

# Rehabilitation of Sieberts Class Iii Defect Using Fixed Removable Prosthesis (Andrew's Bridge) : - A Case Report

Ashish.R.Jain MDS<sup>a</sup>, V.Hemakumar BDS<sup>b</sup>, T.Janani<sup>c</sup>,

<sup>a</sup>Reasearch Scholar, Department of Prosthodontics,

Saveetha Dental College and Hospitals, Saveetha University, Chennai, India.

<sup>b</sup>Senior Consultant, Dencity Dental Care, T.Nagar, Chennai, India

<sup>c</sup>CRRI, Department of Prosthodontics, Tagore Dental College and Hospitals, ,Chennai, India.

## Abstract

Restoration of an anterior ridge defect is not an easy task for a prosthodontist. To achieve speech and esthetics closure of the defect must be done along with replacement of the missing teeth. These defects can be treated with conventional removable or fixed partial denture but they do not replace the lost soft tissue structures. Totally implant-supported restorations are very successful, but they are of questionable prognosis in case of three sided defects. In such cases the Andrew's bar system can be an option. Andrews bridge is combination of both removable and fixed partial denture and fulfills all the requirements like phonetics, hygiene, aesthetics and comfort. Fixed-removable partial dentures are particularly indicated for patients with extensive supportive tissue loss and when the alignment of the opposing arches and/or esthetic arch position of the replacement teeth create difficulties for placement of a conventional fixed partial denture. This article presents a case report that describes the process of fabrication of Andrews Bridge to treat a Siebert's Class III anterior ridge defect using natural teeth as abutments for its fixed component followed by a removable component. Andrew's bar system provides a reliable alternative for implants in cases treating anterior ridge defect

**Keywords:** Andrew's Bridge, Bar Attachment, Class III ridge defect.

## INTRODUCTION

Tooth loss is often followed by loss of alveolar bone especially in cases of trauma and congenital defects. Such cases require replacement of the lost teeth as well as closure of the defect in order to achieve esthetics, phonetics and mastication. The term localised alveolar ridge defect is intended to refer to volumetric deficit of limited extent in bone and soft tissue within the alveolar process<sup>1</sup>. These defects have been classified both qualitatively and quantitatively<sup>2,3</sup>. The most commonly used classification is the Seibert's nomenclature. It classifies the defects from Class I to Class III. Buccolingual loss of tissues (class I), Apicocoronal loss of tissues (class II) and combination of buccolingual and apicocoronal loss of tissues (class III)<sup>2</sup> (Fig 1). These defects may be corrected surgically or it may be restored nonsurgically using fixed and/or removable prosthesis. The clinician as well as the patient most often do not resort to surgical correction due to the complexity of the treatment. Therefore prosthodontic correction is often the treatment of choice.

The defects can be treated with conventional removable or fixed partial denture but their success rate is minimal. In case of removable partial denture, when it replaces the lost structures it becomes heavy and the retention is compromised. Conventional fixed partial denture and implant supported FPD fails to replace the lost soft tissue structures. In such cases replacement of teeth along with the supporting structures can be achieved by "Andrew's Bridge"<sup>4</sup>. They are indicated in cases with excessive residual ridge defect, jaw defects either due to trauma and/or surgical ablation, Cleft palate patients with congenital or acquired defects and sometimes could be used

in patients with periodontal problems<sup>5,6</sup>. The Andrew's System is usually of two types based on the area of bar attachment. They are pontic supported and bone Anchored or Implant supported.

Dr. James Andrews of Amite, Louisiana first introduced the fixed removable Andrew's system (Institute of Cosmetic Dentistry, Amite, L.A.) in 1975<sup>7</sup>. The Andrew's system is a combination of both removable and fixed partial denture. The fixed bridge is made of PFM crowns, fused to a premanufactured bar that is permanently cemented to the prepared abutment. The removable pontics are made of metal sleeve tract embodied within an acrylic removable partial denture. This article thus explains the procedure of fabricating and correcting a ridge defect using a pontic supported fixed-removable Andrew's Bridge.

## ASSETS OF ANDREWS SYSTEM :

- It includes all the advantages of both fixed and removable partial dentures.
- Reduces the denture bulk
- Good retention
- Permits replacement of missing alveolar structure
- Good patient comfort and cost effective.
- No palatal coverage or lingual flange coverage as in conventional RPD
- No soft tissue impingement and the surrounding structures.
- The system acts as stress breaker while transmitting unwanted leverage forces.

## BLOCKS OF THIS BAR SYSTEM:

- Technique sensitive procedures.
- Food and plaque trap in the flange area leads to tissue proliferation in the region of contact of bar and ridge.

- Inadequate soldering leads to failure of the prosthesis
- Derive their entire support from the abutment teeth, Hence the life of the prosthesis largely depends on the abutment teeth
- Minimum 3 – 4 mm occlusogingival height is necessary for proper functioning.

This article explains the correction of a class III ridge defect using a pontic supported fixed-removable Andrew's Bridge.

#### CASE STUDY

A 52 year old male patient reported to the clinic with a Chief complaint of missing teeth in lower front and back tooth region of jaw. Upon questioning the patient revealed mobility in lower front and back teeth ten years back due to periodontal disease. Since the patient at that time was not willing for treatment he had undergone extraction of all eight involved teeth (33,32,31,41,42,43,44,45). The present Clinical examination of the patient showed loss of residual ridge both horizontally as well as vertically in that region leading to a Class III type defect according to Seibert<sup>2</sup>. The rest of the teeth and the surrounding structures were in good condition.

#### TREATMENT OPTIONS


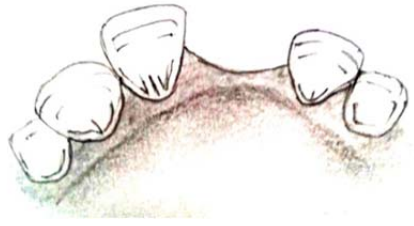
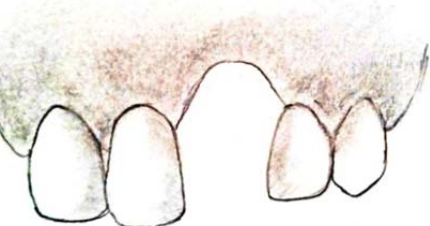
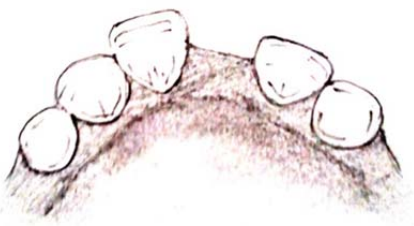
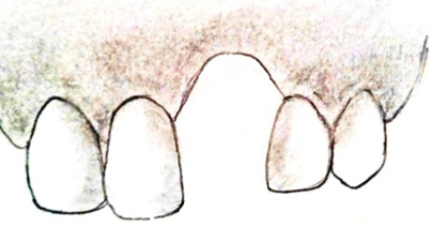
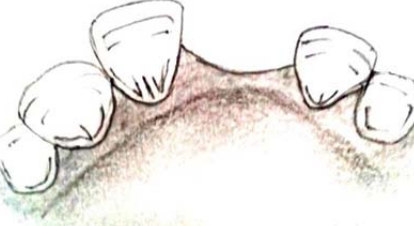
Since the patient had a three sided defect the prognosis of implant was questionable. Therefore the following options were given to the patient.

1. Conventional removable partial denture
2. Conventional fixed partial denture
3. Surgical bone grafting followed by implant placement
4. Andrews fixed-removable partial denture

The patient had already worn a removable partial denture. He was not comfortable with removing and replacing the denture, hence he required a fixed prosthesis. Since patient required restoration of the bone defect along with replacement of the teeth, conventional fixed partial denture was also eliminated from the options. The patient was not willing for surgical bone grafting followed by implant placement since its success of the graft and implant were not assured since it was a three-sided defect. Ultimately the patient chose Andrews fixed-removable partial denture since it combined the advantages of both removable and fixed partial denture and it was advantageous over the other options in this case.

#### TREATMENT COURSE

- The mandibular first molar on right side and the premolars and the first molar on the other side were chosen in this case as abutments to support the Andrew's System.
- Alginate impressions (Tulip Alginate Impression Material, Cavex, Holland Bv, Haarlem Holland) of the maxillary and mandibular arches were made and the diagnostic cast was poured using Dental stone Type III (Ultrarock, Kalabhai Karson Pvt Ltd, Mumbai, India).
- A wax-up for removable partial denture was done in such a way that it would close the defect and restore esthetics. It was tried in the patient's mouth for esthetics and phonetics.
- A Putty (Aquasil Putty Material, Dentsply) index was made with the trial denture in mouth.
- The abutment teeth 34,35,36 and 46 were prepared to receive Porcelain fused to metal (PFM) crowns. (Fig 2) Elastomeric impressions were made using putty wash technique with polyvinylsiloxane (Aquasil Lv Ultra, Smart Wetting Impression Material, Dentsply, Detrey GmbH, Konstanz, Germany) and master casts were poured in die stone (Ultrarock, Kalabhai Karson Pvt. Ltd., Mumbai, India) and mounted on a semi-adjustable articulator. (Hanau Modular Articulator System, Waterpik Technologies Inc., Fort Collins, Colo.)
- The provisional restoration were fabricated using tooth colored self-cure acrylic resin (ALIKE™; GC America, ALSIP, USA) by indirect technique and was luted onto the prepared teeth using temporary cement (FREEGENOL TEMPORARY PACK; GC Corp., Tokyo, Japan)
- Wax-up was done for PFM retainers and they were connected with a preformed plastic bar attachment (OT Bar Multiuse, Rhein 83) adapted according to the curvature of the ridge running parallel to it. The bar was attached to the abutment teeth as posteriorly as possible.
- The putty index was placed on the cast to ensure proper placement of the bar.
- The whole pattern was then casted in chromium-cobalt alloy and this 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.
- Shade selection was done followed by ceramic firing on the copings. The restoration was then finished and polished. (fig 3)
- The temporary restoration was removed and the fixed component of the Andrew's System were cemented with resin modified glass ionomer cement (FujiCEM; GC America, Alsip, USA) over the prepared teeth (fig 4). type and brand
- With the crowns in position, along with the bar, an alginate impression was made and cast was poured with dental stone (Ultrarock, Kalabhai Karson Pvt. Ltd., Mumbai, India)
- Occlusal rim was made on the cast and missing teeth were arranged. Wax trial was done to check for esthetics
- The wax pattern was acrylised using a pink coloured heat cured acrylic resin with a clip placed in the lingual aspect to attach this RPD over the bar attachment (fig 5).
- The RPD was inserted into the patient's mouth in such a way that the clip beneath the RPD attaches to the bar on the fixed component. (Fig 6)
- Following this the patients was trained to properly remove and replace the RPD fabricated over the fixed component of Andrew's Bridge and to maintain proper oral hygiene by following the oral hygiene instructions.
- The patient was reviewed periodically to assess the prognosis of the treatment.

SIEBERT'S CLASSIFICATION	FRONTAL VIEW	OCCLUSAL VIEW
<p><b>CLASS I</b> Buccolingual loss of tissues</p>		
<p><b>CLASS II</b> Apicocoronal loss of tissues (class II)</p>		
<p><b>CLASS III</b> Combination of buccolingual and apicocoronal loss of tissues</p>		

**Figure 1:** Seibert's classification of anterior ridge defects



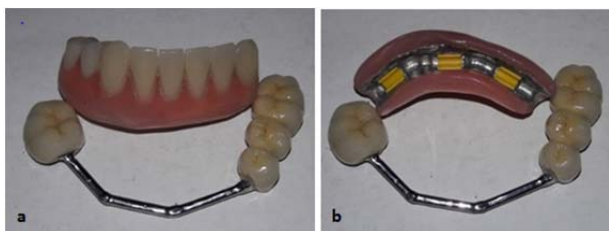
**Figure 2:** Tooth preparation done in 34, 35, 36 & 46 for PFM restoration



**Figure 3:** Finished and polished PFM restoration along with the bar attachment



**Figure 4:** Final metal-ceramic restoration of abutment teeth along with the Andrew's bar in the patients oral cavity.



**Figure 5:** a. Final prosthesis - Andrew's bar system b. Removable component shows the sleeve for bar attachment.



**Figure 6:** Final completed Andrew's fixed removable partial denture for the correction of class III defect in the patient's oral cavity-Frontal view

#### DISCUSSION

It has been reported that most of the cases with anterior tooth loss is accompanied by alveolar bone loss (ridge defects) and only 9% of the patients did not have ridge defects.<sup>9</sup> The most commonly seen defects are the combined Class III defects (56% of cases) followed by horizontal defects Class I (33% of the cases) and vertical defects were reported to be found in 3% of the patients.<sup>9,10</sup> Complete closure of the defect can be treated with conventional removable or fixed partial denture but may restore either esthetics or function but not both.

Andrew's fixed-removable system is a commendable alternative for treating the anterior ridge defects. The advantages of the conventional Andrew's system over the implant supported fixed partial dentures have been largely reported in the literature and textbooks<sup>11-15</sup>. Fixed removable partial dentures are particularly indicated for patients with extensive supportive tissue loss and when the alignment of the opposing arches and/or esthetic arch position of the replacement teeth creates difficulties. Andrew's system achieves maximum aesthetics and phonetics in Class III ridge defect cases, when other traditional treatment options are not feasible. The advantage of pontic anchored Andrew's system is that it utilizes natural abutments eliminating the need for implant surgeries.

The prosthesis consists of the missing teeth set in a removable partial denture of gingival colored acrylic resin that clips over bar which connects the PFM retainer over the abutment teeth. The length and curvature of the bar depends upon the length of the edentulous span, ridge form and interocclusal space available. The bar is soldered to the retainers at a slight mesiodistal angulation. A minimum of 2 mm vertical bar height is required for sufficient strength

to support the removable portion of the restoration, but tissue contact is not desirable.<sup>16</sup>

The Andrew's bar and sleeve tract is constructed from a precision machined space-age alloy. With an unusual viscous molecular attraction of fitting and superior resistance to stress corrosion. These unique molecular values, in addition to the precision fit, allow the acrylic segment to be inserted and removed thousands of times without losing retention, whereas the durability of the bar and clip attachment is questionable since the bar and clip are made from two different materials and, eventually, one of them will wear the other.<sup>17,18</sup>

The Andrews bridge is more stable and retentive because it is completely tooth borne and the occlusal forces are also directed towards the long axis of the supporting teeth. The flange of the pontic assembly is contoured to improve comfort, esthetics, and phonetics, and to resist possible torque during function. Above all, the major advantage of the Andrew's system is that the pontic assembly can be removed to facilitate hygiene procedures and may be relined as the ridge resorbs.<sup>19</sup> Limited reports of the failure of such prosthesis are found in the literature. The failures are mainly due to inadequate soldering which can be avoided by attaching retainers to the bar in a single casting.<sup>20</sup>

#### CONCLUSION

Andrew's bridge permits rehabilitation of congenital and acquired defects when conventional treatments are not feasible. This fixed-removable prosthesis effectively restores the esthetics and speech by replacing the missing teeth and achieving complete closure of the defect. The patient treated with the Andrew's Bar System in this case report was followed-up for a period of 1 year. The patient was found to be comfortable with the prosthesis without any complaint and showed an improved esthetics and phonetics. Hence, this type of denture which has qualities of both the fixed partial denture and the removable partial denture can be indicated in cases where the abutments would support a fixed partial denture but a severe defect is present in the edentulous space.

#### REFERENCES

1. Studer S, Naef R, Scharer P. Adjustment of localized alveolar ridge defects by soft tissue transplantation to improve mucogingival esthetics: A proposal for clinical classification and evaluation of procedures. *Quintessence Int* 1997;28(12):785-805.
2. Seibert JS. Reconstruction of deformed, partially edentulous ridges, using full thickness onlay grafts. Part I. Technique and woundhealing. *Compend Contin Educ Dent* 1983;4(5):437-53.
3. Allen EP, Gainza CS, Farthing GG, Newbold DA. Improved technique for localized ridge augmentation. A report of 21 cases. *J Periodontol* 1985;56(4):195-9.
4. D.B. Tuinzing. *Preimplant Surgery of Bony Tissues*; J.Prost.Dent:1998; 80,(2):175-183.
5. Gordon N. Gates and Andrews J. Boch. Boulder. *Prosthodontics-crown and bridges.mht*
6. Nallaswamy; *Textbook of Prosthodontics*. 2edition. 606-609.
7. James E. Immeleus and Mohamed Aramany. *A Fixed - Removable Partial Denture For Cleft Palate Patients*. *J.Prost.Dent*. 1975 :34:(3) :286-291.
8. Ashish R Jain, *A Prosthetic Alternative Treatment for Severe Anterior Ridge Defect using Fixed Removable Partial Denture Andrew's Bar System*, *World Journal of Dentistry*, October-December 2013;4(4):282-285

9. Abrams H, Koczyk RA, Kaplan AL. Incidence of anterior ridge deformities in partial edentulous patients. *J Prosthet Dent* 1987;57(2):191-4.
10. Garber DA, Rosenberg ES. The edentulous ridge in fixed prosthodontics. *Compend Contin Edu* 1981;2(4):212-23.
11. Everhart, R. and Cavazos, E.: Evaluation of a fixed removable partial denture: Andrew's bridge system. *J. Prosth. Dent.*, 2 : 180, 1983.
12. Finger, I.; Block, M. and Salinas, T.: Treatment of a resorbed maxilla with sinus grafting, implants and a spark-erosion overdenture: Clinical report. *Implant Dent.* 1 : 150, 1992.
13. Glantz, P.O.: On the biomechanics of implant retained overdenture. EOTC symposium on intraosseous implant supported overdentures, Brussels, Belgium, 1989.
14. Guerra, L.R.; Finger, I.M. and Block, M.S.: Tissue supported implant overdentures. *Implant Dent.*, 1 : 69, 1989.
15. Hansen, C.A.; DeBoer, J. and Woolsey, G.: Esthetics and biomechanical considerations in reconstructing and using dental implants. *Dental Clinics of North America*, 36 : 713, 1992.
16. Dr Priyanka Gubrellay et al. Andrews Bridge System – A literature Review, *IJRID* Volume 4 Issue 3 May.-June. 2014
17. Sillard, R.: Fixed Removable Dental Implant "S" System. United States patent no. 4.931.016, June 5, 1990.
18. Worthington, P. and Branemark, P.: *Advanced Osseointegration Surgery: Application in the Maxillofacial Region*, p. 233, Quintes., Chicago, 1992.
19. Mueninghoff, L.: Fixed removable partial denture. *J. Prosth. Dent.*, 5:547, 1982.
20. Limited reports of the failure of such prosthesis are found in the literature. The failures are mainly due to inadequate soldering. However, this was completely eliminated by attaching retainers to the bar in a single casting