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CASE REPORT

Botryoid odontogenic cyst: Report of case found in routine imaginological examinations and an update of the literature

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Abstract:

Botryoid odontogenic cyst (BOC) is a rare variant of the lateral periodontal cyst (LPC). As the biological behavior of BOC is variable and the literature is limited to that of individual case reports, there is no accepted consensus on the best management strategy. A 43-year-old Caucasian male was referred to a private dental clinic for routine radiographic examination. Extraoral and intraoral evaluations revealed no alterations. Panoramic radiography, periapical radiography, and cone beam computed tomography revealed a well-circumscribed osteolytic lesion of 2.0 cm in diameter, extending from the region of teeth 33 to 35. The provisional diagnostic was odontogenic keratocyst or lateral periodontal cyst. Histological analysis of the incisional biopsy revealed multiple cystic cavities lined by a thin nonkeratinized epithelium, exhibiting focal plaque-like thickenings, surrounded by a dense fibrous capsule. The diagnosis was BOC. The purpose of this study was to critically analyze the clinical and radiologic features of BOC based on case reports and case series published in the literature from 1973 to 2018 and to add a new one from our files.

Keywords: Bone Diseases; Odontogenic Cysts; Mandible.

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INTRODUCTION

The botryoid odontogenic cyst (BOC) is a rare entity originally described by Weathers and Waldron in 1973[1] and considered as a variant of the lateral periodontal cyst (LPC)[2]. BOC occurs most frequently in the gnathic bones in the region of mandibular premolars, followed by the anterior region of the maxilla. It affects both sexes, without predilection, and exhibits a higher prevalence in the sixth/seventh decades of life[3,4].

Radiographically, the cyst appears as a radiolucent image, unilocular or multilocular, with well-defined margins[5]. Histologically, the BOC reveals multiple pathological cavities lined by thin nonkeratinized epithelium, which resembles the reduced enamel epithelium, with focal plaque-like thickenings. Clear cells containing PAS-positive granules resulting from glycogen accumulation and a subepithelial zone of hyalinization are not uncommon[3,6,7].

The treatment of choice for BOC is enucleation and higher recurrence rates differentiates it from the LPC, which presents low recurrence rates[8,9]. Therefore, it is important to differentiate the two entities and long-term follow-up of patients diagnosed with BOC is recommended after surgical excision[9].

The purpose of this study was to analyze the clinical and radiologic features of BOC based on case reports and case series published in the literature from 1973 to 2018, and describe a new case. In addition, a discussion of the factors involved in the prognosis of this lesion is also provided.

CASE REPORT

A 43-year-old Caucasian male patient referred to a private dentistry service for routine radiographic examination. No changes were observed in extra-oral and intraoral evaluations. Panoramic and periapical radiographs, and cone beam computed tomography, revealed a well-circumscribed osteolytic lesion with 2.0 cm diameter, extending from teeth 33 to 35, causing discrete expansion of the lingual cortical plate (Figures 1 and 2). The patient was asymptomatic, and the adjacent teeth had vital pulp, except the tooth 36.

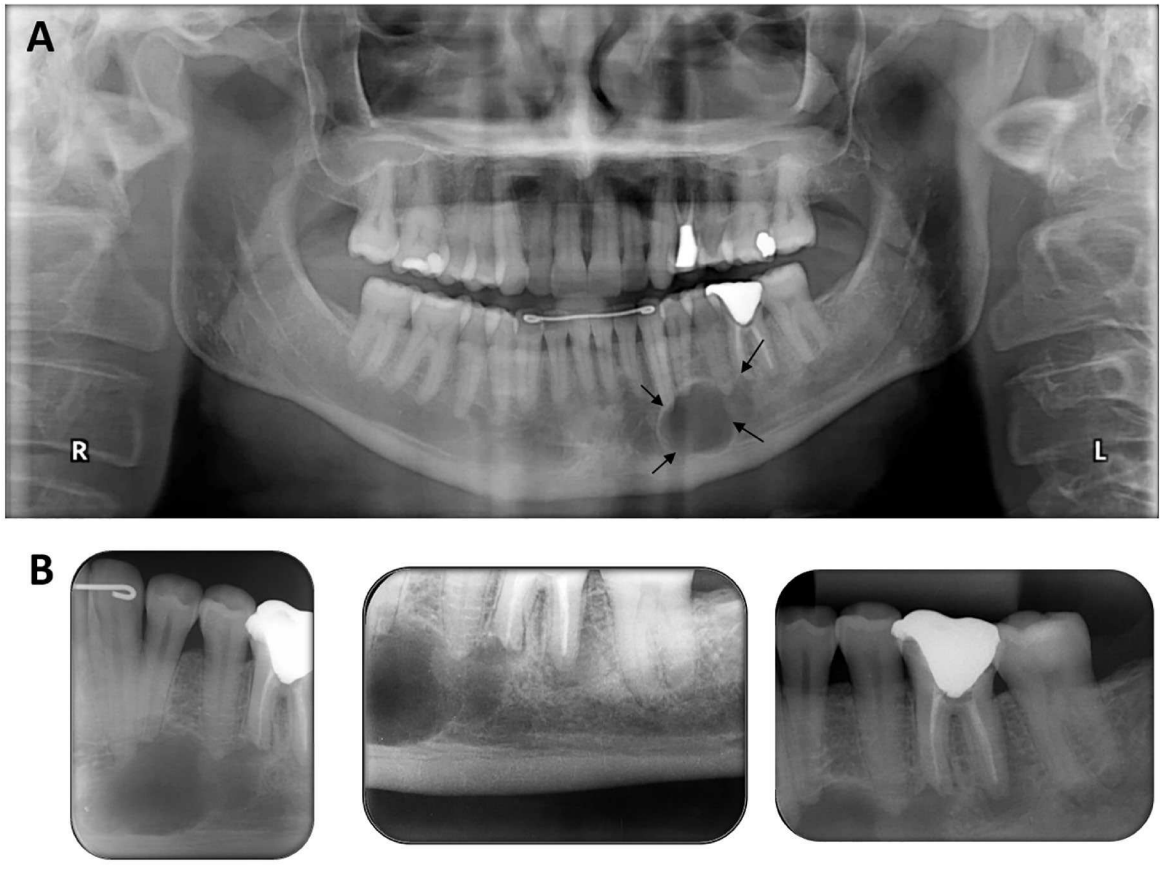

Figure 1. (A) Panoramic x-ray showing the bilocular radiolucent lesion in the apical region of the teeth 33, 34, 35 and 36 (arrows). (B) Periapical radiographs showing more details of the lesion. There was no root resorption and displacement of other involved teeth.

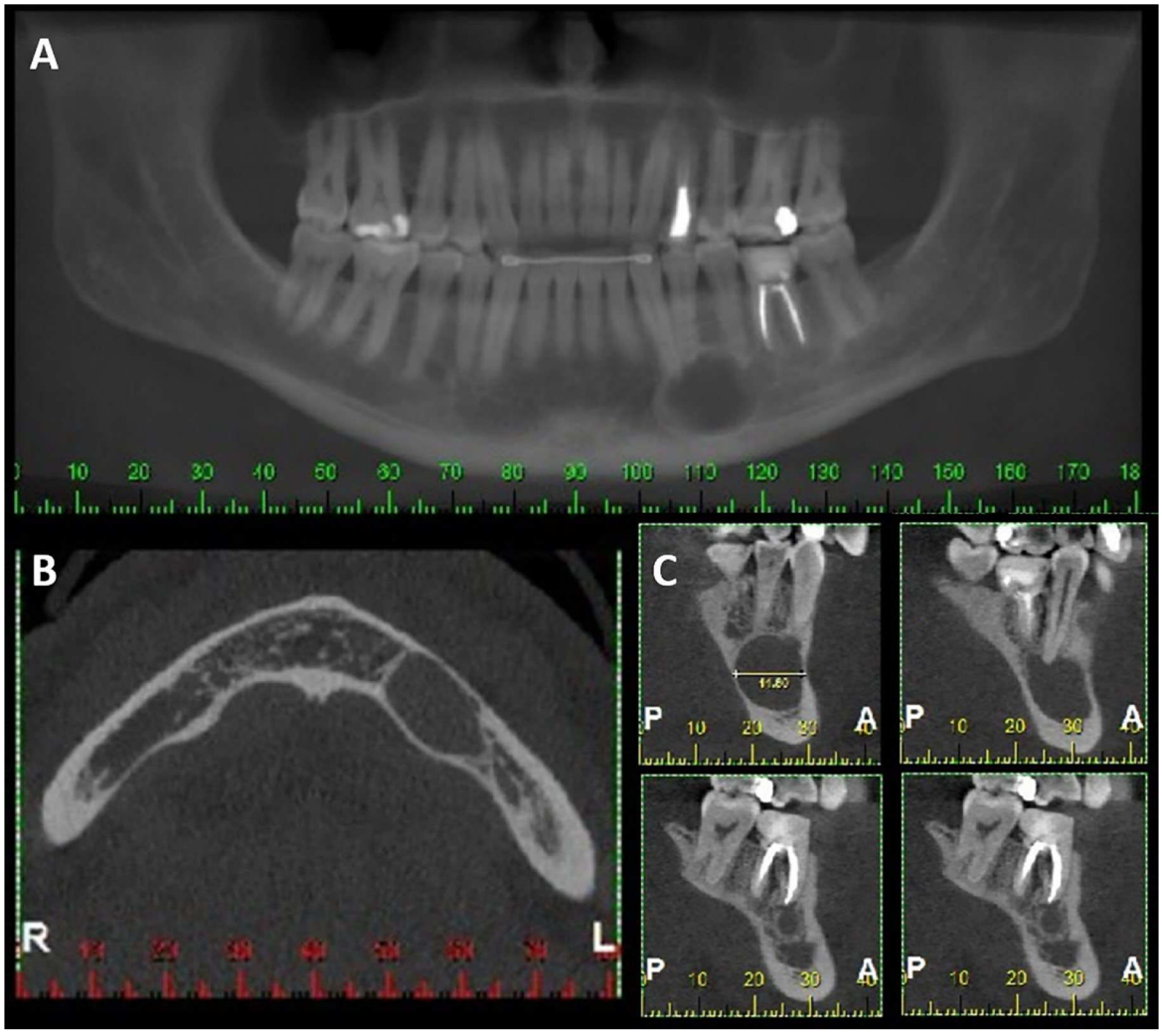

Figure 2. Cone beam computed tomography. (A) Panoramic reconstruction, (B) axial cuts, showing a well-circumscribed hypodense lesion, causing discrete bulging of the lingual cortical mandibular bone, (C) sagittal cuts, showing a well-defined hypodense cystic lesion.

No previous history of trauma was reported by the patient. Previous medical history was not contributory. The presumptive diagnoses were odontogenic keratocyst × periodontal lateral cyst. Incisional biopsy was performed and the surgical specimen was submitted to the Service of Oral Pathology of the School of Dentistry at Tiradentes University to histological examinations. Histopathological examination revealed multiple cystic cavities lined by a thin odontogenic epithelium, exhibiting focal plaque-like thickenings, surrounded by a dense fibrous capsule (Figure 3). The diagnosis was BOC. The patient was submitted to surgical enucleation and curettage of the lesion and is under follow up without signs of recurrence for 3 years.

DISCUSSION

A literature review using electronic databases (PubMed and LILACS) to identify relevant publications between 1973 and 2018 that included cases of BOC was made. The following search term was used: "botryoid odontogenic cyst". Articles that had no histological information to confirm the diagnosis were excluded. A total of 98 cases of BOCs, including the present one, have been identified since the first publication in 1973 by Weathers and Waldron[1] (Table 1). The analysis of the BOC cases showed that the patients' ages ranged from 20 to 85 years, with a mean age of 53.98±15.38 years. The female sex was slightly more affected

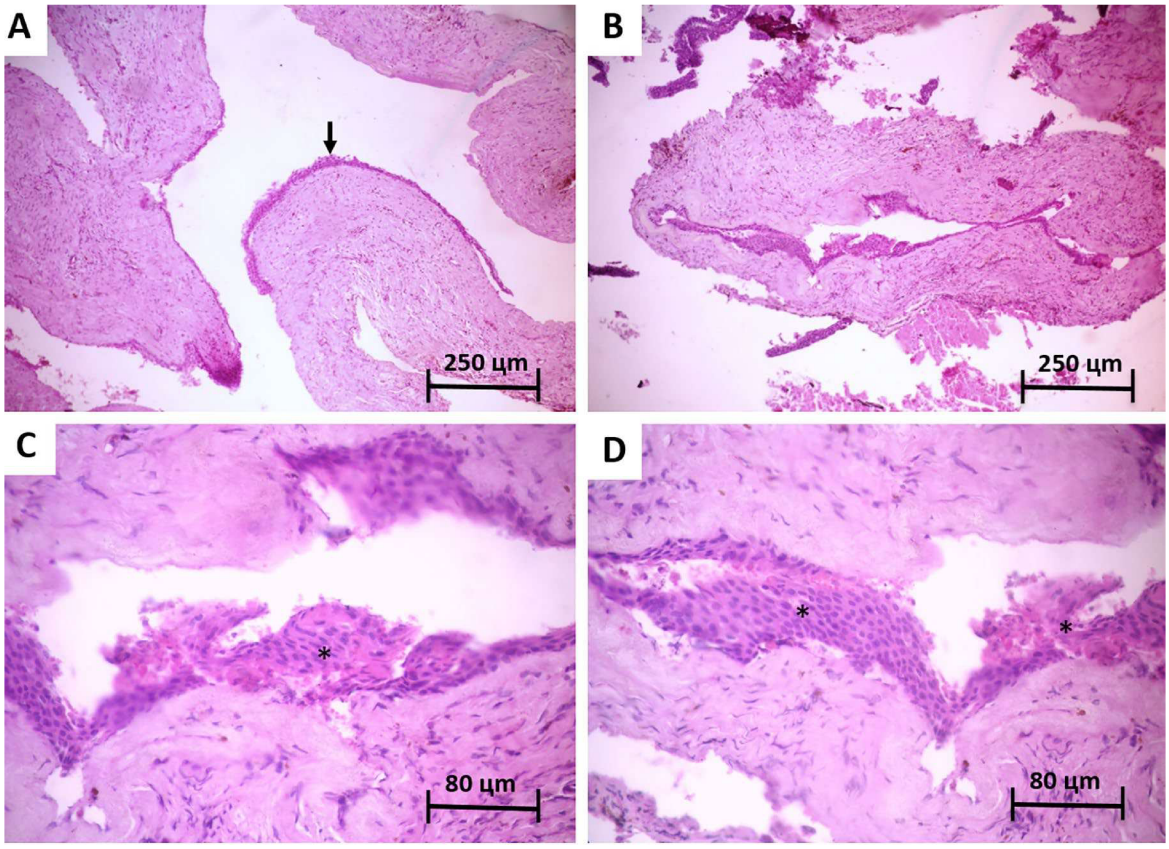

Figure 3. Photomicrographs of histological sections. (A and B) Pathological cavities lining by thin nonkeratinized epithelium (arrow). (C and D) Details of focal epithelial thickening (*) typical of this lesion (H&E).

(53.06%, n=52) than the male sex (46.93%, n=46), showing a higher prevalence in the sixth/seventh decade of life. The mandible was more involved (86.6%, n=84) when compared to the maxilla (13.4%, n=13), and there was 1 non specified case[10]. Regarding symptomatology, most cases were asymptomatic (73.2%, n=62), while only 22 (26.8%) had some symptoms, being pain or paresthesia the most common symptoms. Very similar data were also reported by Méndez et al.[11] and Vidaković et al.[12].

From the imaging perspective, although BOC presents a polycystic aspect microscopically, radiographically it can exhibit unilocular or multilocular radiolucent image, and for this reason it makes differential diagnosis with a variety of other odontogenic cysts or neoplastic conditions that affect the jaws[8,13]. In this study, radiographic data from 78 cases were available. There was a slight predominance of multilocular BOC (52.6%, n=41) compared to unilocular lesions (47.4%, n=37), contrasting to the results of a series of cases reported by Méndez et al.[11] in which 60% of the lesions were unilocular.

The hard blade of adjacent teeth often appears intact and cystic growth can cause root divergence similar to LPC[5]. Dental resorption and cortical rupture are uncommon. Moreover, some authors still comment that the discovery of the lesion, as in the present case, was occasional, during the realization of imaging examinations[3]. These data suggest that routine imaging examinations may play a key role in the early diagnosis of central lesions of the jaws.

Furthermore, it is important to emphasize that the radiographic appearance seems to affect the rate of recurrence of these lesions. Twelve recurrent cases were reported and 11 (91.7%) presented multilocular radiographic appearance. In addition, multilocular BOCs had statistically larger mean values than lesions with unilocular radiographic appearance (p=0.025, Mann-Whitney) (Table 2). These data suggest that besides the multilocular radiographic appearance, the size of the lesion may be another important factor in relation to the recurrence of BOCs.

Table 1. Demographic and clinical features of botryoid odontogenic cysts described in the literature (1973 - 2018).

Nº of cases	Author	Mean age (years)	Gender	Localization	Symtoms	Radiographic appearence	Treatment	Recurrence
2	Weathers and Waldron, 1973.	68	M (1) F (1)	Mandible (2)	No	Multilocular (1) Unilocular (1)	Excision (2)	NR
3	Kaugars, 1986.	56,3	M (2) F (1)	Mandible (3)	Yes	Multilocular (3)	Enucleation (3)	1 recurrence after 9 years
10	Greer and Johnson, 1988.	46	M (6) F (4)	Mandible (9) Maxilla (1)	No	Multilocular (2) Unilocular (8)	NR	3 recurrences
1	Phelan et al., 1988.	23	F	Mandible	No	Multilocular	Enucleation/curettage	2 recurences
1	Heikinheimo et al., 1989.	51	F	Mandible	No	Multilocular	Enucleation/marginal resection	4 recurrences in 9 years*
1	Redman et al., 1990.	67	M	Mandible	No	Multilocular	Excision	NR
2	Lindh, 1990.	44,5	F (2)	Mandible (2)	Yes (2)	Multilocular (2)	Excision (2)	1 recurrence
1	De Sousa, 1990.	54	F	Mandible	No	Multilocular	Enucleation	No
1	Van der Waal, 1992.	23	F	Mandible	No	NR	NR	NR
33	Gurol et al., 1995.	55,4	M (16) F (17)	Mandible (24) Maxilla (8) NR (1)	Yes (18) No (8) NR (7)	Multilocular (15) Unilocular (1) NR (17)	NR	2 recurrences 10 No 21 NR
1	Falcone et al., 1995.	55	F	Mandible	NR	NR	NR	NR
2	Carter, 1996.	58	M (1) F (1)	Mandible (2)	NR (1) No (1)	Multilocular	Enucleation/curettage (1) NR (1)	No (2)
1	Weibrich G. et al., 2000.	64	M	Mandible	No	Multilocular	NR	NR
1	Miguel et al., 2002.	82	M	Mandible	No	Multilocular	Enucleation	NR
1	Uçok et al., 2005.	32	F	Mandible	No	Multilocular	Enucleation	NR
6	Ramer and Valuri, 2005.	56	M (1) F (5)	Mandible (6)	No (4) Yes (2)	Multilocular (2) Unilocular (4)	NR (6)	No (4) Yes (2)
1	Albuquerque Jr et al., 2005.	53	F	Mandible	No	Unilocular	Enucleation	No
1	Chi et al., 2007.	80	F	Mandible	No	Multilocular	Enucleation	NR
1	Chebicheb et al., 2008.	21	F	Maxilla	No	Multilocular	Enucleation	No
1	Farina et al., 2010	64	F	Mandible	No	Multilocular	Excision	No
1	Nan et al., 2010	67	M	Mandible	NR	Multilocular	NR	No
10	Santos et al., 2011.	38,5	M (7) F (3)	Mandible (8) Maxilla (2)	No (3) Yes (7)	Multilocular (6) Unilocular (3) NR (1)	NR (10)	No (5) Yes (4) NR (1)
1	Cohen and Bhattacharyya, 2011.	45	F	Mandible	NR	Multilocular	NR	NR
1	Mori et al., 2011.	59	F	Mandible	No	Multilocular	Excision	No

1	Maciel-Santos et al., 2011.	43	F	Maxilla	No	Multilocular	Enucleation	No
1	Arora et al., 2012.	20	F	Mandible	Yes	Unilocular	Enucleation	NR
1	Frei et al., 2014.	57	F	Mandible	NR	Multilocular	Descompression/ enucleation	NR
1	Magral et al., 2014	52	M	Mandible	NR	Unilocular	Enucleation	NR
1	Anuradha et al. 2014.	21	M	Mandible	Yes	Multilocular	Enucleation and use of carnoy's solution	No
1	Gonçalves et al., 2015.	44	M	Mandible	No	Multilocular	Enucleation/peripheral ostectomy	No
1	Naile Cura et al., 2015.	57	M	Mandible	Yes	Unilocular	Enucleation	NR
1	Darin Johnston et al., 2015.	51	F	Mandible	No	Multilocular	Curettage	NR
1	Almeida et al. 2015.	55	F	Mandible	Yes	Multilocular	Ressection	No
1	Fatima et al., 2015.	67	F	Mandible	Yes	Multilocular	Enucleation/curettage	No
1	Vidakovic et al, 2016	44	F	Mandible	Yes	Unilocular	Enucleation	No
1	Redman et al., 2017.	71	M	Mandible	No	Multilocular	Enucleation/peripheral ostectomy	No
1	Present case	43	M	Mandible	No	Multilocular	Enucleation/curettage	No

Legend: NR: not reported, F: Female, M: Male. *4th recurrence was removed en bloc with margins of uninvolved bone including both premolars.

Table 2. Association between radiographic appearance and tumor size of BOCs.

			Large (cm)	
		n	mean±SD (min-max)	*p*-value*
Radiographic appearance	Unilocular	15	1.52±1.06 (0.4-4.5)	0.025
	Multilocular	19	2.79±2.05 (0.2-7.5)	

* Mann-Whitney test

Histopathologically, the BOCs are very similar to those of LPCs, differing only in the multicystic aspect[6,14]. Both lesions have a thin odontogenic epithelial lining, often composed of cuboidal or columnar cells, with foci thickening on plaque, and clear cells rich in glycogen dispersed throughout the epithelial tissue. Additionally, subepithelial hyalinization of the connective tissue of the cystic capsule may also be noted[3,6,12]. It must be emphasized that the presence of multiple pathological cavities guaranteeing a multicystic appearance is indispensable for the diagnosis of BOC[6,14]. Similar findings were observed in the present case.

However, it is important to emphasize that although the multicystic appearance is fundamental for the definitive diagnosis of this lesion, any damage of this aspect during the biopsy or during the manipulation of the laboratory specimen can make it difficult to differentiate it from the LPC[14,15] and to have negative implications for the patient, since the BOCs clearly show a higher recurrence rate (21.7%) when compared to the LPCs (2.4%)[9], resembling the recurrence rates commonly seen in glandular odontogenic cysts (21.6%)[16] and odontogenic keratocysts (21.1%)[17], which has led some authors to propose more radical surgical approach and longer follow-up to ensure the success of treatment of BOCs[7]. Thus, the precise distinction between these two entities is a particularly important issue, capable of greatly influence the treatment and prognosis of these lesions.

This high rate of recurrence can be explained in a number of ways, namely, the multicystic nature of the lesion, which makes complete excision more difficult, and increases the risk of future recurrences due to the presence of remnants of the cystic epithelium after surgery[12] or inherent biological nature of the lesion itself, evidenced by the moderate proliferative index (Ki-67)[2].

There are several explanations for the apparently more aggressive behavior of the botryoid variant compared to the LPCs: the lining epithelium has a higher proliferative rate, low apoptotic index or both[2]. Explaining these possibilities has been a fruitful approach in studies of another aggressive lesions of odontogenic origin, such as odontogenic keratocyst (CO), for example[18-23]. Based on this assumption, Redman et al.[2] performed an exploratory study to determine if there was a significant difference in proliferative activity, apoptosis and expression of genes that control these activities between BOCs, LPCs and adult gingival cysts (AGCs), and found that the higher percentage of p53 and Bcl-2 positive cells observed in the BOC compared to common PLCs and AGCs may help to explain their more aggressive behavior, and suggests that the products of these genes may play important roles in the greater differential between proliferation and apoptosis observed in the BOC. However, as this is an exploratory study, further investigations are still necessary to understand the biological behavior of this lesion.

The treatment of choice for BOC is surgical enucleation, with meticulous bone curettage. Adjuvant procedures after surgical enucleation such as peripheral osteotomy, cryotherapy or application of Carnoy's solution have been proposed in order to minimize the high risk of relapse this lesion[9]. In the current case, the patient underwent enucleation and curettage, and after 3 years of follow-up, no sign of relapse was observed. The clinical aspects, and especially the possibility of obtaining a CT of the lesion, associated with the experience of the surgeon, justify the adopted conduct, due to the absence of bone fenestration and communication of the lesion with adjacent soft tissues. The integrity of the surgical site observed guided the surgical planning and ruled out the need to remove adjacent soft tissues.

CONCLUSION

In conclusion, BOC is a rare multicystic variant of LPC, which is commonly observed in older adults. Due to the high rate of recurrence, the long-term follow-up of patients diagnosed with BOC is necessary. Additionally, the size and multilocular pattern probably being the main factors associated with recurrence.

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