

Rehabilitation of a Patient using a Twin-Stage Technique to achieve Balanced Occlusion in Implant-Supported Overdenture: A Clinical Report

Deepthi Kalahasti, Veena Hegde, Aparna Ichalanged Narayana, Dhanasekar Balakrishnan

ABSTRACT

Ideal occlusion on an osseointegrated implant has not been investigated with 6° of freedom biomechanically. The current accepted tenet is to avoid horizontal forces on fixtures and for edentulous cases, a balanced articulation must be created. Hobo and Takayama proposed a twin stage procedure to develop disocclusion and anterior guidance more precisely and scientifically. They concluded that effective cusp angle is the most reliable among all the factors effecting occlusion. They proposed a two stage procedure to develop effective cusp angle of 25° in order to achieve balanced occlusion in complete denture prosthesis. This clinical report describes a step-by-step procedure involved in developing balanced occlusion using twin stage technique in implant supported overdenture.

Keywords: Implant-supported overdenture, Twin-stage procedure, Condition I, Balanced occlusion.

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INTRODUCTION

Role of occlusion is important to osseointegrated prosthesis; however, it is not always emphasized for routine prosthetic procedures. A poorly restored occlusion on osseointegrated implants could result in deleterious effects to the prosthesis and supporting bone. Complications (prosthetic or bony support) reported in follow-up studies underline occlusion as a determining factor for success or failure.¹ Several authors suggested that the choice of occlusion for implant-supported complete dentures should be a balanced occlusion ensuring that there is no interference with jaw movements into eccentric positions.²⁻⁶ Balanced occlusion is defined as an occlusal scheme in which bilateral, simultaneous, anterior and posterior occlusal contacts of teeth occur in centric and eccentric jaw positions.⁷ Hobo and Takayama proposed a twin-stage procedure to develop disocclusion and anterior guidance more precisely and scientifically.⁸ Twin Hoby articulator has been designed exclusively for the twin-stage procedure which is an arcon type semiadjustable articulator which uses axis-orbitale plane as a horizontal reference plane.⁸

This clinical report describes the effective application of 'condition 1' of twin-stage procedure in conjunction with semiadjustable articulator to obtain balanced occlusion.

CLINICAL REPORT

A 65-year-old man was referred to Department of Prosthodontics, Manipal College of Dental Sciences, Manipal, Karnataka, India, with a chief complaint of difficulty in using his mandibular removable complete denture and inability to masticate food efficiently. Clinical examination of the oral cavity revealed completely edentulous maxillary and mandibular arches which were prosthetically rehabilitated 7 years ago with implants in position A, B, D and a bar-supported mandibular overdenture which employed a bar and clip retention mechanism (Fig. 1). However, the intaglio surface of the mandibular overdenture revealed a distorted clip which

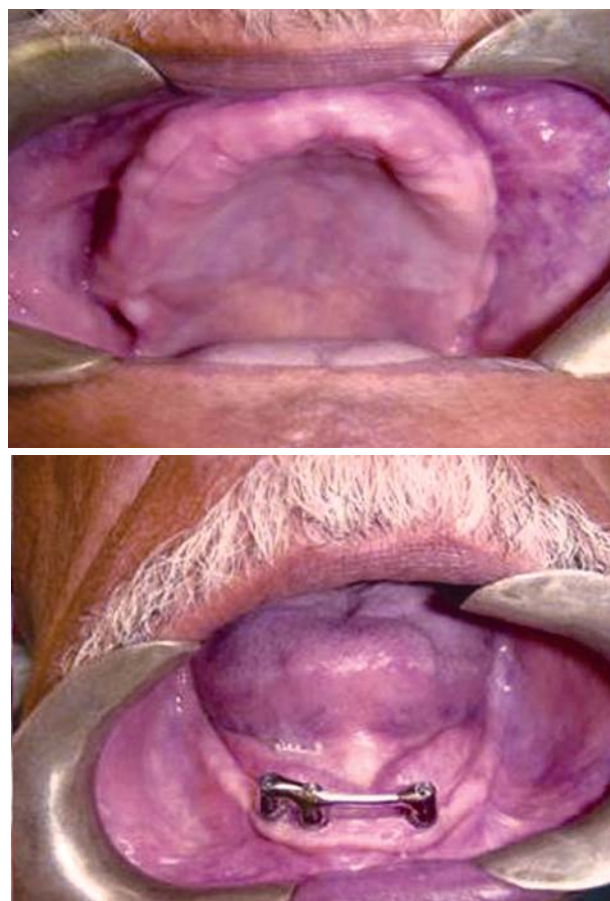


Fig. 1: Preoperative intraoral view

attributed to patients inability to retain the mandibular prosthesis. Various treatment alternatives, such as implant-supported screw retained fixed, refabrication of implant-supported mandibular overdenture were put forth. As the patient was reluctant to undergo any further surgical procedures, it was decided to fabricate a conventional maxillary complete denture and a mandibular bar-supported overdenture with a bar and clip retention mechanism.

Preliminary impressions of maxillary and mandibular arches were made with an irreversible hydrocolloid (Tropicalgin; Zhermack, Badia Polesine, Italy) and were poured in type II and type IV gypsum respectively (Kalstone and Kalrock ; Kalabhai Karson Pvt Ltd, Mumbai, India). Custom made trays for closed tray technique were fabricated with self-cure acrylic resin (DPI-RR Cold cure; Bombay Burmah trading corporation Ltd; Mumbai, India), conventional border moulding procedures were carried out using green stick compound (DPI Pinnacle tracing sticks; Bombay Burmah trading corporation Ltd; Mumbai, India). Final impression for maxillary arch was made with Eugenol free zinc oxide (Cavex outline; cavex Holland BV, Netherlands) and type III gypsum was used to obtain a master cast. Prior to mandibular final impression procedure, the bar was removed and respective short impression copings (Frialit-2 transfer coping D 3.8; Friadent GmbH, Mannheim/Germany) were placed and the impression was made with Polyether impression material (Impregum Penta; 3M ESPE, St.Paul, MN) (Fig. 2). Impression copings were then transferred into the impression, lab analogues (Frialoc implant analog; Friadent GmbH, Mannheim/Germany) were attached and cast was poured in type IV gypsum. Record base and occlusal rims were fabricated after placing the bar on to the mandibular cast. Maxillary cast was mounted using a ear piece facebow (Hanau spring bow; Waterpik technologies, Fortcollis, CO, USA) (Fig. 3) and mandibular

cast was mounted in centric relation using gothic arch tracing on a semiadjustable articulator (Hanau wide vue; Waterpik technologies, Fortcollis, CO, USA). Anterior teeth were arranged (Acryrock teeth set; Dental Manufacturing Ruthinium group, Badiapolesine, Italy) and were later removed after anterior try in and the wax sockets served as guides for them to be replaced at a later stage. Posterior teeth were arranged in cusp to fossa relation at the recorded centric relation and the articulator was then programmed and adjusted for sagittal condylar guidance = 25°; Bennett angle = 15°; sagittal incisal guidance = 25°; lateral incisal guidance = 10° (Condition I of twin stage) (Fig. 4). In order to achieve balanced articulation, the occlusal surfaces of posterior teeth were adjusted to establish a standard cusp angle of 25°. Once this was achieved, the anterior teeth were arranged back in wax socket guides and interferences were eliminated. Posterior try in was carried out to verify the centric relation and was also confirmed with interocclusal records (Aluwax; Aluwax dental products, Allendale, MI) (Fig. 5). Waxed-up dentures were invested, flaked and dewaxed. After dewaxing, clip (Gold bar clip; Friadent GmbH, DE Mannheim) was incorporated on the arbitrarily blocked bar (Fig. 6), packed with heat cure acrylic resin (Trevalon HI, Dentsply India Pvt Ltd, Gurgaon, India) and was cured. Denture was retrieved, trimmed and polished (Fig. 7). Finished prosthesis was inserted and postinsertion instructions were given (Fig. 8). A 6-month follow-up revealed, no adverse clinical signs or symptoms and the patient reported a satisfactory function, esthetics.

DISCUSSION

The use of condition I of twin-stage procedure enables the clinician to attain balanced occlusion eliminating need to record eccentric records to program the articulator. This technique uses average values of condylar and incisal

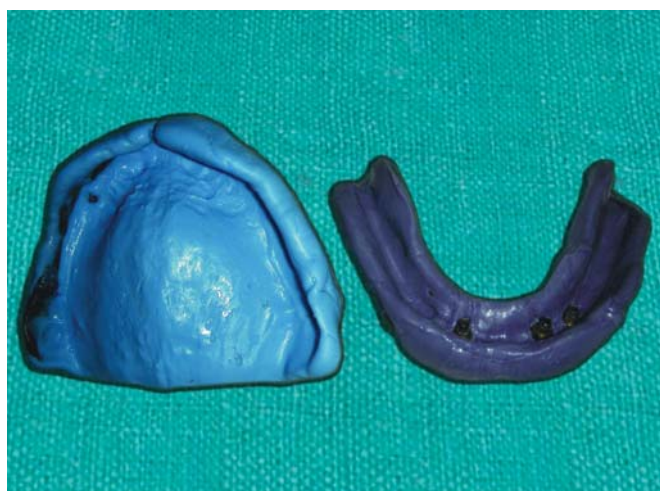


Fig. 2: Maxillary and mandibular final impressions

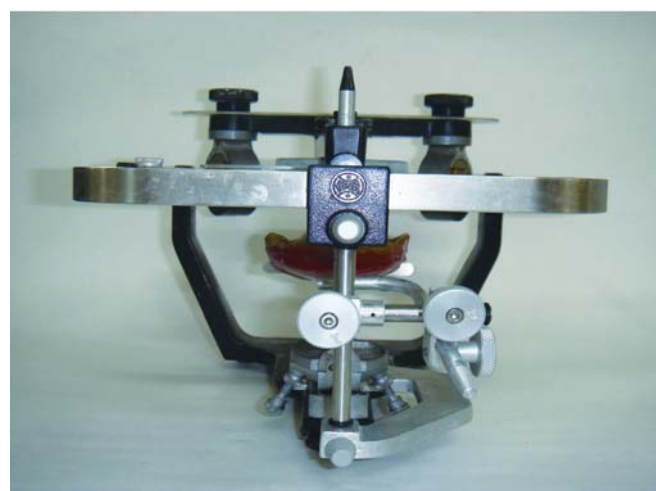


Fig. 3: Transfer of facebow to articulator

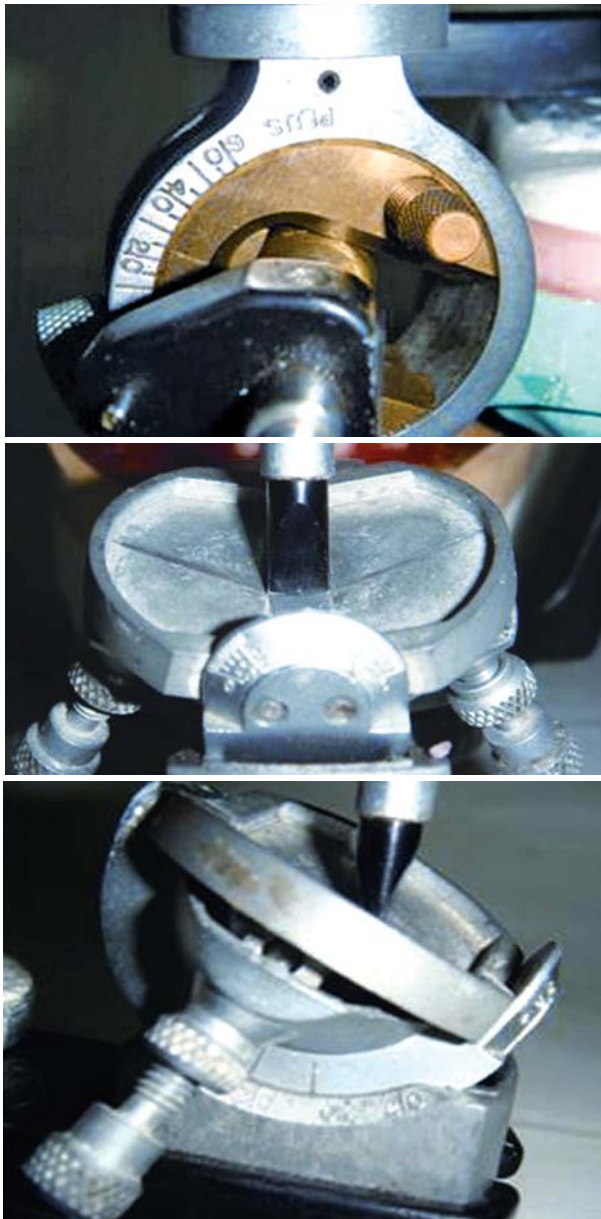


Fig. 4: Articulator adjustments

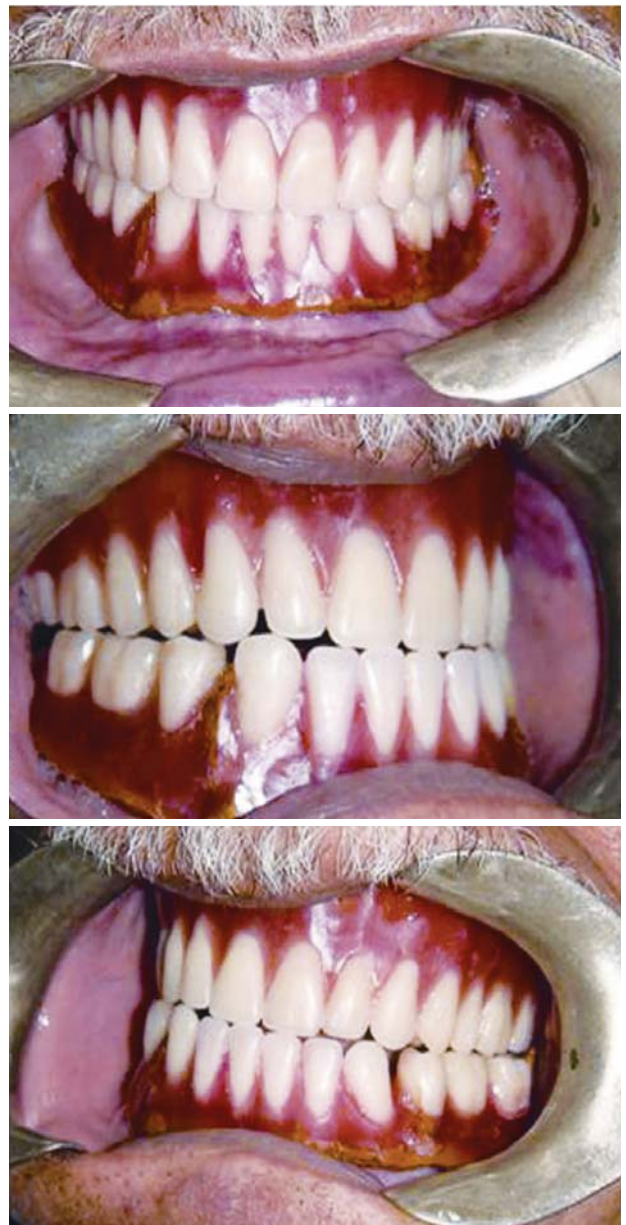


Fig. 5: Waxed-up denture try in

guidance to achieve an effective cusp angle of 25°. Embryologically, the cusp angle is an independent factor from both condylar and incisal paths. To obtain good occlusion in restorative treatment, the critical factor may be to reproduce a standard value for the cusp angle. During the course of fundamental research using the electronic measuring system and mathematical analyses,⁸ influence of condylar path on disocclusion was found to be less than previously thought. It was one-half to one-fourth the influence compared to the incisal path effect on disocclusion. One of the disadvantages of this procedure is whenever, there is an abnormal curve of Spee, standard effective cusp angle presented in the twin-stage procedure cannot be applicable.

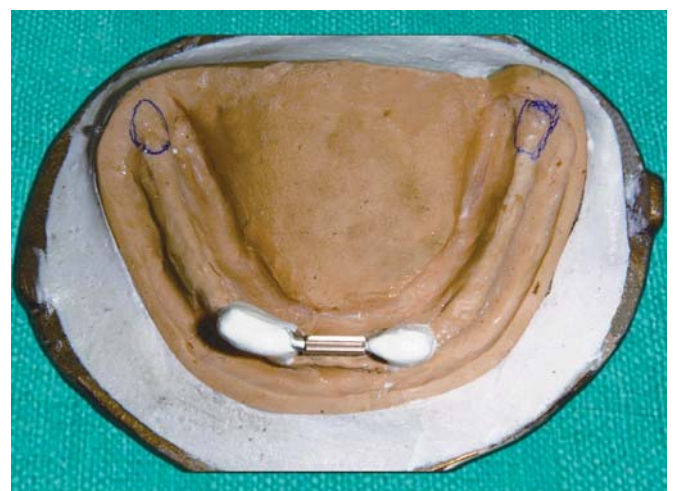


Fig. 6: Incorporation of clip onto bar



Fig. 7: Intaglio and outer surface of finished prosthesis



Fig. 8: Finished prosthesis intraorally in centric, protrusive, lateral movements

SUMMARY

This clinical report demonstrated that balanced occlusion can be achieved by using condition 1 of twin-stage procedure which provides a valuable prosthetic option. Prosthetic treatment included a maxillary complete denture and mandibular implant-supported overdenture. The incorporation of clip over bar significantly contributed to retention and stability.

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