Case Report

Metal Meets Function: Complete Denture with Metal Occlusal Surface – A Case Report

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ABSTRACT

Acrylic resin teeth are highly susceptible to accelerated occlusal degradation, a condition that may precipitate diminished masticatory efficacy, loss of vertical dimension of occlusion (VDO), prosthetic instability, and temporomandibular joint (TMJ) dysfunction. Numerous strategies have been proposed to mitigate this clinical challenge, including the integration of highly cross-linked acrylic teeth, the utilization of amalgam or metallic occlusal inserts, composite restorations, or the application of gold and metallic occlusal veneers. While various protocols for the fabrication of metallic occlusal surfaces are documented in the literature, these methodologies are frequently associated with prohibitive costs, extensive laboratory timelines, and complex, multi-stage procedures. Additionally, these conventional workflows often necessitate prolonged patient periods of prosthetic edentulism during the manufacturing phase. This article elucidates a streamlined, efficient, and economically viable technique for the construction of metallic occlusal surfaces on complete dentures, presenting a pragmatic alternative to traditional restorative methods.

Key words: Metal occlusal surface, Porcelain teeth, Tooth wear, Prosthesis durability

INTRODUCTION

The clinical utility of acrylic resin denture teeth is frequently constrained by rapid occlusal attrition, which can precipitate critical sequelae, including alterations in centric occlusion, the development of temporomandibular disorders (TMD), diminished masticatory efficiency, loss of vertical dimension of occlusion, and subsequent prosthetic instability. The severity of this degradation is multifactorial, being influenced by both underlying clinical conditions and the duration of prosthesis service.[1]

Parafunctional activities, including bruxism, clenching, and gnashing, are significantly prevalent, with studies indicating that 15–20% of patients undergoing prosthetic therapy engage in such behaviors.[2,3,4] These activities exert continuous, excessive force on dental restorations, which can compromise the integrity, retention, and longevity of the prosthesis. Consequently, various investigators have documented techniques for the fabrication of metallic occlusal surfaces to provide enhanced durability for patients manifesting severe occlusal wear, orofacial tardive dyskinesia, or self-induced excessive masticatory habits.[4,5]

The application of metallic occlusal surfaces is particularly indicated for dentures opposing restorations with gold occlusal surfaces, or when constructing complete dentures, removable partial dentures, and overdentures using the functionally generated path (FGP) technique, which necessitates extensive occlusal refinement.[6] Furthermore, this therapeutic modality is indicated when enhanced structural reinforcement and long-term durability of the prosthesis are required. This article describes a rapid, straightforward, and cost-effective technique for the clinical fabrication of metallic occlusal surfaces on complete dentures.

CASE REPORT

A 58-year-old male patient presented to the Department of Prosthodontics, Crown and Bridge, Institute of Dental Sciences, Bareilly, with the chief complaints of severely worn denture occlusal surface.

Intraoral examination revealed completely edentulous maxilla with partially edentulous mandibular arch. (Figure 1).

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Fig. 1: Preop

Further clinical assessment revealed the history of four complete denture fabrication i.r.t maxillary arch within a time span of three-years. Although the prostheses maintained adequate retention, the rapid progression of occlusal attrition necessitated frequent replacements, resulting in significant patient discomfort, psychological distress, and the logistical burden of recurrent clinical appointments.

To address this complex clinical presentation and mitigate the rate of prosthetic tooth wear, the fabrication of complete dentures featuring cast metal occlusal surfaces was indicated. Metal occlusal surfaces are frequently recommended for dentures opposing natural dentition, as well as for prostheses where superior durability and heightened resistance to occlusal wear are required.

Following a comprehensive evaluation of the patient's clinical requirements, a modified protocol for the fabrication of these prostheses was implemented. While standard clinical and laboratory workflows were initially followed, specific modifications were integrated to achieve the desired therapeutic outcomes. After a successful wax try-in appointment, the prosthesis was processed, finished, and polished utilizing a laboratory remount procedure. To facilitate the metal integration, polyvinylsiloxane putty indices (Aquasil Soft putty/Regularset, Dentsply, Germany) were generated for each quadrant. Subsequently, the posterior acrylic teeth were meticulously prepared with central retentive tags to accommodate the metal copings without compromising the vertical dimension of occlusion. [Fig. 2a]

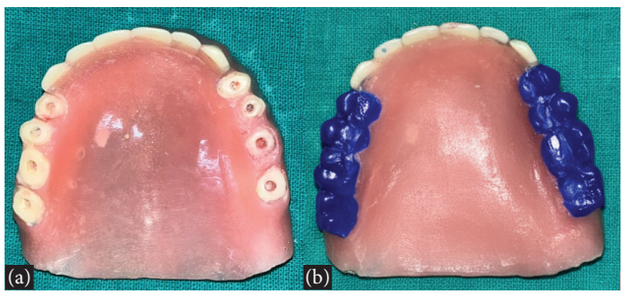

Fig. 2(a and b): Coping and post preparation, wax pattern fabrication

Wax patterns were constructed utilizing inlay casting wax (kronenwachs, bego, Germany), refined for precision, and verified for appropriate seating and retention [Fig. 2b]. The patterns were then invested in phosphate-bonded investment material (Bellasun, Bego, Germany) and cast in a nickel-chromium alloy (wirocer plus,bego, germany). Final finishing and polishing of the castings were performed in accordance with standard laboratory protocols [Fig. 3 a,b].

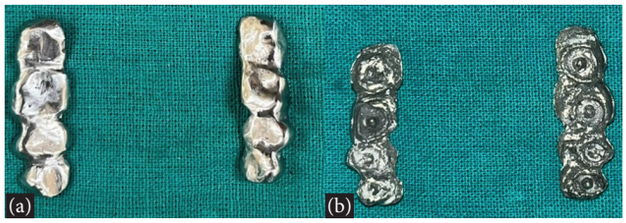

Fig. 3(a and b): Polished metal copings

After proper finishing and polishing the metal catings were cemented on the acrylic tooth surface using tooth colored self polymerizied acrylic resin (DPI, Mumbai, India)(Fig. 4). Denture insertion was done (Fig. 5a,b,c,d). Recall visits were scheduled after 24hours, 1 week, 1 month, and then every subsequent 3 months initially. Patient was on regular yearly follow up there after. Denture provided the effective services to the patient satisfaction.

Fig. 4(a and b): Metal copings luted with tooth colored acrylic to the denture

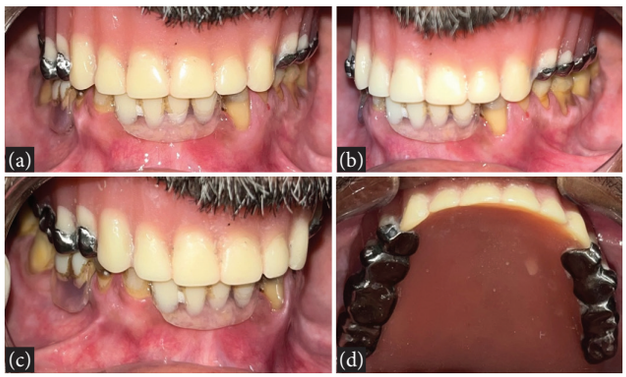

Fig. 5(a to d): Post op

DISCUSSION

The application of conventional denture fabrication techniques, with appropriate clinical and laboratory modifications, can enhance treatment outcomes and contribute to long-term clinical success. Although the present technique involves an additional clinical and laboratory step, it proved effective in addressing the patient's persistent problem of excessive prosthetic tooth wear.[4,5]

Metal occlusal surfaces offer several advantages, including the superior physical properties of metal, improved adaptability of the occlusal surfaces, and a positive psychological impact resulting from increased prosthesis durability. However, certain limitations must also be considered, such as compromised esthetics, the need for mechanical retention between the metal and acrylic resin, and the increased weight of the prosthesis.[6]

Porcelain teeth may be considered as an alternative to metal occlusal surfaces; however, they are associated with greater stress transmission to the supporting structures, brittleness, higher cost, and reliance on mechanical retention within the denture base.[7] Another alternative is the use of silver amalgam restorations, which are relatively economical and require fewer clinical and laboratory procedures. Nevertheless, amalgam is generally limited to the restoration of occlusal fossae, pits, and fissures rather than the entire occlusal surface. Consequently, its application may be more suitable in cases involving a single complete denture rather than situations requiring extensive reinforcement of prosthetic teeth.[8]

Recently, the dual milling technology is used for facbrication of metal occlusal denture for its ability to ensure highly accurate occlusion. The digital nature of this workflow minimizes the potential for assembly errors that might occur with more manual, conventional fabrication methods.[9]

CONCLUSION

Within the limitations of this clinical report, the use of metal occlusal surfaces demonstrated favorable long-term outcomes in managing excessive prosthetic tooth wear. The technique was particularly beneficial in addressing the functional challenges associated with the patient's condition and may be considered a viable treatment option when posterior esthetics is of lesser concern. Four years of follow-up revealed sustained patient satisfaction, satisfactory prosthesis performance, and no requirement for denture replacement, indicating the durability and clinical effectiveness of this approach.

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