



**ORIGINAL RESEARCH PAPER**

**Surgery**

**PLASMA RICH FIBRIN AND BONE GRAFT IN MANAGEMENT OF DENTIGEROUS CYST**

**KEY WORDS:** Dentigerous Cyst, Plasma Rich Fibrin, Bone Graft

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**ABSTRACT**

Developmental odontogenic cysts are dentigerous cysts. Generally presented as an unanticipated and asymptomatic unilocular radiolucencies of unerupted, embedded and impacted tooth crowns of posterior mandible. Tooth bearing cyst with rapid growth rate arising from epithelial remnants of the tooth forming organ. Follicular compression by developing tooth causes venous flow obstruction leading to fluid accumulation between unerupted tooth and follicular epithelium. Recent bone regenerative techniques for cystic lesions are established. Hence, we here present a case of most common surgically enucleated dentigerous cyst with novel technique of plasma rich fibrin and bone graft for promoting faster osseous regeneration along with repair of soft and hard tissues post - operatively. This is the first case in literature where a dentigerous cyst is managed surgically with enucleation followed by placement of plasma rich fibrin and bone graft.

**INTRODUCTION:**

Odontogenic cysts are jawbone cysts with common presentation as swellings of jaw and midface lined with cells derived from odontogenic epithelium.<sup>1</sup> Abundant epithelial remnants in jawbones carved higher prevalence rate of cysts in entire human body.<sup>2</sup>

Developmental odontogenic cysts are dentigerous cysts. In every 100 unerupted teeth, frequency noted as 1.44 which accounts for about 24% of all true cysts of epithelial lining.<sup>1</sup>

Dentigerous cyst appears as radiolucent area encompassing crowns of unerupted, embedded, impacted tooth or dental anomalies like odontomas at cemento - enamel junction in symmetrical fashion.<sup>2</sup>

Typical involvement is seen in posterior mandible with mandibular third molars followed by permanent maxillary canines, mandibular premolars, maxillary third molars and permanent central incisors and deciduous dentition<sup>4</sup> with slight male predilection of second to fourth decades.<sup>1</sup>

Rapid growth rate is associated with lesions growing more than 5cm of follicular space diameter. Management modalities include enucleation and marsupialization. Erratically furnished dentigerous cysts with cortical expansion and erosion can metamorphose into uni-cystic ameloblastoma, intraosseous mucoepidermoid carcinoma and squamous cell carcinoma.<sup>1</sup>

Here we present a case of dentigerous cyst which is surgically enucleated and managed with placement of plasma rich fibrin and allogeneous bone graft. This is the first case in literature where a dentigerous cyst is managed surgically with enucleation followed by placement of plasma rich fibrin and bone graft.

**CASE REPORT**

- 1) This study was approved by the G.S.L Dental College and Hospital and participant signed an informed consent agreement
- 2) This study followed the Declaration of Helsinki on medical protocol and ethics and the regional Ethical Review Board of G.S.L Dental College and Hospital approved the study

A 38-year male patient reported to the Department of Oral and Maxillo-Facial Surgery of G.S.L Dental College and Hospital, Rajamahendravaram with a chief complaint of pain in the right lower back teeth region since 1week. Pain was insidious on onset, continuous, dull aching with no aggravating factors and relieved on analgesic medication.

There is no relevant medical history. Patient was subjected to routine general systemic examination. Extraoral examination reported no contributory significant details. On intraoral examination, missing right third molar is elicited. (Fig 1) Routine haematological investigations revealed normal values.



**Fig 1**

**RADIOGRAPHIC EXAMINATION:**

Orthopantomography (OPG) (Fig 2) reveals a well-defined radiolucent lesion involving right third molar, body and ramus of mandible measuring approximately 2X2 cm in size. There was radiographic evidence of right mandibular third molar at inferior border of mandible.



Fig 2

**HISTOPATHOLOGICAL FEATURES:**

Soft tissue sections show thin odontogenic cystic lining epithelium with 3-4 cell layer thickness and consists of mucous cells in few areas. The epithelium and connective tissue interface are flat. The underlying connective tissue wall shows mild chronic inflammatory cell infiltrate. (Fig 3)

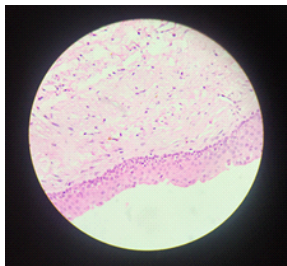


Fig 3

**TREATMENT:**

Under local anaesthesia, an intraoral incision was placed along the anterior border of ramus and subperiosteal dissection is done. Buccal mucoperiosteal flap is raised and cystic lesion is carefully dissected and dental follicle is enucleated using blunt forceps. Superficial bone margins were trimmed with bur and entire surgical area was irrigated. Plasma rich fibrin placement is done with sticky bone graft and covered with membrane. (Fig 4) Wound closure was achieved using layered suturing with 3-0 vicryl sutures. The healing was uneventful. Post radiographic evaluation done after 1 year reveals good bony trabeculae. (Fig 5)

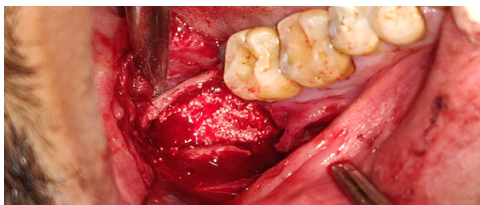


Fig 4



Fig 5

**DISCUSSION:**

Kramer 1974 defined a cyst as a pathological cavity having fluid, semifluid or gaseous contents lined by epithelium and which is not created by accumulation of pus.<sup>5</sup>

Dentigerous cyst is the true developmental odontogenic epithelial cyst that encloses partially or completely the crown of unerupted tooth by its expansion of follicle and attached to its neck.<sup>5</sup>

Space occurs between reduced enamel epithelium and enamel organ of impacted or unerupted or embedded tooth by follicular expansion with internal pressure generation as the fluid accumulates.<sup>4</sup> Association of dentigerous cyst with tooth reveals the causative internal pressure by fluid which denotes cystic presence in hard tissues rather than soft tissues.<sup>2</sup>

Dentigerous cyst arise at various periods randomly with varied size of less than 2 cm in diameter to a massive expansion of jaws measuring more than 10 cm.<sup>6</sup>

Dentigerous cyst presentation is of painless expansion and erosion of cortical bone in involved area which are routinely identified in two dimensional orthopantomography's.<sup>2</sup> Here, it presented with an acute insidious type of dull pain which is continuous.

Three variants – Central, Lateral and Circumferential variants of dentigerous cyst are noted. Zerrin et al retrospective analysis for 5 years reveals 56% cases of central variant which portraits cyst which envelops crown symmetrically and pushes tooth away from the direction of eruption.<sup>8</sup> Tooth is identified at the anatomical regions of inferior border of mandible or ascending ramus or maxillary canine in maxillary sinus or orbital floor and a maxillary central incisor in nasal floor.<sup>4</sup>

44% Lateral variant is the dilation of follicle on one aspect of crown. Common with teeth which are partially erupted in which their superior aspects are only exposed.<sup>4</sup>

Circumferential variant shows cyst enveloping entire tooth and it should be differentiated from envelopmental variety of odontogenic keratocyst.<sup>4</sup>

Our case reveals the typical central variant of dentigerous cyst which is positioned radiographically at the inferior border of mandible in right side.

Differential diagnosis of dentigerous cyst include radicular cysts, odontogenic keratocyst, odontogenic tumours like ameloblastoma, pindborg tumour, odontoma, odontogenic fibroma and cementomas.<sup>3</sup>

Management of dentigerous cysts in cases of completed growth are surgical excision or enucleation with or without associated tooth removal. Enucleation with associated tooth removal is more radical approach with advantage of lower recurrence rate of lesion.<sup>4</sup>

Marsupialization is a conservative approach that preserves tooth associated with dentigerous cyst. It promotes spontaneous eruption when sufficient space is available in dental arch for accommodation of that tooth. Commonly recommended for larger dentigerous cysts, in cases concerning pathological fractures and possibility of destruction of surrounding structures. Predictive indicators for tooth eruption include effectiveness of marsupialization, root maturity, long axis of involved tooth in alveolar bone and availability of space in the dental arch by using Pell and Gregory classification. Drawbacks are slow healing and cicatrisation.<sup>4</sup>

Our case was surgically enucleated with associated right mandibular third molar with cystic lining. Superficially plasma rich fibrin (PRF), sticky bone graft placement is done and covered with membrane.

Novel therapeutic approach in management of cystic lesions

for promoting faster osseous regeneration and repair of soft and hard tissues within 6months post-operatively is done through Plasma rich fibrin.<sup>7</sup>

Concentrated platelets in a small volume of plasma is PRF. Platelet degranulation, releases many biologic active substances like platelet derived growth factor PDGF, transforming growth factor – beta TGF – beta, insulin like growth factor IGF-1.<sup>8</sup> They participate in primary haemostasis thereby helping in repair and regeneration of soft and hard tissues.<sup>7</sup> Their central role in haemostasis, osteoblastic proliferation, differentiation and angiogenesis with low thrombin concentration and molecular structure are optimum for migration of fibroblasts and endothelial cells.<sup>9</sup>

Plasma rich fibrin application in oral and maxillofacial surgery is thriving in aspects of healing of extraction sockets in impacted teeth removal, implantology, cleft lip and palate, ulcer management, osteonecrosis of jaws, reconstructive surgical moraliities with ablative surgeries, oro-antral and oronasal fistulas<sup>7</sup> as fibrin is a biomaterial , that bear constituents favourable such as the platelets and leukocyte cytokines.<sup>9</sup>

Plasma rich fibrin offers mechanical advantages like maintaining of grafted materials together by providing area for formation of new bone during initial healing period. It facilitates cellular migration, vascularization and graft survival. Continuous healing process is created due to the gradual release of platelet cytokines. (PDGF,TGF – beta, IGF – 1) Leukocyte and cytokine presence help in self-regulation of inflammatory and infectious phenomena within grafted material.<sup>9</sup>

Application of PRF diminishes the intra - operative and post - operative bleeding, enhances rapid soft and hard tissue healing and aid in initial stability of grafted tissue by enhancing bone graft density by allowing significant post-operative protection.<sup>9</sup> It promotes rapid vascularization of healing tissue by delivering growth factors.<sup>7</sup>

Bone grafts remain gold standard for reconstruction of bony defects. Bone graft is any implanted material that promotes healing of bone whether alone or in combination with other material. Augmentation of bone healing at site occurs through osteoconduction, osteoinduction and osteogenesis ideally by providing template that direct three-dimensional bone growth.<sup>10</sup> Bone healing time and risk of post complications are reduced with application of grafting techniques and help in mature bone development.<sup>9</sup>

Complete bone regeneration is seen and good bone density was observed on radiographic evaluation of orthopantomography after 1 year postoperatively. It proves plasma rich fibrin placement in surgical enucleated sites shows progressive, promising and significant results in wound healing and regeneration. Placement of sticky bone graft accelerated the wound healing and minimized bone loss during post-operative period

**CONCLUSION:**

Typical central variant of dentigerous cyst associated with right mandibular third molar is presented here. Surgical enucleation followed by placement of plasma rich fibrin and sticky bone graft promoted regeneration of bony trabeculae with accelerated wound healing and minimized bone loss post operatively.

**REFERENCES:**

1. Gururaj Arakeri, Kirthi Kumar Rai, Hosadurga Rudraswami Shivakumar, Shahnavaj I.Khaji: A massive dentigerous cyst of mandible in a young patient: a case report. *Plast Aesthet Res* 2015; 2:294-8
2. Masahiko Terauchi, Satoshi Akiya, Junya Kumagai, Yoshio Ohyama and Satoshi Yamaguchi: An analysis of dentigerous cysts developed around a mandibular third molar by panoramic radiographs. *Dent J* 2019, 7, 13
3. Vaishnavi Devi Majeti, Damera Srikanth, Aditya Mohan, Sudheer MSV: Bilateral dentigerous cyst of mandible – A rare entity, case report and review

of literature: *Int J Res IJRSR* Vol 8, Issue 9, pp.19878-19881, sept 2017.

4. Shoeb Kasim Jendi, Sameer Shaikh: The tooth crossing the confinement of mandible: A unique expression of central variety of dentigerous cyst. *Ind J Otolary Head Neck Surg*
5. Merryn Shear and Paul M. Speight textbook of cysts of oral and maxillofacial region, 4th edition.
6. Ugur Kocer MD, H Mete Aksoy MD, Yigit O Tiftikcioglu MD, Dilek Ertoy MD, Onder Karaaslan MD: Giant dentigerous cyst occu[ying the right hemimandible. *Can J Plast Surg* Vol 10 No 4 July/August 2002
7. Manzoor Dar, Tajamul Hakim, Ajaz Shah, Latief Najar, Gowhar Yaqoob, Faiqah Lanker: Use of autologous platelet rich fibrin in osseous regeneration after cystic enucleation: a clinical study . *J Oral Biol Craniofac Res*. 2016 Nov; 6 (Suppl 1):S29 – S32
8. Zerrin E, Husniye DK, Peruze C (2014) Dentigerous cysts of the jaws: clinical and radiological findings of 18 cases. *J Maxillofac Radiol* 2(3): 77-81
9. Nesligul Niyaz Kokdere, Timucin Baykul and Yavuz Findik: The use of platelet rich fibrin (PRF) and PRF – mixed particulated autogenous bone graft in the treatment of bone defects: An experimental and histomorphometric study. *Dent Res J (Isfahan)*. 2015 Sep-Oct; 12(5): 418-424.
10. Mohammed E. Elsalanty, David G. Genecov: Bone grafts in Craniofacial surgery: *Cranio maxillofac Trauma Reconstr*. 2009 Oct; 2(3): 125-134