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Management of surgical biopsy site using Platelet-Rich Fibrin (PRF) membrane: A case series

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Abstract

In 2000, platelet-rich fibrin (PRF), the second generation of autologous platelet concentrates gained popularity for various applications in the medical and the dental fields, owing to its potentiality of better wound healing, epithelisation and regenerative property.

In this paper, we report 2 cases of oral lesions which were indicated for biopsy. An excisional biopsy was performed to confirm the provisional diagnosis. However, healing from this type of oral biopsy can take several weeks due to the amount of tissue removed to prevent potentially adverse events following exposure of the bone surface, the biopsy site was managed with the use of PRF membrane. The clinical findings, histologic features and surgical management of the above cases are presented.

Keywords: Excisional biopsy, PRF Membrane, nevus, hyperkeratosis.

Introduction

Oral mucosal lesions have varying presentations and their diagnosis can range from benign hyperkeratosis to malignancies [1]. A few of these lesions are also seen involving the gingiva which may be due to local or systemic factors.

Various diagnostic surgical procedures can be employed for procuring adequate representative tissues for histopathologic examination in order to confirm the clinical diagnosis and propose the required treatment plan in oral lesions [2]. The conventional approach for this is the surgical biopsy technique performed with scalpel which has its advantages such as cost-effectiveness, low technique-sensitivity and controlled approach. However the main disadvantage is that the defect created by it heals by secondary intention resulting in patient discomfort post-operatively [3].

PRF is a second generation platelet concentrate which has no anti-coagulant agents and has exhibited excellent anti-bacterial, anti-inflammatory, and regenerative potentials [4]. The fibrin clot formed after centrifugation of patient's blood, has a fibrin network which has the ability to release different types of growth factors which can also serve as an ideal medium for adhesion, migration, proliferation, and differentiation of various cells [4].

It has been utilized to enhance epithelization, keratinization and wound healing in various surgical procedures in the medical and the dental fields [4]. It is also not known to produce the undesirable "patch effect", as the tissue colour and consistency are more natural [5].

Owing to the spectrum of properties of PRF including better wound healing, this paper focuses on two cases of excisional biopsies in which PRF membrane is used in the management of biopsy site.

Case Report 1

A 50-year-old female patient reported to the outpatient department, with a chief complaint of decay of upper right front tooth, associated with food lodgement for the last 2 months and medical history revealed that patient was hypertensive since 15 years. During the intraoral examination, a pigmented brownish-black lesion in relation to the mandibular canine, over the attached gingiva was noted measuring approximately 4x4mm [Figure 1(A)]. Lesion was plaque-like, slightly raised, firm, well circumscribed, had a smooth surface, non-tender, non-fluctuant, non-pulsatile & non-compressible and not associated with pain or discomfort.

Radiographic examination showed no horizontal or vertical bone loss in the region.

Based on these findings, provisional diagnosis was given:

- Melanotic papule.
- Nevus.

Following haematological investigation, conventional surgical procedure by scalpel method was chosen for the excision of the lesion.

Upon administration of local anaesthesia with 2% lidocaine, a full thickness tissue biopsy, including 2mm of the peripheral normal tissue, exposing the bony alveolar surface was obtained, in order to achieve adequate thickness of the tissue and to evaluate the surface of exposed alveolar bone for any involvement [Figure 1(D-E)].

Surgical site was then covered with a periodontal dressing and histopathologic evaluation was performed on the tissue obtained [Figure 1(F)].

Microscopic examination of the haematoxylin and eosin stained soft tissue specimen showed overlying stratified squamous epithelium with areas of hyperplasia and atrophy with increase in number of melanocytes. The lamina propria showed proliferation of the nests of nevus cells showing spindle shape, lymphocytic and epithelioid morphology, some of which appeared pigmented [Figure 3].

The clinical and histopathological features confirmed the diagnosis of an Intramucosal Nevus.

The biopsy site however showed healing at the edges of the wound, but with alveolar bone exposed in the centre until 3 weeks post excisional biopsy [Figure 2(A)]. Hence in a second surgical procedure, PRF was prepared from 5ml of patient's blood, that was withdrawn from the antecubital vein, by centrifuging at 2700 rpm for 12minutes [Figure 2(B)]. The clot was then squeezed between sterile gauze, and the PRF membrane obtained [Figure 2(C)], was placed onto the exposed bone surface and sutured using 3-0 non-resorb able sutures [Figure 2(D)]. A tin foil was adapted [Figure 2(E)] and then covered with a periodontal dressing [Figure 2(F)].

Following this, in two weeks, the surgical site had healed uneventfully [Figure 6(A)]. However, the patient was lost to follow up subsequently.

Case Report 2

A 48-year-old male reported to the outpatient department, with a chief complaint of pain in relation to the upper right front tooth.

During the intraoral examination, generalised diffuse greyish white homogenous plaque-like, keratotic, non-scrapable, non-tender lesion was noted in the maxillary and the mandibular arch [Figure 4(A)]. Based on the clinical diagnosis of homogenous leukoplakia, patient was started on topical 1% Clotrimazole application over the affected area and vitamin A supplements. The patient was followed up for 4 months during which resolution of the lesion in all the sites except in relation to the right mandibular premolar region was seen involving the marginal and attached gingiva and measuring approximately 3x4mm in size.

Following haematological investigation and upon administration of local anaesthesia, a full thickness tissue biopsy, including 2mm of the peripheral normal tissue was obtained [Figure 4(C)]. This involved the marginal gingiva in relation to 45 and to prevent any further gingival recession which may have resulted from gingival shrinkage, a PRF membrane was sutured at the surgical site with 3-0 non-

resorbable sutures [Figure 4(F)]. This was then covered with tin foil, followed by placement of periodontal dressing [Figure 4(G)]. Patient was followed up for 2 weeks which showed satisfactory healing [Figure 6(B)].

Microscopic examination showed stratified squamous epithelium which was hyperplastic, hyper keratinized and focal ortho-keratinized. The underlying connective tissue stroma was moderately cellular with fibroblasts and collagen fiber bundles, dilated blood capillaries and a mild chronic inflammatory infiltrate chiefly lymphocytic.

The clinical and histopathological features were suggestive of the diagnosis of Epithelial hyperplasia with hyperkeratosis.

An 8 month follow up was done and no recurrence of the lesion was noted [Figure 7].

Discussion

Definitive histopathologic diagnosis is required for confirming clinical diagnosis of various oral lesions which maybe neoplastic, reactive, or a mucosal manifestation of more widespread mucocutaneous disease; and for the institution of appropriate treatment which is based on the specific characteristics of the disease and its underlying pathophysiology [2].

Surgical biopsy technique can be classified as, incisional and excisional biopsies. It may be considered as a double-edged sword with advantages such as precision, low cost, and favourable healing, along with disadvantages such as haemorrhage, post procedure discomfort and pain [3].

Another disadvantage of surgical biopsies is that the defect created at the site of biopsy heals by secondary intention and the absence of sutures encourages the formation of granulation tissue followed by scar formation with greater possibilities of secondary complications like superadded infections [3].

The original concept leading towards the preparation of platelet concentrates was that concentrated platelets and autologous growth factors are responsible for initiating wound healing and enhancing cell adhesion, proliferation, and migration of various cell types [6].

Limitations during preparation, handling and lower growth factor profile of PRP (platelet-rich plasma) has led to the emergence of a second-generation platelet concentrate termed PRF (platelet-rich fibrin) which has gained popularity recently [6].

PRF was developed in the year 2001, by Choukroun *et al.* as an improved formulation of the previously utilized PRP [6]. PRF has further been modified over the past few years and has been widely used in various dental procedures.

Standard PRF or L-PRF is obtained simply by centrifugation at 2700rpm for 12minutes without anticoagulants with 5-10ml of blood obtained from the antecubital vein and is therefore strictly autologous [6].

The PRF clot formed after centrifugation, predominantly consists of a fibrin matrix which is rich in platelet and leukocyte cytokines such as IL-1 β , -4, and -6, and growth factors such as TGF- β 1, PDGF-AB, and VEGF [7].

PRF also acts as a scaffold to deliver cells important for regeneration along with constant release of growth factors that allows accelerated wound healing.

Owing to the wound healing and regenerative properties of PRF, it has been used as a palatal bandage following harvesting of subepithelial connective tissue graft, in gingival recession defects, intrabony defects, furcation defects, and for epithelialization following depigmentation procedure [8]. It also produces the same tissue colour and consistency as that

of the adjacent tissue [5].

Hence, coverage of exposed connective tissue or alveolar bone post biopsy can minimize the likelihood of postoperative bleeding and facilitate healing by preventing surface trauma [9]. To assess this, in the first case of intramucosal nevus, PRF membrane was used to cover and protect the exposed alveolar bone from trauma since even after 2 weeks, the healing by secondary intention had led to incomplete coverage of exposed bone that is, only at the edges of the wound.

Similarly in the second case, since the lesion involved marginal and attached gingiva, excisional biopsy involving the normal peripheral tissue, led to recession in relation to 45.

Hence to prevent further recession occurring from shrinkage of gingiva and to allow recession coverage, PRF membrane was used.

Successful outcome was obtained in both the cases, in terms of better wound healing and gingival recession coverage. These results were analogous with the outcome of Debnath *et al.*, 2018 who made an effort to treat the recurrence of Pyogenic Granuloma with the use of PRF membrane, which was placed onto the exposed bone surface and stabilized with sutures [8]. The case of Epithelial hyperplasia with hyperkeratosis was followed up for 8 months and no recurrence of the lesion was noted.

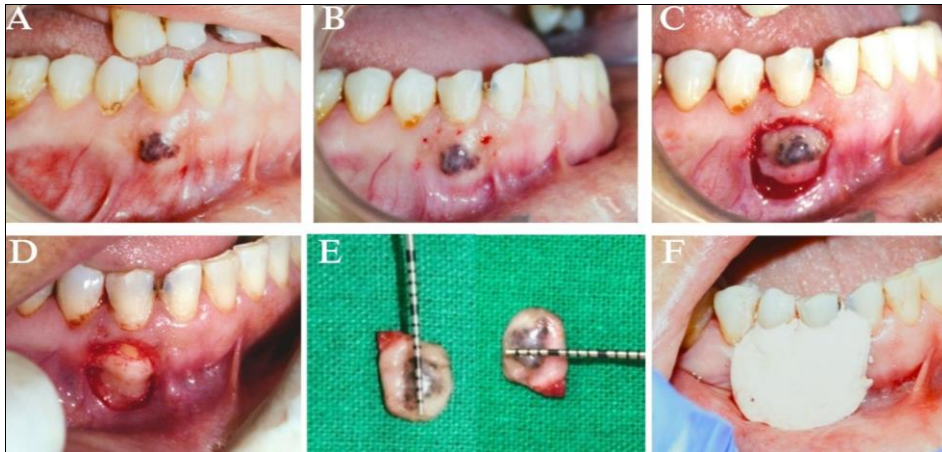


Fig 1: Excisional biopsy performed in relation to right mandibular canine region

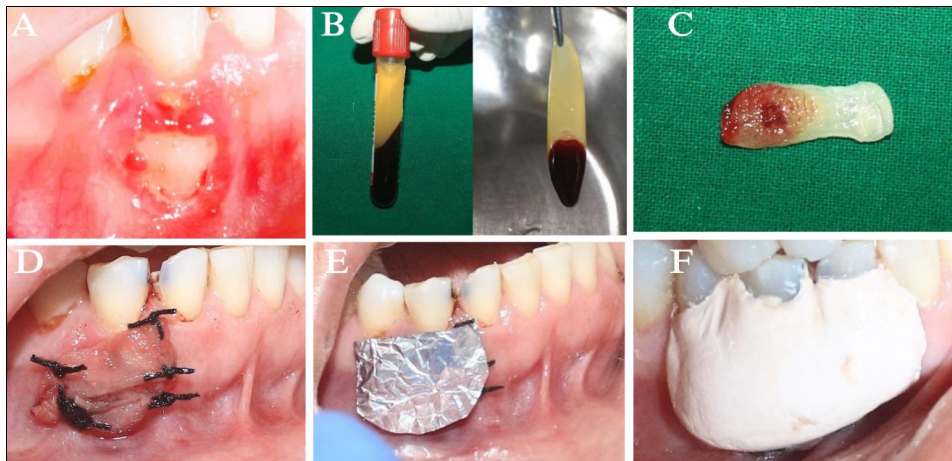


Fig 2: Unsatisfactory healing after 3 weeks was followed by suturing of PRF membrane at the biopsy site

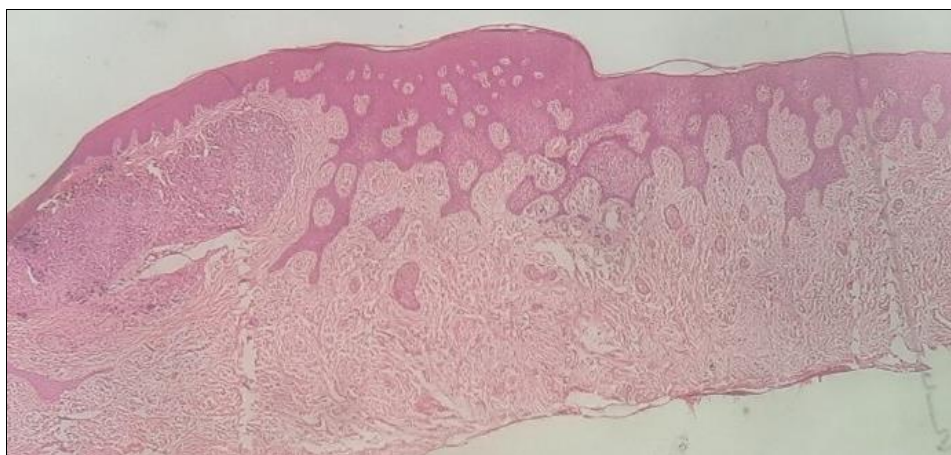


Fig 3: Histopathological section

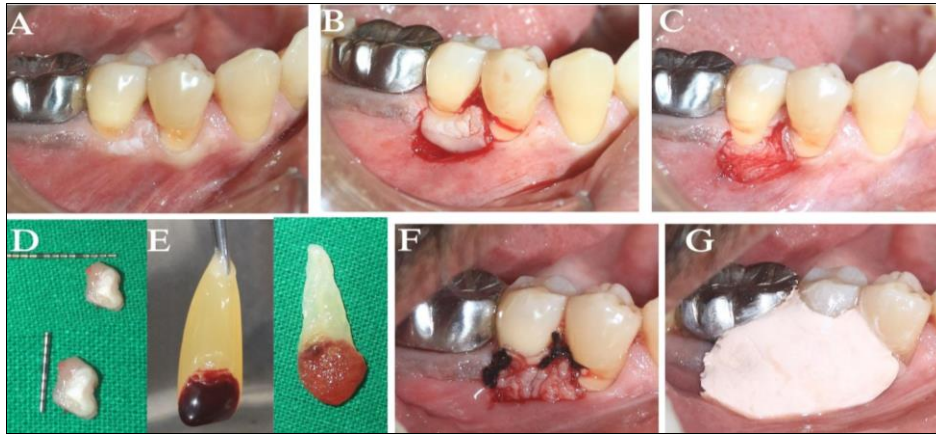


Fig 4: Excisional biopsy performed in relation to right mandibular premolar region, followed by suturing of PRF membrane at the site of biopsy

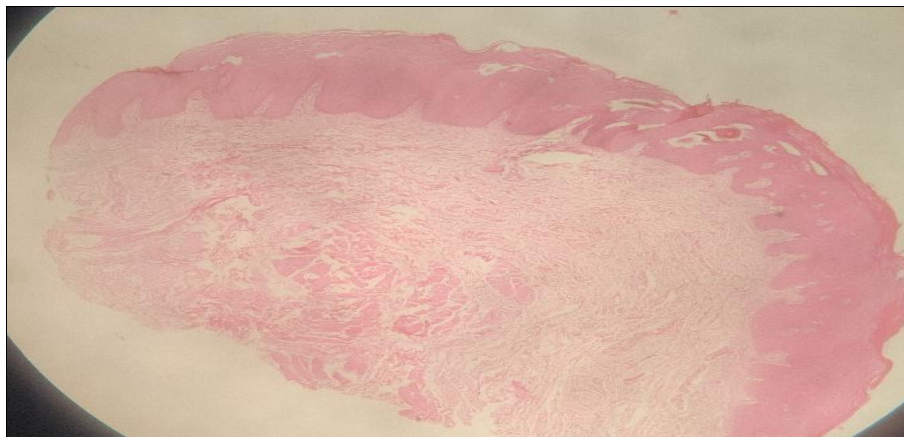


Fig 5: Histopathological section



Fig 6: Two weeks follow up of case1(A) and case 2(B)



Fig 7: Eight month follow up of case 2(A)

Conclusion

Knowledge regarding diagnosis and treatment of oral lesions can help dental professionals in timely and accurate management of these lesions. Biopsies are advisable to confirm the diagnosis of lesions through histopathologic examination. PRF membranes have proven to have regenerative potential and therefore can be used successfully to manage the biopsy site in order to prevent post-operative complications.

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Consent for Publication

The authors certify that they have obtained written informed consent from the patient before starting the treatment. In the consent form, the patient was informed about the disease condition and the treatment options available. The patient provided written consent to publish the case report. The patient understood that due efforts will be made to conceal her identity and that her name will not be published. Institutional approval was not required to publish the case details.

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Disclosure

The authors declare that they have no competing interests.

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