

# Very Large Inflammatory Odontogenic Cyst with Origin on a Single Long Time Traumatized Lower Incisor

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## ABSTRACT

One of the consequences of traumatic injuries is the chance of aseptic pulp necrosis to occur which in time may become infected and give origin to periapical pathosis. Although the apical granulomas and cysts are a common condition, their appearance as an extremely large radiolucent image is a rare finding. Differential diagnosis with other radiographic-like pathologies, such as keratocystic odontogenic tumour or unicystic ameloblastoma, is mandatory. The purpose of this paper is to report a very large radicular cyst caused by a single mandibular incisor traumatized long back, in a 60-year-old male. Medical and clinical histories were obtained, radiographic and cone beam CT examinations performed and an initial incisional biopsy was done. The final decision was to perform a surgical enucleation of a lesion, 51.4 mm in length. The enucleated tissue biopsy analysis was able to render the diagnosis as an inflammatory odontogenic cyst. A 2 year follow-up showed complete bone recovery.

**Keywords:** Enucleation, Oral surgery, Trauma tooth

## CASE REPORT

The intraoral observation did not reveal any atypical condition except for a large amalgam filling on tooth #36. The ice sensibility test revealed normal responses for all teeth from #35 to #45, except for tooth #41 which did not respond. The electrical pulp test confirmed the results of the ice test. The panoramic radiographic interpretation was able to reveal a very large mandibular radiolucent lesion extending from tooth #35 to #45 [Table/Fig-1a]. Intraoral periapical radiographs were taken which showed apical root resorption in teeth #34, #33, #41 and #43 [Table/Fig-1b-d]. A smaller periapical lesion could be observed surrounding teeth #41 and #42. One interesting point was observed at this point, all mandibular incisors had small pulp chambers and very thin root canals except for tooth #41 which had a long and wide pulp chamber and a large root canal [Table/Fig-1c]. Class II mobility was seen in teeth #32, #31, #41, #42, although no periodontal pockets were present [Table/Fig-1e]. The pulp diagnosis for the involved teeth was normal pulp except for tooth #41 which was diagnosed with a pulp necrosis probably coming from traumatic injury. Due to the characteristics of the larger radiolucent lesion no apical diagnosis was possible to be performed at this point. The clinical condition and doubts were explained to the patient, and all the procedures described below were explained and accepted by him.

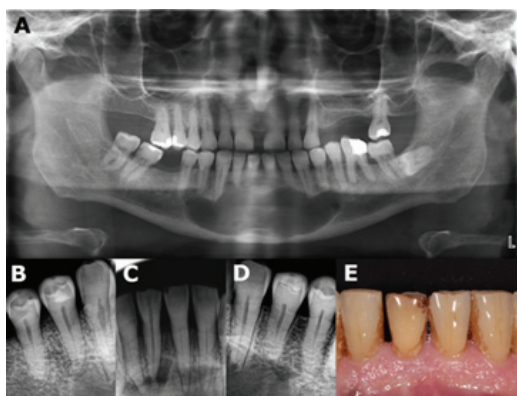
Given the clinical history but also the size of the lesion, the differential diagnosis included: radicular cyst, keratocystic odontogenic tumour (KCOT) and unicystic ameloblastoma. Thus, a biopsy was performed

with a trephine to remove part of the wall of the cystic lesion and aspiration of cyst fluid.

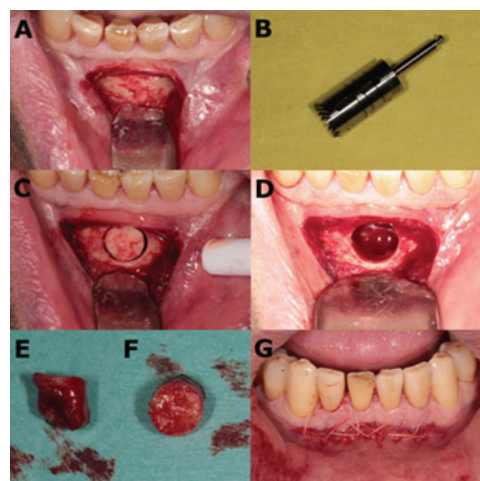
Under local anaesthesia performed using 1.8 ml of 4% articaine with 1:200,000 epinephrine (Artinibsa, Inibsa, Spain), a 2 cm wide incision was performed using a scalpel blade #15 in the buccal aspect of the anterior mandibular region in between teeth #32 and #42. Then, the flap tissues and periosteum were retracted (full-thickness flap), and the bone exposed in the mental region. Using a low speed 0.8cm trephine, a circular osteotomy was performed in between teeth #31 and #41. A bone fragment with the soft tissues attached in the internal surface corresponding to the cystic lesion was collected. The flap was sutured with absorbable stitches (Vicryl rapide, Ethicon) [Table/Fig-2a-g].

The biopsied tissue was divided in three bottled samples, a sample A with bone and membrane wall with a sample size of 8 mm, a sample B with fresh cyst content and a sample C with fixed cyst content.

The three samples were processed in whole. The histological diagnosis for sample A was of bone tissue without lesion and fibrous cystic wall without epithelial lining, with reparative alterations and chronic inflammation with multinucleated giant cells of foreign body type in relation with cholesterol crystals. For both samples B and C the diagnosis was cystic content composed of amorphous



**[Table/Fig-1a-e]:** (a) Initial panoramic radiograph; (b-d) Initial periapical radiograph from teeth #35 to #45; (e) Pre-operative front photograph, a darker colouration can be observed in tooth #41

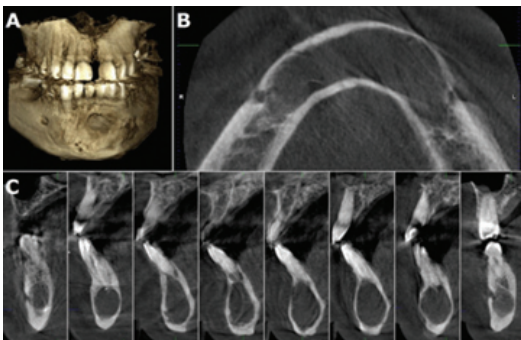


**[Table/Fig-2a-g]:** (a) Surgical flap approaching the pre-mandible region, (b) Bone trephine used; (c) Circular bone incision; (d) After biopsy; (e, f) Biopsied tissue collected; (g) Sutures after biopsy surgery. (Surgical procedure performed by FF)

material and cholesterol crystals with chronic inflammation, observing multinucleated giant cells of foreign body type. These morphological aspects were compatible with an odontogenic cyst, but, since no epithelial lining was observed, it was not possible to perform a definitive diagnosis.

A cone beam computed tomography (CBCT) was performed (Planmeca ProMax, Planmeca, Finland) and the images analysed on proper computer visualization software (Planmeca Romexis, Planmeca, Finland) [Table/Fig-3a-c]. These images showed a large sized lesion occupying all trabecular bone from tooth #34 to #44 region. All teeth had apical root resorption more severe for the incisors. Both mental foramen were compressed by the lesion, which justifies the reported numbness feeling. The lesion had a length (mm) of 51.4 (axial slice), and a height/deep (mm) of 11.7/8.8 (sagittal slice at left mental foramen), 15.2/13.2 (tooth #33), 23.0/10.4 (tooth #41), 17.2/11.0 (tooth #43) and 11.6/8.4 (right mental foramen) measured using Romexis rule.

At this point a tumour origin was excluded. So a more conservative approach was debated with the patient. Decompression or marsupialization was explained as two techniques that could improve both symptoms and prognosis of a possible enucleation surgical approach. Nevertheless the patient made clear that the numbness and progressive loss of sensibility was something that



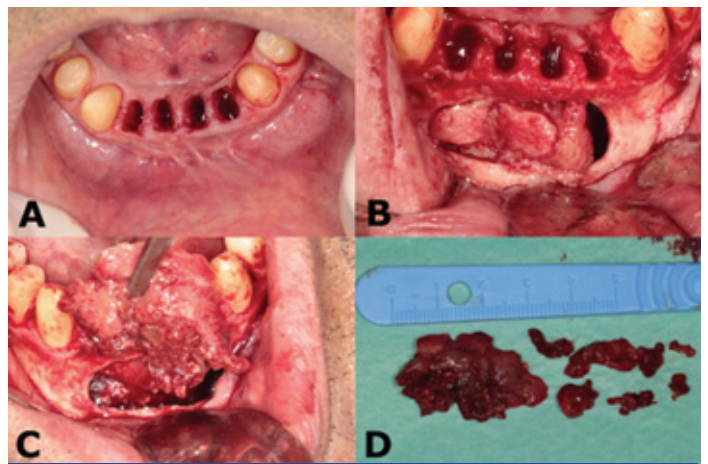
**[Table/Fig-3a-c]:** (a) 3D reconstruction; (b) Pre-mandible axial slice showing a very large radiolucent lesion occupying all trabecular bone between both mental foramen; (c) Pre-mandible sagittal slices (from left to right: right mental foramen, teeth from #43 to #33 and left mental foramen) show a very large radiolucent lesion occupying all trabecular bone

was really bothering him, along with some worry regarding the lesion itself and requested a more radical approach.

The endodontic treatments on teeth #34, #33, #43 and #44 were planned and performed prior to surgery. The lower incisors were planned to be maintained, although due to the unpredictability of this being possible due to tooth mobility and root resorption, its endodontic treatment was decided to be performed post-surgical. The exception was tooth #41 which was planned to be extracted due to mobility and heavy root resorption.

Under local anaesthesia, a sulcular incision was performed from teeth #35 to #45 with a full-thickness flap retraction. After soft tissues retraction the lower incisors showed more mobility than what was expected, and the decision to remove them was made. Both mentonian nerves were exposed. Using a small round bur on a surgical hand piece, an ovoid osteotomy with 3 cm wide was made. After careful retraction of the cystic wall, the cyst was totally removed [Table/Fig-4a-d]. The cystic cavity was washed with physiological saline. A collagen absorbable membrane (Bio-gide, Geistlich) was used to close the bone window surgical opened. The wound was sutured with absorbable stitches (Vicryl rapide, Ethicon) [Table/Fig-5a-d].

The whole removed tissue was sent to analysis. The enucleated sample had several fragments with irregular surfaces with sizes ranging from 2 mm to 34 mm. The observed aspects were similar to those reported in the incisional biopsy, observing however, a cyst partial lining by non-keratinized epithelium [Table/Fig-6a,b]. These morphological aspects allow a definitive diagnosis of odontogenic



**[Table/Fig-4a-d]:** (a) Dental preparations and teeth extractions; (b) Surgical cyst detachment; (c) Cyst removal; (d) Cystic tissue removed. (Surgical procedure performed by FF)



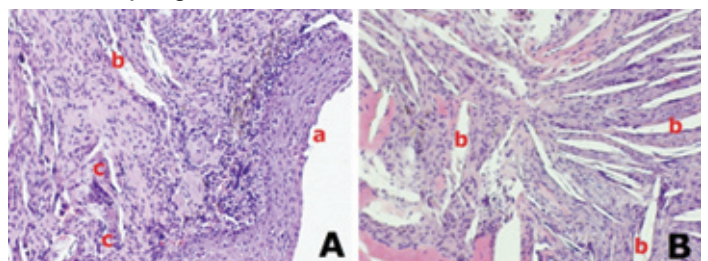
**[Table/Fig-5a-d]:** (a) Cystic bone cavity after surgical enucleation; (b) Resorbable collagen membrane placement; (c) Suture; (d) Provisional bridge. (Surgical procedure performed by FF)

cyst with non-keratinized epithelium: a radicular cyst (inflammatory odontogenic cyst).

The main complain related to the numbness feeling disappeared completely a few days after the enucleation surgery. The patient was followed weekly during the first month and every six months for two years. Complete comfort was reported. At two years postoperative panoramic radiograph showed a complete bone regeneration without any type of regression [Table/Fig-7]. Due to financial constrains a provisional bridge was still being used.

## DISCUSSION

The most common type of radiolucent pathologies present in the jaws are apical granulomas and cysts, which may represent 73% overall [1], although other pathological conditions incidences have been reported, such as keratocystic odontogenic tumours (8,8%), central giant cell lesions (1,3%) or ameloblastomas (1,2%) [1]. Metastatic lesions have an incidence of less than 1% [1]. The most usual radiolucent lesions, the periapical granulomas [1-3], have an inflammatory origin based on an infectious condition established in



**[Table/Fig-6a,b]:** Histological analysis of enucleated lesion presenting a non-keratinized epithelium: (a) large amounts of cholesterol crystals; (b) multinucleated giant cells of foreign body type (c) in association with the crystals and several other inflammatory cells





**[Table/Fig-7]:** Twenty five months follow up shows complete bone regeneration

a root canal system of a particular tooth, the treatment for these conditions is based on an infection control through a root canal treatment. For cyst-like pathologies, the treatment may range from non-surgical root canal treatment to surgical enucleation. These two histological conditions are benign, usually with small dimensions, with very low recurrence rates and with a very good prognosis if correctly diagnosed and treated. But other radiolucent conditions such as keratocystic odontogenic tumours, which may have a neoplastic nature, or central giant cell lesions have a high recurrence rate, can provoke root resorptions and paresthesia [4,5]. In uncommonly large radiolucent lesions differential diagnosis with orthokeratinized odontogenic cyst or unicystic ameloblastoma has to be performed.

The most usual cause that may lead to root canal infection is caries or microleakage from previous restorations. Dental trauma may lead to aseptic pulp necrosis [6], and although this may be initially a bacteria free condition, the loss of defensive mechanisms of a healthy pulp may lead in the future to a root canal infection due to microorganisms' penetrations through traumatic cracks and exposed dentin tubules. The infectious conditions in traumatized teeth may only be understood many years after the traumatic injury.

There has been some debate regarding the management of large periapical cyst-like lesions. The treatment options range from non-surgical root canal treatment to endodontic microsurgery or even tooth extraction [7].

Two types of cysts have been described in Nair's work, the "true cyst" which presents cavities completely enclosed by epithelial lining, and the "pocket cyst" containing epithelial-lined cavities that present a direct communication to the root canal system [3,8]. The "true cyst" is considered conditions with a poor prognosis that may only be solved with a surgical approach [3]. On the other side the periapical granuloma is considered a pathological condition that responds very well to a non-surgical root canal treatment. Clinically and radiographically it is impossible to differentiate between a periapical granuloma and a periapical cyst, since this diagnosis is only possible to be performed by an anatomopathologist after a biopsy analysis. Nevertheless it is well accepted that the larger the lesion the higher the possibility of been a radicular cyst [2,9]. Lesions with a radiographic size of 200 mm<sup>2</sup> have an almost 100% chance of being cysts [2,9]. Although considered a clinical condition with a poor prognosis, some authors argue that the cystic lesions have to respond favourably to the non-surgical treatment. This assumption is based in the fact that the success rates for endodontic treatment may reach 85% [10] for teeth with periapical pathology and the evidence that suggests that 33% [1] of the periapical lesions are radicular cysts, which means that some of these lesion must be healing.

A conservative approach would be advisable when dealing with inflammatory lesions related to an intra-canal infection. In the particular case described in this report, the option of decompression and marsupialization where analysed after the results of the incisional biopsy. Both techniques had an advantage of being capable of

reducing the size of the lesion to a point where there was no need to perform interventions on the adjacent canines and premolars and probably of solving the problem of the numbness feeling that was assumed to be related with the pressure that was being made by the inflammatory process on the mental foramen. However, it was not guaranteed the results would be favourable in the uncommonly aggressive lesion. The presence of a extremely large radiographic image, superior to the 200 mm<sup>2</sup> size gave a reasonable conviction that was a radicular cyst despite the non-identification of epithelial wall in the incisional biopsy, and the presence of heavy quantities of cholesterol crystals, which have been described as factors that may lead to persistent apical periodontitis [11], along with the desire of the patient to definitively solve the situation made the enucleation surgical approach as the better option to this particular case. 4 teeth had to receive prophylactic endodontic treatment prior to surgery, since it was not possible to perform a good curettage without irreversible damage the periapical area, but no retro-apical preparation was performed because the pulp diagnosis on the time of the root canal therapy.

When reviewing the available literature, very few cases are available reporting very large radicular cysts caused by traumatic injuries, and most of them are reported in the pre-maxilla. Most of them were solved by surgical means [12-14] although there are reports of non-surgical successful treatments [15,16]. Two other case reports showed a large sized lesion in the mental region with very similar characteristics. One of the cases required a similar approach to the one presented in this paper [17], while in the other case, the lesion was not so aggressive and the surgical enucleation was possible to be performed maintaining all teeth [13].

## CONCLUSION

This case may serve as a reminder that even a single tooth traumatized long back may be the cause of an uncommonly large and aggressive odontogenic cyst. Nevertheless, other kind of radiolucent lesions must be always ruled out through a biopsy analysis. A conservative approach is always desirable; however, the surgical enucleation may be a valid and successful option to lesions with such large dimensions.

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