

Case Report

Open Access, Volume 2

Efficacy of platelet rich fibrin (PRF) in bone regeneration of dentigerous cystic lesion: A case report

***Corresponding Author: Abdulwahab Ismail Al-kholani**

Conservative Department, Faculty of Dentistry, Sana'a University Yemen.

Email: prof_kholani@yahoo.com

Received: Dec 13, 2021

Accepted: Jan 18, 2022

Published: Jan 25, 2022

Archived: www.jclinmedimages.org

Copyright: © Al-kholani AI (2022).

Abstract

The purpose of this case report is to illustrate clinically and radiographically the effectiveness of advanced Platelet-Rich Fibrin (PRF) inserted into the bone defect resulting from a periapical cyst enucleation. Periapical or radicular cysts are the most common inflammatory cysts of the jaw. The surgical intervention aims to remove periapical pathology to obtain bone regeneration and healing of periapical tissues. Improving the regeneration of the human body by using the patient's own blood, just like it is done during a routine blood test. It is then separated using a centrifuge [2,8]. The healing period of the cystic cavity is from 6 months to 1 year, but when the cystic cavity is filled with (PRF), the healing time is accelerated and decreasing to the half of the period. A dentigerous cyst is the most common developmental odontogenic cyst. It is a benign and asymptomatic intraosseous lesion that affects the bones of the maxillofacial complex, interfering with tooth eruption [3]. Spontaneous eruption of lower left first premolar was taken place after marsupialization of an infected dentigerous cyst and extraction of the deciduous teeth.

Keywords: Platelet-Rich Fibrin (PRF); dentigerous cysts; mineralization; marsupialization; regeneration.

Introduction

A dentigerous cyst encloses the crown of an unerupted tooth, attaching to the neck of the tooth, and grows by expansion of its follicle. It is classified as a developmental cyst by the World Health Organization [4]. Dentigerous cysts usually form in response to pulpal death and subsequent tissue necrosis, the dentigerous cyst develops around the crown of unerupted teeth apparently in the absence of an inflammatory stimulus. Dentigerous cysts are usually discovered when radiographs are taken to investigate a failure of tooth eruption and malaligned or missing tooth [1].

Platelet rich fibrin contains platelets and growth factors in the form of fibrin membranes prepared from the patient's own blood free of any anticoagulant or other artificial biochemical modifications [1,2]. Autologous PRF is said to have healing capabilities as a biomaterial and presently studies have been conducted which show its application in various disciplines of dentistry and oral and maxillofacial surgery [2]. In the present report, the relationship between dentigerous cysts of permanent successor teeth and periapical lesions of the associated deciduous teeth during the transitional dentition was examined radiographically.

Enucleation and marsupialization are the best options to treat a dentigerous cyst [5,6]. The first is the process in which the cyst is completely removed without rupture; this is generally indicated for small cysts. For large lesions, this procedure can cause fracture of the mandible, tooth devitalization, or removal of impacted teeth associated with the lesions that do not need to be removed.

Case report

A 14-year-old female patient visited our Dental Center in April 2021 for the purpose of orthodontic treatment and she was not aware of the presence of a cystic lesion on the lower left side of the mandible. After clinical and radiographical examination it was found that unerupted mandibular left permanent first premolar associated with an infected dentigerous cyst that was treated with marsupialization followed by placement of Platelets Rich Fibrin (RPF). We performed the marsupialization technique accounting for the possibility of physiologic eruption of the permanent tooth related to the cyst without orthodontic follow-up or any other treatment.

The CT scan radiograph from her first visit showed a large cyst with a radiolucent area involving the mandibular left first premolar, permanent canine and deciduous first molar, which exhibited prolonged retention and irregular resorption of its roots (Figure 1). On the basis of clinical, radiological and cytological investigations Dentigerous Cyst was diagnosed.

The presence of inflammatory cellular infiltration in the epithelial lining and subepithelial connective tissue was observed. This case showed that the periapical inflammation had spread to involve the follicle at the left lower second premolar.

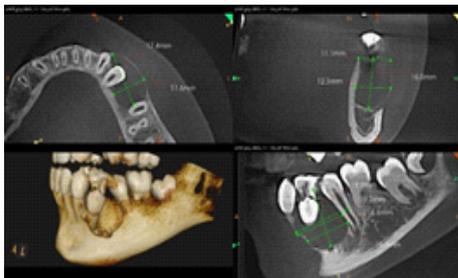


Figure 1: A CBCT preoperative radiograph showed a large cyst with a radiolucent area involving the mandibular left first premolar, permanent canine and deciduous first molar, which exhibited prolonged retention and irregular resorption of its roots.

On the basis of above diagnosis further treatment was planned. Written consent was taken from the patient parent and was informed about the procedure to be carried out.

After the extraction of deciduous tooth, the patient was planned to go ahead with marsupialization. Under proper aseptic conditions and optimal anesthesia incision were placed. Once the incision was placed a full thickness mucoperiosteal flap was elevated. The moment the flap was elevated cystic fluid started to ooze out and after a little bit of elevation the cyst was observed.

The cystic lining of the lesion was removed fully. The diseased bone was also removed using bone rongeur and round bur.

Concerning the preparation of Platelet-Rich Fibrin (PRF) we follow Vidhale procedure (Vidhale et al, 2015). Nearly 5 ml of whole venous blood was collected in two sterile vacutainer tubes of 6 ml capacity without anticoagulant. The vacutainer tubes were then placed in a centrifugal machine at a speed of 3000 revolutions per minute (rpm) for 10 minutes [6]. After centrifugation collected blood settled into the following layers: red lower fraction containing red blood cells, upper straw colored cellular plasma and the middle fraction containing the fibrin clot as shown in (Figure 2). The upper straw colored layer was removed and middle fraction was collected, 2 mm below lower dividing line, known as PRF. Mechanism of formation: fibrinogen reacts with circulating thrombin to form fibrin between red corpuscles at the bottom and acellular plasma at top [6]. Platelets were trapped avidly in the fibrin meshes. PRF was placed in defect followed by suturing (Figure 3). On patient's evaluation after 4 months, OPG showed increased radiopacity as compare to earlier radiograph and good amount of regeneration, repair at the site of cystic cavity was also appreciated which could be subjected to the use of PRF graft (Figure 4).

The clinical and radiographic evidence after 8 months showed that the lower left first premolar had successfully erupted without orthodontic intervention or any other treatment (Figures 4 and 5).

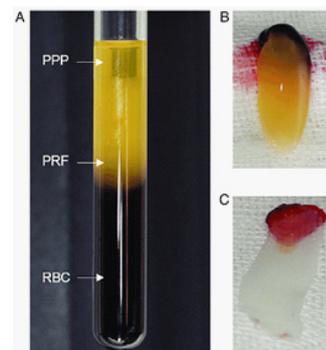


Figure 2: The production of PRF exudate. (A) Following centrifugation, the blood samples formed three layers. The upper layer contained PPP, the bottom layer was comprised of RBCs and the middle layer was the PRF clot. (B) The PRF clot was separated from the upper part of the RBC layer. (C) The PRF clot was squeezed between two sterile gauzes to form a PRF membrane. Courtesy of (Li X et al, 2018).



Figure 3: A PRF was placed in cystic cavity followed by suturing.

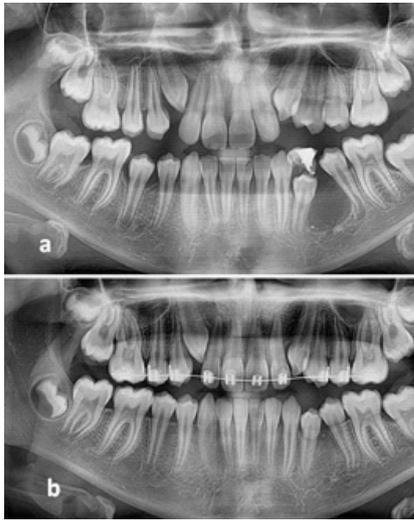


Figure 4: Preoperative radiograph (a) and post operative (b) revealed a good amount of regeneration, repair at the site of cystic cavity.



Figure 5: Postoperative photograph 8 months later showing the lower left first premolar after spontaneous eruption.

Discussion

It was suggested that radicular cysts arise from the epithelial remnants in the periodontal ligament as a result of inflammation [9]. Many radicular cysts are asymptomatic and are discovered when periapical radiographs are taken [10]. Dentigerous cysts are characterized by a well-defined unilocular radiolucency in the pericoronal area of an unerupted permanent tooth and cortical margins are continuous with the follicle at the cemento-enamel junction of the permanent tooth [11].

The infection of the cyst probably originated in the first deciduous molar, which showed radiopaque filling material in the crown.

After the surgical intervention, healing usually occurs by repair or regeneration [2]. Regenerative surgery using barrier membrane and graft material aid in the formation of new tissues and functional reconstruction [12].

The present case reported the clinical efficacy of platelet rich fibrin (PRF) in the treatment of periapical bony defect [2]. The main component of PRF are the growth factors which are very essential for wound healing. PRF contains platelet derived growth factor (PDGF), TGFβ1 and β2, insulin like growth factor (IGF), epidermal growth factor (EGF), vascular EGF, and fibroblast growth factors which play a major role in bone metabolism and regulates cell proliferation. PDGF activates collagenase which improves the strength of healed tissue. TGFβ activates fibroblasts to form procollagen and it deposits collagen. PRF fastens healing by controlling the local inflammatory response [13].

Declarations

Patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be reported in the journal. The patients understand that her name and initial will not be published.

Conflict of interest: No potential conflict of interest is relevant to this article, all authors declare that no financial and personal relationships with other people or organizations could inappropriately influence (bias) their work.

Acknowledgement: I thank all the participants in the work and the patient.

References

- White SC, Pharoah MJ. Oral radiology, principles and interpretation. 6th ed. St. Louis (Mo): Mosby; 2009: 347.
- Gupta V, Bains BK, Singh GP, Mathur A, Bains R (2011) Regenerative potential of platelet rich fibrin in dentistry: Literature review. *Asian J Oral Health Allied Sci* 1: 22-28.
- Shear M, Speight PM. Cysts of the oral and maxillofacial regions. Blackwell Publishing. 2007: 59-76.
- Kramer LR, Pindborg JJ, Shear M. International histological classification of tumors. Histological typing of odontogenic tumors (2nd edn). Geneva, Switzerland: World Health Organization. 1992: 34-36.
- Ertas U, Yavuz MS. Interesting eruption of teeth associated with a large dentigerous cyst in mandible by only marsupialization. *J Oral Maxillofac Surg*. 2003; 61: 728-30.
- Archetti C, Bonetti GA, Pieri F, Checchi L. Orthodontic extraction: conservative treatment of impacted mandibular third molar associated with a dentigerous cyst. A case report. *Quintessence Int* 2004; 35: 371-4.
- Vidhale G, Jain D, Jain S, Godhane AV, Pawar GR. Management of Radicular Cyst Using Platelet-Rich Fibrin & Iliac Bone Graft - A Case Report. *J Clin Diagn Res*. 2015; 9(6): ZD34-ZD36.
- Li X, Yang H, Zhang Z, Yan Z, Lv H, Zhang Y and Wu B: Platelet rich fibrin exudate promotes the proliferation and osteogenic differentiation of human periodontal ligament cells in vitro. *Mol Med Rep* 18: 2018: 4477-4485.
- Ramakrishna Y, Verma D. Radicular cyst associated with a deciduous molar: A case report with unusual clinical presentation. *J Indian Soc Pedod Prev Dent*. 2006; 24(3): 158-60.
- Chiu WK, Sham AS, Hung JN. Spontaneous alignment of permanent successors after enucleation of odontogenic cysts associated with primary teeth. *Br J Oral Maxillofac Surg*. 2008; 46(1): 42-5.
- Neville B, Damm D, Allen C, Bouquet J. Oral and Maxillofacial Pathology. 3rd ed. Elsevier; 2008. Chapter 3.
- Shivashankar VY, Johns DA, Vidyath S, et al. Combination of platelet rich fibrin, hydroxyapatite and PRF membrane in the management of large inflammatory periapical lesion. *J Conserv Dent*. 2013; 16(3): 261-4.
- Prasanthi NNVD, Chittem J, Simpsy GS, et al. Surgical management of a large inflammatory periapical lesion with platelet-rich fibrin. *J Interdiscip Dent*. 2017; 7(2): 76-9.