

## Restoring esthetics of proclined and discolored maxillary incisors with all-ceramic crowns

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### Abstract

Proclined or flared maxillary incisors are difficult to restore in terms of esthetics as these are the most prominent teeth in the mouth. It requires an artistic and technical abilities and a thorough knowledge of the smile design principles about proportion, symmetry, harmony and anatomical morphology. Multidisciplinary teamwork can reestablish a satisfactory esthetics improving psychological status of the patient. Metal-ceramic crowns can allow for highly esthetic solutions in such cases correcting proclined teeth approximating them to more correct shapes. This case report presents a multidisciplinary treatment of flared maxillary incisors with all-ceramic crowns to achieve optimum esthetics and function.

**Keywords:** Maxillary incisors, esthetics, all-ceramic crowns.

### Introduction

Pathological migration of maxillary anteriors is referred as “spreading”, “fanning”, “tipping”, or “flaring” that may include undesired extrusion and rotations of teeth.<sup>(1)</sup> When displacing forces acting on teeth exceeds the resistance of the healthy periodontium, it induces orthodontic movement that may be associated with hypermobility of the teeth.<sup>(2)</sup> This is the reason why prevalence of pathological tooth migration is more in patients with periodontitis.<sup>(2)</sup> Pathological migration is a change in tooth position resulting from disruption of the forces that maintain the teeth in a normal position, with reference to the skull.<sup>(3)</sup> Periodontal disease plays a major role in the etiology of pathological migration producing esthetic and functional problems for the patient.<sup>(2)</sup> This necessitates clinician’s ability to identify and eliminate such displacing forces causing tooth movement before rehabilitating such patients.

Traditional metal-ceramic crowns offer a high strength to the prosthesis, but compromised in esthetics and biocompatibility. To overcome these disadvantages, a number of novel all-ceramic systems have been introduced enable enough in restoring anterior, posterior and multiple units. The patients with high expectancy of esthetics and concerns about the intraoral biocompatibility of metals can be offered an option of all-metal or metal-free crowns.<sup>(4)</sup> Such crowns allow for highly esthetic solutions like color corrections or color matching and allow the clinicians to reshape malformed teeth or those which are in incorrect arch positions, approximating to their correct shapes as possible.

Developments in dental materials have introduced a large number of all-ceramic systems for full-coverage restorations. Some systems use a single layer glass-ceramic material (e.g., Dicor, Dentsply/Chalk; IPS

Empress, Ivoclar/Vivadent), whereas others have a dual layer design (InCeram, Vident, Porcera, Nobel Biocare).<sup>(5)</sup> With the advent of computer aided design and milling (CAD/CAM), it was possible to improve all-ceramic technology with high strength such as procera system that was introduced in 1993.<sup>(4,6)</sup> This all-ceramic crown resists fracture during function of parafunction, both in the anterior and posterior regions, even under high stress.<sup>(7)</sup> The clinical evaluation of all-ceramic crowns have been promising that have reported a success rate of 98.4% over a period of 2 to 3.5 years.<sup>(6)</sup> Clinical assessment of high-strength all-ceramic crowns has proved a 100% satisfaction rate among the patients those who were given all-ceramic crowns.<sup>(7)</sup>

Successfully treating a patient by means of fixed prosthodontics requires a thoughtful combination of many aspects of dental treatment: patient education and the prevention of further dental disease, sound diagnosis, periodontal therapy, operative skills, occlusal considerations, and sometimes placement of removable complete or partial prostheses and endodontic treatment.<sup>(8)</sup> Achieving an optimal esthetic result, when replacing missing teeth in the esthetic zone, is a demanding restorative challenge.<sup>(9)</sup> The maxillary anterior teeth are the most difficult teeth to restore as far as patient esthetics is concerned. When they are proclined, the patient wants esthetic corrections in them to have acceptable if not ideal smile. The management of such a case becomes all the more difficult when the patient has urgency and the only treatment option left with the dentist is the prosthodontic rehabilitation. An individual’s facial and dental looks reflects their personality and social communications to a great extent.<sup>(10)</sup> The esthetic demands placed before prosthodontist by their patients on an urgent basis makes to plan the treatment in a more organized and

systematic manner.<sup>(11)</sup> The smile is most valuable that plays a vital role in building one's self image and boosting their self-confidence.<sup>(12)</sup> This case report describes the esthetic correction and restoration of maxillary incisors with the all-ceramic crowns.

### Case Report

A 25-years-old male patient reported to the department of prosthodontics with a chief complaint of proclined and discolored anterior teeth of the upper jaw. He wanted an urgent esthetic correction to improve his looks and smile. When examined clinically, patient had proclined and discolored maxillary incisors (11, 12, 21, and 22), as well as mesio-incisally rotated maxillary right lateral incisor (12) with an overjet of 12 mm (Fig. 1a & b). All the four incisors were vital with an acceptable periodontal support. While planning treatment, patient was given the option of orthodontic treatment, since he had spacing between his maxillary anterior teeth. He was also told of endodontic intervention accompanied by post and core with four incisors followed by full veneer crowns on them. He was not ready for extraction with maxillary incisors followed by either implant-supported or tooth-supported crowns. Patient demanded immediate correction of his smile and chose the second option where intentional endodontic intervention was planned before carrying post and core fabrication. So final treatment plan included intentional root canal treatment with four incisors followed by post and core, and definitive restorations made of metal-free crowns.



a



b

**Fig. 1: Proclined maxillary central incisors- a) Labial and b) Lateral view**

### Procedure

The diagnostic impressions were made with an irreversible hydrocolloid impression material (VELPLAST, IDS Denmed Pvt. Ltd., New Delhi, India) and the casts were poured in type III dental stone ((Kalstone; Kalabhai Karson, Mumbai, India). The casts were mounted on a semi-adjustable articulator to analyze the occlusion preoperatively. A diagnostic wax-up was done and showed to the patient so that he could perceive final form of the new restorations in view of esthetics. Diagnostic wax-up assists in providing the additional information that may not be evident during clinical examination. It furnishes visual and functional details while providing predictable outcomes of the planned treatment.<sup>(13)</sup> Intentional root canal treatment was carried with 11, 12, 21 and 22, after which the canals were prepared with the help of peeso-reamers so that minimum 3 mm of gutta percha was left in the canals. The canal impressions were made with pattern resin over which the core of the pattern resin (GC Pattern Resin; GC Corp., Tokyo, Japan) was fabricated (Fig. 2). The patterns were then invested and casted. The post and core restorations were then cemented in the canals with glass-ionomer luting cement (Ketac™ Cem radiopaque, 3M ESPE, Germany) (Fig. 3). As the abutments were root canal treated, more reduction was done on the labial side of the teeth to allow the crowns to be fabricated in a proper teeth alignment. The abutment teeth were prepared by using modified shoulder diamond burs followed by careful retraction with unimpregnated retraction cord (Prime Cord, Prime Dental Products Pvt. Ltd., Thane, India) and the impressions were made with double-mix impression technique using a combination of putty and light viscosity polyvinyl siloxane elastomeric impression material ((Reprosil; Dentsply DeTrey GmbH, Konstanz, Germany). An irreversible hydrocolloid was used to make an impression of opposing arch. After obtaining an interocclusal record, a face bow transfer was completed and the shade selection was achieved with a shade guide. The provisional crowns were cemented with non-eugenol temporary cement (NETC, Meta Biomed Co. Ltd., Korea) till the definitive crowns are fabricated (Fig. 4). The metal-free or all-ceramic (Procera) crowns were returned from the dental laboratory that was examined on model cast for fit and contacts. Provisional crowns were removed, abutments were cleaned of the temporary cement and the all-ceramic crowns were tried to check for their marginal fit and proximal contacts. After patients' approval, crowns were cemented with a glass ionomer luting cement (Ketac™ Cem radiopaque, 3M ESPE, Germany) and post-operative instructions were given to the patient (Fig. 5, 6 & 7). Patient was educated to maintain a meticulous oral hygiene supplemented with floss and recall appointments were scheduled.



**Fig. 2: Posts fabricated with pattern resin**



**Fig. 3: Cast post cemented**



**Fig. 4: Provisional crowns cemented**



**Fig. 5: Definitive crowns cemented**



**Fig. 6: Pre-operative view**



**Fig. 7: Post-operative view**

### Discussion

In view of drawbacks of metal-ceramic crowns, all-ceramic restorations provide a promising outcome in restoring anterior teeth. A five-year clinical evaluation of all-ceramic crowns has reported a high success rates.<sup>(14,15)</sup> Allergic reactions with metal-free crowns are much lower than metal crowns.<sup>(4,15)</sup> The optical properties of all-ceramic crowns mask dark dentinal staining, amalgam core build-ups, and metallic post and cores, without the need for subopaquers. Hence, cementation can be done with a variety of luting agents such as zinc phosphate cement, resin-based cement, or glass-ionomer cements.<sup>(15)</sup>

A thorough diagnosis must first be made of the patient's dental condition, considering both hard and soft tissues. This must be correlated with the overall physical health and psychological needs of an individual. Using the diagnostic information that has been gathered, it is then possible to formulate a treatment plan based upon the patient's dental needs, mitigated to a variable degree by his or her medical, psychological, and personal circumstances. The restoration of maxillary anterior teeth is one of the most significant challenges in esthetic dentistry. The treatment given to the patient in this case report is a need-based treatment rather than an ideal treatment. This treatment option has three major benefits like it is the most conservative treatment option available, and the least time consuming and the most economical for the patient.

The limitations of this treatment could be due to greater angulation, the force vector acting on to the maxillary incisors are not favourable. This problem is solved due to greater incisal overjet as well as canine-guided occlusion in lateral excursions. Also, the labial fullness due to the maxillary incisors could not be reduced as the teeth are in the same place (only the position of incisal edges is changed).

### **Conclusion**

The human race is the only species capable of smiling. A viewer first notice in a smile is the contour of the anterior teeth. Thus fractured, ill-positioned, stained or darkened teeth draw unwanted attention. Loss, fracture or discoloration of teeth leads to decrease in self confidence and self esteem, leading to patient's shy behavior making him feel unacceptable to the society. Fixed prosthodontics can offer exceptional satisfaction for both patient and dentist. It can transform an unhealthy, unattractive dentition with poor function into a comfortable, healthy occlusion capable of years of further service and greatly enhance esthetics.

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