Acta Scientific Dental Sciences (ISSN: 2581-4893)

Volume 5 Issue 4 April 2021

Case Report

# A Novel Reconstruction of a Large Mandibular Cystic Defect by Bone Graft Substitute

**Radhika Shashank Tayshetye[1]*, Nitin Bhola[2], Anendd Jadhav[3] and Chirag Patil[1]**

*[1]Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College, Wardha, Maharashtra, India*

*[2]Professor and head of Department, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College, Wardha, Maharashtra, India*

*[3]Associate Professor, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College, Wardha, Maharashtra, India*

***Corresponding Author:** Radhika Shashank Tayshetye, Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College, Wardha, Maharashtra, India.

**Received:** February 05, 2021

**Published:** March 06, 2021



## Abstract

Odontogenic cysts are the most common lesions in the oral and maxillofacial region. The commonly chosen treatment approach for it is enucleation and extraction of the involved tooth, if required. To decrease infections and for spontaneous bone regeneration, various bone grafts are increasingly investigated for filling the defect. Autogenous bone graft being the gold standard has its various shortcomings which lead to the search for allogenous, xenografts and alloplasts. Surgical grade calcium sulfate is considered a convenient, safe and readily available bone graft substitute with consistently successful results. This uniqueness of Calcium Sulphate has increased its purpose in the void filling. The purpose of this paper is to present a case of a large Dentigerous Cyst (D.C.) which was successfully managed by antibiotic impregnated Calcium Sulphate as a Bone Graft Substitutes in post cystectomy defect and exhibit its spontaneous bone regeneration radiographically.

**Keywords:** Bone Grafts; Bone Regeneration; Bone Substitute; Calcium Sulphate; Dentigerous Cyst; Enucleation

## Introduction

The dentigerous cyst is a common pathology encountered by an Oral and Maxillofacial surgeon, after a radicular cyst with an incidence of 17% [1]. It is a developmental cyst that originates by separation of the follicle from around the crown of an unerupted tooth due to the accumulation of fluid, originated by the pressure exerted by a potentially erupting tooth on the follicle.

Dentigerous cyst is more common in males and develops in the second and third decades of life [2]. They are usually asymptomatic unless it becomes secondarily infected. Radiographically, they are lined by well-defined sclerotic margins and have three varieties Central, Lateral and Circumferential [1]. It is usually solitary or maybe multiple and associated with syndromes such as Cleidocranial dysplasia, Maroteaux-Lamy syndrome and Mucopolysaccharidosis [3].

Regeneration of large cystic bony defects is a clinical challenge that usually necessitates bone grafting material. An ideal bone graft must possess Osteointegration, Osteoinduction, Osteoconduction and Osteogenesis. There has always been a quest for an ideal replacement of the bony lesions. There are a variety of grafts

used such as autogenous, allogenous, xenografts or alloplastic materials. Amongst these, Autograft is considered the biologic "gold-standard", against which others are compared. Despite the benefits of autografts, allografts and xenografts there are limitations, which gave rise to an increasing interest for search of Bone Graft Substitute. Alloplasts undergo "Creeping substitution" which is a process of initiation of bone formation by osteoconduction and act as a framework of blood vessels and subsequent migration of osteoblasts from surrounding healthy bone. Success of an alloplastic material depends on rate of creeping substitution and replacement by bone. We have considered Calcium Sulphate for filling the bone cavity as it is biocompatible, has a rapid resorption rate, osteogenic, osteoconductive and osteoinductive property [4].

This article reports the case of a large dentigerous cyst in the left mandibular region which was successfully treated with Enucleation followed by Bone Graft Substitute.

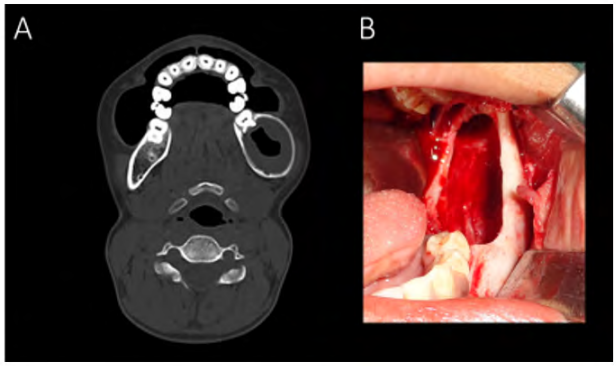


**Figure 1:** A) Preoperative axial cut presenting a unilocular lytic expansile lesion over left ramus of mandible. B) Intraoperative cystic defect.

## Case Report

In July 2018 a 14-year-old, systemically healthy female visited our out-Patient Department of Oral and Maxillofacial Surgery with a complaint of painful swelling in the left side of mandibular posterior region of jaw since 6 months. There was no contributory or relevant past medical history. The swelling was initially small in size and gradually increased to the size of 3 x 2 cm approx., roughly oval with a smooth surface and ill-defined borders. It was associated with pain which was gradual in onset, dull aching, intermittent and localized in nature. Patient did not demonstrate any neural involvement in form of paresthesia. Intraoral examination revealed painful bony hard swelling from 37 to anterior border ramus of the mandible of size 4 x 3 cm approximately with the expansion of buccolingual plates and obliteration of the lower-left vestibule. An aspiration biopsy was performed initially to establish whether the lesion was solid or cystic; aspiration was negative. Bone Biopsy was suggestive of "Infected Dentigerous Cyst". CT scan revealed unilocular lytic expansile lesion of approximately size 34 x 25 mm in the ramus of mandible on left side with a floating tooth within, with cortical bone disruption (Figure 1A and 1B). Based on the clinical, radiological and biopsy findings an initial diagnosis of dentigerous cyst was established.

Under standard patient protocols, naso-endotracheal intubation was done. Crevicular incision was given from 33 to anterior border of ramus posteriorly. Full thickness mucoperiosteal flap was reflected. Bone was drilled using bur and cystic lining was exposed with intact lingual cortex. Cystic lesion was enucleated and lining was sent for histopathological examination. Inferior alveolar nerve was identified and preserved. Cystic cavity was thoroughly curetted. Extraction with 36, 37 and 38 done. Peripheral ostectomy was performed. Surgical grade calcium sulphate powder - Stimulan (Biocomposites) which is pure with a physiological pH was used. It is available with the RapidCure kit which includes 5 cc of calcium sulphate hemihydrate powder. 240 mg of tobramycin liquid was mixed with each 5 cc of calcium sulphate in the mixing bowl. The ingredients were mixed for 30 seconds until "doughy" stage. The paste formed was applied to the moulds and allowed to set for 15 minutes in a typical theatre temperature of 17°C. After drying the surgical defect, the beads were placed and hermetic closure was done. Postoperatively patient was prescribed cephalosporin antibiotics and analgesics. The patient was advised to maintain oral hygiene, avoid trauma to surgical site and was kept on regular follow up. Patient was followed regularly clinically and radiographically for 1, 3 and 6months (Figure 2). OPG after 6 months revealed complete bone formation in the cystic cavity. CT cuts showed 3-dimensional replacement of bone in the cystic cavity. Patient has been followed up for 2 years.

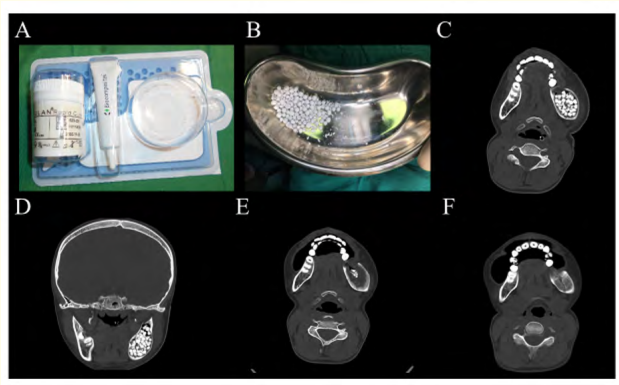


**Figure 2:** A) RapidCure kit. B) Calcium sulphate beads. C) and D) both presenting incorporation of cystic defects by calcium sulphate beads after 1 month. E) Axial cut of mandible post 3 months of intervention. Shows resorption of calcium sulphate beads and initial bone formation. F) Axial cut of mandible post 6 months of intervention. Shows complete regeneration of left mandibular angle.

## Discussion

The treatment of a cyst is based on the following features such as patient age, cyst site and size, the involvement of vital structures and the potential of unerupted teeth into occlusion of the impacted tooth involved. Small cysts are usually treated by Enucleation. Large dentigerous cyst is treated by Marsupialization followed by Enucleation. Enucleation has a better prognosis, with minimal recurrence expected due to the complete removal of pathologic lining. Large cystic cavity after removal of cystic lining apart from creating a large dead space renders mandible to be prone for pathological fracture and infection. Hereby it is advisable to graft the cyst.

The reconstruction of defect can be done by various grafts, depending on size and site of defect. The autogenous bone graft is regarded as the gold standard due to its osteoconductive, osteoinductive and osteoprogenitor properties. However, its drawbacks are donor site morbidity, limited availability and increased operative time. Allografts overcome the limitations of autografts however, the risk of transmission of viral disease from donor to recipient is not completely removed. Complication of allografts are aseptic discharge, fracture and non-union. Xenografts are derived from a genetically different species than the host, such as bovine bone grafts. Its drawback being transmission of infection. Synthetic bone grafts have evolved due to their properties such as osteoconduction and osteointegration. There are various Bone Graft Substitutes such as bioactive glasses, glass ionomers, calcium sulfate, calcium phosphates, α- and β-tricalcium phosphate (TCP), and synthetic hydroxyapatite [4].

Calcium Sulphate used to fill the cystic defect aided in spontaneous bone regeneration. Surgical grade Calcium sulphate is bioresorbable and available in hemihydrated form. It is hypothesized that the calcium sulphate in the surgical site alters the osmolality of the wound. It leads to the movement of water out of cells with the accumulation of fluid, wound drainage and does not cause allergic reactions. It resorbs rapidly within 1 - 3 months creating porosity while stimulating bony ingrowth [7]. It is radiopaque and hence can be evaluated radiographically. The assessment of extensive lesions is better done by CT scan than panoramic radiographs [6]. CT scan reveals size, and content of the lesion, as well as the status of the cortical plates and relationship of the lesion with the adjacent anatomic structures. Hence radiographic analysis is necessary for evaluation spontaneous bone formation.

## Conclusion

The treatment approach of Large cystic defect must include regeneration of bone by immediate Bone graft placement so as to avoid delay in bone formation and undue pathologic fracture. Calcium sulphate dihydrate has been useful in bone regeneration of the cystic defect with minimal complication within a limited span.

## Bibliography

1. Shear M and Speight P. "Cysts of the oral and maxillofacial regions". *John Wiley and Sons* (2008).

2. Jindal G., *et al*. "Dentigerous cyst associated with mandibular 2nd molar: an unusual entity". *Journal of Maxillofacial and Oral Surgery* 14.1 (2015): 154-157.

3. Dhupar A., *et al*. "Bi-maxillary dentigerous cyst in a non-syndromic child–review of literature with a case presentation". *Journal of Stomatology, Oral and Maxillofacial Surgery* 118.1 (2017): 45-48.

4. Precheur HV. "Bone graft materials". *Dental Clinics of North America* 51.3 (2007): 729-746.

5. Sumer M., *et al*. "Inferior alveolar nerve paresthesia caused by a dentigerous cyst associated with three teeth". *Medicina Oral, Patología Oral y Cirugía Bucal* 12.5 (2007): 388-390.

6. Krennmair G and Lenglinger F. "Imaging of mandibular cysts with a dental computed tomography software program". *International Journal of Oral and Maxillofacial Surgery* 24.1 (1995): 48-52.

7. Kallala R., *et al*. "Use of Stimulan absorbable calcium sulphate beads in revision lower limb arthroplasty: safety profile and complication rates". *Bone and Joint Research* 7.10 (2018): 570-579.