Modified Functionally Generated Path Technique to Develop Occlusal Scheme in Single Complete Denture

Abstract

Single maxillary denture often represents vigorous challenge to the practicing dentists. The difficulty arises when the maxillary dentures are set to fit the occlusion of natural mandibular teeth. The functionally generated pathway technique registers occlusal pathways of the posterior teeth in functional wax and is described as the “three-dimensional static expression consists of dynamic tooth movement.” The current article represents a technique for a patient who was rehabilitated with a maxillary complete denture, and a harmonious occlusion was achieved between the complete denture and the mandibular natural dentition. Functional maxillary denture is therefore in medical dentistry the successful culmination of human’s high practice and represents the golden goal sought by every dental practitioner and expected by every denture patient.

Keywords: Functional chew in, functionally generated path, removable prosthodontics, single complete denture

Introduction

Successful complete denture depends on many variables; three major factors which decide the success of complete denture are retention, stability, and support.[1] In natural articulation, the mandibular teeth move over the maxillary teeth in a harmonious manner. The cusps of upper jaw move in the fossae and grooves of opposing cusps of lower jaw, and normally, there should be no interference during the various mandibular movements.[2] The occlusal surfaces and incisal edges of the teeth need to have certain curved pathways that balance and function harmoniously with the movements of condyles in the glenoid fossae.[3] This is achieved by means of functionally generated path (FGP) technique. FGP is defined as a registration of the paths of movement of the occlusal surfaces of the teeth or occlusal rims of one dental arch in plastic, wax, or other medium attached to teeth or occlusal rims of opposing arch.[4] This article therefore discusses an alternative method to obtain a balanced occlusion for completely edentulous maxillary arch against mandibular natural dentition using FGP technique which was developed way back in the 1930s and is now becoming popular.[5]

Case Report

A 42-year-old male patient reported to the Department of Prosthodontics, Institute of Dental Sciences, Bareilly, seeking replacement of missing upper teeth [Figure 1]. His dental history revealed extraction of mandibular teeth due to periodontitis 2 years ago. Generalized attrition of the mandibular teeth was evident. The mandibular occlusal plane was satisfactory without any supraeruption. Hence, no correction was needed.

In the 1st appointment, impressions of both the arches were made. Irreversible hydrocolloid impression material (Zelgan 2008; DPI-India Mumbai, India) was used for making an impression of the mandibular natural dentition. The preliminary impression of the maxillary arch was made with an impression compound [Figure 2] (Pyrax, Roorkee, Uttarakhand, India) and preliminary casts were made.[6]

In the 2nd appointment, custom tray was fabricated over the preliminary cast, border molding was performed, and a final impression was made with zinc oxide-eugenol impression paste (DPI Impression Paste, Mumbai). The impression was boxed and the cast was made with...
Agarwal, et al.: Modified functionally generated path

Indian Journal of Dental Research | Volume 30 | Issue 2 | March-April 2019

311

type III dental stone. An autopolymerizing acrylic resin record base was constructed on the maxillary cast and a modeling wax occlusal rim was made. An additional record base was constructed on the same cast and impression compound was used to fabricate another maxillary occlusal rim.[7,8]

Modeling wax occlusal rim was adjusted for desired lip support and to establish desired vertical dimension of occlusion.[9] Carding wax was added to the full width and length of the impression compound occlusal rim. This assembly was inserted in the patient’s mouth and the patient was guided to first close into centric occlusion. Indentations of the patient’s mandibular teeth were recorded in the carding wax [Figure 3]. These indentations served as the future centric stops. The patient was then instructed to open the mouth and slowly move the jaw to either left or right (about 5 mm) and then slide the jaw back into the centric position. This was repeated several times before accepting it as the final record. The wax indentations of the mandibular teeth acted as a guide to close it in the centric position. This was done for both left and right lateral excursions. Similarly, the protrusive movement was also recorded.

The completed wax-path record was placed on the master cast, and the mandibular cast was removed from the articulator.

The generated wax path was carefully boxed and vacuum-spatulated, dental stone Type III was poured into it. This formed the stone core which was attached to the articulator. The wax was cleaned from the stone core.[9] All the artificial teeth were arranged against the stone core. Trial dentures were then inserted into the patient’s mouth and were checked for esthetics, phonetics, vertical dimension, and centric occlusion. The denture was then processed. Laboratory remount was done of the processed dentures against the stone core [Figure 4]; the denture was inserted in the patient’s mouth [Figure 5] without any deflective occlusal contacts; smooth protrusive and lateral excursions were achieved [Figures 6 and 7]. The patient satisfactorily accepted the denture as evident in recall visits and has been using it comfortably for the past 8 months.[6]

Discussion

FGP technique is a simple and positive approach which can produce excellent results. This technique is capable of producing very accurate results, but it demands great care and meticulous attention to detail.[2] In the present technique, patient’s own functional jaw movements were used to form a three-dimensional opposing cast or template.[10] The patient reproduced a kinetic record of his own jaw movements in gliding and masticatory mandibular excursions. These centric and eccentric records were used to achieve a harmonious balanced occlusion in a single complete denture without modifying the natural dentition of the patient.[11] Vig described a similar technique but recommended the use of a fin of a resin placed into the central grooves instead of compound. The clinical and laboratory procedures were essentially the same as the
usual denture techniques, except in the use of the FGP, the occlusal surfaces of the denture teeth were adjusted according to the stone core which represented the generated path.[9]

Conclusion

The FGP technique is indicated for complete denture opposed by natural or reconstructed teeth. Although above-mentioned method differs from the usual approach of denture construction, it can be easily mastered.[9] Harmoniously balanced occlusion between the maxillary complete denture and the mandibular natural dentition by modifying Meyer’s FGP technique can be easily attained.[6] If the FGP technique is carefully recorded, only minimal occlusal adjustments will be required during denture insertion, which is a major advantage over the conventional technique.[2]

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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