



Root Banking, A Way To Long Term Esthetics – A Review With Case Report

KEYWORDS

Root banking, fixed partial denture, root canal treatment, periodontal ligament.

* Dr. Muthuraj H.L

Reader, Dept Of Prosthodontics
Farooqia Dental College and
Hospital Mysore, Karnataka - 570021
India

Dr. Neha Nanal

Senior Lecturer, Dept Of
Prosthodontics, Farooqia Dental
College and Hospital Mysore,
Karnataka - 570021 India

Dr. Shashwath MS

Senior Lecturer, Dept Of
Orthodontics, Farooqia Dental
College and Hospital Mysore,
Karnataka - 570021 India

Dr. Shwetha. M

Reader, Dept Of Periodontics, Farooqia Dental
College and Hospital, Mysore, Karnataka - 570021
India

Dr. Anvitha. D

Reader, Dept Of Periodontics, Farooqia Dental
College and Hospital, Mysore, Karnataka - 570021
India

ABSTRACT

Loss of tooth is a traumatic experience for any person. Naturally, their expectation from its replacement is not just for function but to restore esthetics as well. Extraction causes unavoidable resorption of alveolar ridge which leads to unaesthetic appearance especially in maxillary anterior region. Root banking is a procedure where the compromised tooth root stumps are preserved within the hard and soft tissues on which the prosthetic rehabilitation is carried out. This article presents the review with case report of a 21 year old male patient with fractured anterior teeth, where the fractured crown parts were replaced with fixed partial denture, preserving the remaining root part of the teeth within the tissues.

INTRODUCTION:

In 1954 Devan¹ stated "perpetual preservation of what remains, rather than meticulous reconstruction of that which has been lost". As per the statement, it is essential to understand the importance of each and every structure of the oral cavity, the relevance of preserving these vital structures and also the consequences of losing them.

It is not uncommon to see the alveolar bone resorption followed by the extraction of the teeth or root stumps. During the first year after extraction, reduction of the residual height in the midsagittal plane is about 2 to 3 mm for the maxilla and 4 to 5 mm for the mandible. The remodeling continues after healing, but at a lower intensity. In mandible the annual rate of reduction in height is about 0.1 to 0.2mm and in general four times less in the edentulous maxilla². Schropp et al³ observed the extraction results in resorption of surrounding tissues, and width of alveolar ridge decreases by upto 50% annually. Following a tooth extraction, bone and soft tissue tend to shrink if no corrective measures or treatments are undertaken. This can leave insufficient bone volume for subsequent implant placement, or may cause a gap between the pontic and the gingiva underneath a dental bridge.

This type of resorption was considered to be normal for decades. But with present advancement in the techniques, patients' concern for esthetics, and awareness about the need of masticatory apparatus for nutrition as well as the relative increase in the urge of the patients to retain natural teeth, it is a great task for a dentist to satisfy the patients providing them with form, function and esthetics at the same time. Even with excellent care, patients experience non-carious defects of the natural tooth-crowns with age and the embedded roots which are left within the alveolar bone are usually recommended for extraction as per the older concepts of dentistry. But today's goal of conservation in dentistry dictates otherwise.

Root banking technique is one such procedure which not only preserves the structures present but also prevents the complications occurring as a result of soft/hard tissue changes leading to compromise in esthetics. Root banking is the procedure of submucosal root retention by surgical amputation of the crown followed by non surgical endodontic treatment of the remaining root structure⁴.

This case report provides an idea about the potentially successful aesthetic rehabilitation in cases with the loss of almost complete crown portion and minimally damaged roots using the root banking technique. The preservation of root of the fractured crowns by performing non-surgical endodontic treatment and reducing them to the alveolar bone level by raising full thickness mucoperiosteal flaps with subsequent suture placement, maintains the natural attachment apparatus, that is, periodontal ligament of the tooth. This in turn allows for complete preservation of the alveolar bone frame in terms of height, width and composition and thereby assists in the creation of a healthy and esthetic prosthetic site.

REVIEW OF LITERATURE

The root submergence technique was originally described to prevent alveolar bone resorption that follows extraction of teeth. In majority of cases, the dental pulps were kept vital or endodontic intervention was done prior to or during the procedure. This prevented downward migration of epithelial cells during periodontal regeneration procedures thus preserving framework of the alveolar ridge⁵. Bjorn was the first person to publish report regarding such root submersions⁶.

Howell⁵ observed that alveolar bone under complete dentures did not resorb even after more than 10 years after submergence of the root. O'Neal⁷ conducted histopathologic examination of endodontically treated submerged roots in dogs and found that osteocementum and a con-

nective tissue layer had formed between cut surface of root and the newly formed bone.

Guyer⁸ in 1975 was the first to submerge vital roots in humans. He observed that the roots displayed radiographically normal conditions and the alveolar ridge was maintained for over 2 years.

Von Wowern and Winther⁹ conducted a 4 year follow-up study of 20 cases where crown was resected and endodontic intervention of roots was done. They were the first to propose the concept of vital root retention based on observation that bone resorption did not occur around retained teeth, but this was later abandoned due to soft tissue complication. They reported perforation when dentures were placed over submerged roots but no such complication was seen associated with the pontic sites since occlusal forces are not directed towards gingiva.

A long edentulous span poses greater difficulty is esthetic rehabilitation when compared to loss of single tooth where the adjacent natural teeth help to maintain the scalloped architecture to a certain extent.

Salama et al¹⁰ have proposed a technique to ensure more predictable protocol for esthetic implant treatment for multiple-missing teeth using root submergence technique. Compared to socket preservation technique, a much greater amount of supporting tissues may be preserved using this technique.

CASE REPORT^{11,12} :

A 22 years old, male patient reported to the Department of Prosthodontics, Farooqia Dental College and Hospital, Mysore, with the fractured anteriors due to trauma two days back. Intra oral examination of the patient revealed mild laceration of the upper lip and Ellis grade III fracture of incisors (P.1a & 1b). Radiographic examination was done to rule out any root fracture. Radiograph revealed the fracture of left central incisor, lateral incisor and right central incisor near the cervical region. The first phase of treatment involved removal of fractured tooth fragments and debridement and cleaning of lacerated upper lip (P.2). No sutures were placed on the lip since the laceration was very minimal. The fractured fragments of the teeth were removed under local anesthesia.

The remaining portion of crowns of the fractured teeth were examined and post and core treatment was ruled out since the remaining crown part was inadequate (<2mm) for supporting the core material. The treatment plan was done to retain the root stumps by non surgical endodontic root canal treatment (P.3). Since the patient was young, retaining the root stumps by endodontic treatment would help in maintaining the natural attachment apparatus of the teeth, proprioception and also prevents the resorption of the underlying alveolar bone. Most importantly patient is prevented from the psychological trauma of undergoing extraction and loosing the teeth at a very young age.

Once the endodontic treatment was complete, the remaining coronal part of the fractured teeth were reduced to the crestal bone level using an air driven hand piece and football diamond point. Slight modification was done in the procedure compared to that of conventional root banking technique. Instead of raising full thickness flap to cover the root stumps and suturing the flap over it, here the roots were left exposed, after reducing them to the crestal bone

level. The canal orifices were closed with miracle mix cement. This modification was done to overcome the complications of conventional root banking technique. Researchers have shown that complications like gingival tissue perforations and cyst formation occurred around the roots when they are embedded within the tissues^{8,9}.

Tooth supported fixed partial denture was planned by utilizing both canines and left lateral incisor as abutments (as per Ante's law). Tooth preparation was done on these abutment teeth and six unit fixed partial denture was fabricated and cemented in place (P.4). Patient was followed up after 2 years since completion of treatment and the level of crestal bone was found to be satisfactory.

In a long span bridges, it is not uncommon to see bone resorption below the prosthesis which creates unaesthetic space between the bridge and underlying bone. In such case, patients usually complains of food impaction below the prosthesis and also bad odor. Root banking technique help to overcome such problems posed by bone resorption, especially in the anterior region when long span fixed partial denture is planned to

Thus the advantages of preserving the root stumps by root banking technique includes^{10,13} :

Prevents alveolar bone resorption, maintains alveolar ridge height and frame.

Prevents epithelial down growth in periodontal regeneration procedures.

Improved esthetic result with long term predictability when restoring multiple adjacent teeth in esthetic zone.

Eliminates risk of caries and periodontitis

Guided pattern of functional and para-functional force distribution to the surrounding bone.

CONCLUSION:

Advocating the theory of root banking can be summarized by the following statement that "the undisturbed root attached to the alveolar bone by the periodontal ligament is the perfect implant"¹³. The loss of teeth and PDL and their replacement by prosthesis inevitably changes the pattern of force distribution along with the menace of alveolar resorption. Residual ridge resorption is the major unsolved oral condition which causes physical, psychological and economic problems for millions of people all over the world. So, even the extraction of a few remaining teeth although in a compromised condition should be a well thought and planned decision. Root banking can be therefore taken as a viable option to overcome these problems. Its major advantage lies in the preservation of alveolar framework. Alveolar bone maintenance depends on the presence of healthy root and PDL which transmits functional and para-functional forces to the surrounding bone. Today, the concepts and techniques of osseointegration, periodontal surgery, tissue regeneration and esthetic restoration and above all, the implant technology, that is constantly providing innumerable benefits have dramatically advanced our potential as restorative dentists.. However it can be safely assumed that implants will never surpass the ability of a natural tooth to preserve the surrounding bone and soft tissue height.

Hence, root banking technique should be recognized and

practiced as a very effective technique for maximum tissue preservation along with esthetic rehabilitation of prosthetic sites.

Photographs

1. Pretreatment

a) clinical photo



b) Radiograph



2. After removal of fractured segments and tissue debridement



3. Non surgical Endodontic treatment wrt 11,21,22



4. After cementation of tooth supported fixed prosthesis



REFERENCES:

1. De Van M. The nature of the partial denture foundation: suggestions for its preservation. JPD 1952;2(2):210-218.
2. Zarb, G.A. and Bolender, C.L. Prosthodontic Treatment for Edentulous Patients, 12th edn. St. Louis: C.V. Mosby, 2009;44-45.
3. Schropp L, Wenzel A, Kostopoulos L, Karring T. Bone healing and soft tissue contour changes following single tooth extraction: A clinical and radiographic 12 month prospective study. Int J Periodontics Restorative Dent 2003;23:313-323.
4. Dugan DJ, Getz JB, Epker BN. Root banking to preserve alveolar bone: a review and clinical recommendation. J Am Dent Assoc 1981 Nov; 103(5):737-743.
5. Howell Howell F. Retention of alveolar bone by endodontic root treatment. Seminario Annual del Grupo de Estudios Dentales U.S.C de Mexico 23, May 1970
6. Bjorn H. Experimental studies on reattachment. Dent Practit 1961;11:451-4.
7. O'Neal R, Ground T, Levin MP, del Rio BCE. Submergence of roots for alveolar bone preservation. I. Endodontically treated root. Oral surg Oral Med Oral Pathol 1978;45:803-810
8. Guyer SE. Selectively retained vital roots for partial support of overdentures: A patient report. J Prosthet Dent 1975;33:258-263
9. Von Wowern N, Winther S. Submergence of roots for alveolar ridge preservation. A failure (4-years follow up study). Int J oral Surg 1981;10:247-50.
10. Salama M, Ishikawa T, Salama H, Funato A, Garber D, Advantages of

- the root submergence Technique for pontic site development in Esthetic Implant Therapy. *Int J Periodontics Restorative Dent* 2006;27(6):520-527.
11. Hiremath HP, Doshi YS, Kulkarni SS, Purbay SK. Endodontic treatment in submerged roots: A case report. *J Dent Res Dent Clin Dent Prospect* 2010; 4(2):64-68.
 12. Mittal M, Arora S. Root Banking- a case report. *Clinical Dentistry* 2009 June; 111(6):20-23.
 13. Choudhary A, Hazarika K, Bhuyan Ac. Root banking:the submergent preservative!!!- a review. *Indian Dentist Research and review* Dec 2011; 6(4)