CASE REPORT

Giant radicular cyst of the maxilla

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Accepted 4 April 2014

SUMMARY

Radicular cysts are inflammatory odontogenic cysts of tooth bearing areas of the jaws. Most of these lesions involve the apex of offending tooth and appear as well-defined radiolucencies. Owing to its clinical characteristics similar to other more commonly occurring lesions in the oral cavity, differential diagnosis should include dentigerous cyst, ameloblastoma, odontogenic keratocyst, periapical cementoma and Pindborg tumour. The present case report documents a massive radicular cyst crossing the midline of the palate. Based on clinical, radiographical and histopathological findings, the present case was diagnosed as an infected radicular cyst. The clinical characteristics of this cyst could be considered as an interesting and unusual due to its giant nature. The lesion was surgically enucleated along with the extraction of the associated tooth; preservation of all other teeth and vital structures, without any postoperative complications and satisfactory healing, was achieved.

BACKGROUND

Odontogenic cysts can be broadly divided into developmental and inflammatory types based on their aetiology. Inflammatory odontogenic cysts include the radicular cysts and the lateral periodontal cysts. Radicular cysts (apical periodontal cyst, dental root end cyst) are the most common inflammatory odontogenic cysts of tooth bearing areas of the jaws.¹ They originate from an epithelial rest of Malassez in periodontal ligaments secondary to inflammation.² They are most frequently found at the apices of the involved teeth with infected or necrotic pulps; however, they may also be found on the lateral aspects of the roots in relation to accessory root canals.³

Most commonly, radicular cysts occur between the third and the sixth decade of life with male predominance. Clinically, the lesion is usually small, asymptomatic but may sometimes exhibit mild pain and sensitivity to percussion. The affected tooth is usually non-vital and the surrounding mucosa may exhibit bluish discolouration.⁴ Histopathologically, the radicular cyst is a chronic inflammatory lesion with a closed pathological cavity. It is lined either partially or completely by non-keratinised stratified squamous epithelium.²

The present case report documents of an unusual case of an infected giant radicular cyst in the posterior maxilla crossing the midline of the palate. In spite of its massive size and lying close to vital structures, it did not erode the bone and integrity of important anatomical structures such as maxillary sinus, orbital floor and nasal floor were

maintained. The adjacent teeth were vital without any evidence of root resorption. Conventional surgical enucleation resulted in the successful resolution of the cyst with complete bone regeneration.

CASE PRESENTATION

A 32-year-old male patient reported to our dental institute with a chief symptom of mild pain and pus discharge in relation to the left upper back tooth region. On clinical examination, there was a massive palatal swelling with pus discharge, extending from teeth 25 to 28, crossing the midline of the palate (figure 1). The dental history revealed repeated prescription of antibiotics and analgesics at private dental clinics for the same persistent swelling since 6 months. Medical history was unremarkable. There was a mesioproximal caries in relation to 26, which was non-vital. The rest of the teeth in vicinity, 24, 25, 27 and 28 were surprisingly vital. On palpation, the lesion was soft and fluctuant. The buccal vestibule was devoid of any swelling or draining sinus tract. Lymph nodes were non-palpable. Oral hygiene was poor with grade 3 stains and calculus.

INVESTIGATIONS

The patient was advised for cone beam CT (CBCT), but he was unwilling for CT or CBCT, as he was poor and had financial constraints. Hence he was advised for orthopantomograph, intraoral periapical radiograph, maxillary occlusal radiograph and routine laboratory investigations. Radiographic examination revealed a large unilocular radiolucency with well-defined radiopaque border (figure 2). Routine laboratory investigations were within normal limits. Fine needle aspiration

Figure 1 Preoperative photograph.

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To cite: Deshmukh J, Shrivastava R, Bharath KP, et al. *BMJ Case Rep*. Published online: [please include Day Month Year] doi:10.1136/bcr-2014-203678

Figure 2 Preoperative orthopantomograph.

revealed turbid brown-coloured fluid, consisting dense infiltrate of acute inflammatory cells, predominantly polymorpho nuclear leukocytes. Few isolated epithelial cells were seen, which were normal in size, shape and appearance. Cytological picture was suggestive of an acute inflammatory lesion. Based on clinical, radiological and analysis of aspirate, a provisional diagnosis of an infected radicular cyst was made. After surgical enucleation and biopsy, histopathological picture revealed non-keratinised stratified squamous epithelium with long irregular rete ridges showing a characteristic arcading pattern (figure 3A). The underlying connective tissue was loosely fibrocellular with chronic inflammatory infiltrate containing predominantly lymphocytes and plasma cells. Many newly formed blood vessels with areas of haemorrhage were seen (figure 3B). Histological findings confirmed clinical diagnosis of a radicular cyst.

DIFFERENTIAL DIAGNOSIS

In view of its clinical characteristics, similar to some commonly occurring lesions in the oral cavity, the differential diagnosis of the radicular cysts should include dentigerous cyst, pindborg tumour, periapical cementoma, traumatic bone cyst, ameloblastoma, odontogenic keratocyst and odontogenic fibroma.² Confirmatory diagnosis of the radicular cyst is established only after surgical biopsy and histopathological examination of the lesion.

TREATMENT

The patient was advised for surgical excision and biopsy. Careful enucleation of cyst was performed along with extraction of 26 under local anaesthesia. Extreme caution was exercised taking into account the lack of advanced imaging benefits of CT or CBCT (figure 4). Intact bone was present all around the apices of adjacent teeth; hence no postoperative endodontic treatment was performed on other teeth. Excised tissue was sent for histopathological investigation. Necessary prescriptions and postoperative instructions were given.

OUTCOME AND FOLLOW-UP

Postsurgical follow-up after 15 days showed considerable reduction in the size of swelling with prompt healing of surgical site (figure 5A). At 6 months follow-up, no recurrence was observed (figure 5B) and orthopantomograph revealed a new bone formation at the site of cystic lesion (figure 6). The other teeth remained vital, ruling out requirement of endodontic treatment.

Figure 3 (A) Arcading pattern of epithelium and (B) chronic inflammatory cells.

DISCUSSION

Inflammatory jaw cysts comprise a group of odontogenic lesions. They originate as epithelial residues in the periodontal ligament due to apical periodontitis following the death and necrosis of the dental pulp. Radicular cysts are diagnosed either during routine radiographic examination or following their acute exacerbation.⁵

Figure 4 Surgical enucleation.

Figure 5 (A) Postoperative after 15 days and (B) postoperative after 6 months.

Prevalence of the radicular cysts in the maxilla is 60% as compared with mandible, and is associated with buccal or palatal enlargement.² The present case was associated with a huge palatal swelling without any buccal involvement.

Radicular cysts grow slowly and lead to mobility, root resorption and displacement of teeth. Once infected they may lead to pain and swelling and patients become aware of the problem.⁶ In our case no mobility, root resorption or displacement of teeth was seen despite the presence of a large chronic infected cystic lesion.

Radicular cystic lesions undergo asymptomatic evolution with crepitations followed by erosion and fluctuation of the overlying soft tissue. The bone in the surrounding area will be thinned out with springiness and egg shell crackling, leading to cortical plate expansion. The alveolar process exhibits a paper-like texture on palpation,³ as seen in our case.

Radiographically, the radicular cyst appears as round or pear-shaped unilocular radiolucency at the apex of a non-vital tooth. The margin of a radicular cyst is radiopaque with hyperostotic borders, which continues with the lamina dura. However, in

Figure 6 Postoperative orthopantomograph (6 month).

infected or rapidly enlarging cysts, the radiopaque margin may not be present. The chronic radicular cyst may result in the resorption of offending tooth roots.³ Despite being infected the present case had a clear radiopaque border and no root resorption was evident, which was helpful in the provisional diagnosis of radicular cysts. Other odontogenic cysts like dentigerous cysts, odontogenic keratocysts and odontogenic tumours such as ameloblastoma, Pindborg tumour, odontogenic fibroma and cementoma may share the same radiological features as radicular cysts. Hence histopathological evaluation is necessary most of the time to diagnose these types of giant lesions. In extensive cases, radiographs alone may not be sufficient to show the full extent of the lesions, and advanced imaging may be needed.^{3 7} However, in our case the patient was unwilling for expensive investigations, because of his financial problems. Hence, he reported to our institute where routine investigations and treatment was performed free of cost.

Radicular cysts are generally associated with the root apex of a carious or fractured tooth due to the presence of dead and necrotic pulp. Massive dental cysts sometimes may extend into the sinus away from the original epicentre³ and sometimes present as a large multilocular radicular cyst.¹ The present case though massive, clinically and radiographically did not show any signs and symptoms of maxillary sinus invasion.

Simon⁸ described two types of the radicular cysts. One form is a true radicular cyst which contains a closed cavity entirely lined by the epithelium and the other form of a radicular cyst is a periapical pocket cyst also known as bay cyst. The epithelium is attached at the margins of the apical foramen in such a way that the cystic lumen is open to the affected root canal. Nair⁹ found that 61% were true cysts, and 39% were pocket cysts.

Histopathologically, radicular cysts are lined completely or in part by stratified squamous epithelium. These linings may be discontinuous in part and range in thickness from 1 to 50 cell layers. The lumen of a cyst contains fluid with low concentration of protein and collection of cholesterol clefts (Rushton bodies) with multinucleated giant cells. Different intensities of acute and chronic inflammatory infiltrate are present subepithelially.¹⁰ Few cases are reported with hyaline bodies which represent a secretory product of the odontogenic epithelium in radicular cyst. The deposits of cholesterol crystals arise from the disintegration of red blood cells, lymphocytes, plasma cells and macrophages.¹¹ In our case, histopathological finding revealed acute and chronic inflammatory infiltrate without any Rushton bodies.

Occasionally metaplastic changes, in the form of mucous cells or ciliated cells, are frequently found in the epithelial linings of radicular cysts due to migration of these cells from maxillary sinus or nasal cavity.

A few well-documented cases^{12 13} indicate that squamous carcinoma occasionally arises from the metaplastic changes in the epithelial lining of the radicular cysts. Long-standing cases of radicular cysts have shown histopathological evidence of transition from a cystic lining to epithelial dysplasia and further progressing as infiltrating squamous carcinomas. At present, there is no concrete evidence that cyst epithelium is at particular risk of carcinomatous transformation and no justification regarding cysts as precancerous lesions. However, clinicians should be aware of the remote chances of radicular cyst converting into squamous carcinoma.

The recommended treatment option available for radicular cyst is the conventional endodontic approach combined with decompression¹⁴ or surgical enucleation of a cyst with extraction of the offending tooth. Some authors are of the view that suspected radicular cysts must be totally enucleated surgically to remove all epithelial remnants.¹⁵ The treatment of these cysts is still under discussion and many professionals opt for a conservative treatment by means of endodontic technique. However, in large lesions the endodontic treatment alone is not efficient and it should be associated with a decompression or a marsupialisation or even with enucleation.^{16 17} When the lesion is small with approximately 1 cm in diameter, most clinicians opt for conventional endodontic treatment but a surgical option for massive lesion is either marsupialisation or enucleation. Endodontic treatment of radicular cysts eradicates microbes or substantially reduces the microbial load from the root canal and prevents reinfection by orthograde filling.¹⁸ Once periapical inflammation is reduced, there will be a decrease in inflammatory mediators and cytokines released by innate and adaptive immune cells and the epithelial cells of a cyst's lining epithelium will die of apoptosis.¹⁹ Lesions that fail to resolve with such therapy may be successfully managed by extraction of the associated non-vital teeth and curettage of the epithelium in the apical zone.¹⁸ The other options suggested are surgical decompression to reduce the size of the lesion before marsupialisation or complete enucleation is planned, to reduce the chances of damage to other teeth or anatomic structures.²⁰ Conservative treatment approaches have proved to be effective for the treatment of radicular cysts in primary teeth.¹⁸ However, surgical decompression and marsupialisation requires 3–12 weeks of prolonged follow-up and uncomfortable healing period.²¹ Nair^{4 9} considered that the type of cyst was important, and the true cyst is self-sustaining and may persist even after endodontic treatment. In contrast, the lumen of a pocket cyst is continuous with the root canal and thus dependent on the pulpal infection for its growth and persistence. Pocket cysts, therefore, resolve and heal after conventional endodontic treatment, and true cysts require surgical excision. As the present case represented true cyst, surgical enucleation was considered.

Enucleation of large cysts in the jaws is an invasive method that may lead to complications such as damage of the adjacent teeth or anatomic structures, but contemporaneous and less invasive surgical techniques for treating large radicular cysts have been developed.²¹ Endoscopically assisted enucleation is an innovative alternative method that can be as conservative as marsupialisation, allowing preservation of important surrounding structures, with the greater advantage of one step treatment, reduced healing period and very low morbidity. The endoscopic approach provides good visualisation of the whole cystic cavity allowing the removal of any pathological tissue and preservation of integrity of the vital anatomical structures involved.²¹ The current case was of a giant infected true cyst, and the patient had consulted many dentists for the persistent problem. Thus,

one step conventional surgical enucleation and extraction of offending tooth was performed, as this technique is more used in treating massive lesions.²² In spite of using the conventional surgical technique, vitality of the adjacent teeth and integrity of vital anatomical structures were not violated. Recently, much attention has been paid to the regeneration of destroyed periapical tissues after surgical elimination of the periapical pathology. In order to aid reparation process, after surgical enucleation, guided bone generation methods are in use. However, there are considerable controversies regarding the use of guided bone regeneration techniques in periapical defects.²³ Few studies are of the opinion that regenerative techniques are not superior, either with regard to the speed or quality of healing.²⁴ In contrast, other studies^{23 25} stated that conventional treatment results were less predictable in comparison with cases in which regeneration methods were used. We observed complete regeneration of bone without employing any guided tissue regenerative techniques.

Learning points

- The clinical characteristics of the present case could be considered as interesting due to its unusual presentation and giant architecture.
- Clinicians should be aware about the uncommon clinical manifestations of radicular cysts.
- Ideal treatment option for chronic, true chronic infected radicular cysts is surgical enucleation with extraction of the offending tooth/teeth.
- Surgical decompression followed by endodontic treatment before cystectomy is another option in some cases depending on the size and chronicity of the cyst. These techniques are suitable for paediatric patients and may require a prolonged treatment period.
- Follow-up of the case is necessary to rule out recurrence and endodontic involvement of other teeth.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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