



CASE REPORT

Management of Anterior Ridge Defect with Andrew's Bridge

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ABSTRACT

Residual ridge deformity after tooth loss is an expected outcome. The treatment of a patient with a history of trauma with loss of teeth and ridge defect is a significant challenge. This article presents a case of Seibert's class III ridge defect in the maxillary anterior region, which was treated with a fixed-removable system, the Andrew's bridge, for economical and time constraints. It requires a castable bar and sleeve attachment, which provides precision and retention while seating. It is primarily indicated where abutments are capable of supporting a fixed partial denture, but residual ridge shows severe loss.

Keywords: Fixed-removable prosthesis, Sleeve attachment, Seibert's ridge defect.

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INTRODUCTION

Loss of alveolar bone after tooth loss is an expected outcome. Residual ridge deficiency has been reported in 91% of the cases after extraction.¹

Seibert in 1983 gave a classification for ridge defects: Class I – faciolingual loss of tissues with normal ridge height; class II – apicocoronal loss of tissue with normal ridge width; class III – combination of bone loss in both dimensions.² These defects may be restored in principle by two methods – either the defect may be corrected surgically during the preprosthetic phase or it may be restored nonsurgically using fixed and/or removable prosthesis.³

The defect could be managed surgically by ridge augmentation and implant placement with restoration.⁴ The nonsurgical options include removable partial denture (RPD)/cast partial denture (CPD), fixed partial denture (FPD) with gingival ceramics, or an Andrew's bridge.

Prosthetic treatment of a surgically uncorrected localized alveolar ridge defect with a fixed restoration is associated with several esthetic challenges like loss of papillae and formation of open "black" interdental spaces; compromised phonetics; or danger of food impaction under the pontic. In large defects, the treatment options like fixed/implant prosthodontics are unable to fulfill all the requirements and the cost could also be a reason to advocate an alternative treatment plan. In such conditions, the Andrew's bridge is a good prosthodontic option. It was Dr James Andrews of Amite, Louisiana, who introduced the fixed-removable Andrew's system (Institute of Cosmetic Dentistry, Amite, LA, USA).⁵ He developed this technique to overcome the problems associated with the restorations of severe residual ridge resorption or jaw defect cases. Primary indications for this restoration are cases where the abutments are capable of supporting an FPD, but the residual ridge has been partially lost due to trauma, congenital defects, or other pathologic processes, so that a conventional FPD would not adequately restore the patient's missing teeth and supporting structures.⁵ This article presents a case report where Andrew's bridge was fabricated to achieve desired esthetic outcome in a case of gross tissue loss in the edentulous area.

CASE REPORT

A 24-year-old male patient reported to the department with the chief complaint of missing teeth in anterior and posterior regions of upper and lower arches since past 6 months due to a road traffic accident. He had suffered multiple facial fractures for which he was treated with maxillofacial plating. Patient desired esthetically pleasing restoration and wished for improvement in his speech. Past dental history showed that 14 was endodontically treated. Medical history was not relevant.

On extraoral examination, he had a square facial form and straight profile. A healed scar was seen extending from the lip to the chin on the right side. Lip length was average, but reduced mobility due to scar tissue formation. The temporomandibular joint deviated to the right while closing due to presence of plates in that region, but no clicking was observed. The smile line was medium (Fig. 1).

On intraoral examination, the mouth opening was adequate; 11, 12, 13, 31, 41, 42, 43, and 46 were missing.

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Fig. 1: Extraoral image

A large Seibert's class III defect was seen in the maxillary anterior region, which was 5 mm in the apicocoronal and 3 mm in the buccolingual dimension. A smaller Seibert's class III defect was seen in the mandibular anterior region where it was 3 mm in the apicocoronal and 3 mm in the buccolingual dimension; 14 was endodontically treated; 21 had increased proclination. The abutment teeth had adequate clinical crown height and the remaining dentition was periodontally healthy. As anterior teeth were absent, the posterior teeth showed group function occlusion (Figs 2A to C). Preoperative orthopantograph showed that severe bone loss was present in the region of missing

teeth. Adequate bone support with positive architecture with remaining dentition was observed. Plates were seen in the body of the mandible in close proximity to the roots of 44 and 45, which were physiologically mobile. Plates were also seen in maxillae and zygomatic arch area (Fig. 3). On intraoral periapical radiograph, the prospective abutment teeth adjacent to the edentulous area were sound with good crown – root ratio.

Diagnostic casts of both the arches were made using irreversible hydrocolloid impression material. A facebow record was taken and casts mounted on a semiadjustable articulator for diagnostic purpose and planning. A diagnostic wax-up was carried out to visualize the tooth position and soft tissue contour in patient's mouth prior to planning of the prosthesis, and the group function occlusion was maintained (Fig. 4). Treatment options available were RPD, CPD, FPD with gingival ceramics or gingival molds, and bone augmentation with implant placement. Various treatment options were discussed with the patient.

According to diagnostic evaluation and patient consideration, the following treatment was planned. As a severe loss of hard and soft tissues was observed in the maxillary anterior region, the patient was unwilling to undergo block graft with implant placement; hence, an alternate treatment plan for the patient was an Andrew's bridge which would be a fixed – removable prosthesis. For mandibular missing anterior teeth, a 5-unit fixed



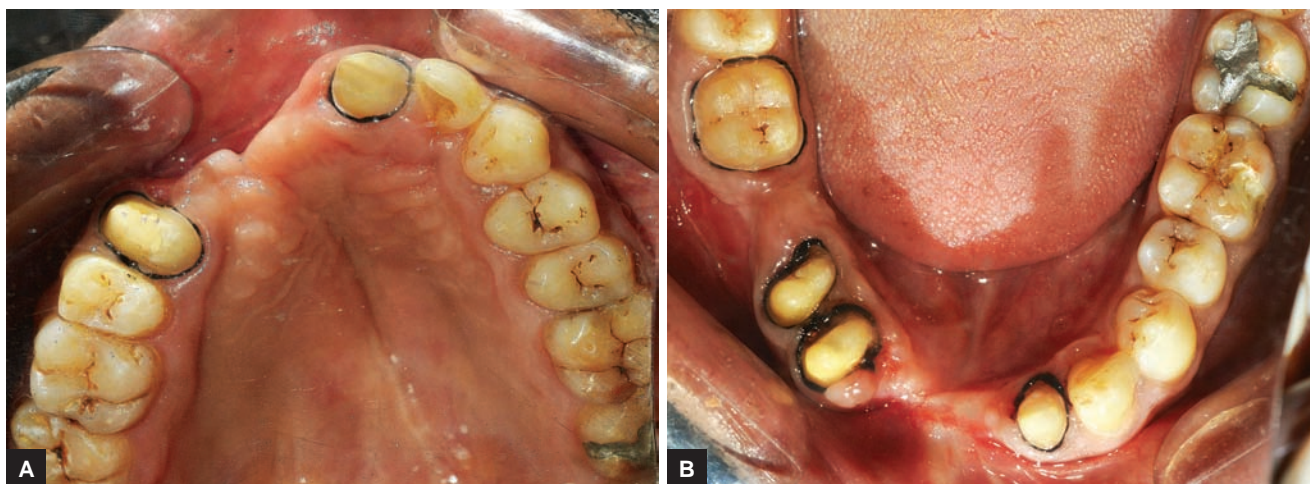
Figs 2A to C: Intraoral image



Fig. 3: Orthopantograph



Fig. 4: Diagnostic trial



Figs 5A and B: Tooth preparation and retraction

prosthesis, porcelain fused to metal restorations with gingival ceramics with 32 and 44 as abutments was planned. The amount of loss of hard and soft tissue was not as much as that of the maxillary anterior region, so it was a feasible option. A 3-unit fixed porcelain fused to metal prosthesis was planned for the mandibular posterior region with 45 and 47 as abutments.

A multidisciplinary treatment was planned for the patient, which involved periodontic management, endodontic treatment, and prosthetic rehabilitation.

Scaling and polishing of both the arches was carried out. Intentional endodontic treatment was required with 21 so that the proclination could be decreased in final prosthesis. Intentional endodontic treatment was also required for 44 and 45 due to its close proximity to the plates underneath, which would eventually cause them to become nonvital. Shade selection was done for the natural teeth present.

For Andrew's bridge, tooth preparation of 11 to 14 was done to receive porcelain fused to metal retainers. For the mandibular arch fixed prosthesis, tooth preparation of 32, 44, 45, and 47 was done to receive porcelain fused to metal retainers. Equicrevicular finish lines were given. After preparation of teeth in both the arches, gingival dilation by chemico-mechanical method using 15% aluminum chloride hemostatic agent and 000 retraction cord was done (Figs 5A and B). Final impressions were made with putty wash technique in addition to silicone elastomeric impression material in stock metal trays and poured in die stone (Fig. 6).

Patient was provisionalized in the maxillary arch with temporary crowns in resin-based temporary material on 21 and 14 by direct technique from the index of the diagnostic wax-up with an RPD for replacing missing 11, 12, and 13. For the mandibular arch, 5 and 3 units temporary bridges were fabricated by indirect technique using resin-based temporary material. These were luted

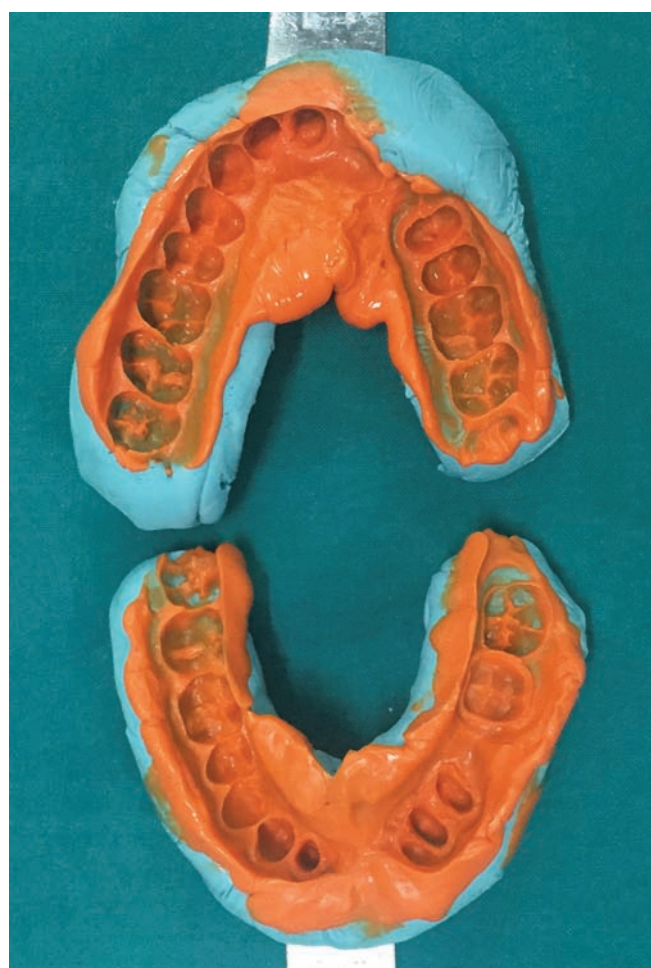


Fig. 6: Final impressions for fabrication of Andrew's bridge and FPDs

with temporary cement. The removable die master casts were mounted with facebow relation and interocclusal records. For Andrew's bridge, a castable plastic burn-out bar (incorporated in fixed component) and sleeve (incorporated in removable component) was used (Bredent Attachments, VPS-FS (Friction-Snap) System) (Fig. 7). The bar was rectangular with 50 mm in length, 1.5 mm

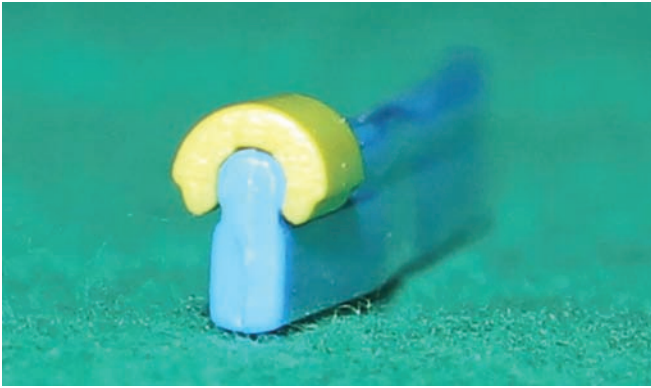


Fig. 7: Plastic burn-out bar pattern with retentive sleeve

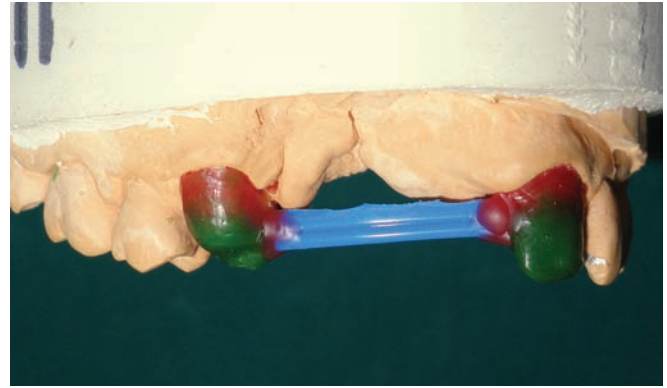


Fig. 8: Wax pattern for fixed component



Fig. 9: Metal trial of maxillary fixed prosthesis and mandibular bisque trial



Fig. 10: Maxillary fixed component

in width, and 3.5 mm in vertical height. A minimum of 2 mm vertical height was required for sufficient strength to support the removable component.⁶ The sleeve/clip used provided friction fit of retention level 2.

Wax pattern was fabricated on 21 and 14 for full copings, and the prefabricated bar was cut to required dimension and attached to mesial aspects of abutment copings; care was taken that it followed the arch form with an angulation to facilitate clip placement (Fig. 8). It was casted in nickel – chromium alloy, retrieved, finished, and checked for the fit on master cast. At the same time, the casting for the other FPDs in the mandibular arch was also done, and the metal substructure was checked on the cast and their bisque trial was carried out intraorally (Fig. 9). Later, all these were checked intraorally for their fit and occlusal relation. After ceramic layering and glazing of all the restorations, the bar was finished and polished overall except for the groove present in the center of the bar, so as to preserve frictional gripping of retentive sleeves (Fig. 10). The fixed component of the Andrew's bridge was placed and checked intraorally, the clip was placed in position and was additionally blocked out for ease of pick-up in irreversible hydrocolloid impression material (Fig. 11).

The teeth arrangement for the RPD component was done on the master cast using the diagnostic putty index



Fig. 11: Pick-up impression

(Fig. 12). Since there was loss of labial alveolar bone in upper anterior region, gingival flange was fabricated so as to aid in closure of defect to replace missing hard and soft tissues and provide lip support. After satisfactory try-in denture, it was processed into heat cure acrylic resin. The fixed component was then luted on the abutment teeth with glass ionomer cement. The mandibular FPDs were also luted. The clip was placed over the bar in position. The removable part was tried for fit, esthetics,



Fig. 12: Mounted cast with prosthesis



Fig. 13: For pick-up of the sleeve in the removable component



Figs 14A and B: Pick-up of the clip in removable component

and space for pick-up of clip in autopolymerizing acrylic resin. Potential undercuts intraorally were blocked (Fig. 13), and space was created in the intaglio surface for autopolymerizing resin. Small quantity of fluid consistency of autopolymerizing resin was loaded onto the intaglio surface of the denture and placed over the bar with the clip such that the retentive clip was picked up in the removable component (Figs 14A and B). The removable component was

clipped onto the bar of the fixed component, and the luting of the mandibular arch FPDs was completed (Fig. 15). The patient was trained for placement and removal of the denture (Fig. 16). Hygiene instructions included daily use of mouthrinse, interdental brushing, and flossing beneath the rectangular bar and adjacent abutment teeth. A WaterPik device for oral irrigation was advised. Periodic recall at first week, and first month followed by 3 months up to 6 months was carried out with no loss of retention or adaptability with either components of final prosthesis.



Fig. 15: Postoperative extraoral image



Fig. 16: Postoperative intraoral image

DISCUSSION

The most commonly combined (vertical and horizontal) class III defects (56% of cases) were found followed by horizontal defects of class I (33% of the cases) and only 3% of patients were reported with class II vertical defect.⁷ The famous dictum by Devan is, "Our objective was the perpetual preservation of what remains, than meticulous reconstruction of what was lost."⁸ In our case, the patient desired a fixed prosthesis for both the arches. However, it was not possible to give complete fixed restoration in maxillary arch, as there was more loss of tissues, which could not have been replaced by a bridge for desired esthetics.

In a conventional RPD, the forces would be directed to the underlying tissues, which would cause further resorption of bone, whereas in an Andrew's bridge, the forces are directed partially to the bar that shields the underlying ridge from further resorption.

A conventional CPD was not acceptable to the patient since it was removable and also would have been unesthetic due to the anterior clasp arm. Implant placement procedure would have required block graft placement for which the patient was unwilling. Even with the bone grafting in such cases, the success of osseointegration was questionable.⁹ Hence, within the limitations of case presented, Andrews's bridge was thought to be the most acceptable economic solution for the patient. The advantage of this prosthesis was that it could give a partially fixed prosthesis with patient's ability to maintain oral hygiene and replace the missing associated structures.

In a 12-year period, more than 25 Andrew's bridges were made and found to be as durable as conventional FPDs.⁵ The only failures in the bar were due to inadequate soldering as seen from the literature, and these failures were eliminated by casting the retainers directly to the bar in one piece to prevent fracture at connector area as in this case.

CONCLUSION

The success of any therapeutic treatment depends upon a variety of parameters including careful selection of suitable patients for each treatment, formation of a treatment plan, and careful implementation of a treatment procedure. The Andrew's bridge helped us to make a successful prosthesis, which was acceptable esthetically and functionally. The principal advantage was the flexibility in placing denture teeth, while the major technical problems were related to crown length and soldering. The physiologic advantages were effective oral hygiene and increased stability of the splinted teeth. Another crucial factor was the path of withdrawal of the removable component with respect to the fixed prosthesis. Therefore, in this case, we could achieve the desired esthetic results with a partially fixed and stable prosthesis.

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