VOLUME - 15, ISSUE - 05, MAY - 2026 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Dentistry

# INJECTION MOULDING TECHNIQUE FOR OCCLUSAL PLANE CORRECTION IN A SINGLE COMPLETE DENTURE CASE: A CLINICAL REPORT

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**ABSTRACT** Full mouth rehabilitation in patients with a completely edentulous maxilla opposing a compromised mandibular dentition is a complex prosthodontic challenge due to altered occlusal plane, reduced vertical dimension, and unfavourable force distribution. This case report describes the rehabilitation of a male patient presenting with difficulty in mastication, characterized by a completely edentulous maxillary arch and a mandibular arch with generalized attrition, supra-eruption, missing incisors, and a failing fixed partial denture (FPD). A systematic approach was adopted involving re-establishment of the vertical dimension of occlusion (VDO) and correction of the occlusal plane using Broadrick Occlusal Plane Analysis. A diagnostic wax-up guided treatment planning, and mandibular rehabilitation was carried out using an indirect composite injection moulding technique, which allowed precise transfer of the planned occlusion in a minimally invasive manner. A new FPD replacing 33 32 31 41 42 43 44 was fabricated, followed by the construction of a maxillary complete denture with bilaterally balanced occlusion. Correction of the mandibular occlusal plane was crucial in achieving simultaneous bilateral contacts, thereby improving denture stability. Considering that masticatory forces in complete denture wearers are significantly lower than those in natural dentition, appropriate occlusal design further enhanced functional efficiency. The treatment resulted in improved aesthetics, function, and patient satisfaction, demonstrating that injection moulding is a predictable and conservative approach for full mouth rehabilitation.

**KEYWORDS :** Full Mouth Rehabilitation, Injection Molding, Broadrick's Analysis, Bilaterally Balanced Occlusion, Composite Resin.

## INTRODUCTION

Full mouth rehabilitation of patients with a completely edentulous maxilla opposing a partially dentate mandible presents significant biomechanical and occlusal challenges. The presence of an irregular mandibular occlusal plane due to attrition, supra-eruption, and missing teeth often prevents the establishment of a harmonious occlusion, ultimately compromising denture stability and longevity.

Achieving bilaterally balanced occlusion is critical in complete denture prosthodontics, as it enhances retention and stability during functional movements. However, such balance is unattainable without prior correction of the mandibular occlusal plane. Literature emphasizes that improper alignment of mandibular teeth and occlusal discrepancies can lead to instability and mechanical failure of the prosthesis.

Conventional treatment approaches often involve extensive tooth preparation with full coverage restorations. In contrast, the injection moulding technique using composite resin represents a minimally invasive, additive approach that lies between traditional crown-and-bridge rehabilitation and removable prosthetic options. This technique allows precise replication of a diagnostic wax-up while preserving tooth structure and improving efficiency and predictability.

Additionally, studies have demonstrated that masticatory forces and chewing efficiency in complete denture wearers are significantly reduced compared to natural dentition, necessitating careful occlusal planning to distribute forces evenly and enhance prosthesis longevity. Advances in composite materials further support their use in full mouth rehabilitation, offering favourable mechanical properties, repairability, and acceptable long-term clinical performance.

This case report illustrates a structured and minimally invasive approach combining occlusal analysis, injection moulding technique, and complete denture prosthodontics to achieve functional and aesthetic rehabilitation

A male patient reported with the chief complaint of difficulty in mastication. Clinical examination revealed a completely edentulous maxillary arch (fig.a). The mandibular arch showed generalized attrition, supra-eruption of posterior teeth, missing mandibular incisors, and a failing fixed partial denture extending from 33 to 43 (fig.b).

### Treatment Objectives

- Establish a functional vertical dimension of occlusion (VDO)
- Correct the mandibular occlusal plane
- Restore mandibular dentition using a minimally invasive approach
- Fabricate a new FPD (33 to 43)
- Provide a maxillary complete denture with bilaterally balanced occlusion

Primary impressions were made using irreversible hydrocolloid and impression compound, followed by secondary impressions using elastomeric materials. A facebow record was obtained and transferred to a Hanau semi-adjustable articulator to simulate mandibular movements accurately.

Maxillomandibular relations were recorded to determine the appropriate VDO. Broadrick Occlusal Plane Analysis was performed using a Broadrick flag to establish the ideal curvature and orientation of the mandibular occlusal plane, ensuring compatibility with functional mandibular movements.

A diagnostic occlusal wax mock-up was fabricated based on the established VDO and corrected occlusal plane. This served as a guide for evaluating aesthetics, phonetics, and occlusal harmony prior to definitive treatment.

Intraoral correction of the mandibular occlusal plane was performed according to the diagnostic wax-up The composite build-up of the mandibular dentition was performed using an indirect injection moulding technique, which enabled precise transfer of the diagnostic wax-up into the oral cavity while

preserving maximum tooth structure. Following the establishment of the vertical dimension of occlusion and correction of the occlusal plane, a diagnostic wax-up was completed to guide the final morphology. Based on this wax-up, a transparent thermoplastic template was fabricated using a vacuum-formed soft sheet. The template accurately replicated the planned occlusal anatomy, and injection ports were created on the occlusal surfaces to allow controlled delivery of composite resin.

Prior to the procedure, minimal tooth preparation was carried out as the technique is primarily additive in nature. The tooth surfaces were cleaned thoroughly to remove debris and plaque, and selective enameloplasty was performed where required. Adequate isolation was maintained using rubber dam. A conventional adhesive protocol was followed, wherein the enamel surfaces were etched with 37% phosphoric acid for 15–20 seconds (fig.c), rinsed thoroughly, and gently air dried. A bonding agent was subsequently applied and light-cured.

The transparent template was then carefully positioned intraorally(fig.d). Injectable composite resin was introduced through the preformed injection ports(fig.e). Gentle pressure was maintained to facilitate complete seating and intimate contact of the material with the prepared surfaces. Light curing was performed through the transparent index to ensure adequate polymerization of the composite resin(fig.f).

After complete curing, the template was carefully removed, and the excess composite material was trimmed using finishing burs and hand instruments. Occlusal refinement was carried out to establish proper contacts in centric and eccentric movements, with particular emphasis on achieving simultaneous bilateral contacts to enhance the stability of the opposing complete denture. Final finishing and polishing were performed using polishing discs and rubber points to obtain a smooth surface texture and natural anatomical contours.

This technique allowed accurate reproduction of the diagnostic wax-up intraorally, facilitating correction of the mandibular occlusal plane with minimal removal of sound tooth structure. The injection moulding approach provided a predictable and efficient method for restoring worn dentition while maintaining a conservative treatment philosophy.

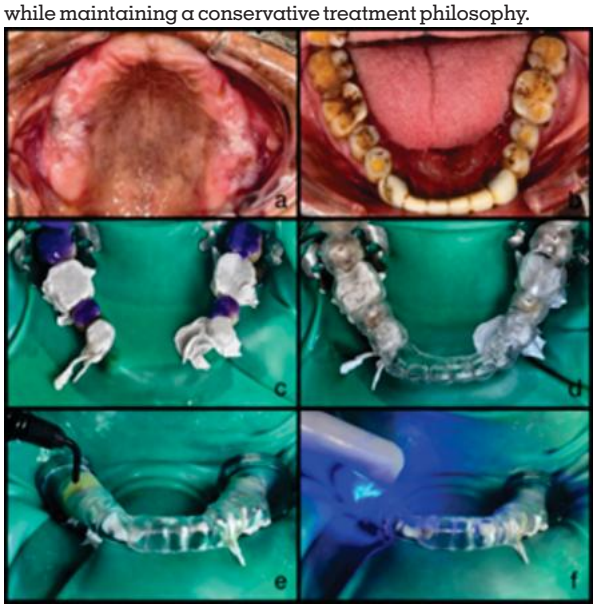


Fig.a Maxillary arch, Fig.b Mandibular arch, Fig.c acid etching of alternate teeth Fig.d template adapted Fig.e injectable composite resin was introduced through the preformed injection ports Fig.f light curing was performed through the transparent index.

Following mandibular occlusal correction, maxillary teeth were arranged to achieve esthetics, phonetics, and bilateral balanced occlusion. The trial denture was evaluated intraorally for vertical dimension, centric relation, and occlusal harmony, and necessary adjustments were made.

The denture was fabricated using conventional heat-cured PMMA through standard processing, finishing, and polishing procedures to ensure optimal fit, retention, and stability.

At delivery, fit and occlusion were verified and adjusted. The patient was instructed on denture hygiene, insertion and removal, avoidance of hard foods initially, night-time removal, and the need for regular follow-up visits.

## CONCLUSIONS

This case demonstrates that correction of the mandibular occlusal plane combined with a minimally invasive injection moulding technique and complete denture rehabilitation can effectively restore function, stability, and esthetics. The approach offers a conservative, predictable, and adaptable solution for managing single complete denture cases with compromised opposing dentition.

## DISCUSSION

Rehabilitation of an edentulous maxilla opposing mandibular dentition is biomechanically challenging due to unfavourable force distribution and compromised denture stability. Occlusal plane correction is therefore critical for achieving functional harmony.

In this case, the injection moulding technique enabled precise, minimally invasive composite build-up with predictable transfer of the diagnostic wax-up. Composite, though traditionally considered less wear-resistant, has shown improved properties with newer formulations and offers advantages such as conservatism, cost-effectiveness, and reparability.

Importantly, complete denture wearers exhibit significantly reduced bite forces and masticatory efficiency , resulting in lower occlusal loading. When opposed by acrylic denture teeth, which are softer and less abrasive, composite wear is further minimized.

Thus, despite its limitations, composite is a clinically acceptable material for occlusal build-up in such cases, owing to reduced functional forces and the need for adaptability.

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