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A Manoeuvre for Ridge Preservation: Root Submergence Technique - A Case Report

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Abstract: *Collapse of the alveolar ridge both vertically and horizontally following the extraction of teeth is a challenging task for a prosthodontist to deal with. The preservation of ridge can be attained by many techniques including Socket Shield, Pontic Shield and Root Submergence technique all of which comes under partial extraction therapy (PET). This case report describes the technique of preserving the alveolar ridge resorption by submerging the natural teeth roots followed by fabrication of complete dentures over the healed ridge.*

Keywords: *Partial extraction therapy, Root submergence, Ridge resorption, Complete denture.*

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I. Introduction

DeVan has rightly quoted that "the perpetual preservation of what remains is most important than the meticulous replacement of what is lost." Alveolar bone resorption has been defined as "a complex multifactorial oral disease governed by physical and physiologic laws.'' Ridge resorption post extraction or tooth loss is well reported in literature. [1] The resorption rate is usually most rapid in the first 6 months following extraction. [2] During the first year after tooth extraction, the reduction of the residual ridge height in midsagittal plane is about 2 to 3 mm for the maxilla, and 4 to 5 mm for the mandible. After healing, the remodeling will continue but with decreased intensity. In the mandible, the annual rate of reduction in height is about 0.1 to 0.2 mm and four times less in the edentulous maxilla [3] however, the average reduction of the residual ridge after tooth loss has been estimated to average 0.5 mm per year according to David M. Casey et al. Therefore, the only known reliable prevention of alveolar bone loss is the prevention of tooth loss. [4] Partial extraction therapy (PET) is a group of interventions that serves in minimizing ridge resorption under preventive prosthodontics. It comprises of root submergence, socket shield, pontic shield and proximal- socket shield. In all the techniques decoronation is done followed by retention of either complete root or a part of root. [5] The root submergence technique or the root banking was introduced in the 1950s in prosthodontics to maintain the alveolar ridge under complete dentures. Howell was the first to report a clinical study of submerged endodontically treated roots in humans in an attempt to preserve alveolar bone under complete dentures. [6]

II. Case report

A 26 year old patient came to the Department of Prosthodontics and Crown & Bridge, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal, for prosthetic rehabilitation of multiple missing teeth. On clinical examination it was found that the patient had multiple retained deciduous teeth in both maxillary and mandibular arches, missing permanent teeth with reduced inter- ridge space and a vertical growth pattern. Patient had a class III profile (figure1). Panoramic radiograph revealed multiple impacted teeth in both maxillary and mandibular arches. Teeth exposed to oral cavity were found to be root canal treated.

Implant treatment was not possible for complete rehabilitation because of the presence of multiple impacted teeth. Since the inter-ridge space was less, it was difficult to place the overdenture in such reduced space. Root submergence surgery followed by fabrication of complete denture was planned over the healed ridge. Root submergence was planned to retain the roots of the root canal treated teeth in both the arches in order to preserve the alveolar bone. Given below is the stepwise procedure for prosthetic rehabilitation of the patient :

1. Teeth with more than 1 mm mobility [7] and the ones that will have excessively reduced root length after submergence were extracted.
2. Patient was kept on follow ups to check for any post endodontic complication for root canal treatments that were performed one month back.
3. Patient was recalled after two months for root submergence surgery. Submergence was carried out in a quadrant wise manner in both the arches.
4. Root submergence of maxillary arch was done first. Local anaesthic agent was administered in the maxillary left quadrant.
5. Full thickness muco-periosteal flap was raised with the help of a sharp periosteal elevator.
6. The palatal flap was secured with the help of 3-0 black braided silk suture for retraction of the flap.
7. Decoronation of the teeth was done with the help of high speed air rotor handpiece to a level of 2 mm below the alveolar crest. [8] All sharp bony or root spicules were smoothened. [9] Flaps were apposed and extra soft tissue was trimmed off before suturing.
8. Similarly the right maxillary quadrant underwent root submergence after suturing the left quadrant (figure 2).
9. Patient was recalled after one week for suture removal.
10. Submergence of roots of mandibular arch was performed in the same manner after 3 weeks from the date of first surgery.
11. Ridge was allowed to heal completely and patient is recalled after 6 weeks (figure 4). [10]
12. Primary impression of maxillary and mandibular arches were made using impression compound (Y-DENTS, MDM CORP.) and diagnostic cast was poured with Type II Dental plaster (Kalabhai Kaldent Plaster, Kalabhai Karson, India) . (Figure 5 & 6)
13. Spacer was adapted over the diagnostic casts and custom trays were fabricated with self cure acrylic resin (DPI RR Cold Cure acrylic repair material).
14. Border moulding was done with low fusing compound (DPI PINNACLE Tracing Sticks) and final impressions were obtained of both the arches with zinc oxide eugenol impression paste (DPI Impression Paste). (Figure 7)
15. Boxing and beading of the impressions was done and master casts were obtained with type III dental stone (Kalstone Dental Gypsum type III, Kalabhai Karson, India).
16. Temporary record base was fabricated with shellac baseplate (Deepti Baseplate) for readptation to get proper retention of the record base and occlusal rims were fabricated with modeling wax (Hindustan Dental Products).
17. Jaw relation was recorded and facebow transfer was done. Definitive centric relation was recorded.(Figure 8 & 9)
18. Teeth arrangement was done and try-in was perfomed. (Figure 10)
19. Wax finished denture flasking was done followed by dewaxing, packing with heat cure acrylic resin (COLTENE Heat Cure Denture Base material ana curing. Final dentures were obtained. Finishing and polishing was done.
20. Insertion of maxillary and mandibular complete denture was done and post- insertion instructions were given to the patient. Regular follow was done to check for the health of the residual ridge, to check for exposure of the submerged roots and to ensure proper function of the prosthesis. (Figure 11 & 12)

III. Discussion

With the advent of root submergence technique for ridge preservation, a more prosthodontically desired treatment is achieved with the preservation of as much alveolar ridge as possible. The rationale for root submergence or PET is that the alveolar bone reduction is progressive and irreversible following the extraction of teeth and if the tooth root can be preserved, it will maintain the alveolar ridge contour by preventing its collapse. In Helsham's clinical survey of 2,000 patients referred for removal of retained roots, 1,676 patients were without symptoms or recognizable pathoses, for more than 50 years in some cases. Findings such as pain and infection were rare, and occurred mostly when the roots were exposed to the oral environment. [11]Benefits of tooth retention have also been clearly outlined by Atwood. [2] Garver and others suggested a sequence for treatment planning in dental rehabilitation revolving around a proper diagnosis. [7] A proper diagnosis, treatment planning, meticulous preservation of hard and soft tissue during the surgical procedure, maintenance of

prosthesis and regular follow ups are some crucial factors that determines the success of the prosthesis and well being of patient's oral tissues.

IV. Conflict of interest

None.

Figure 1(a) : Pre-operative extraoral frontal and profile view

Figure 1(b) :Pre-operative intraoral occlusal view of maxillary and mandibular arches

Figure 1(c): Pre-operative OPG

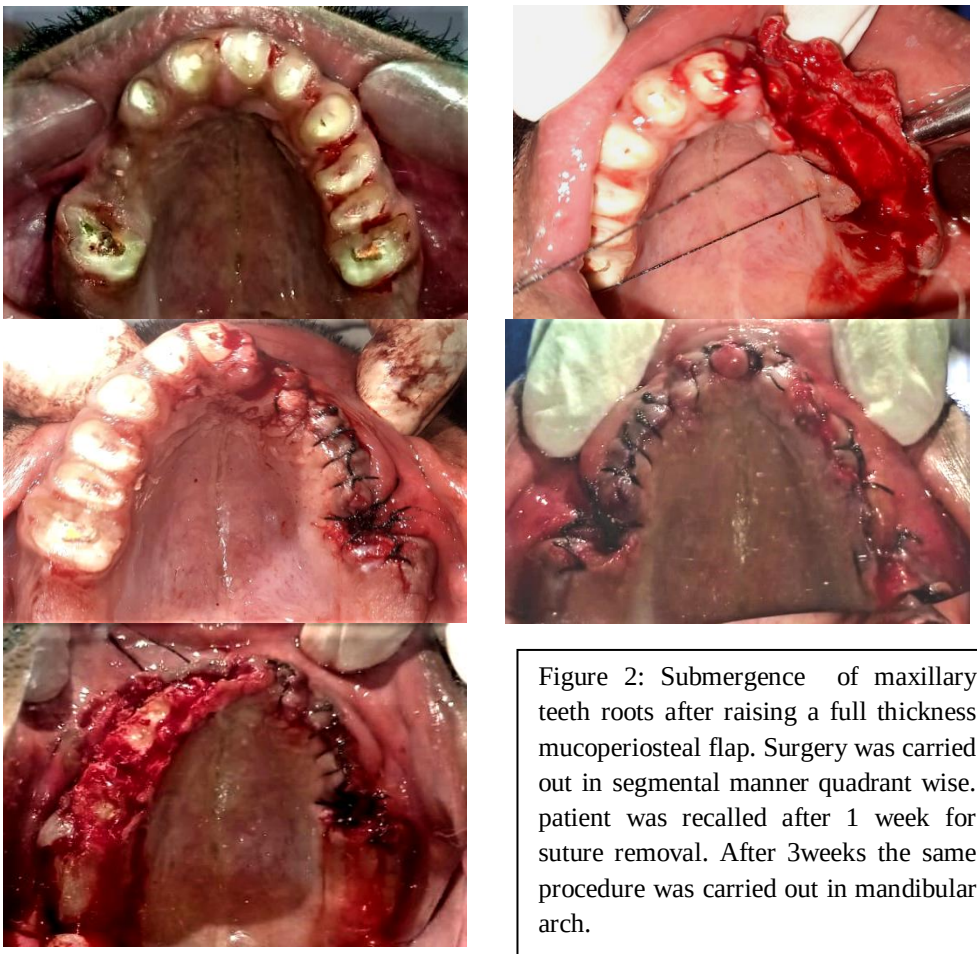

Figure 2: Submergence of maxillary teeth roots after raising a full thickness mucoperiosteal flap. Surgery was carried out in segmental manner quadrant wise. patient was recalled after 1 week for suture removal. After 3weeks the same procedure was carried out in mandibular arch.

Figure 3: Post root submergence OPG

Figure 4(a): Maxillary and mandibular ridges after complete healing post root submergence surgery

Figure 4 (b) : Extraoral view after root submergence

Figure 5: Primary impression of maxillary and mandibular arches

Figure 6:Diagnostic casts

Figure 7: Final impressions made with zinc oxide eugenol impression paste

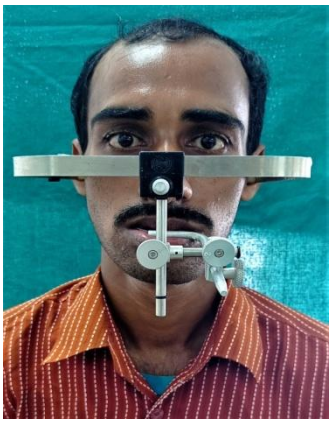

Figure 8: Facebow transfer

Figure 9: Jaw relation recorded

Figure 10: Teeth arrangement

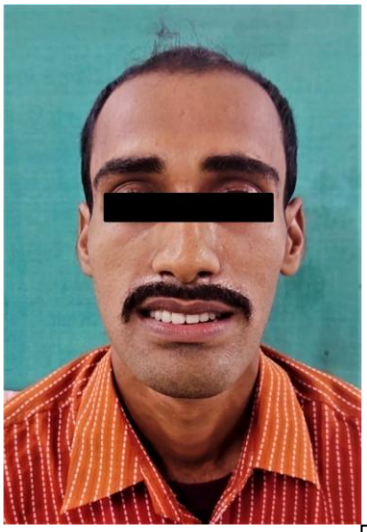

Figure 11: Post operative extraoral frontal and profile view

Figure 12: Post-operative intraoral view

References:

[1]. Hiremath HP, Doshi YS, Kulkarni SS, Purbay SK. Endodontic treatment in submerged roots: a case report. Journal of dental research, dental clinics, dental prospects. 2010;4(2):64.
[2]. Atwood DA. Reduction of residual ridges: a major oral disease entity. Journal of Prosthetic Dentistry. 1971 Sep 1;26(3):266-79.
[3]. Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic treatment for edentulous patients: complete dentures and implant-supported prostheses. Elsevier Health Sciences; 2013 Nov 21.
[4]. Casey DM, Lauciello FR. A review of the submerged-root concept. The Journal of Prosthetic Dentistry. 1980 Feb 1;43(2):128-32.
[5]. Salama M, Du Toit DJ. Partial extraction therapies (PET) part 1: maintaining alveolar ridge contour at pontic and immediate implant sites. Periodontics. 2016;36(5):681-7.
[6]. Cook RT, Hutchens LH, Burkes EJ. Periodontal osseous defects associated with vitally submerged roots. Journal of Periodontology. 1977 May 1;48(5):249-60.
[7]. Garver DG, Fenster RK. Vital root retention in humans: a final report. The Journal of prosthetic dentistry. 1980 Apr 1;43(4):368-73.
[8]. Plata RL, Kelln EE. Intentional retention of vital submerged roots in dogs. Oral Surgery, Oral Medicine, Oral Pathology. 1976 Jul 1;42(1):100-8.
[9]. Reames RL, Nickel JS, Patterson SS, Boone M, El-Kafrawy AH. Clinical, radiographic, and histological study of endodontically treated retained roots to preserve alveolar bone. Journal of Endodontics. 1975 Nov 1;1(11):367-73.
[10]. Darby I, Chen S, De Poi R. Ridge preservation: what is it and when should it be considered. Australian dental journal. 2008 Mar;53(1):11-21.
[11]. Dugan DJ, Getz JB, Epker BN. Root banking to preserve alveolar bone: a review and clinical recommendation. The Journal of the American Dental Association. 1981 Nov 1;103(5):737-43.

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