Cairo Dental Journal, 11 (1) : 11-15,1995

BONE ANCHORED ANDREW'S BAR SYSTEM A PROSTHETIC ALTERNATIVE#

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ABSTRACT

Though totally implant-supported restorations are very successful, dentists may resort to prescribe implant overdentures because of functional, anatomical, economical or aesthetic considerations. However, the loading conditions of the partially implant-supported overdenture may affect the long term predictability of this type of restoration. The concept of the Andrew's bar system can be utilized with dental implants. In some cases the Andrew's bar system is superior to the implant-supported fixed partial denture and other techniques for implant overdentures. The purpose of this article is to evaluate and describe the Andrew's bar system over osseointegrated implants showing the improvements in both functionality and aesthetics of such prosthetic option. The use of Andrew's bar system over implants offered the dentist another option in meeting patient's needs.

INTRODUCTION

It has been documented from the work of Branemark and co-workers that the long term results with fixed prostheses supported by four to six osseointegrated fixtures was successful[2>4]. However, this prosthetic treatment is not always possible to perform, particularly in subjects with excessive residual ridge resorption and jaw defects due to trauma and/or surgical ablation. Under such circumstances, restorative dentists may resort to implant overdentures, in order to restore the defective hard and soft tissues so as to achieve complete hygiene, comfort, normal phonetics and natural aesthetics[(U4)]. A variety of attachments and innovations have been advocated to retain implant overdentures[(7n2r18)]. These retentive options range from a simple bar and clip device to more sophisticated spark-erosion overdentures[(17)]. The prosthesis using a bar and clip is partially implant supported i.e., it has a dual support, namely the fixtures and the residual ridge. As a result of this the biomechanical loading conditions are not favourable to the fixtures, resulting in excessive torque and unpredictable longevity[8r11J]. On the other hand, even though the spark-erosion overdenture is totally implant supported, it has some inherent problems associated with this type of restoration. These problems include technique sensitivity, excessive bulkiness of the bar and the relatively high cost of the equipment[(13)].

Dr. James Andrews of Amite, Louisiana introduced the fixed removable Andrew's system (Institute of Cosmetic Dentistry, Amite, L.A.). The Andrew's system was constructed from a fixed bridge with removable pontics[(3)]. The fixed bridge is made of PFM crowns, fused to a premanufactured bar that is permanently cemented to the prepared abutment, while the removable pontics are made of metal sleeve tract embodied within an acrylic removable partial denture. This technique possesses the advantage of flexibility in placing denture teeth as well as the stabilizing qualities of a fixed prosthesis, qualities that are desirable for any implant prosthesis. The purpose of this article was to evaluate and describe the Andrew's bar system as a superstructure over osseointegrated implants.

PROCEDURE AND TECHNIQUE

After the second implant surgery, i.e. exposure of the fixtures, abutments heads are connected to the fixtures and osseointegration is confirmed. An impression of the abutment heads is registered using implant impression copings and a master cast is poured (Fig. 1,2). A trial denture is fabricated, and the aesthetic result is confirmed in the patient's mouth, then the trial denture is returned to the master cast and a plaster index is fabricated to maintain the position of the teeth and to aid as a guide in the proper positioning of the metal bar. An appropriate bar is selected from the

Presented at the 8th Saudi International Dental Conference. January 17-20, 1994, Riyadh, Kingdom of Saudi Arabia.

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preformed curvatures available using the final cast as a guide, and is attached labially to the wax framework connecting the abutments. The whole assembly is invested and cast with high Palladium alloy (Jel-5, Jelenko, Dental Health Products, Armonk, New York) (Fig. 6). The cast framework is tried in the patient's mouth to verify the fit and to check for possible soft tissue impingement by the bar (Fig. 3). Employing a routine laboratory pick up procedure, the precision sleeve is incorporated into the acrylic prosthesis during the resin packing procedure (Fig. 4). To seat the final prosthesis, the metal bar framework is fastened to the abutment heads and the acrylic segment (denture with the sleeve) is seated to evaluate retention, stability, extension and ability of the patient to grasp and remove the acrylic segment (Fig. 5). Figures (6-10) provide a brief illustration of a patient with misalignment of the opposing arches treated successfully with the Andrew's bar system.

DISCUSSION

The concept and advantages of the conventional Andrew's system are adequately reported in the literature and textbooks[6,9,15,16], when compared to the implant-supported fixed partial dentures. The bone anchored Andrew's system provides maximum aesthetics and optimum phonetics in cases involving considerable supporting tissue loss, jaw defects and when alignment of the opposing arches and/or aesthetic arch position of the replacement teeth create difficulties. Otherwise, overly long pontics slanted to contact the residual ridge are often the end result when utilizing fixed restorations in such cases.

Another favourable criterion of the Andrew's bar system is that it can be removed by the patient for hygienic access to the implant abutments and surrounding tissues. Further, the gold screw access can be hidden within the removable acrylic segment of the prosthesis whenever there are severely angulated implants. When compared to a bar and clip implant overdenture, the loading conditions achieved with the Andrew's bar system resemble those of fixed partial dentures, being entirely bone anchored with even distribution and minimum transverse loading on the fixtures, whereas the bar and clip overdentures are supported both by immobile fixtures and by resilient mucosa, resulting, over a period of time, in progressive ridge resorption and permanent soft tissue changes, tending to increase vertical forces as well as bending and horizontal forces on the fixtures[8ai]. In some cases, the configuration and the distance between the adjacent fixtures are limited, a situation that may prevent the use of a bar and a clip rider. In such conditions, Andrew's bar can be utilized simply by placing the bar labial to the fixtures as illustrated (Fig.3).

The Andrew's bar and sleeve tract is constructed from a precision machined space-age alloy (Carpenter 20 Cb-3 stainless, Carpenter Steel Division, Carpenter Technology Corporation, Redding, Pennsylvania). 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.

More recently, spark-erosion technology has been introduced to dental technology(i7) \/ js made of a primary bar casting joining the implants and a removable metal superstructure upon which the replacement teeth are processed. The precise fit of the secondary restoration over the primary bar casting and the rigid fixation with the spark eroded attachment dictate that the restoration becoming viewed as totally implant supported. Both the Andrew's bar system and the spark-erosion overdenture share the similarity of having the advantages of the totally implant supported fixed partial denture and the implant supported overdenture[10]. However, the inherent problems associated with the fabrications of spark-erosion overdenture may limit the availability of the technology to the profession because only large dental laboratories can offer this type of service.

Since the Adrew's bar system is an implant born prosthesis with the stabilizing qualities of fixed prosthesis, the number, configuration and the integration area of the fixtures must be sufficient to serve this purpose. Therefore, the rules and considerations of determining the length, width and the number of fixtures with implant-

Fig. 1: Impression copings screwed to position second surgical procedure.

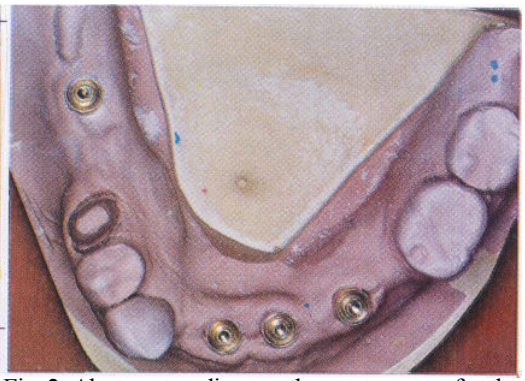

Fig. 2: Abutment replicps on the master cast. after the

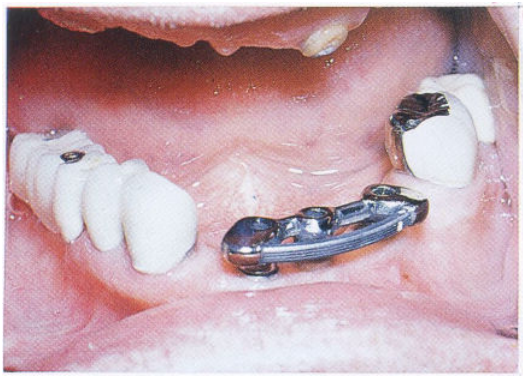

Fig. 3: Fixed components of the Andrew's system at the try-in stage.

Fig. 4: Tissue side of the removable component showing the metal sleeve embedded in the acrylic resin.

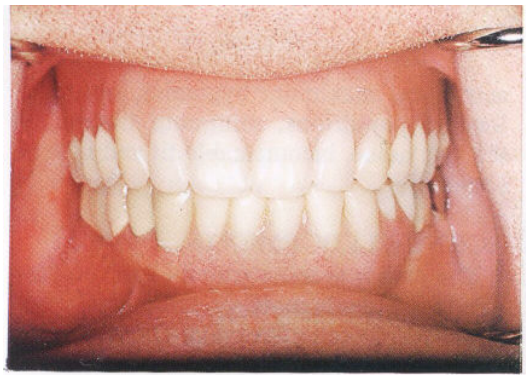

Fig. 5: Completed mandibular Andrew's prosthesis in the mouth with natural appearance and labial contour.

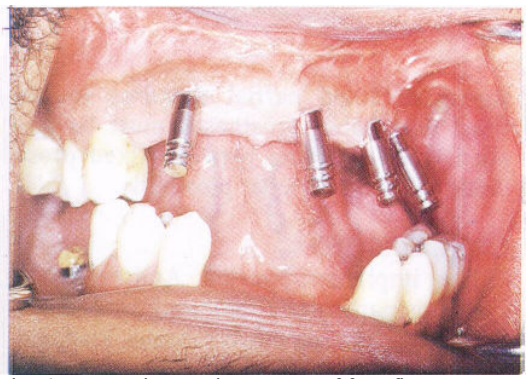

Fig. 6: Impression coping on top of four fixtures, note severe misalignment of upper and lower jaws caused by firearm trauma.

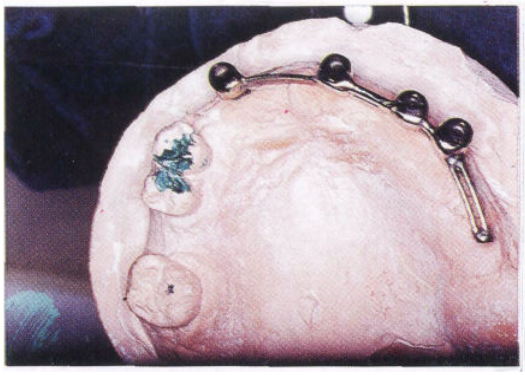

Fig. 7: Andrew's bar fabricated with cantilever double bars. Distal to the most posterior fixture in order to increase the retention.

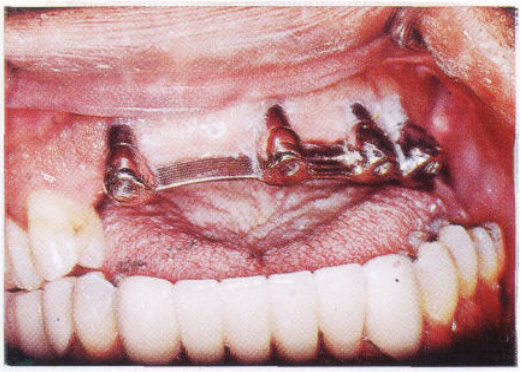

Fig. 8: The fixed framework at the try in stage, the bar should be relieved whenever there is an impingement on the soft tissues.

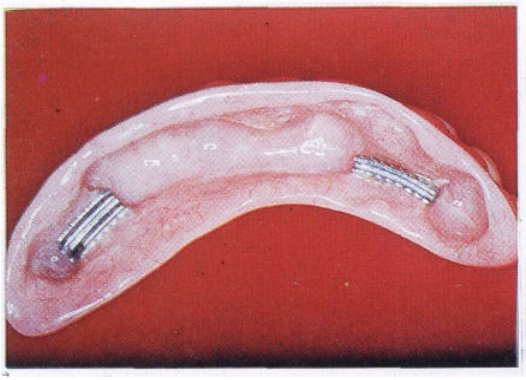

Fig. 9: The removable acrylic segment including metal sleeve.

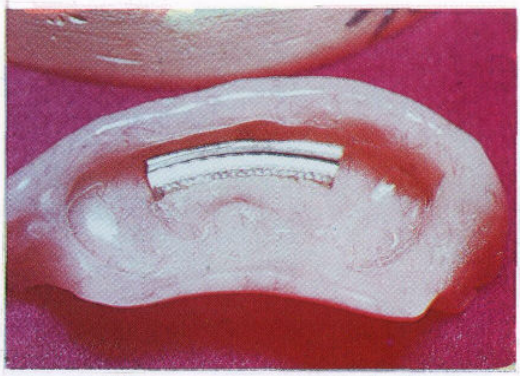

Fig. 10: Clinical appearance of the final restoration with minimum open bite achieved with the Andrew's restoration.

supported fixed partial dentures and/or fixed detachable prostheses must be applied when deciding between fixed prosthesis and Andrew's bar prosthesis.

CONCLUSIONS

The implant-supported Andrew's bar system is particularly indicated for patients with extensive supportive tissue loss and when alignment of the opposing arches and/or esthetics arch position of the replacement teeth create difficulties. The Andrew's bar system provides maximum aesthetics, maximum hygienics, optimum loading conditions, minimum trauma to the soft tissue, incomparable fit and is very economic.

ACKNOWLEDGEMENTS

The author is most grateful to Professor Leonard Mueninghoff, director of Graduate Prosthodontics Program, University of Alabama at Birmingham and to Dr. Aleem Abdullah, Assistant Professor, King Saud University, College of Dentistry for their support and guidance.

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