

## CASE REPORT

# ESTHETICS BY ROOT SUBMERGENCE TECHNIQUE - A NOVEL APPROACH

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### ABSTRACT

The aesthetic around the teeth, pontics and implants is determined by the volume and symmetry of the natural gingival contour. Osseous reduction following extraction of teeth results in unaesthetic bony concavities in aesthetic zone. This article describes a simple and effective method of retaining root stumps in the concerned area following endodontic treatment to preserve alveolar bone heights and aesthetics.

**KeyWords:** Root submergence technique, Alveolar bone height, preservation.

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## INTRODUCTION

The osseous reduction following extraction of the teeth is considered as an inevitable consequence resulting unaesthetic bony concavities especially in esthetic zone. The extraction of teeth eliminates the need for an alveolar process, and the bone is resorbed.<sup>1</sup> Roux suggested that the loss of alveolar bone occurring after tooth loss is an example of disuse atrophy. The only reliable method known to preserve alveolar bone is the maintenance of functioning healthy teeth. There is a gradual loss of the alveolar bone due to the pattern of bone remodelling.<sup>2</sup> In spite of the availability of newer treatment modalities like endodontic restoration and periodontic procedures for preservation of the remaining teeth, they are not feasible for the patients in severe stages where restoration might not be possible. The only reliable method of preserving the remaining bone is by maintaining the functional health of the teeth. Over the years, many studies showed that roots which are fractured and left behind during extractions are retained into the alveolar bone with no evidence of pathosis.<sup>3,4,5</sup> Use of retained roots to preserve alveolar bone in over-denture treatment has been a common practice through the vital or non vital root submergence concept. But use of retained roots to preserve alveolar height and esthetics in fixed prosthodontics has not received much attention. In fixed prosthodontics restoring esthetics in patient with severe bone loss has always been a challenge. Methods adopted in cases of inadequate bone in esthetic zone include use of gingival porcelain, surgical soft tissue or hard tissue regeneration using grafts or reconstruction using gum veneers. While all these methods have proved to be effective, a simpler and much more efficient method is retaining the root stumps in the concerned area following endodontic treatment to eliminate the source of infection.

Atwood and Coy found the mean reduction for the anterior maxillary bone to be about 1 mm per year and for the anterior mandible, 0.4 mm per year following the loss of teeth.<sup>6</sup> The only reliable method known to preserve alveolar bone is the maintenance of functioning healthy teeth.<sup>7</sup>

We report a case in which a endodontically treated root submergence was carried out to prevent the alveolar ridge reduction prior to fabrication of a fixed prosthesis in maxillary anterior region. This article suggests a strategy to provide a more predictable protocol for esthetic treatment of anterior tooth loss using the root submergence technique (RST). By maintaining the natural tooth root with the RST, a much greater amount of surrounding tissue may be preserved than with the conventional technique, which almost always leads to crestal bone resorption and thus reduction of the height of the interdental papillae and width of the edentulous ridge. RST instead maintains the natural attachment apparatus of the tooth in the pontic site, which in turn allows for complete preservation of the alveolar bone frame and assists in the creation of an esthetic result.

## Case report

A 25-year-old female reported to the Department of Prosthodontics with a chief complaint of unesthetic appearance due to missing front teeth. Patient had a history of trauma few months back, resulting in fracture and subsequent loss of tooth. On intra-oral examination it was found that 21 was missing. (Fig1A) Upon radiographic examination it was found that root of 21 was present without any sign of periapical pathology and 11 showed a periapical radiolucency suggestive of a pathology. (Fig 1B) She was referred to the Department of Conservative Dentistry and Endodontics for consultation regarding 11 and the retained root of 21 which required endodontic treatment procedures, and to assess the periapical status of remaining teeth. Treatment plan for the patient included crown in 11 and post and core placement followed by crown placement for 21.

Following root canal treatment, it was concluded that post and core treatment with respect to 21 would result in unfavourable crown to root ratio and poor prognosis of the prosthesis. Therefore, treatment plan was modified according to clinical situation and a fixed prosthesis was planned with 11 and 22 as

abutments. 22 showed unfavourable overjet precluding its use as an abutment unless sufficient clearance was generated; which was possible only through a intentional root canal treatment followed by post and core placement. Part of the treatment plan was to evaluate the possibility of more natural looking pontic appearance if residual ridge could be stabilised from further resorption by retaining the remaining root.<sup>7,8</sup>

Therefore, it was decided to cover the root with mucosa for healing to take place. For this purpose the root of 21 was reduced to one millimeter subosseous height after undergoing endodontic therapy (Fig 2A). After reduction the primary soft tissue closure was achieved over the site and sutures were placed (Fig 2B).

Following a period of one week, sutures were removed after ensuring adequate healing (Fig 2C). 22 was prepared to receive a custom cast post and core and 11 and 22 were prepared as an abutment to receive a fixed prosthesis (Fig 2D).

An interim prosthesis was given to the patient until next appointment in which final prosthesis cementation would be done (Fig 3A). With adequate bone height, a more natural looking prosthesis could be fabricated without black triangles near the pontic area or excessive use of unsupported gingival porcelain application. In this case very slight gingival porcelain in Pontic area was used to match the cervicoincisal height with adjacent tooth. (Fig 3B)

## DISCUSSION

Atwood<sup>6</sup> observed that the “Reduction of residual ridges needs to be recognized for what it is: a major unsolved oral disease which causes physical, psychological and economic problems for millions of people all over the world.” Both objective and subjective findings clearly indicate the significant benefits of tooth retention since, even the extraction of a patient’s few remaining teeth should be a serious decision.<sup>8</sup> Alveolar bone maintenance depends upon the presence of healthy roots and periodontal ligaments, which transmit functional and parafunctional forces to the surrounding bone. The loss of teeth and periodontal ligaments and their replacement by artificial substitutes inevitably changes the degree of

esthetics and also the pattern of force distribution.<sup>9</sup> Bjorn<sup>10</sup> was the first person to publish a report of root submersions. Masterson<sup>11</sup> in 1979 submerged 36 vital teeth in 10 patients and followed the vitality and position of the sectioned roots, the surface integrity of soft tissue coverage, and the osseous tissue character surrounding the roots of the sectioned teeth for 3 years. He concluded that the patients in general, felt as though they had some of their own teeth, which suggested more of an intact body image, and exhibited good proprioceptive, perceptive and psychologic response. Ortega Alejandra and Salgado Silva<sup>12</sup> in 1991 concluded that atrophy of the alveolar process can be avoided by intentionally preserving dental roots in patients with ideal periodontal and pulpal health conditions.

The concept of vital root retention was also proposed by Von Wowern and Winther<sup>13</sup> in 1981, based on the observation that bone resorption did not occur around retained teeth, but this was later abandoned due to soft tissue complications.

In 2007 Maurice Salama et al<sup>14</sup> suggested a strategy to provide a more predictable protocol for esthetic implant treatment for multiple-tooth defects using the root submergence technique (RST). RST maintains the natural attachment apparatus of the tooth in the pontic area, which in turn allows for complete preservation of the alveolar bone.

Patient had mild deep bite and was suggested for orthodontic treatment but she was not interested. Even then the final outcome of the treatment was up to mark and well accepted by the patient.

## CONCLUSION

It has long been recognised that whatever restorative materials are used for clinical crowns, and however masterfully the prosthesis is fabricated, it is the volume and symmetry of the natural gingival contours that determine esthetics around the teeth, pontics and implants alike.

For this purpose, maintenance of an abundance of natural soft tissue and underlying bone volumes and contours in the event of tooth loss are of a significant concern on long term esthetics, function and ease of hygiene maintenance. For these reasons different

**Fig 1**



Fig 1:  
 A-Pre-treatment intra oral view.  
 B- Pre-treatment radiograph showing retained root in 21 and periapical pathology in 11  
 C- Post endodontic treatment radiograph.

**Fig 2**



Fig 2  
 A- Reduction of remaining root to 1mm subosseous height.  
 B- Primary soft tissue closure was achieved over the root.  
 C- Post operative healing stage.  
 D- Tooth reduction in 11 and post and core followed by tooth reduction in 22.



Fig 3  
 A-Interim prosthesis.  
 B- Final prosthesis.



Fig 4  
 Pre and post treatment photographs of the patient.

strategies have been engaged to preserve the residual ridge crest and associated soft tissue. This approach allows the opportunity to achieve a more natural result with a minimally invasive approach. Preservation of tissue is more desirable than allowing ridge atrophy to occur and then be faced with the prospects of hard and soft tissue reconstruction. To paraphrase DeVan, "Our goal should be the perpetual preservation of what remains rather than the meticulous restoration of what is missing".<sup>15</sup> Another way of saying this is that the best dentistry is the least dentistry necessary to return the patient to acceptable function and esthetics.

It can be concluded that mucosal coverage of roots as a means of preserving the residual alveolar ridge is a sound clinical method for those patients where undue ridge resorption would unfavourably compromise the esthetics of fixed prosthesis. The undisturbed root attached to the alveolar bone by the periodontal ligament is the "perfect" implant.

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