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Andrews Bridge: A fixed removable prosthesis

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ABSTRACT

Prosthodontic rehabilitation of a large anterior ridge defects is often a challenge. Such defects require not just the replacement of the missing teeth, but also closure of the defective area so as to achieve proper speech and esthetics. Andrews Bridge is a fixed-removable prosthesis that is one of the treatment modality indicated in patients with large ridge defects. The prosthesis successfully replaces the missing teeth along with complete closure of the defect, restoring speech and esthetics. This article presents a case report describing 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 superstructure.

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1. Introduction

Prosthodontic rehabilitation of a large anterior ridge defects is often a challenge. An Andrews Bridge is a fixed-removable prosthesis that is one of the treatment modalities indicated in patients with large ridge defects. Apart from providing maximum aesthetics and optimum phonetics in cases involving considerable supporting tissue loss or when alignment of the opposing arches or aesthetic position of the replacement teeth creates difficulties, another favourable criterion of the Andrew's bar system is that it can be removed by the patient for hygiene. This forms an alternative faster and efficient treatment option compared to surgical correction and rehabilitation following the placement of implants.

2. Case report

A 33-year-old male patient was referred from the division of Oral and Maxillofacial Surgery for evaluation and prosthetic rehabilitation. On eliciting the history, the patient had undergone multiple surgical procedures following a road traffic accident for fracture of frontal bone, zygomatico-maxillary complex fracture, bilateral sub condylar fracture and fracture parasymphysis. Extra-oral examination revealed multiple scar marks and a facial deformity. The anterior portion of the chin was depressed extending from the junction of the vermilion border of the lower lip up to the base of the mandible (Fig. 1). It was also associated with a whistling speech. Intra oral examination revealed missing teeth number 31, 32, 33 and 41 with an associated alveolar defect extending up to the basal bone (Fig. 2). Teeth number 34 and 42 were restored with composite restorations. A three-unit full coverage Porcelain fused to metal (PFM) fixed partial denture was present replacing missing 21. The occlusion was group function on the left side and canine protected on the right side. An orthopantamograph (OPG) was taken to check the condition of the remaining teeth and the supporting bone to help in the diagnosis and treatment planning (Fig. 3). OPG revealed multiple bone plates in the anterior region of the mandible with loss of alveolar bone in the area of the missing

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Fig. 1 – Pre-operative extra oral view.



Fig. 2 – Intra oral view showing the alveolar defect.

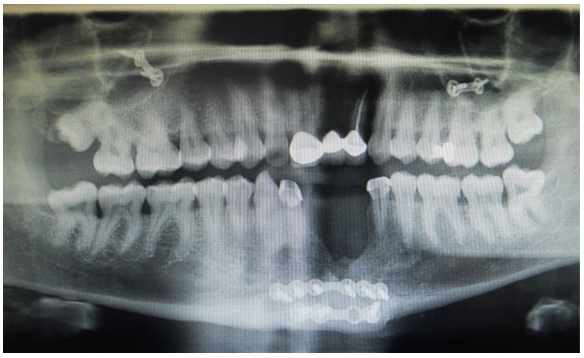


Fig. 3 – OPG depicting the extent of the defect.

teeth. A diagnosis of a post-traumatic partially edentulous mandibular arch with a residual dentoalveolar defect was made. Considering the clinical situation, it was decided to rehabilitate the patient using a fixed and a removable prosthodontic intervention. A teeth supported Andrews Bridge with a modified hybrid prosthesis to restore the lost tooth and residual alveolar defect was planned. Arbitrary face bow



Fig. 4 – Tooth preparation.



Fig. 5 – Coping Trial.

transfer was done to a Hanau semi adjustable articulator and the casts were mounted in maximum intercuspation. The incisal guidance on the articulator was then customised using autopolymerising resin.

In the first phase of treatment, teeth no.: 34, 35, 42 and 43 were prepared for a full coverage PFM restoration (Fig. 4) and impressions were made using addition silicone impression material. Provisional crowns were fabricated and luted on the prepared teeth simultaneously. The wax pattern was fabricated on the prepared die and a bar assembly of the appropriate size was contoured, cut and waxed up to follow the contour of the residual alveolar ridge without interfering with the surrounding mucosa and also ensuring adequate self-cleansing space between the pattern and the floor of the mouth. The entire framework of the bar and the waxed up crown was then sprued, invested and casted. Occlusion was first adjusted on the articulator and then checked intra orally. The framework was then trimmed and finished before a try in was done to check for the extension and fit (Fig. 5). The metal coping framework was also checked for any interference in centric, protrusive and eccentric movements. Try in was repeated once again after porcelain firing. The occlusion was maintained as group function on the left side and canine protected on the right side. Glaze firing was done and the entire crown assembly with the bar was luted into the patient's mouth (Fig. 6). The anterior bar with the crowns was luted using a provisional cement until the entire prosthesis was finished, and anterior guidance was established.



Fig. 6 – Bar framework intraorally.

In the second phase, the mandibular impression was made after blocking the area below the bar using modelling wax. Once the cast was retrieved, the wax was removed and acrylic teeth to match the aesthetics of the remaining teeth was selected and waxed up on the edentulous area above the bar (Modelling Wax, Maarc Products, India). The anterior guidance was established during the bisque trial and also during the wax try in. Firstly, coordinated centric relation stops were established on all anterior teeth, then the centric stops was extended forward at the same vertical to include light closure from postural rest position. Group function was established in straight protrusion and stress distribution was ensured in lateral excursions. The wax pattern was tried intra orally and wax was added on the labial flange area until adequate contouring of the defect area below the lower lip was achieved. The wax pattern was invested and dewaxed. The mould space was packed using reinforced heat polymerising polymethyl methacrylate (Lucitone 100, Dentsply). Acrylisation was completed followed by trimming and finishing. The prosthesis was checked intraorally for occlusal/incisal clearance and for adequate support of the lower lip and the chin (Fig. 7). Phonetic evaluation was also redone. The clip assembly was adapted intraorally over the bar in the requisite position and a window was created on the lingual surface of the acrylic partial denture corresponding to the position of the clips. The opening of the window was sealed using autopolymerising resin (DPI-RR Pink, India) to incorporate the clips to the partial denture framework by the pick-up technique. The partial denture framework was then retrieved, trimmed and polished following which



Fig. 7 – Prosthesis in situ.



Fig. 8 – Post treatment extra oral photograph.

necessary instructions were given. Periodic follow-up of the patient at 03 monthly intervals for a year showed a satisfactory clinical outcome with good aesthetics and phonetics (Fig. 8).

3. Discussion

Prosthodontic rehabilitation of a large anterior ridge defects is often a challenge. This requires replacement of form, function and aesthetics. Pre-operative classification of the localised alveolar defect can be used as a guide in evaluating the prognosis and technical difficulties.

Seibert classified alveolar crestal defects as Class I, Class II and Class III[1]:

Class I: Buccolingual loss with crestal height maintained.

Class II: Vertical loss with buccolingual width maintained.
Class III: Combination of buccolingual and vertical loss.

The case treated was a Siebert's Class III with both buccolingual and vertical bone loss.

Various treatment options available to treat such ridge defects are[2–6]:

1. Soft Tissue Procedures include various options like.
   The Roll Technique: for Class I defects.

   The Interproximal Graft Technique: for Class II and III defects.
2. Free Gingival Graft.
3. The Onlay Graft for augmentation of ridge width and height.
4. Distraction osteogenesis.
5. Combination of a ridge augmentation using bone grafts followed by implant supported prosthesis.
6. Other methods include removable cast partial dentures, fixed partial denture and fixed removable partial denture (Andrew's Bridge). To replace such large alveolar defects with a fixed prosthesis would result in overly long pontic to

contact the residual ridge and often resulting in over contoured and aesthetically poor restorations.

In this case, bone grafting and augmentation procedures were not considered, as the patient was unwilling for any further surgical intervention. Distraction was not considered, as bone plates were present in the parasymphysis region. Surgical correction of the defects using grafts and placement of implants is not only an expensive and time consuming treatment plan but repetitive secondary surgical procedures would require greater patient compliance. Cast partial denture was ruled out as the teeth on either sides of the defect were compromised and the bone plates present would lead to ulceration of the mucosa overlying it. An Andrews Bridge was considered also due to its splinting action on the teeth around the defect.

Andrews Bridge system[7–11]:

This design was given by Andrews in 1966. Two types of bars are used, a single bar to use anteriorly and a twin bar for posteriors. These bars are available in three lengths of three different curvatures. Each curve is a segment of a circle and the combinations allow adaptation to most clinical situations. Since the bar formed part of the arc of a circle, it simplifies reconstruction should a patient lose or damage the removable section.

One of the advantages is its strength, while the curved construction allowed the use of bars anteriorly. For any given situation, Andrews recommended using the bar with the greatest possible curvature, thereby providing a maximum length and hence more frictional surface and greater wear resistance. It also resulted in a more critical path of insertion that reduced the chance of accidental dislodgement of the prosthesis.

The posterior bar provided greater retention and resistance to all dislodging forces, and smaller versions of both anterior single and posterior twin bars were available where vertical space was restricted. As with all other bar prostheses, careful planning was required with particular attention to the assessment of vertical and buccolingual space available, together with an examination of the mucosa to be covered by the bar. The small cross section simplified plaque control and design of the restoration.

Single bars could be used for posterior restorations provided it is not necessary to reduce the height of the bar. This is useful where buccolingual space is restricted or when the anterior abutment is well forward in the arch. As with any bar retained prosthesis the design of the preparation must allow for adequate bulk of metal close to the gingival margin. All types of bar prostheses require a common path of insertion for the fixed section of the restoration, unless an auxiliary system has been incorporated. A shoulder or chamfer preparation adjacent to the bar is recommended, for this will contribute to the strength of the crown margins which are prone to damage under load.

The disadvantage of this system includes the need to frequently remove the prosthesis for cleaning and the associated loss of retention of the clips.

4. Conclusion

Andrews Bridge provides maximum aesthetics and optimum phonetics in cases involving considerable supporting tissue loss, jaw defects and when alignment of the opposing arches or aesthetic position of the replacement teeth creates difficulties. Another favourable criterion of the Andrew's bar system is that it can be removed by the patient for hygiene access. Surgical correction of the defects using grafts and placement of implants is not only an expensive and time consuming treatment plan but the fact that the patient has to go through the ordeal of repetitive secondary surgical procedures would require greater patient compliance.

Conflicts of interest

The authors have none to declare.

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