

A Report on the Clinical Management of a Severely Deficient Siebert's Class III Ridge Defect using the Andrew's Bridge System

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Abstract

The Andrew's bridge is a fixed removable partial denture that is used as an alternative to long span conventional fixed or removable partial dentures and dental implants when these are contraindicated due to aesthetics, bone morphology, patient's condition, or cost. It combines the rigidity of a fixed partial denture with the flexibility of tooth placement provided by a removable partial denture. When employed with a semi-precision attachment system, occlusal loads are more favorably transferred to the tissue surface, protecting the abutment teeth from harmful non-axial loading. In the present case report, the patient reported with a Kennedy class IV edentulous area with Seibert's class III ridge defect in the maxillary arch, which was rehabilitated with a simple and cost-effective fixed-removable prosthesis to compensate for the soft and hard tissue defect.

Keywords: Esthetic rehabilitation, Andrew's bridge, Fixed removable prosthesis, Ridge defect, Seibert's classification.

INTRODUCTION

Absence of teeth has a definitive impact on patients' satisfaction with their dentition regardless of personal factors such as age, gender, and level of education. The higher the number of missing teeth the lower the levels of satisfaction with respect to appearance, oral comfort, general performance, and eating dimensions.^[1] This tooth loss can occur either due to an altered physiology with respect to the immune system or connective tissue, or due to pathologies such as trauma, benign and malignant lesions, or developmental anomalies. The deficient residual ridge is at an increased risk of resorption in addition to being inadequate at providing the necessary stability and support for a conventional tissue borne prosthesis. Bone undergoes disuse atrophy in the absence of physiologic strain, an evolutionary tactic employed by the body.^[2] This bone resorption is rather quick; i.e., 50% of the width of the alveolar ridge is lost in the 1st year after extraction (5–7 mm), and two-third of this reduction occurs in the first 3 months. Loss of alveolar height occurs to a lesser extent; around 1–2 mm within the same period.^[3]

Seibert, classified this bone resorption as follows:^[4]

- Class I. Bucco-lingual loss of tissue with normal ridge height in an apico-coronal dimension

- Class II. Apico-coronal loss of tissue with normal ridge width in a buccolingual dimension
- Class III. Combination buccolingual and apico-coronal loss of tissue resulting in loss of normal height and width.

If not promptly rehabilitated and put back into use, the residual ridge reduces in dimension both bucco-labially and apico-coronally. Implants are the ideal treatment option in almost every scenario, except in cases where the ridge is deficient apico-coronally, as bone augmentation is more predictable in width than height.^[5] Pneumatization of the maxillary sinus can cause loss of bone height, especially in the posterior regions due to the concave morphology of the sinus floor. Poor oral hygiene and periodontal health may compromise implant stability and lead to increased susceptibility to implant loss, loss of supporting bone, and post-operative infection.^[6]

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For severely deficient Siebert class III ridges, a fixed removable partial denture offers the best option in terms of both function and aesthetics. When employed with a semi-precision attachment system, harmful occlusal forces are directed away from the abutment teeth toward the tissues due to the resiliency of the attachment. This promotes both bone health and reduces tooth mobility, and uncomplicates oral hygiene procedures. Dr. James Andrews of Amite, Louisiana, introduced the fixed removable Andrews Bridge system (Institute of Cosmetic Dentistry, Amite, LA.) consisting fixed retainers connected by a rectangular bar that follows the curve of the ridge beneath it. The prosthesis consists of teeth set in a patient removable flange of gingiva-colored acrylic resin that clips over and is stabilized by the rectangular bar. Though this arrangement occasionally causes food entrapment underneath the flange, it is still the most aesthetic treatment option available for large ridge defects, especially in the anterior maxilla.^[7,8]

CLINICAL REPORT

A 22-year-old male patient presented to the Department of Prosthodontics and Crown and bridge, voicing concerns about both esthetic and functional challenges arising from the absence of upper front teeth due to road traffic accident over the past decade. External examination showed inadequate lip support, while an intraoral assessment revealed the absence of teeth in specific regions - 11, 12, 21, 22, 23 and a marked reduction in the height and width of the residual alveolar ridge in the maxillary anterior region, classified as Siebert's class III. The rest of the teeth and the surrounding structures were in good condition (Figure 1).

The following treatment options were proposed:

1. Conventional removable partial denture – Ruled out because of a three-sided defect and absence of flange
2. Conventional fixed partial denture – Ruled out due to aesthetic issues where-in severe height defect could not be masked by gingival porcelain
3. Surgical bone grafting followed by implant placement – Ruled out due to economic factors and long rehabilitation time
4. Andrew's fixed-removable partial denture – Most convenient option.

Preparation of the abutment teeth

Diagnostic impressions of the maxillary and mandibular arch were made using irreversible hydrocolloid impression material. Vital tooth preparation was conducted for tooth 13, 14, 24 and 25 to receive Porcelain Fused to Metal (PFM) crowns. Gingival retraction was performed, and a final impression was obtained using a polyvinyl siloxane material in a stock tray, employing a two-stage technique with a spacer and light body impression (GC Flexceed) (Figure 2). Temporary restoration of the prepared teeth was achieved using a tooth-coloured self-cure acrylic resin (DPI Self-cure Tooth Moulding Powder Shade A2) through an indirect technique. The resultant master

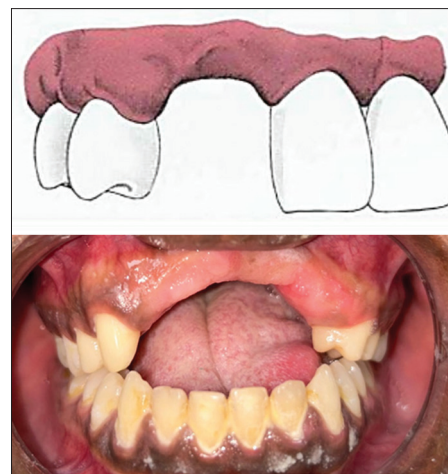


Figure 1: Top: Diagrammatic representation of Seibert's class III residual ridge deformation, Bottom: Intra-oral view after surgical removal of maxillary anterior teeth following road traffic accident showing Seibert's class III ridge defect. (Frontal view)



Figure 2: Top left: Tooth preparation in 13, 14, 24 and 25 for porcelain fused to metal restorations, Top Right: Two-stage poly-vinyl siloxane impression made, Middle: Preci - Horix – Ceka Preciline attachment, Bottom Left: Pre-fabricated castable bar attached between waxed up copings 13 and 24, Bottom Right: Casted metal bar soldered with copings.

casts were poured using Type-IV gypsum (Ultrarock, Kalabhai Karson Pvt. Ltd., Mumbai, India), and the casts were mounted on a three-point articulator.

Incorporation of the precision attachment

The abutment patterns for copings were waxed. The plastic bar pattern (Ceka Preci-Horix) was cut to the appropriate length and the gingival extension of the bar was reduced to proper height to approximate gingival contour. The bar was attached to the wax pattern of the retainers, and was slightly tilted such that the path of insertion of the metal framework and the removable partial denture did not coincide. This was done to reduce the chances of dislodgement of the retainers on repeated insertion and removal of the partial denture. The nylon retention riders were placed on the bar, positioned on the model, and checked on the articulator to make sure that there was adequate vertical space for the acrylic denture teeth. The abutments, pattern, and attachments were sprued together, and casting was completed and finished. The casting was then polished. Care was taken to not grind the cast bar with stones burs or rubber wheels, or over-polish the bar, as this would reduce the bar diameter and alter the fit and retention of the riders (Figure 2).

Try-in of the fixed component

The metal framework was tried in the patient's mouth and was checked for esthetics, phonetics, and clearance between the bar attachment and underlying soft tissues. The plastic riders were placed in the proper position on the bar. The undercuts of the bar were blocked out with carding wax such that the retentive undercuts of the riders were not blocked out. An alginate impression was taken of the bar placed in the mouth, with the riders in position. The fabricating riders were held in proper position in the model by the extensions of the riders in the stone (Figure 3).

Cementation of the fixed prosthesis

Shade selection was done, and the restoration was finished and polished. At this stage, the retainer and bar framework were luted onto the abutment teeth using resin modified glass ionomer cement (FujiCEM; GC America, Alsip, USA). Next, the metal housings were slid onto the fabricating riders from one end. These will remain embedded in the acrylic resin after processing (Figure 3).

Fabrication of the removable partial denture

Occlusal rim was made on the cast and the teeth were arranged. Wax trial was done to check for aesthetics. The prosthesis was then processed with heat cure acrylic resin (DPI Heat Cure Universal Pack), followed by meticulous finishing and polishing. After retrieval of the denture, fabricating riders were removed and were replaced with the nylon retention riders (medium retention) into the receptacles of the metal housings with the provided insertion tool. The finished denture was then delivered.

Prosthesis delivery

The removable component was then inserted into the fixed component. The patient received aftercare instructions and was diligently followed up for 3 months. The patient was made aware regarding the frequent wearing of the retentive sleeves which would have to be replaced. The patient was reviewed periodically to assess the prognosis of the treatment (Figure 4).



Figure 3: Cemented fixed component of Andrew's bridge – Top: Occlusal view, Middle Left: Frontal view, Middle Right: Right lateral view, Bottom Left: Pre-formed plastic riders picked up in the impression, Bottom Right: Cast fabricated.

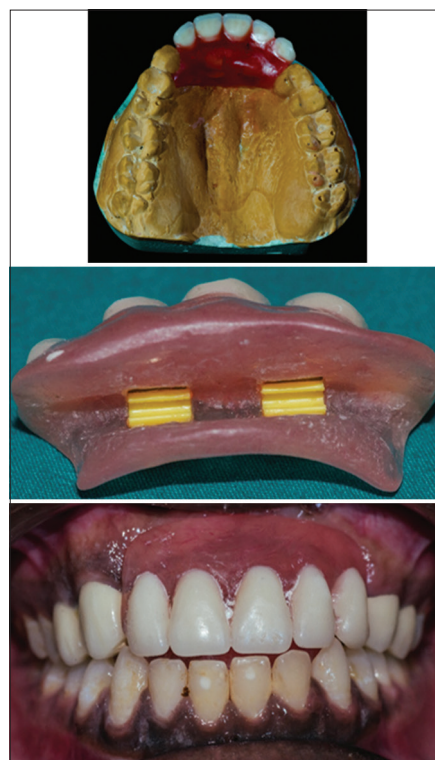


Figure 4: Top: Removable component waxed up after try-in, Middle: Intaglio surface of removable component of Andrew's bridge showing sleeve, Bottom: Post-operative photograph of Andrew's Bridge replacing 11, 12, 21, 22, and 23 using bar and sleeve attachment. (Frontal view)

DISCUSSION

Treatment with endosseous implants is generally the best option for long-term rehabilitation. It has been noticed that the cost or reluctance to surgery for bone augmentation is an important factor that precludes implant placement in a lot of cases. The maxillary canine region is considered the best site for implant placement to replace anterior teeth. However, A study of 431 patients revealed that in the partially edentulous maxilla, the placement of implants in anterior regions of an edentulous arch was possible only in 55% of cases, meaning that other options may be considered.^[6]

Treatment with conventional fixed prosthesis is the next logical option. However, long span anterior fixed partial denture prosthesis can be problematic due to the lever action provided by increased distance of pontics from the inter abutment axis. In the presence of large alveolar defects, constructing a conventional fixed partial denture runs the risk of fabricating long pontics with or without gingival masking, resulting in unaesthetic, over-contoured restorations. In addition, increased crown height also increases the torsional forces applied on the abutment teeth and contribute to their mobility.^[7,8]

CONCLUSION

In the current situation, Andrew's bridge was the best treatment modality because of the size of ridge defect. The patient was born to a single mother, and it was difficult for her to bring her son in for multiple chair-side procedure appointments and

was also economical for her to bear considering she was the sole earning member and had to fend for herself and her son.^[9] Andrews's bridge treatment is an economical, esthetic, and functional treatment option compared to other modalities of treatment; hence, it is best suited for the scenario.

REFERENCES

1. AL-Omiri MK, Karasneh JA, Lynch E, Lamey PJ, Clifford TJ. Impacts of missing upper anterior teeth on daily living. *Int Dent J* 2009;59:127-32.
2. Qin YX, Rubin CT, McLeod KJ. Nonlinear dependence of loading intensity and cycle number in the maintenance of bone mass and morphology. *J Orthop Res* 1998;16:482-9.
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;23:313-23.
4. Seibert JS. Reconstruction of deformed, partially edentulous ridges, using full thickness onlay grafts. Part I. Technique and wound healing. *Compend Contin Educ Dent (Lawrenceville)* 1983;4:437-53.
5. Chrcanovic BR, Albrektsson T, Wennerberg A. Periodontally compromised vs. Periodontally healthy patients and dental implants: A systematic review and meta-analysis. *J Dent* 2014;42:1509-27.
6. Oikarinen K, Raustia AM, Hartikainen M. General and local contraindications for endosseal implants--an epidemiological panoramic radiograph study in 65-year-old subjects. *Community Dent Oral Epidemiol* 1995;23:114-8.
7. Zarb GA, MacKay HF. Cosmetics and removable partial dentures--the class IV partially edentulous patient. *J Prosthet Dent* 1981;46:360-8.
8. Resnik RR. *Misch's Contemporary Implant Dentistry*. 4th ed. Netherlands: Elsevier Inc.;2021. p. 419.
9. Everhart RJ, Cavazos E Jr. Evaluation of a fixed removable partial denture: Andrews bridge system. *J Prosthet Dent* 1983;50:180-4.