillin 500 mg, twice daily for 7 days) together with
221 analgesics and anti-inflammatory medications (ibuprofen 300 mg, three times a day for 5
222 days) were provided. Local cold application and home oral care instructions were advised.
223 The post-operative phase went smoothly. Patient follow up then pursued for seven years. A
224 panoramic radiograph follow-up taken after approximately 1-year showed resolution of the
225 lesion with complete bone formation (Fig. 4 A). Further panoramic radiographs were taken
226 every year and so following the treatment and none revealed any abnormal findings at the
227 site of the lesion (Fig. 4 B, C). Mandibular teeth had remained, each follow-up visit,
228 responsive to pulp vitality tests. Five years after the surgery, two fully milled zirconia crowns
229 supported by bone level tapered implants (Straumann, Germany) of a 3,3mm diameter and
230 10mm length were placed to restore the missing maxillary lateral incisors (Fig. 4 D).

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240 Figure 4: (A) 1-year post-operative orthopantomography taken 2015 showing complete bone
241 formation (red arrow) in the area of the excised lesion; (B and C) follow-up
242 orthopantomography taken in 2016 and 2017 respectively showing complete healing (red
243 arrows); (D) Orthopantomography taken in 2019, showing complete healing in the area of
244 excised lesion (red arrow) as well as two implant supported crowns restoring the missing
245 maxillary lateral incisors (green arrows).
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247 3. DISCUSSION

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250 Solitary bone cysts have a controversial etiopathogenesis. Cystic degeneration of
fibro-osseous lesions, intraosseous vascular anomalies, deregulation of bony metabolism

251 and low infection level were the main suggested etiologies [1;16]. The most common
252 justification implies that liquefactive necrosis or blood clot resorption post traumatic
253 intramedullar hemorrhage leads, as a result of enzymatic activity, to the damage of the
254 surrounding bone and thus enlarging the bone cavity [16;17]. However, variations
255 concerning the presence of traumatic history in the majority of reported cases can serve as a
256 limitation to this theory [16].

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258 Our patient had no trauma history thus hindering the establishment of a principal
259 etiological factor. Solitary bone cysts have no epithelium and exhibit radiographically cystic
260 appearance [4]. They are more prevalent in young male patients' lower jaw [4]. Cystic cavity
261 may be empty or filled with gas or blood. The content of the cavity might be related to the
262 duration of existence of the cyst [1;18]. In early stages, the lesion usually contains either
263 blood or serosanguineous fluid diminishing with the lesion's age and eventually becoming
264 empty [2]. Treatment of solitary bone cysts can be mediated by curettage of the cystic wall,
265 exploration of the cystic cavity and addition of filling material to the cavity. The first treatment
266 modality was the most commonly used [15]. Resolution typically takes up to 6 months or
267 longer, depending on the size of the lesion [19]. Recurrence of the lesion is usually rare and
268 was more observed in cases treated with simple lesion curettage.

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270 Decompression together with the addition of the filling material within the cystic cavity
271 play an important role in decreasing the recurrence rate [9]. For this reason, a minimum of
272 two-year follow-up is recommended to be able to determine cystic lesion remission or
273 recurrence [19].The differential diagnosis of the jaw solitary bone cysts includes odontogenic
274 cysts, such as periapical cyst, and odontogenic tumors, like keratocystic odontogenic tumor
275 [20].

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277 The case described in this report presented clinical data complying with previous
278 literature. Our patient carrying an asymptomatic lesion discovered incidentally during a
279 radiographic examination prior to an orthodontic treatment. The conducted treatment was
280 surgical enucleation and curettage with copious irrigation and cleaning of the cystic cavity
281 without adding any filling material. One-year radiographic follow-up showed a decrease in
282 the cystic lesion size and a better trabeculated pattern in lower jaw areas which are
283 considered as favorable results. No evidence of recurrence was detected 7 years post
284 treatment.

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286 **4. CONCLUSION**

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288 A solitary bone cyst is an osseous non-neoplastic asymptomatic lesion that is
289 usually incidentally identified during routine radiological examination. It is characterized by
290 the absence of epithelial lining with a scalloped effect around the roots of the concerned
291 teeth. Multiple treatment modalities were advocated where surgical curettage was the most
292 commonly used since it helps in diagnosis confirmation. A three-year span follow up,
293 coupled with radiographic imagining, must be conducted up in order to determine remission
294 or recurrence rate. The remission of solitary bone cyst will be more reliable when suitable
295 trabecular bone is observed and not only when we have decrease in the cystic cavity.

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297 **ACKNOWLEDGMENT**

298 None

299 **CONFLICT OF INTEREST**

300 The authors would like to note that there are no areas of potential conflict of interest, and
301 that patient consent for publication was obtained in a timely manner.

302

303 **AUTHORS' CONTRIBUTIONS**

304 Clinical Examination: D.H., F.S.; Surgical work: D.H.; Manuscript Preparation: D.H., F.S.,
305 B.A.; Manuscript Editing: D.H., F.S., B.A.; Manuscript Review: D.H., F.S., B.A.

306 **INFORMED CONSENT**

307 Written informed consent was obtained from the patient.

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