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Smile designing and facial aesthetics in prosthodontic rehabilitation: Case report

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Abstract
This case report describes the esthetic rehabilitation of a 16-year-old male with severe fluorosis on maxillary anteriors. Diagnostic evaluation, wax-up, and mock-up were performed to plan treatment. Conservative tooth preparation was followed by digital intraoral scanning and CAD/CAM fabrication of lithium disilicate crowns. The restorations were adhesively cemented under rubber dam isolation. A systematic integration of conventional and digital techniques resulted in improved esthetics, function, and patient satisfaction.

Keywords: Dental fluorosis, Esthetic rehabilitation, CAD/CAM dentistry, Lithium disilicate crowns, Digital smile design

Introduction

A smile is one of a person's greatest beauty assets, and a defective smile can be perceived as a physical handicap since the mouth and teeth attract significant attention. With increasing aesthetic awareness, patients seek treatments that provide optimal functional and cosmetic outcomes. Traditionally, smile enhancement in prosthodontics relies on the dental technician's expertise through a diagnostic wax-up, which helps in treatment planning, patient communication, provisional restorations, and guides final prosthesis fabrication. The wax-up must be accurate, aesthetic, and clinically feasible.

Modern digital approaches such as CAD/CAM and Digital Smile Design (DSD) allow clinicians to create 3D digital models, design restorations virtually, and fabricate them using advanced technologies like 3D printing. These methods improve precision, predictability, and aesthetic outcomes.

This case report presents a multidisciplinary approach integrating functional, aesthetic, and conservative restorative procedures.

Case repor

A 16-year-old male presented with discolored maxillary anterior teeth and was concerned about his smile aesthetics. History and preoperative photographs were recorded. The patient had severe dental fluorosis, with no significant medical, family, or previous dental history.

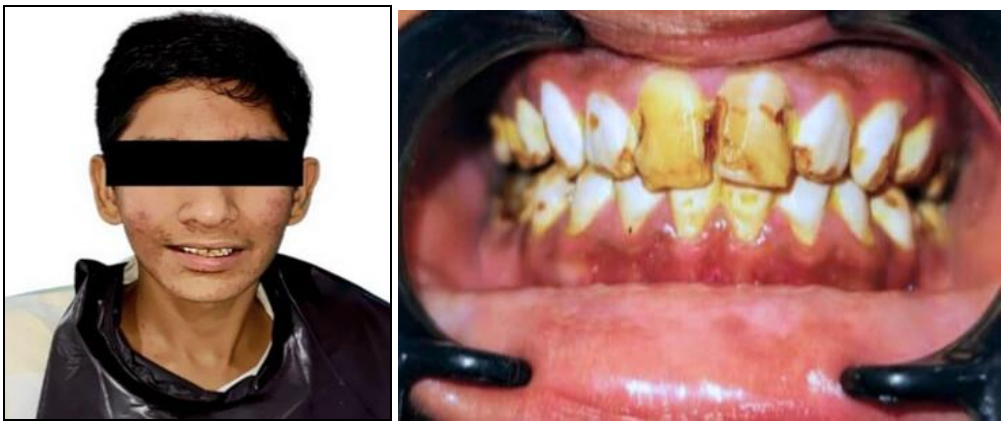

Fig 1

Clinical Examination

Extraoral examination revealed a symmetrical face with a tapered facial form and straight profile. Intraoral examination showed severe dental fluorosis with healthy gingiva and a thick biotype, along with minor asymmetry in gingival zeniths.

Diagnostic Records

Diagnostic impressions and study models were made (Fig 2) for diagnosis, treatment planning, and prosthesis design.

Treatment Objectives: Improve aesthetics, preserve enamel, smooth surface defects, restore form and function, and enhance patient confidence.

Treatment Plan: Diagnostic wax-up followed by lithium disilicate ceramic restorations, with a mock-up for aesthetic evaluation and patient approval.

Clinical Steps – Tooth Preparation

Anterior all-ceramic crown preparation was performed to ensure adequate ceramic thickness while conserving tooth

structure. Labial reduction of 1.0–1.5 mm was done in two planes, incisal reduction of 1.5–2.0 mm using a butt-joint/incisal overlap design, and lingual reduction of 0.8–1.0 mm. A 1.0–1.2 mm shoulder or heavy chamfer finish line with rounded internal angles was placed supragingivally (Fig 3). All line angles were rounded with a 6–10° taper to achieve optimal strength, esthetics, and periodontal health.

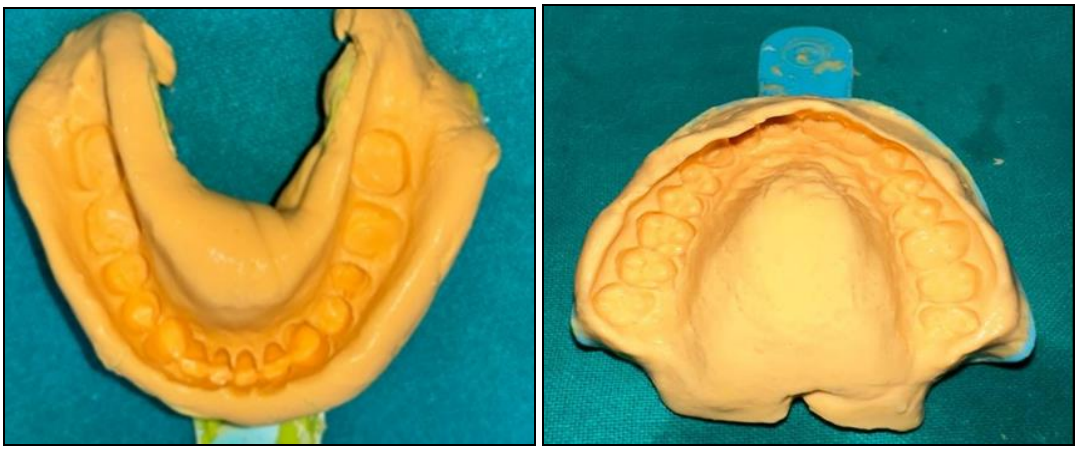

Fig 2: (Diagnostic Impression i.r.t maxillary and mandibular arch)

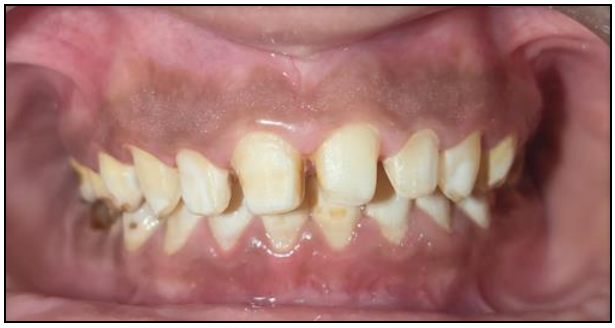

Fig 3

Retraction Cord Placement

In maxillary anterior teeth, a retraction cord is placed to laterally and vertically displace gingival tissues, exposing the finish line for accurate intraoral scanning. The cord is gently packed into the sulcus using a cord packer under dry field conditions to achieve hemostasis and moisture control (Fig 4). Proper retraction ensures precise margin capture, prevents distortion, and enhances the fit and esthetics of anterior restorations.

Fig 4

Digital Impression / Intraoral Scanning and Provisionalization

An intraoral scan of the prepared maxillary anterior teeth is performed to obtain a precise digital impression of the tooth preparations, clearly capturing the finish lines, margins, surface details, and spatial relationship with adjacent and opposing teeth. Adequate soft-tissue retraction and moisture control are ensured to allow accurate margin recording. The digital scan provides essential data for CAD–CAM designing and fabrication of esthetic restorations such as veneers or crowns, while eliminating inaccuracies associated with conventional impression materials.

Fig 5

Provisional restorations: Were fabricated using the temporary resin material, ensuring proper contour, contacts, and aesthetics during the laboratory phase.

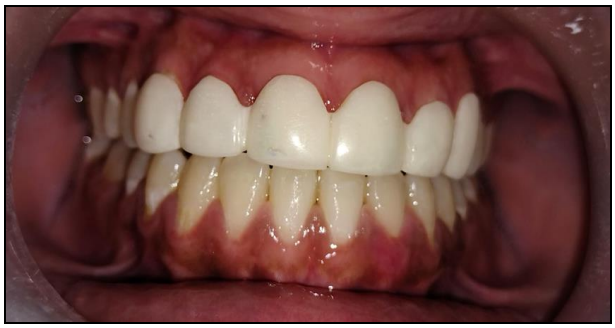

Fig 6

Laboratory Fabrication

Lithium disilicate full crowns were fabricated using the pressed ceramic technique, then finished, characterized, and glazed for optimal esthetics.

Try-In

Crowns were tried intraorally to evaluate fit, shade, and contour. Adjustments were made, and patient approval was obtained before cementation.

Cementation

The crown intaglio was etched with hydrofluoric acid and silanated. The tooth surface was etched, bonded, and the crown was cemented with light-cure resin cement under rubber dam isolation (Fig 7). Excess cement was removed, light cured from all aspects, and occlusion was checked and adjusted.

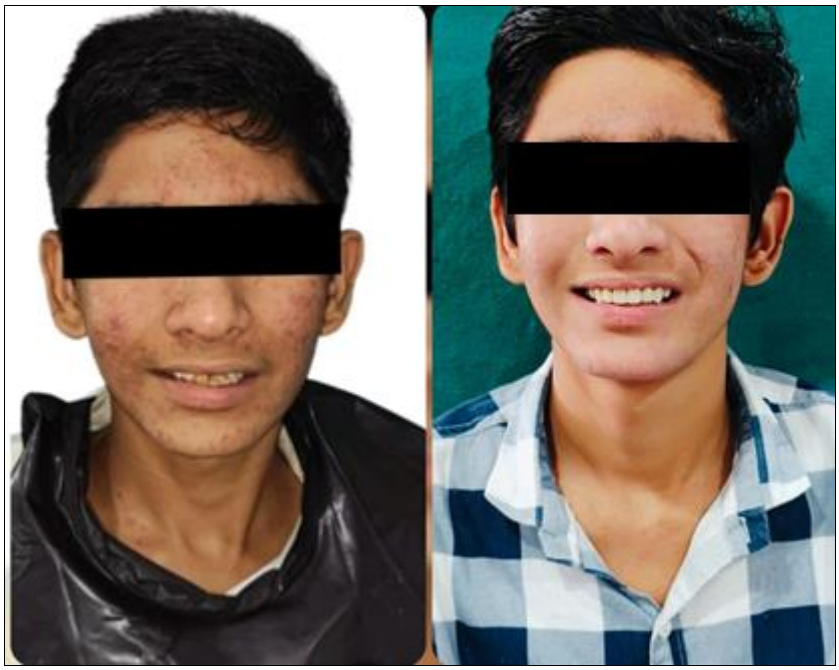

Fig 7

Post-Cementation

Avoid hard foods for 24 hours, maintain oral hygiene, and attend follow-up for evaluation.

Discussion

Smile designing requires careful integration of esthetics and function. Diagnostic mock-ups improve patient communication and reduce treatment uncertainty. Full-coverage all-ceramic crowns provide excellent esthetics and color stability when properly indicated. Long-term success depends on precise planning, appropriate material selection, and maintenance of periodontal health.

Conclusion

A systematic smile design approach allows clinicians to deliver predictable and aesthetically pleasing results. Comprehensive diagnosis, patient involvement, and conservative restorative techniques are key factors in successful smile rehabilitation.

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