Full mouth rehabilitation using a custom-made broadrick flag: A case report

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ABSTRACT

Introduction: Full mouth rehabilitation is an extensive and intensive restorative procedures in which the occlusal plane is modified to accomplish “equilibration”. An instrument called the Broadrick flag has been used to assist in the reproduction of tooth morphology that is commensurate with the curve of Spee. This case report demonstrates the making and use of a custom-made Broadrick occlusal plane analyzer (BOPA) on a semiajustable articulator to determine the correct orientation of the occlusal plane in a full mouth rehabilitation (FMR). Case Report: A 62-year-old man complained of difficulty in chewing since two years. On clinical examination, it was found that teeth present were 11, 14, 21, while the mandibular arch had all the teeth except 31, 32, 41, 42, 45 after complete examination, case was planned for full mouth rehabilitation using custom made BOPA.

Conclusion: FMR was an the important part in treatment protocol of this case. A custom-made occlusal plane analyzer was fabricated and used for re-establishing the decimated occlusal plane in harmony with the stomatognathic system.

Keywords: Full mouth rehabilitation, Anterior survey point, Posterior survey point, Curve of spee, Occlusal plane

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INTRODUCTION

In the past, “dental cripples” were condemned to full mouth extraction and complete dentures were made. But the changing face of Prosthodontics due to advancement in technology, materials and equipment have simplified the task of rehabilitating diseased mouths.

‘Full mouth rehabilitation’ is an extensive and intensive restorative procedures in which the occlusal plane is modified to accomplish “equilibration” [1]. Proper management of the occlusal plane is essential for full mouth rehabilitation cases. Broadrick occlusal plane analyser (Broadrick flag; Teledyne Water Pik, Fort Collins, Colo.) has been used to assist in the reproduction of tooth morphology that is commensurate with the curve of Spee and its use prevents the introduction of protrusive interferences [2]. The Broadrick occlusal plane analyser (BOPA) is an expensive instrument and has been adapted to only a
few articulator systems, which limits its use universally [3, 4]. To overcome this, a custom-made BOPA was designed for semi-adjustable articulator, which can be used with any semi-adjustable articulator with slight modifications.

This case report demonstrates the making and use of a custom-made Broadrick occlusal plane analyzer which can be utilized with any semi-adjustable articulator very efficiently, for full mouth rehabilitation cases.

Fabrication of customized Broadrick occlusal plane analyser:

Materials Used
- Semiadjustable Articulator (Dentatus articulator type, ARH, Sweden)
- Base plate Wax (DPI, Mumbai, India)
- Metal sleeve with slots (Fly Rail, Rlnwel)
- Clear acrylic sheet (2 mm thick, 4x4 inch) (Apex industry Pvt. Ltd, India)
- Clear self cure acrylic resin (DPI, Mumbai, India)
- A4 Gum stick paper (Desmat)
- Paper holding pins
- Compass (Omega)

Fabrication Method
This is the simplest method for fabrication of highly useful BOPA for any type of semiadjustable articulator. (here described for dentatus articulator, type ARH)
- Clear self cure acrylic resin attachment blocks are fabricated with metal sleeves attached to it, it is made to fit to the upper jaw member of the articulator.
- With the acrylic indices attached and metal sleeve adapted over it, a clear acrylic sheet is adhered with a cyanoacrylate adhesive at the centre of the metal sleeve.
- A gum stick paper of same size is pasted over the clear acrylic sheet.
- The flag is attached to the upper jaw member of the articulator with support of acrylic indices and paper holding pins (Figure 1).

CASE REPORT

A 62-year-old man reported to the Department of Prosthodontics, with chief complaint of difficulty in chewing since two years. On clinical examination, it was found that teeth present were 11, 14, 21, while the mandibular arch had all the teeth except 31, 32, 41, 42, 45 (Figure 2). From diagnostic mounting and intraoral examination it was found that there was decrease in vertical dimension of occlusion, missing maxillary teeth, suprajacent mandibular posterior teeth and deranged occlusal plane. The treatment option opted was a full mouth rehabilitation.

The use of a BOPA was indicated to assess and redesign the level and orientation of the occlusal plane. The maxillary cast was removed from the articulator, and the custom made flag was attached on top of the upper member of articulator. The anterior survey point (ASP) was chosen on the midpoint of the disto-incisal edge of the mandibular right and left canine, from which a long arc of 4-inch radius was drawn on the flag with a compass. The posterior survey point (PSP) was located on the anterior border of condylar element on articulator and a short arc was drawn from the posterior survey point on the flag to intersect the long arc of anterior survey point [5]. The needle of the compass was placed on the point of intersection of both the arc and a four inch radius line was drawn on the buccal surfaces of right mandibular teeth. Similar procedures were repeated for left mandibular teeth. A putty index of polyvinyl siloxane impression material was made on the buccal surfaces of mandibular teeth up to the line.

After diagnosis the treatment was planned in two phases:
- Phase I: Pre-prosthetic treatment - Oral prophylaxis and intentional root canal in relation to 24, 46, 48
- Phase II: Prosthetic treatment

Maxillary: A removable partial denture with rest seats in relation to 11, 21 and a telescopic coping in relation to 24 was fabricated for missing maxillary teeth (Figure 3).

Mandibular: A mock preparation was done on the duplicated diagnostic cast. The mandibular teeth were reduced, maintaining the gross anatomy, with help of occlusal plane cutting guide. A clear acrylic template was prepared over the occlusal and lingual surfaces of prepared mandibular teeth. Intrarorally, mandibular teeth were prepared, maintaining the gross occlusal morphology of the individual tooth by placing the occlusal plane cutting guide and clear acrylic template. Diagnostic wax up was done and duplicated with vacuum formed acrylic sheet. Provisional restorations in relation to 31, 32, 33, 34, 35, 41, 42, 43, 44, 45 and 46 were fabricated.

After a four week trial period, the patient reported that the provisional restorations and upper denture were comfortable, no abnormal wear facets were evident, occlusal contacts were present in maximum intercuspatation position and no interferences in eccentric movements. Permanent restorations were temporarily cemented for one week, necessary corrections were made on recall appointment and then final cementation was done (Figure 4, 5).

DISCUSSION

Mouth is an integral part of somatognathic system. Disruption in any component results in malfunctioning of this system. Reintegration of components of somatognathic system requires full mouth rehabilitation. Full mouth rehabilitation seeks to convert all unfavourable forces on teeth, into favourable forces which permit normal function and therefore induce healthy periodontal conditions. Thus entails the performance of all the procedures necessary to produce
a healthy, aesthetic, well-functioning, self-maintaining somatognathic system [6, 7].

In 1963, Dr Lawson Broadrick developed an instrument to provide a guide to the most suitable position and orientation of the posterior occlusal plane. Its purpose is to permit reconstruction of the Curve of Spee in harmony with incisal and condylar guidance [8, 9]. Since no such apparatus was available with Dentatus semi-adjustable articulator, a custom made BOPA was fabricated, which served the following purposes in the treatment plan of the case:

(a) Preliminary determination of an acceptable plane of occlusion on the study models as an aid in treatment planning.

(b) Preliminary determination of the amount of reduction that will be required when each tooth is prepared.

(c) In the laboratory wax-up and final metal ceramic restoration, determination of the height of each cusp tip, which helped in establishing the curve of Spee and the curve of Wilson.

A maxillary removable partial denture with cingulum rests on metal ceramic restorations in relation to 11, 21 was incorporated which helped in distribution of stresses along the long axis of the tooth and a telescopic coping over 14 for support and retention of prosthesis.

The altered cast impression technique was used for long span edentulous area in upper jaw to distribute the forces uniformly over a broad area.

The weekly follow up for two months showed no clinical signs of occlusal disharmony, no regressive changes in the teeth, maximum intercuspation in centric occlusion, no interferences in protrusive and lateral excursions. The patient reported improvement in masticatory function with the prosthesis.

**CONCLUSION**

Full mouth rehabilitation was an imperative aspect in treatment protocol of this case. It entailed all the procedures necessary to produce a healthy, aesthetic, well-functioning, self-maintaining masticatory mechanism. A custom-made occlusal plane analyzer was
fabricated and used for re-establishing the decimated occlusal plane in harmony with the somatognathic system. Complete treatment procedure ultimately resulted in confidence and satisfaction to the patient.

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Saurabh Chaturvedi – Conception and design, interpretation of data, Drafting the article, Critical revision of the article, Final approval of the version to be published
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Guarantor
The corresponding author is the guarantor of submission.

Conflict of Interest
Authors declare no conflict of interest.

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REFERENCES
1. Goldman I. The goal of full mouth rehabilitation. J Prosthod Dent 1952;2:246–51.
2. Lynch CD, McConnell RJ. Prosthodontic management of the curve of Spee: Use of the Broadrick flag. J Prosthod Dent 2002;87:593–7.
3. Toothaker RW, Graves AR. Custom adaptation of an occlusal plane analyzer to a semi-adjustable articulator. J Prosthod Dent 1999;81:240–2.
4. Small BW. Occlusal plane analysis using the Broadrick flag. Gen Dent 2005;5:250–2.
5. Needles JW. Mandibular movements and articulator design. J Am Dent Assoc 1923;10:927–35.
6. Joseph S.Landa. An analysis of current practices in mouth rehabilitation. J Prosthod Dent 1955;5:537.
7. Gill JR. Treatment planning for mouth rehabilitation. J Prosthod Dent 1952;2:230–45.
8. Dawson PE. Evaluation, diagnosis and treatment of occlusal problems. 2nd ed. St Louis: Elsevier 1989;85:373–81.
9. Bowley JF, Stockstill JW, Attansio R. A preliminary diagnostic and treatment protocol. Dent Clin North Am 1992;36:551–68.