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International Journal of Current Research
Vol. 10, Issue, 01, pp.64658-64661, January, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

SURGICAL MANAGEMENT OF LARGE RADICULAR CYST WITH ENUCLEATION AND DFDBA BONE GRAFTING IN A PATHOLOGIC DEFECT

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ARTICLE INFO

Article History:
Received 17th October, 2017
Received in revised form
29th November, 2017
Accepted 22nd December, 2017
Published online 31st January, 2018

Key words:
Radicular Cyst,
DFDBA, Bone Graft,
Enucleation

ABSTRACT

Radicular cyst is the most common cystic lesion in the jaws. In the past, there were many different treatment option mentioned in the literature, but total cystectomy i.e enucleation of cyst is gold standard treatment of radicular cyst. After enucleation of cyst, generally surgical bone defect were left as it is, but for accelerated bone healing, bone grafting is advised. This case report presents Surgical Management of Large Radicular Cyst with Enucleation and bone grafting of Demineralized freeze dried bone allograft (DFDBA).

Citation: Dr. Hemant Baonerkar, 2018. "Surgical Management of Large Radicular Cyst with Enucleation and DFDBA Bone Grafting in a pathologic defect.", *International Journal of Current Research*, 10, (01), 64658-64661.

INTRODUCTION

A cyst is pathological cavity having fluid, semifluid or gaseous contents but which is not created by accumulation of pus (Kramer 1974) and it is frequently, but not always lined by epithelium (Shear, 1992). Various types of oral cyst, odontogenic or non-odontogenic are studied and classified since more than a century. The classification of the jaw cysts is given by world health organisation's histological typing of odontogenic tumours in 1992 (Kramer, Pindborg and Shear) (Shear, 1992). Classification given by Shear (2004) is most commonly followed. Radicular cyst is the most common cystic lesion in the jaws. Recent study shows that 42%-44% of all periapical lesions are radicular cysts (Shokier, 2009). A radicular cyst arises from the epithelial residues in periodontal ligaments, due to result of inflammation. Usual aetiology is a carious tooth, which leads to pulp inflammation and then pulp necrosis. Cyst arising after pulp necrosis, are found most commonly at the apex of the involved tooth, so it also called as periapical cyst. After the pulp necrosis, toxins exit at the apex of the tooth which leads to apical inflammation. It then stimulates the epithelial rests of malassez, which found in periodontal ligaments, resulting in formation of periapical granuloma. Eventually, this epithelium undergoes necrosis caused by lack of blood supply and then granuloma progresses to radicular cyst (Shafer, 2006; Shear, 2004). Radicular cyst are also known with various name like periapical cyst, apical periodontal cyst and root end cyst.[3]Many radicular cysts are clinically asymptomatic and always associated with non-vital tooth (Mishra *et al*., 2010). According to shear, it is most commonly seen in fourth and fifth decayed of life, and mostly associated with maxillary teeth (Shear, 2004). The name Carla Partscha (1855-1932) is connected with a method for surgical treatment of large jaw cysts which he introduced in 1910, and which is still today called Partsch I (marsupialization) method and enucleation of the cysts and watertight primary closure, which has been described as "Cystectomy" or Partsch II procedure.Enucleation completely removes the cystic capsule from the bone. Marsupialization is to make an opening, i.e. fenestration, on the outer wall of the cyst through which the cystic content drains into the oral cavity. In this way pressure on the cyst is reduced, resulting in a reduction of the cystic cavity (Torres-Lagares *et al*., 2011). Enucleation and Marsupialization are two surgical treatment methods for radicular cyst (Torres-Lagares *et al*., 2011). Size and location of a cyst is considered before planning the treatment of a radicular cyst, but enucleation and bone grafting are the treatment of choice for large jaw cysts (Bodner, 1996). Now a days there are many bone replacement materials are available, like allograft, xenograft, alloplast, but autologous bone graft said to be gold standard for it. Autologous bone graft

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harvesting procedure has many disadvantages. Allogenic bone grafts have now been used for more than 50 years in orthopaedics and maxillofacial surgery. Recently allogenic bone graft has gained wider attention in the scientific and clinical communities, and some promising results have been achieved, in terms of generating excellent quantity and quality of bone. It has excellent osteoconductive and osteoinductive properties (Kao, 2007). This case report presents surgical management of Large Radicular Cyst with Enucleation, apicoectomy of involved teeth and Bone Grafting in a pathologic defect.

CASE REPORT

A 35 year old male patient was reported to our clinic with the chief complaint of swelling in upper jaw anterior region since 2 to 3 years, and also gave the history of trauma to upper anterior teeth 10 years back due to fall.He said swelling starts with very small elevation in upper vestibule area 3 years back, Then it was gradually increased in present size. The swelling was painless. Patient doesn't have any relevant medical history. On clinical examination, swelling in region of 11,21,22,23 was appreciated, it was involved in vestibular area of same region. Pain on percussion was present on tooth vitality test, tooth no 11,21,22,23 diagnosed as non vital. Size of swelling approx 4 cm X 2 cm in dimensions. On radiographic examination, oncomputerized tomography (CT Scan) images of coronal and sagittal section of maxilla shows localized radiolucency in the periapical region to 11,21,22 surrounded by radio opacity. Orthopentomogram also suggestive of well demarcated radiolucency periapical to 11 to 23 region surrounded by well demarcated radio opaque bone (Fig no 1 & 2) suggestive of localized, osteolytic, periapical pathology.

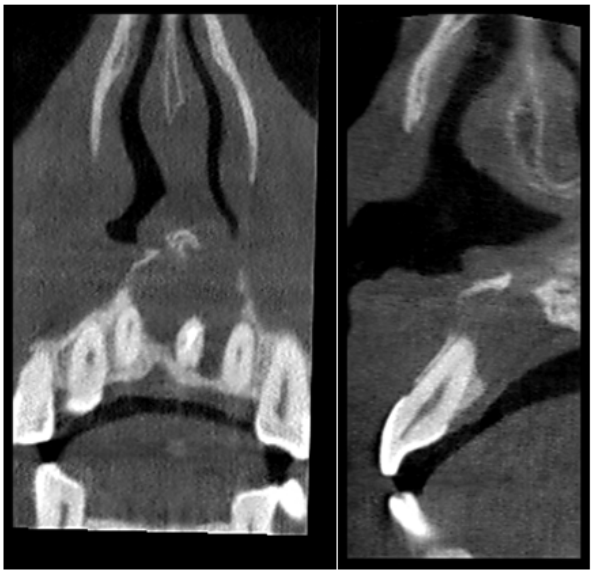

Fig. 1. Preoperative CBCT-coronal and sagittal section

On the basis of case history, clinical examination and radiographical features, the differential diagnosis as radicular cyst, periapical granuloma, periapical cemento osseous dysplasia, traumatic bone cyst, giant cell lesion, and odontogenic tumour were made. The patient was advised for surgical enucleation of the lesion. Routine hematological report was done prior to the surgery, all reports were within normal limits.After following aseptic surgical protocol, case was done under local anaesthesia.

Fig. 2. Preoperative OPG

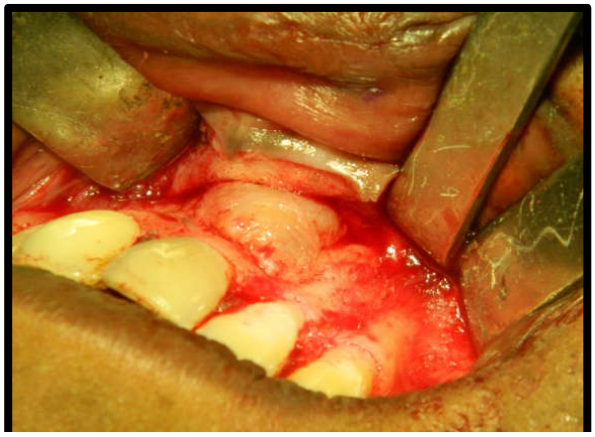

Fig. 3. Exposure of cyst

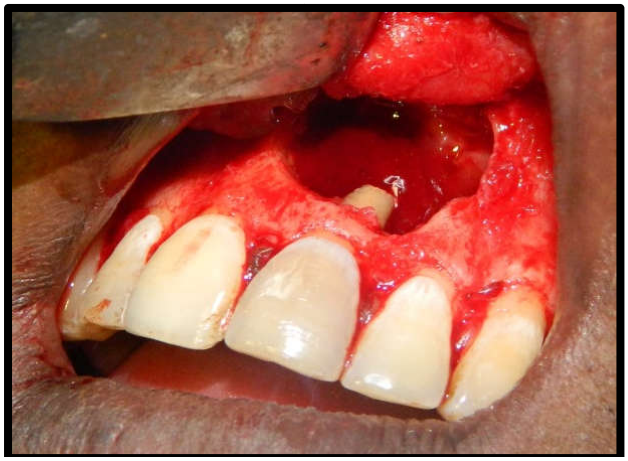

Fig. 4. Enucleation of cyst

Teeth involved in cyst treated with root canal procedure preoperatively. The flap design was marked than full thickness mucoperiosteal flap was reflected.Overlying cortical bone was removed and pathologic tissue was exposed (Fig no 3). With the help of curetes enucleation of cystic tissue was done (Fig no 4).apicoectomy of involved teeth were also done and apex were closed with root end filling restoration.We planed for Demineralized freeze dried bone allograft (DFDBA) bone grafting as bone defect was quite large. Before initiating the surgical procedure Demineralized freeze dried bone allograft (DFDBA) was well soaked in sterile saline to make a paste like consistency (Fig no 5).The bone paste was placed in bony defect and The flap was then repositioned and sutured with the

help of 3-0 black silk (Fig no 6, 7 & 8). Post-surgical instructions and medications were given to the patients. Excised Specimen send to histopathological examination.

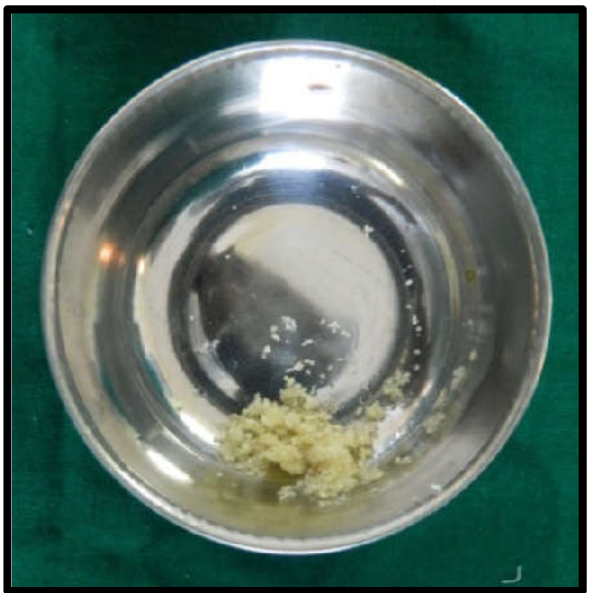

Fig. 5. DFDBA Bone graft soaked in saline

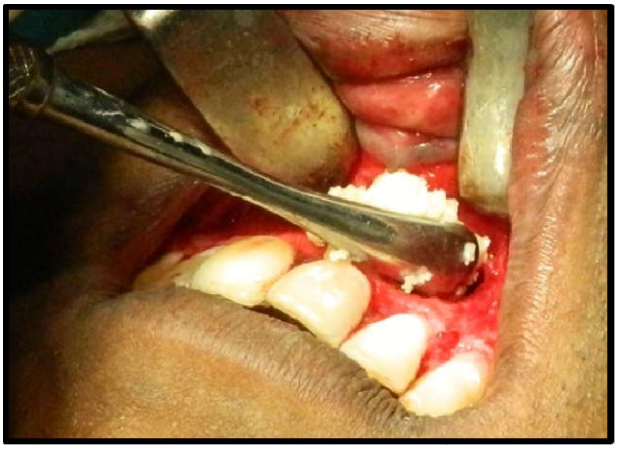

Fig 6: Bone grafting in defect

Fig. 7. Bone defect reconstructed with bone graft

Histopathological report confirms pathology as radicular cyst.Patient was followed up, up to 6 month post operatively (Fig no 9 &10). Post operative 6 month orthopentomograph (OPG) shows optically significant good bone healing.

DISCUSSION

Odontogenic jaw cysts are common lesions in the oral and maxillofacial region.Enucleation and Bone grafting is the treatment of choice for large jaw cysts (Bodner, 1996).

Fig. 8. Wound closure

Fig. 9. Immediate post-operative OPG

Fig. 10. Post-operative after 6 month OPG

After enucleation of jaw cyst, the bone defect is generally left for the spontaneous bone healing which will take time for complete bone healing. Replacement of jaw bone defect is one of the challenges faced by oral and maxillofacial surgeons since long time. Therefore, newer bone grafts and bone grafting procedures have been introduced. For treating such defects bone grafting is an ideal treatment option. The goals of osseous replacement are maintenance of contour, elimination of dead space, reduce postoperative infection, and thus enhance bony and soft tissue healing (Kumar *et al*., 2013). Thus, maintaining appropriate bone continuity with healthy bone healing is of utmost importance.A bone graft is defined as any implanted material that promotes bone healing, whether alone or in combination with other materials.

Table 1. Summery for management of Radicular cyst

Clinical features: • h/o trauma or carious tooth • Associated with non vital tooth • Asymptomatic swelling • Cortical bone expansion
Radiographic features: • Well demarcated oval radiolucency apical to tooth • Surrounded dense radiopaque bone • Displacement of adjacent teeth • Bone or root resorption
Histopathologic features: • Lining of nonkeratinized, stratified squamous epithelium • mixed inflammatory cell infiltration • cholesterol clefts and rushton bodies present
Treatment option: • Enucleation (for small to medium size cyst) • Marsupialization (for large to huge size cyst) • Endodontic treatment (for involved teeth) • Apicoectomy (for apical excision of pathology) • Retrograde restoration (for apical seal of tooth) • Bone grafting (for bone defect reconstruction and fast healing)

The ideal properties of bone graft should be: 1) Osteoinductive and osteoconductive 2) Biomechanically stable 3) Disease free and 4) containing minimal antigenic factors. There are many bone graft materials available now a days. Bone graft materials can be classified[8] as 1) Autograft 2) Allografts 3) Xenografts 4) Alloplastic grafts 5) Synthetic grafts 6) Growth factors enhanced grafts. Although autografts are the gold standard, allografts are much more accepted by patients as the bone grafting material of choice.The most common allograft used is Demineralized Freeze-Dried Bone Allograft (DFDBA). DFDBA is derived from human-cadaver bone whose donors have been screened, selected, and tested to be free of HIV and hepatitis. It is thoroughly processed to eliminate any diseases that might threaten the health of the recipient either by immersing in 100% ethanol or by using of 0.6N hydrochloric acid or nitric acid, which tends to ensure its disease free state. Then the graft is frozen in nitrogen (at a temperature of -196^{O} C), freeze dried and ground to different particle sizes (Mishra *et al*., 2010). The main advantage of DFDBA is, it has not only osteoconductive but also osteoinductive properties. DFDBA used in this case was taken from Tata memorial hospitals tissue bank. Due to the large size of the lesion, surgical approach was planned. The surgical approach to cystic lesions of the jaws is either marsupialization or enucleation. The treatment of choice is dependent on the size and localization of the lesion, the bone integrity of the cystic wall and its proximity to vital structures. In the current case, the lesion was enucleated along with curettage, followed by apicoectomy, placement root end filling material[10] and DFDBA bone grafting. Post-surgical period was uneventful.

The histopathological features of the submitted lesion were consistent with the clinical diagnosis of radicular cyst. The cystic cavity was lined by nonkeratinized, stratified squamous epithelium with mixed inflammatory infiltration being present.In this case ,after enucleation of large radicular cyst DFDBA bone grafting done and after 6 month evident healing was identified on OPG.

Conclusion

Enucleation of radicular cyst with bone grafting should consider as ideal treatment option, because it entirely eliminates pathologic tissue as left in marsupialization or endodontic treatment alone and prevents recurrence. Bone grafting helps in reconstruction of bone defect and fast healing. Still, Final treatment is plan on the basis of size and location of pathology.

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