

Aesthetic Management of Anterior Teeth: A Case Series

Case Series

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Abstract

Facial aesthetics plays an important role in the psychosocial well being of a person. The value of the appearance of one's teeth has taken up great importance. The advances made in adhesive materials have shifted the trend towards a more conservative approach that is also aesthetically pleasing. The following is a series of five cases that discusses the various treatment modalities based on the demands of a case for the aesthetic management of anterior teeth. The first patient reported with a severe generalised attrition and erosion. It was observed that the crown height was compromised and there was a reduction in overjet and overbite. An endodontic treatment was planned for 11 and 21 followed by fibre post and full veneer crowns and veneers were planned for 12 and 22. The second patient reported having fractured 11, 21 and 22. It was observed that 22 was previously endodontically treated and 21 was slightly extruded and required plane correction. An endodontic treatment was planned for 21 followed by indirect veneers for 11, 21 and 22. The third case report is about a patient who reported with acrylic crowns and metal pins in 11 and 21 with previously initiated endodontic therapy that wasn't completed. A retreatment was done followed by custom made metal post and PFM crowns. The fourth patient reported with dislodged crowns in 31, 41 and 42. It was observed that 31, 41 and 42 were previously treated and had a highly compromised crown structure. A custom made metal post was fabricated for the teeth followed by rehabilitation with PFM crowns. The fifth patient reported with discoloured non vital teeth which was conservatively managed with non vital bleaching.

Keywords: Cast Post; Full Veneer Crowns; Indirect Veneers; Lithium Disilicate; Non Vital Bleaching.

Introduction

Facial aesthetics plays an important role in the psychosocial well being of a person [1]. The value of the appearance of one's teeth has taken up great importance. The traditional domain of a dental practitioner that was once centered around eradication of the diseased state of tooth, now also includes enhanced aesthetic corrections. Dental aesthetics was defined as 'visual perception' for the first time in 1947 by Lombardi which had two major aspects: composition and proportion [2]. The discord in the perception of what is deemed aesthetically pleasing by the layman and professional has been well documented [3]. The patient's perception of smile alters based on various factors such as gender, age, ethnicity which can be challenging while attempting to create an ideal smile [4]. A practitioner aims mainly at achieving a balanced smile

through harmony between the hard and soft tissue [5] while also keeping in mind the patients' needs.

In a quest to improve the facial and dental appearance the pioneering work of the likes of Pierre Fauchard spurred the development of a special dental discipline specialising in the treatment of functional and aesthetic dental deficiencies [6].

The advent of bonded ceramics and resin composites have altered the way dentistry was practiced with a significant breakthrough in the 20th century. The advances made in adhesive materials have shifted the trend towards a more conservative approach that is also aesthetically pleasing [7].

Previously our team has a rich experience in working on vari-

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ous research projects across multiple disciplines [8-22]. Now the growing trend in this area motivated us to pursue this project.

The following is a series of five cases that discusses the various treatment modalities based on the demands of a case for the aesthetic management of anterior teeth.

Case Series

Case I

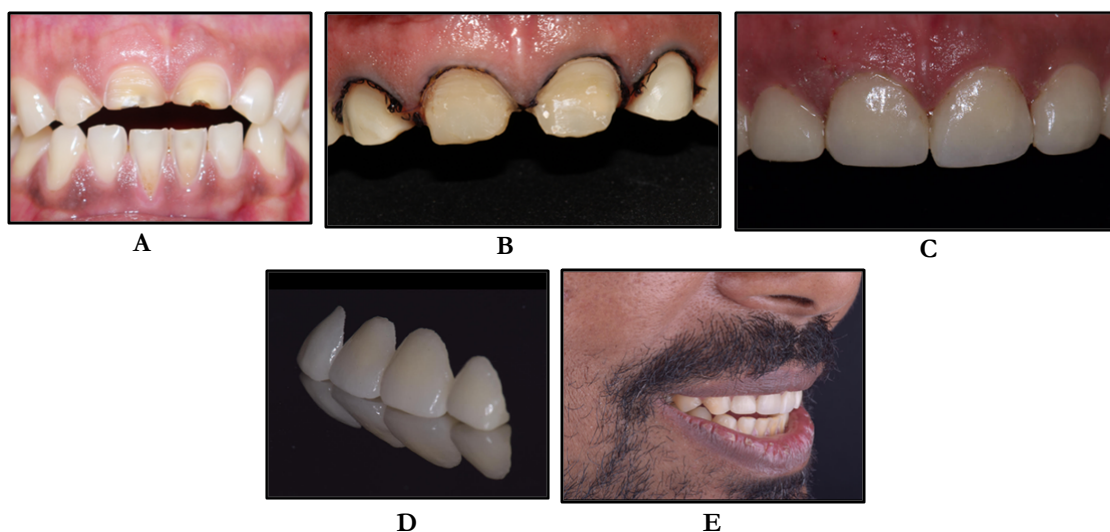
A male patient aged 38 reported with severe generalised attrition and erosion and wanted an aesthetic correction for the appearance of his maxillary anterior teeth. It was observed that the patient had reduced overjet and overbite (Fig1a). There were no periodontal pockets or mobility. The patient was offered the choice of rehabilitation of bite however the patient rejected that option. A diagnostic impression was taken and a wax mockup was done on the cast for the rehabilitation of 12 11 21 and 22, that would help in achieving an optimum aesthetic outcome. For the correction of his overjet, endodontic treatment was planned for 11 and 21 followed by placement for fiber reinforced post and full veneer emax crowns whereas emax veneers were planned for 12 and 22. Horizontal and incisal depth cuts were made for 12 and 22 using the depth cutting diamond bur (Shofu™) and a conservative veneer preparation was done limiting it to the enamel. A traditional preparation was done for 11 and 21 to receive full veneer crowns (Fig1b). The preparation margins were placed equigingival. Double cord technique using 00 followed by 000 cord impregnated with lignocaine was used to achieve gingival retraction before taking the impression. A two stage putty impression was taken. The first impression was taken using putty (ZhermackElite™) with a spacer. This was followed by removal of the 000 cord and injection of the light body elastomer (ZhermackElite™) around the preparation and on the tray before repositioning it. Shade selection was done using the VITA shade guide. For temporization, a putty index was made using the mock up and the teeth were temporized using protemp by 3M ESPETM. IPS Emax™ restorations were fabricated using lithium disilicate to obtain maximum

aesthetic outcome (Fig 1c). Prior to cementation, the occlusal, extrusive and protrusive movements were checked for any discrepancies. The internal surface of the crowns and veneers received 9.5% hydrofluoric acid treatment for 20 seconds followed by application of silane coupling agent. The teeth were isolated using rubber dam and the surfaces were etched using 35% phosphoric acid. This was followed by bonding protocol (3M ESPE Single Bond Universal Adhesive). The crowns were cemented first followed by veneers. A translucent resin cement (3M ESPE RelyXTM U200) was the choice of luting material. Tact cure was done for 5 seconds followed by removal of the excess resin cement and full cure for 30 seconds on both the buccal and lingual sides. After the removal of the rubber dam, the excess cement was removed using a no 12 BP blade. Figure 1d and Figure 1 e show the post operative outcome.

Case II

A male patient aged 44 reported for aesthetic correction of fractured 11 21 and 22 (Fig 2a). Upon clinical and radiographic examination it was observed that 22 was endodontically treated, whereas 21 was extruded and required plane correction. To achieve adequate plane correction, endodontic treatment was performed for 21. This was followed by taking a diagnostic impression and preparing a wax mockup so as to design veneers for 11 21 and 22. A conservative veneer preparation was done by placing the horizontal and incisal depth cuts using the dept cutting diamond bur (Shofu™). The margins were placed equigingival. Double cord technique using 00 followed by 000 cord impregnated with lignocaine was used to achieve gingival retraction before taking the impression (Fig 2b) A two stage putty impression was taken. The first impression was taken using putty (ZhermackElite™) with a spacer. This was followed by removal of the 000 cord and injection of the light body elastomer (ZhermackElite™) around the preparation and on the tray before repositioning it. Shade selection was done using the VITA shade guide. For temporization, a putty index was made using the mock up and the teeth were temporized using protemp 3M ESPETM. IPS Emax™ restorations were fabricated using lithiumdisilicate to obtain maximum

Figure 1a. Preoperative Clinical Picture.
Figure 1b. Tooth Preparation and Cord Packing.
Figure 1c. Emax Veneers and Crowns.
Figure 1d. Cementation of Veneer and Crown.
Figure 1e. Postoperative Smile.



aesthetic outcome (Fig 2c). Prior to cementation, the occlusal, exclusive and protrusive movements were checked for any discrepancies. The internal surface of the crowns and veneers received 9.5% hydrofluoric acid treatment for 20 seconds followed by application of silane coupling agent. The teeth were isolated using rubber dam and the surfaces were etched using 35% phosphoric acid. This was followed by application of the bonding agent (3M ESPE Single Bond Universal Adhesive). A translucent resin cement (3M ESPE RelyX™ U200) was the choice of luting material. Tact cure was done for 5 seconds followed by removal of the excess resin cement and full cure for 30 seconds on both the buccal and lingual sides. After the removal of the rubber dam, the excess cement was removed using a no 12 BP blade. The post operative outcome is seen in Fig 2d.

Case III

A male patient aged 67 reported for the aesthetic correction of maxillary central incisors. Upon clinical examination it was ob-

served that 11 and 21 had acrylic crowns with metal pins protruding out (Fig 3a). Radiographic examination revealed previously initiated endodontic treatment however the canals were not obturated. In the first visit the metal pins were retrieved and the acrylic crowns were removed using a diamond bur (MANI™). It was observed that the coronal tooth structure was compromised. An endodontic treatment was done for 11 and 21 in two visits. To reestablish the crown height and to correct the alignment of the teeth, a custom made cast post was fabricated. Post space was prepared using peeso reamer upto size 4. A metallic sprue was trimmed and placed in the canal followed by a radiograph to ensure adequate space around the sprue for the pattern resin to flow. The canal was coated with liquid paraffin. The powder and monomer of pattern resin (GCTM) were mixed on a glass slab and placed in the canal by coating it around the sprue (Fig 3b). Once the pattern set, it was removed and polished and cast into a custom designed post. In the fourth visit, the custom fabricated posts were checked for the fit, sandblasted and cemented using Type 1 GIC cement (Fig 3c). Double cord technique using 00

Figure 2a. Preoperative Clinical Picture.
Figure 2b. Veneer Preparation with Cord Packing.
Figure 2c. Veneer fabrication.
Figure 2d. Post Operative Smile.

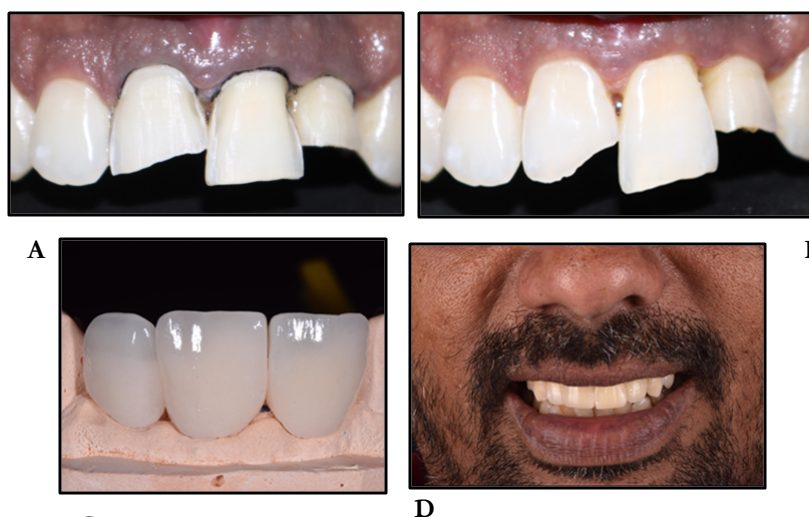


Figure 3a. Preoperative Clinical Picture.
Figure 3b. Resin Pattern.
Figure 3c. Cast Post Cementation.
Figure 3d. Post Operative Smile.



followed by 000 cord impregnated with lignocaine was used to achieve gingival retraction before taking the impression. A two stage putty impression was taken. The first impression was taken using putty (ZhermackElite™) with a spacer. This was followed by removal of the 000 cord and injection of the light body elastomer (ZhermackElite™) around the preparation and on the tray before repositioning it. Shade selection was done using the VITA shade guide. The teeth were temporized using acrylic crowns. In the third visit, the PFM crowns were cemented using type 1 GIC (Fig 3d). Prior to cementation, the occlusion was checked in centric position, protrusive and lateral movements.

Case IV

A male patient aged 61 reported with dislodged crowns in 31 41 and 42 (Fig 4a). Radiographic observations revealed endodontically treated teeth with no periapical pathology (Fig 4b). There were no pockets or mobility and the patient was asymptomatic. Clinical observation revealed compromised coronal tooth structure. The treatment plan involved rehabilitation of the crown height with custom fabricated metal post followed by PFM crowns. Post space was prepared using peeso reamer (MANI™) upto size 3. A metallic sprue was trimmed and placed in the canal followed by a radiograph to ensure adequate space around the sprue for the pattern resin (GC™) to flow. The canal was coated with liquid paraffin. The powder and monomer of pattern resin were mixed on a glass slab and placed in the canal by coating it around the sprue. Once the pattern set, it was removed and polished and cast into a custom designed post. In the second visit, the custom fabricated posts were checked for the fit, sandblasted and cemented using Type 1 GIC (GC™) cement (Fig 4c). Double cord technique using 00 followed by 000 cord impregnated with lignocaine was used to achieve gingival retraction before taking the impression. A two stage putty impression was taken. The first impression was taken using putty (ZhermackElite™) with a spacer. This was followed by removal of the 000 cord and injection of the light body elastomer (ZhermackElite™) around the preparation and on the tray before repositioning it. Shade selection was done using the VITA shade guide. The teeth were temporized using acrylic crowns. In the third visit, the PFM crowns were cemented using type 1 GIC (Fig 4d). Prior to cementation, the occlusion was checked in cen-

tric position, protrusive and lateral movements.

Case V

A male patient aged reported for the aesthetic correction of discoloured 21 which was endodontically treated and had a sound tooth structure (Fig 5a). A minimally invasive approach to alter the discoloration via non vital bleaching was planned. The original colour of the tooth was recorded and the guttapercha was removed to approximately 2 mm from the cemento enamel junction in the apical direction. A millimeter explorer and radiograph was used to demonstrate this depth. A barrier of GIC was placed in this space to seal the dentinal tubules. Non vital internal bleaching was done using sodium perborate and 20% liquid hydrogen peroxide. The bleaching agent was replaced twice to obtain the desired colour with an interval of one week between the two visits (Fig 5b). One week after the bleaching procedure, the cavity was sealed with composite restoration.

Discussion

Our institution is passionate about high quality evidence based research and has excelled in various fields [12, 23-32].

Adhesively bonded direct and indirect dental materials can restore aesthetics and create a pleasing smile with minimal invasiveness and limited sacrifice of natural tooth structure for malformed, malpositioned, or slightly damaged teeth. Indirect ceramic veneers have developed as one of the best methods of conservative anterior aesthetic rehabilitation. Among the various material options, Emax veneers made of lithium disilicate promises high aesthetics due to its high translucency and light transmitting properties [33]. Besides the optical characteristic similar to the dental structure, glass-ceramic materials have good bonding characteristics to the dental structure. The longevity and success of veneers majorly depends on the bonding to the tooth surface which is governed by the surface treatment of ceramic and the tooth surface as well as the choice of adhesive and resin luting cement. Further, the bond strength is higher when the preparation is limited to the enamel [34]. Hence it requires a minimum preparation that does

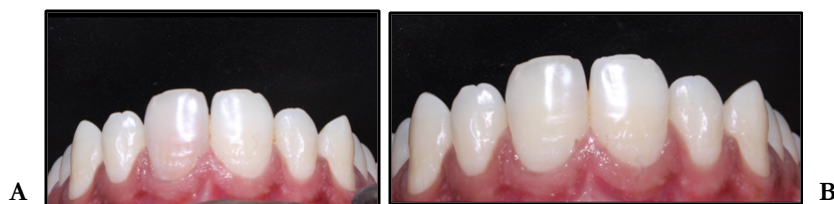
Figure 4a. Preoperative Clinical Picture.

Figure 4b. Preoperative Radiograph.

Figure 4c. Cast post cementation.

Figure 4d. Crown Cementation.



Figure 5a. Preoperative Clinical Picture.**Figure 5b. After bleaching.**

not extend to the dentin. It is recommended that for a lithium disilicate restoration, etching with 9.5% hydrofluoric acid for 20 seconds should be followed by application of silane coupling agent [35]. A light-cured resin-based cement is an appropriate choice for luting indirect veneers in terms of bond strength and increased working time [36-37]. Further the shade of the luting cement is another factor that governs the post cementation appearance of the veneer since choosing a darker shade luting cement can alter the shade of the veneer. Hence a light cure translucent shade was used for luting the veneers.

The restoration of a badly broken down endodontically treated molar tooth is a challenging task. There is an increase in the demand on dentists to restore structurally compromised teeth, and increase the life expectancy of such teeth. The restorability of structurally compromised endodontically treated teeth depends on the tooth position, quality of the endodontic treatment, root length and anatomy, periodontal support, presence of ferrule and remaining crown structure [38]. When the remaining coronal tooth structure to support an artificial crown is compromised, a post is placed to resist rotation of the prosthesis. The cast post and core is custom fitted to the prepared root canal space and designed to resist torsional forces [39]. In anterior teeth with more than 50% tooth structure loss, post and core followed by full coverage restoration is mandatory [40]. Post and cores that are custom fabricated using the standardized fabrication technique have good long term prognosis [41]. A success rate of more than 90% in a retrospective study of 96 teeth treated with cast posts and cores was recorded by Bergman et al., and they concluded that the traditional custom cast post and core can be recommended [42]. In the cases reported in the present literature, the root had adequate length and diameter and there was an optimum ferrule present so as to receive a custom designed post. Either an all ceramic crown with a zirconia coping or PFM to mask the discoloration would be the choice of crown in these cases. Keeping the patient's affordability in mind, PFM crowns were chosen as the final restoration.

In all the cases, a double cord retraction with impregnated cord was used to ensure optimum recording of the margins and control of bleeding [43, 44].

In discoloured endodontically treated teeth with intact coronal tooth structure, non vital bleaching offers a conservative. However bleaching techniques should consider the biological safety. The walking bleach technique was introduced in 1967 by Nutting and Poe where 30% hydrogen peroxide was used along with sodium perborate [45, 46]. However considering the probability of occurrence of external cervical resorption, saline was used along with sodium perborate to avoid the damage caused by high concentration of hydrogen peroxide. Further, placing a barrier of GIC ensured further protection [45].

However, the achievement of ultimate long term success of an aesthetic treatment requires patient education and motivation and the periodic control by the dentist.

Conclusion

Dental aesthetics is becoming one of the leading reasons that patients now attend a dental practice. Treatment planning based on optimum clinical evaluation is imperative to ensure long term prognosis. The treatment must aim at providing the most conservative therapy whenever possible. In cases of endodontically treated teeth, the success not only depends on the endodontic treatment but also on the post endodontic management especially when there is substantial damage to the tooth structure. The aim must be to establish both aesthetics and function.

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