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Esthetic Rehabilitation of Elongated and Discolored Maxillary Central Incisors Using Mock-Up–Guided Restoration: A Case Study

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Abstract: **Elongation and discoloration of maxillary central incisors can compromise smile esthetics and patient confidence. This case study presents the esthetic rehabilitation of elongated and discolored maxillary central incisors using a mock-up–guided restorative approach with zirconia crowns. A diagnostic wax-up and intraoral mock-up were performed to assess tooth proportions, incisal length, and overall smile harmony prior to definitive treatment. The mock-up served as a guide for conservative tooth preparation and enhanced patient communication. Monolithic zirconia crowns were fabricated and cemented to restore optimal form, color, and function. Post-treatment evaluation demonstrated significant improvement in esthetics, proper occlusion, and patient satisfaction. Mock-up–guided zirconia restorations provide a predictable, durable, and esthetically pleasing solution for anterior dental rehabilitation.**

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I. INTRODUCTION

The maxillary central incisors are the most dominant teeth in the esthetic zone and play a vital role in facial appearance, phonetics, and smile harmony. Alterations in their color, size, or morphology can significantly compromise esthetics and negatively impact a patient's psychological well-being [1,2]. Elongation and discoloration of maxillary incisors are commonly associated with trauma, developmental disturbances, parafunctional habits, and previous restorative or endodontic interventions [3].

Esthetic rehabilitation of such cases requires careful evaluation of tooth proportions, incisal display, gingival architecture, and occlusal relationships to achieve a harmonious and natural outcome [4]. Diagnostic wax-ups and intraoral mock-ups are widely accepted tools in contemporary esthetic dentistry, allowing visualization of the proposed treatment outcome, improving patient communication, and guiding conservative tooth preparation [5,6]. The mock-up approach enhances predictability by enabling assessment of functional and esthetic parameters prior to definitive restoration.

Zirconia has gained widespread acceptance as a restorative material due to its superior mechanical properties, biocompatibility, favorable marginal adaptation, and advancements in optical characteristics [7,8]. With improvements in translucency and layering techniques, zirconia-based restorations are increasingly used in the anterior region, offering a balance between strength and esthetics [9]. When combined with a mock-up–guided protocol, zirconia crowns provide predictable esthetic results with long-term clinical success.

This case study describes the esthetic rehabilitation of elongated and discolored maxillary central incisors using a mock-up–guided restorative approach with zirconia crowns, emphasizing the clinical rationale and advantages of this treatment modality.

II. CASE REPORT

A 29 year old women patient reported to the Department of Prosthodontics and Crown & Bridge, Babu Banarasi Das Dental Hospital with a chief complaint of an unaesthetic appearance due to discoloration and an asymmetrically larger crown in the upper front tooth (Fig 1,2) Patient had a history of road accident 15 years back following which the teeth in the upper front region got fractured. Composite restoration in upper anterior teeth 21 and PFM crown was given with anterior teeth 11 after root canal treatment. There was no relevant medical history.

On clinical examination, improperly finished and discolored composite restoration was found on the labial

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aspect and elongated PFM crown restoration was found. Assessment of occlusion, morphology and optical characteristics was done. Considering the extent of defect and patients esthetic demands, it was found that zirconia crown were best suited.

Alginate impression was taken and mock up was done on diagnostic cast (FIG.3). Putty index (Zhermack Elite Hd+ Putty Soft Fast Set) was made using the mock-up(FIG.4). Prior to beginning of teeth preparation, shade selection was performed using a Vita shade guide – 3D Master.

Fig 1 Pretreatment

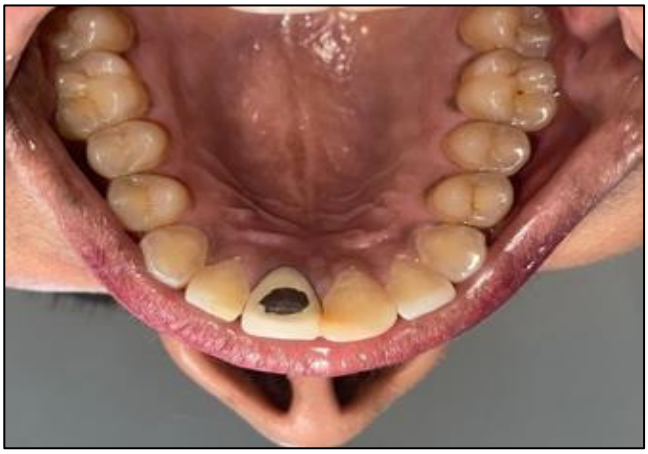

Fig 2 Pretreatment (Occlusal View)

Fig 3 Mock Up

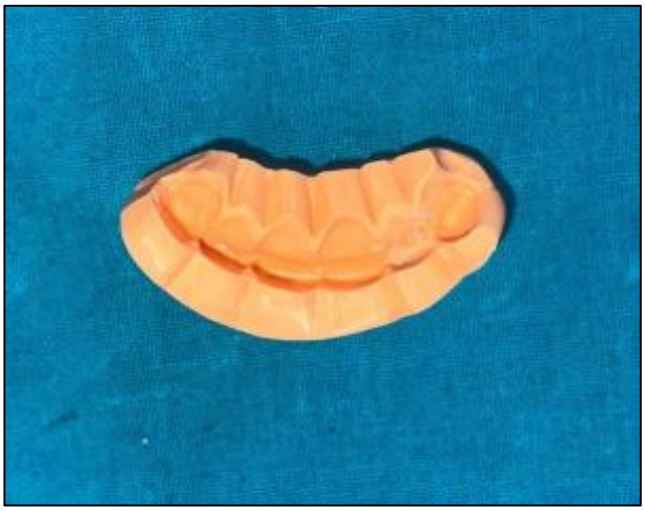

Fig 4 Putty Index

Intentional RCT was done with 21. The PFM prosthesis was removed (Fig. 5,6).

Tooth preparation was done using a long tapered chamfer ended diamond bur (Fig.7).

After completion of the teeth preparation full arch impressions were made using Putty wash single mix technique and an occlusal registration was made (Fig 8). Temporary crowns made with bisacrylate material and polished to a smooth finish were luted to the prepared teeth using non-eugenol temporary cement (Fig 9).

The impression was sent to the lab, refractory stone models of the prepared teeth were made and layered zirconia crowns were fabricated by a CAD-CAM milling process. (Fig 10). Bisque trial: Fit of the prosthesis, incisal contacts at centric and eccentric movements, and shade match were assessed at this stage. For final placement, rubber dam and retraction cord were placed to maintain a contamination free and dry operating field. The intaglio surface of the crown was sandblasted and luted with 3M ESPE Rely X (Fig .11)

Fig 5 After Crown Removal

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Fig 6 Removed PFM Crown


Fig 9 Temporary Crown


Fig 7 Tooth Preparation


Fig 10 CAD-CAM Milled Zirconia (Labial View)

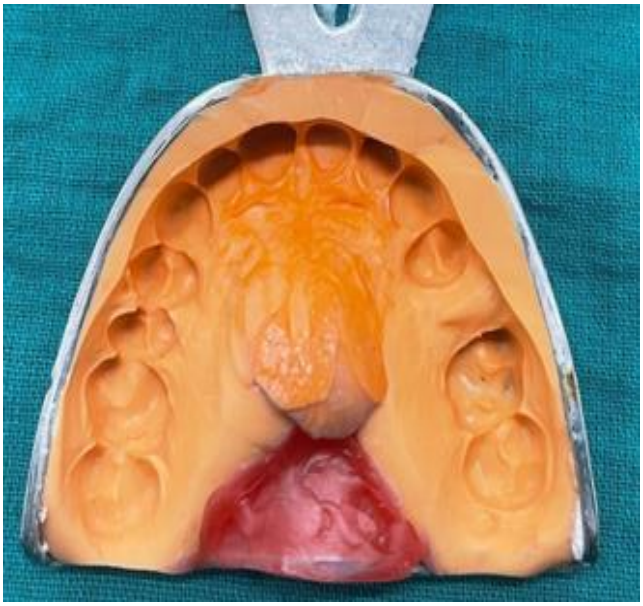
Fig 8 Putty Wash Impression


Fig 11 Postoperative

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III. DISCUSSION

Successful esthetic rehabilitation of anterior teeth depends on meticulous diagnosis, material selection, and execution of a treatment plan that integrates esthetics with function. In the present case, elongation and discoloration of the maxillary central incisors resulted from previous trauma and inadequate restorations, leading to compromised smile harmony and patient dissatisfaction.

The use of a diagnostic wax-up and intraoral mock-up played a crucial role in treatment planning. Mock-ups allow three-dimensional visualization of the final restoration, enabling evaluation of tooth length, contour, incisal edge position, and occlusal relationships before irreversible tooth preparation [5,6]. This approach also improves patient acceptance by allowing them to preview the anticipated outcome and participate actively in treatment decisions.

Zirconia was selected as the restorative material due to its high fracture resistance, excellent biocompatibility, and favourable esthetic properties. Studies have demonstrated that zirconia-based crowns exhibit high survival rates and satisfactory esthetic outcomes when used in anterior restorations [7,9]. Layered zirconia further enhances translucency and shade matching, making it suitable for esthetic zones.

Proper tooth preparation with a chamfer finish line ensured adequate material thickness while preserving tooth structure. CAD-CAM fabrication contributed to precision, marginal accuracy, and consistency of the final restorations [8]. Adhesive luting using resin cement further improved retention and marginal seal, contributing to long-term success.

The mock-up–guided approach combined with zirconia restorations resulted in improved esthetics, optimal occlusion, and high patient satisfaction. This technique demonstrates a predictable and conservative solution for managing complex esthetic challenges in the anterior region.

IV. CONCLUSION

Mock-up–guided esthetic rehabilitation offers a predictable and patient-centred approach for restoring elongated and discoloured maxillary central incisors. The use of diagnostic wax-ups and intraoral mock-ups enhances treatment planning, guides conservative tooth preparation, and improves communication between the clinician and patient. Zirconia crowns, when fabricated using CAD-CAM technology and appropriate layering techniques, provide excellent strength, esthetics, and long-term clinical performance in the anterior region. The present case highlights that a systematic, mock-up–guided protocol combined with zirconia restorations can successfully restore form, function, and smile harmony with high patient satisfaction.

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