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Case Study

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INTERDISCIPLINARY MANAGEMENT OF PERIAPICAL PERIODONTITIS: CASE REPORTS

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BACKGROUND

The aim of these case reports was to evaluate the effect of different flap designs used in periapical surgery. Apicoectomy involves surgical management of a tooth with a periapical lesion, which cannot be resolved by routine endodontic treatment. Objective of apical surgery is to prevent leakage of bacteria and their byproducts from the root canal system into peri-radicular tissue. In the present case reports 3 different flap designs were used, the first case was done by using Luebke–Ochsenbein flap (submarginal scalloped rectangular), second case was done by using papilla base incision with trapezoidal flap, third case was done by using intrasulcular incision with trapezoidal flap. Postoperative healing was evaluated clinically, taking into consideration the swelling, soft tissue changes, recession of marginal gingiva, scarring, and closure of the wound site. Follow up was taken at 1st week and 8th week postoperatively.

KEYWORDS: Periapical surgery, flap design, apicoectomy.

INTRODUCTION

Apicoectomy is the surgical resection of a root and its removal of the apex together with the pathological periapical tissues. Accessory root canals and additional apical foramina are also removed in this way, which may occur in the periapical area and which may be considered responsible for failure of an endodontic therapy.

The ultimate goal in surgical endodontics is the eradication of periapical pathosis using properly designed flaps for the purpose of preserving the periodontal condition of the surrounding area following surgery.[1] During apicoectomy incisions, flap reflection and cortical bone removal is performed and during the procedure the anatomic structure and soft tissue architecture and phenotype must be considered.

While many flap designs have been suggested over the years, some have become obsolete and new techniques have emerged. It is critical that incisions and tissue elevations and reflections are performed in a way that facilitates healing by primary intention. This can be obtained by complete and sharp incision avoiding severing or traumatizing the tissues during elevation; it is equally important to prevent drying of tissue remnants on the root surface and drying of the flap during the procedure.[2]

The objective of peri-apical surgery is to surgically maintain a tooth or teeth, having an endodontic lesion which cannot be resolved by conventional endodontic (re-) treatment.[3] This goal should be achieved by root-end resection, root-end cavity preparation, and a bacteria-tight closure of the root-canal system at the cut root end with a retrograde filling. In addition, the periapical pathological tissue should be completely debrided by curettage in order to remove any extra radicular infection, foreign body material, or cystic tissue. This surgery has greatly benefited from continuing development and introduction of new diagnostic tools, surgical instruments and materials, making this method of tooth maintenance more predictable. Success rates approaching 90% or above have been documented in several clinical studies.[4]

Case selection and planning with good visual and manipulative access is a prerequisite for the successful apicectomy. Selecting the most appropriate flap design and knowing the advantages and disadvantages of each type, coupled with proper reflection and retraction is the key step for improved post–operative healing and reduces the complications occurring during and following surgery.[5]

Two major categories of peri radicular surgical flaps are:[6]

I. Full mucoperiosteal flaps including
- Triangular
- Rectangular
- Trapezoidal
- Horizontal (envelope) flap.

II. Limited mucoperiosteal flaps:
- Semilunar
- Submarginal (triangular or rectangular) Luebke Ochsenbein flaps.

Case 1: Luebke–Ochsenbein rectangular flap.

In the present case report 3 cases of apicectomy procedures done using three different flaps i.e. Luebke Ochsenbein flaps, Papilla base incision with trapezoidal flap, intrasulcular trapezoidal flap. Postoperative healing was evaluated clinically, taking into consideration the swelling, soft tissue changes, recession of marginal gingiva, scarring, and closure of the wound site. Follow up was taken at 1st week and 8th week postoperatively.

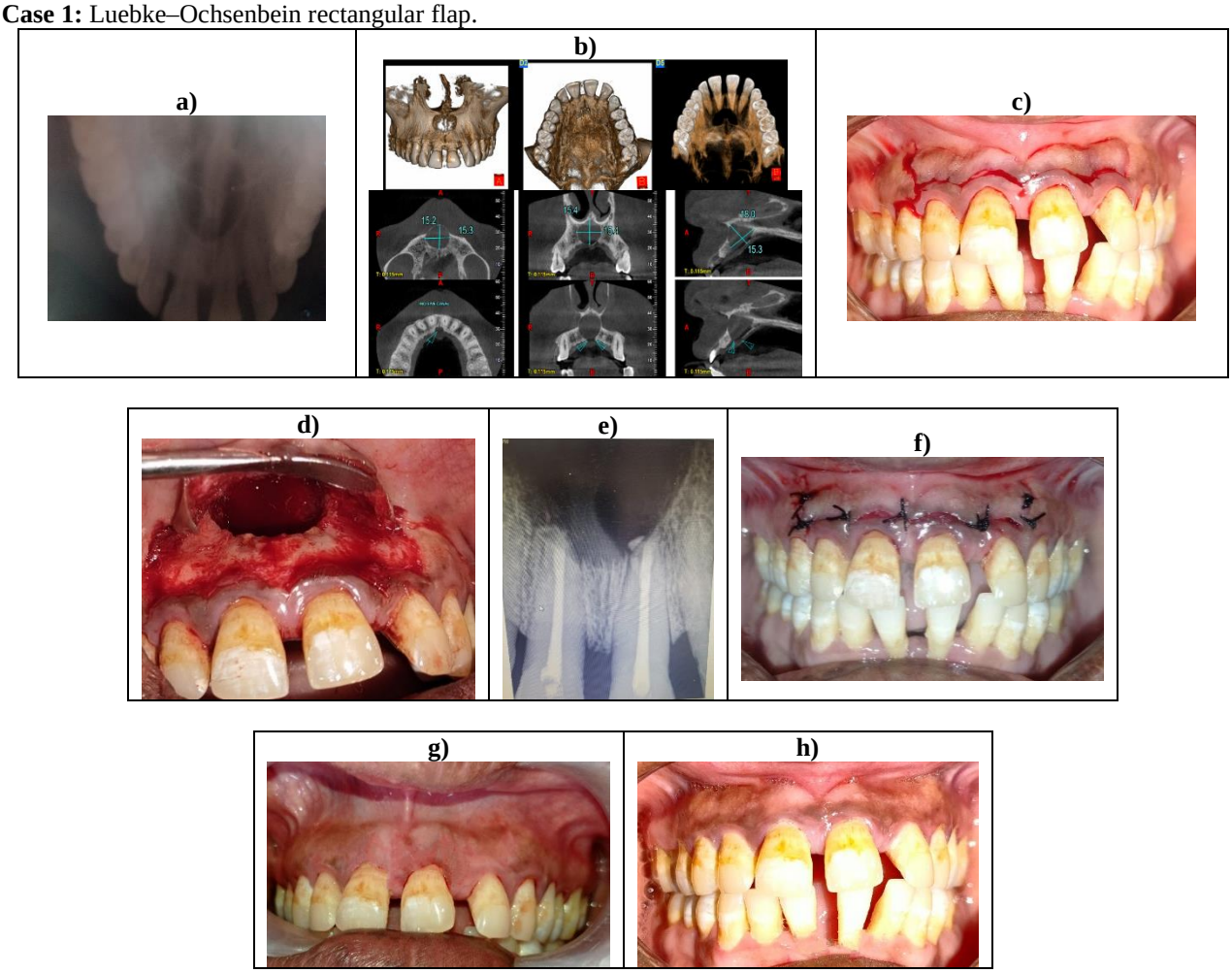

Figure 1
An apicoectomy case treated with Luebke–Ochsenbein rectangular flap in 32 year old male patient. a) preoperative occlusal radiograph showing the well defined radiolucency associated with a large periapical pathology. b) Pre Operative CBCT (Cone Beam Computed Tomography) findings were a single well defined radiolucency noted with anterior maxilla measuring approximately 15.4 mm x 15.3 mm x 18 mm, Expansion and thinning of labial and palatal cortical plate noted, Perforation of palatal cortical plate noted, Thinning of floor of nasal fossa noted, Lesion noted to cross the midline and in close proximity to the peri-apical area of 11, and 21, Cystic lesion noted with anterior maxilla. c) A submarginal scalloped incision was marked and made with two anterior vertical releasing incision preserving the interdental papilla between 11,12,21 and 22 to expose the lesion site. d) Luebke–Ochsenbein rectangular flap was reflected and Buccal cortical bone plate was exposed. The cystic lining was identified and removed, curettage & resection of root end done. e) Retrograde filling done using MTA(Mineral Trioxide Aggregate). f) Flap reapproximated using simple interrupted suture technique. g) Follow up after 1 week post operatively. h) Follow up after 8 week post operatively.

Case 2: Papilla base incision with trapezoidal flap.

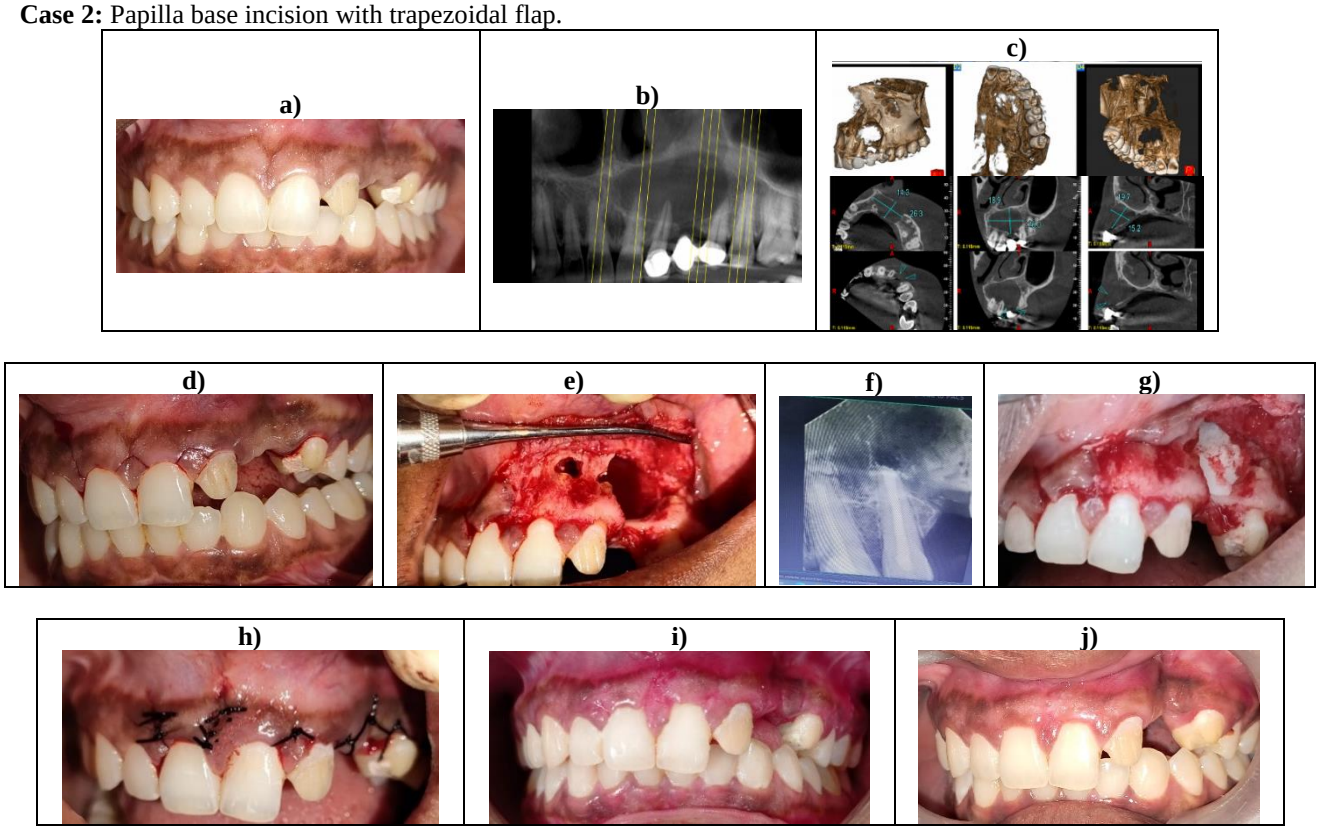

Figure 2
An apicoectomy case treated with Papilla base incision & trapezoidal flap in 30 year old female patient. a)Pre Operative Clinical View b) Pre Operative Intraoral periapical radiograph revealed well defined radiolucency associated with a large periapical pathology. c) Preoperative CBCT (Cone Beam Computed Tomography) findings were, A well defined radiolucency noted in periapical area of anterior maxilla extending from 21 to 24. The lesion measures approximately 26.0 mm x 18.9 mm x 14.3 mm. Partial loss of labial cortical and palatal cortical plate noted. Thinning and partial expansion of labial and palatal cortical plate noted. The lesion noted to just cross the midline and involve the incisive foramen. d) Papilla based Incision along with two vertical releasing incision given e) full thickness elevation of trapezoidal flap f) Retrograde filling done using MTA(Mineral Trioxide Aggregate). g) Cystic lining removed, curettage & resection of root end done, & Ab-gel(absorbable gelatine sponge) was placed in dead space. h) Flap reapproximated using simple interrupted suture technique. i) Follow up after 1 week post operatively. j) Follow up after 8th week post operatively.

Case 3: Intrasulcular incision with trapezoidal flap.

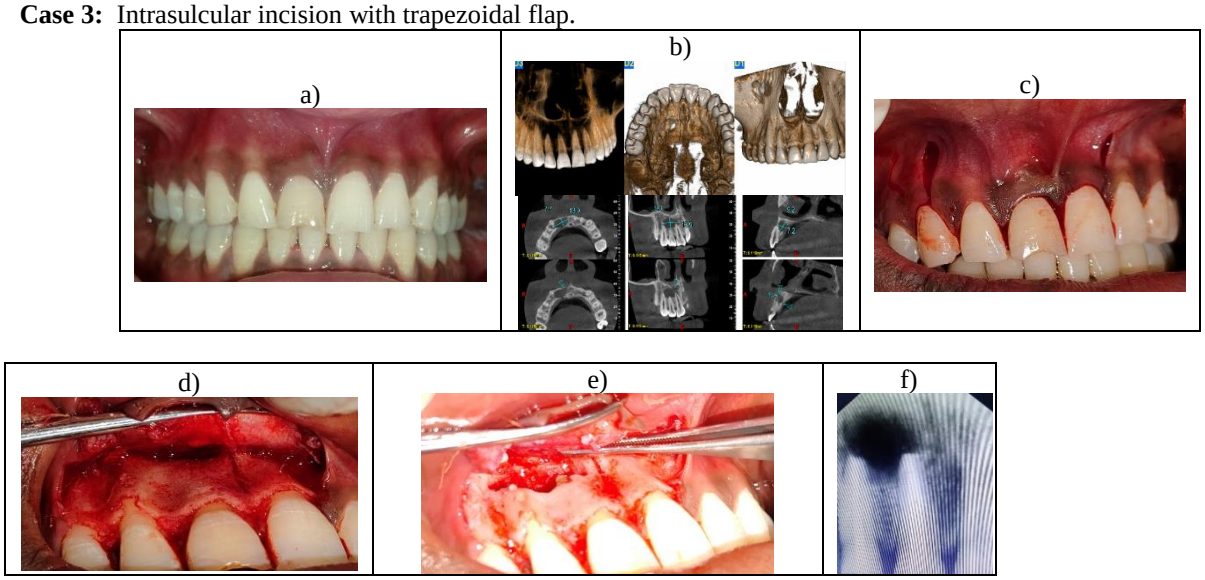

Figure 3
An apicoectomy case treated with Intrasulcular incision & trapezoidal flap in 21 year old male patient. a) Pre Operative clinical view b) Pre Operative CBCT (Cone Beam Computed Tomography) findings were, A single well defined radiolucency noted with periapical area of 11, 12 and 13. The lesion measures approximately 13 mm x 7.7 mm x 9 mm. Thinning, expansion of the labial cortical plate noted. Initiation of perforation with labial and palatal cortical plate noted. The lesion was in close proximity to the incisive canal. Features suggestive of periapical cyst with 11, 12 and 13. c) Intrasulcular incision along with two vertical releasing incision given d) Full thickness trapezoidal flap reflection done e) Cystic lining removed, curettage & resection of root end done. f) Retrograde filling done using MTA (Mineral Trioxide Aggregate). g) Flap reapproximated using simple interrupted & continuous sling suturing (Labial view). h) Palatal view of continuous sling suturing. i) Follow up after 1 week post operatively. j) Follow up after 8th week post operatively.

DISCUSSION

The treatment of soft tissues with adequate surgical techniques and maintenance of a healthy appearance are a challenge in modern esthetic dentistry. The choice of flap designs should allow the maintenance of optimal and sufficient blood supply to all parts of the mobilized and non mobilized portions of the soft tissues.[7]

The effect of any flap design on tissue healing is dependent, first and foremost on the degree of vascular disruption and histological nature of tissues involved by surgery.[8] Anderson and Stern (1996)[9] indicated in their studies that the mitotic activity of oral epithelium was highest in the labial or buccal mucosa and decreased in descending order, in palatal mucosa, sulcular epithelium, junctional epithelium, outer surface of marginal gingiva and was least in the attached gingiva. This remarkable mitotic activity of epithelium in labial or buccal mucosa combined with high cellular content and rapid collagen synthesis play an important role in wound healing by allowing connective tissue regeneration without further insults from oral environment.

The submarginal flap design also referred to as an Ochsenbein–Luebke flap,[10] is similar to the rectangular flap, with the difference that the horizontal incision is placed within the attached gingiva. The two vertical incisions are connected by a scalloped horizontal incision, performed roughly parallel to the marginal contour of the gingiva. The submarginal incision should only be used when there is a broad zone of attached gingiva with a minimum of 2 mm.[11] Leaving a sufficient amount of marginal attached gingiva in place is important to avoid deprivation of blood supply to this un reflected tissue and risk its necrosis. When properly planned and performed, the submarginal flap will leave the marginal gingiva untouched and does not expose restoration margins.[2]

The papilla-base flap was suggested to prevent recession of the papilla. This flap consists of two releasing vertical incisions, connected by the papilla-base incision and intrasulcular incision in the cervical area of the tooth. The papilla-base incision requires two different incisions at the base of the papilla. Although the predictable healing results in the papilla base flap. This technique is challenging to perform.[2]

Gingival recession was more significant in full (intrasulcular) versus limited flaps (submarginal). This may be due to crestal bone loss and post surgical flap dislodgment, while the limited flaps allow for recession free healing.[12,13,14] Intrasulcular flaps results in easy access and reapproximate the flap.

Postoperative results are also influenced by the amount of tissue shrinkage. With prolonged duration of the surgical procedure, there is a risk of drying out of the tissues, especially when a high degree of hemostasis has been achieved. The tissues must be kept moist at all time to help avoid shrinkage and dehydration.[15] This can be particularly problematic in submarginal flap design, resulting in difficult flap re-approximation, with more tension on the tissues. Minimal tension during re approximation and after suturing is important to avoid impairment of the circulation in the wound margins.[16] Shrinkage of the reflected tissue with wound dehiscence will ultimately lead to increased scar formation.

In present case report the Luebke Ochsenbein flap resulted in no gingival margin recession but there was minimal scarring at the attached gingiva. The papilla-base flap resulted in foreseeable postoperative healing as the papilla kept intact with the bone but it was a technique sensitive procedure to perform. The intrasulcular flap was easy to perform gave ease in access and reapproximating the flaps but there was minimal gingival recession seen postoperatively.

CONCLUSION

Apicoectomy is the predictable treatment modality to save a tooth with apical pathology that cannot be managed by non-surgical endodontics. Flap design plays an important role as to how much recession will occur after the surgery. In this article case reports of Luebke–Ochsenbein flap, Papilla based flap showed rapid and recession free healing, In addition short comings of these flap were postoperative color alteration of soft tissues and inflammatory changes & scarring persist for short time in contrast to Intrasulcular flap which showed easy access and ease in approximating the flaps but limitations were the post operative shrinkage of tissue at the margins. To achieve good esthetics, several measures should be considered including accurate preoperative treatment planning in reference to the condition and the quality of the tissue to be manipulated. There should be minimal trauma during incision, elevation, and reflection of a tissue flap.

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