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Multidisciplinary approach with predictable esthetics: A case report

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Abstract This case report explains an effective multidisciplinary approach used to improve the function, biology, and esthetic of a patient presented with an excessive gingival display, a spacing between anterior teeth, small size anterior teeth in maxilla and mandible. Also, unrestorable molars were noted with multiple carious lesions. The treatment combined crown lengthening, prosthetic dentistry using lithium disilicate crowns and minimally invasive implants placement approach.

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1. Introduction

A pleasant smile is an essential contributory factor to wellbeing in modern society (Korkut, 2016; Lukez, 2015). Esthetic dentistry improves the appearance of teeth and enhances the smile (Korkut, 2016). Fundamental esthetic criteria to be considered in designing smile includes tooth form, dimension, characterization, surface texture, and color (Magne, 2003). In addition, nowadays the revolution of the conservative esthetic dentistry techniques to maintain the dental structure as much natural as possible, according to the clinical situation. Making esthetic dental treatment comfortable and more suitable for patients (Korkut, 2016).

An excessive gingival display is known as gummy smile describes the overexposure of the maxillary gingiva while smiling (Silberberg et al., 2009). This condition may create esthetic concern for most of the patients (Mele et al., 2018). Periodontal surgery plays an important role in esthetic dentistry. Esthetic crown lengthening (ECL) procedure indicated to decrease the gingival tissue display that improves the smiling beauty when the clinical crowns are short (Assaf, 2014). Multidisciplinary dentistry is a team approach of different specialties on diagnosis and treatment planning and treatment of oral health conditions. It includes dental implants, esthetic dentistry, dental surgery, dentofacial surgical correction,
Orthodontics, operative dentistry, and periodontal therapy. Setting the esthetic objectives and taking into account the impact on function, structure, and biology, the dentist will be able to use various specialties in dentistry to provide the highest level of dental care to each patient (Alam and Sabir, 2015). ECL is a surgical procedure helps to meet the restorative and esthetic demands of the prosthetic compartment (Moharir et al., 2016). Modern innovations in ceramic materials have evolved to reach high esthetic demands and minimize deficiencies in conventional methods. Recently, lithium disilicate material has been broadly marketed due to its superior adhesive properties and minimally invasive to the tooth structure (Qamheya et al., 2016).

The present case explains a multidisciplinary treatment approach involving esthetic crown lengthening with osteotomy, dental implants, conservative ceramic crowns, and veneers to improve function, esthetics, and dental health.

2. Case Presentation

2.1. Background

39-year old female patient reported to College of Dentistry, Imam Abdulrahman bin Faisal University, Dammam, Saudi Arabia; with a chief complaint “I always try to hide my smile” “I want to fix my teeth”. Past medical history revealed gastroesophageal reflux disease with no medications and allergy. The extra-oral examination included facial symmetry, lymph nodes, temporomandibular joints, salivary glands and muscles of mastication were within normal limits. Intra-oral examinations showed un-pleasant shape, contour, size and generalized spacing between the maxillary and mandibular anterior teeth. Erosion and attrition were noticed mainly in the posterior teeth with multiple carious lesions and old restorations (Fig. 1). Examination of periodontium indicated unhealthy gingival condition with the presence of generalized mild chronic periodontitis and excessive gingival display, calculus deposition and unsatisfactory oral hygiene (Fig. 1). The patient was not satisfied with the smile which had an adverse effect on the patient’s self-esteem. Based on clinical examination and diagnostic tools of the existing problems, many treatment plans were proposed and explained to the patient. Furthermore, the ideal treatment was considered and written consent was signed by the patient.

Thus the treatment plan decided,

Phase I (non-surgical)

![Fig. 1 Pre-operative Extra and Intra-oral examination including simile, frontal, lateral and occlusal views.](image-url)
• Scaling and root planning.
• Caries excavation and provisionalization of right maxillary second molar and left mandibular second molar (#2, 18).
• Removal of defective restorations and provisionalization of right mandibular first premolar and first molar (#28, 30).

Phase II (surgical)

• Crown lengthening procedure of maxillary anterior teeth, premolars and first molars (#4–13).
• Extraction and implant placement on right maxillary first molar and left mandibular first molar (#3, 19).

Phase III (restorative)

• Final direct tooth-colored restorations of right maxillary second molar, left mandibular second molar, right mandibular first premolar and first molar (#2, 18, 28, 30).
• Metal-Ceramic Restorations (MCC) screw-retained crown on implants areas right maxillary first molar and left mandibular first molar (#3, 19).
• All-ceramic crowns for the maxillary anterior teeth (#6, 7, 8, 9, 10, 11).
• All-ceramic veneers for lower anterior teeth and maxillary premolars (#4, 5, 12, 13, 22, 23, 24, 25, 26, 27).

Phase IV (maintenance)

• Periodic check-up every four months.

Fig. 3 The diagnostic wax-up on mounted casts using semi-adjustable Hanau™ Wide-Vue whip mix articulator with the use of face bow transfer. The diagnostic wax-up on study casts mounted on semi-adjustable Hanau articulator with the use of face bow transfer.

2.2. Case description

1. Patient records were taken including chief complaint, history, photographs, and radiographs (Figs. 1 and 2). Diagnostic impression using irreversible hydrocolloid...
impression material and diagnostic casts were made. The occlusal vertical dimension (OVD) and centric relation (CR) were evaluated. Hence, no adjustments were made. Mounting on semi-adjustable Hanau articulator with the use of face bow transfer (Fig. 3).

2. The initial phase consisted of scaling and root planing, patient education and oral hygiene instructions. Caries excavation and provisionalization of right maxillary second molar and left mandibular second molar (#2, 18) were performed.

Fig. 4 The diagnostic wax-up following the fundamental esthetic criteria; tooth axis inclination increases from the central incisors to the canines (dotted lines). Level of interdental contact (red lines). Interincisal angles (yellow lines). Smile line (white line).

Fig. 5 CBCT scan evaluation for future implant #3, 19. Note, the presence of adequate bone height and width.

Fig. 6 A. Two months follow up after the crown lengthening procedure in maximum intercuspation view. B–D. Two months follow up, smile view, right, and left side. Note, the tissues are completely healed.
3. The diagnostic wax-up and mock-up were made as visual communication tools for the patient, dentist, and the laboratory technician as well (Fig. 4). After the mock-up, the amount of soft tissue resection and the extent of bone resection was decided.

4. Non-restorable right maxillary first molar and left mandibular first molar (#19) were extracted. CBCT scan evaluation was made for future implants placement in areas of right maxillary first molar and left mandibular first molar (#19) (Fig. 5).

5. Esthetic crown lengthening procedure of maxillary anterior teeth, premolars and first molars (#4–13) was performed by removing the excess gingival tissue followed by reflecting full thickness flap for osseous reduction. On the same day of surgery, maxillary implant (Zimmer tapered vend-screw implant 4.7 × 13 mm) was placed using the conventional placement technique. Flapless implant placement of mandibular implant (Zimmer tapered vend-screw implant size 4.7 × 11 mm) was made using conventional implant surgical guide and the soft tissues were sutured. 10 days later, the sutures were removed. Two months later, the tissues were completely healed (Fig. 6).

6. Final direct tooth-colored restorations (Filtek™ Z350) of right maxillary second molar, left mandibular second molar, right mandibular first premolar and first molar (#18, 28, 30) were carried out.

7. Maxillary anterior teeth were prepared for all ceramic restorations while veneers preparations were made for the maxillary premolars and mandibular anterior teeth (Fig. 7). Furthermore, lithium disilicate (IPS e.max) crowns for the maxillary anterior teeth (#6, 7, 8, 9, 10, 11) and veneers for mandibular anterior teeth and maxillary premolars (#4, 5, 12, 13, 22, 23, 24, 25, 26, 27) were tried clinically and flawlessly bonded using light cured luting composite cement (Variolink® Veneer kit).

8. MCCs screw-retained implant crowns in areas of right maxillary first molar and left mandibular first molar (#3, 19) were positively seated. Post-operative radiographs were...
taken to confirm the seating. For access sealing, Teflon tapes were placed in the screw access channel holes followed by flowable composite resin restoration (Filtek™ Z350). VDO and CR were maintained. Canine guidance and posterior disclusion on excursive mandibular movements were established without interferences. Moreover, anterior guidance was re-established during the protrusive mandibular movement. Post-operative photos and radiographs were documented (Figs. 8–11).

3. Discussion

Dental treatment aims to restore oral health, function, and aesthetic with minimal complications and long-term success (Kurian et al., 2018). In the present case, esthetically and biologically acceptable restoration cannot be limited to the prosthetic treatment. Therefore, a combination of surgical crown lengthening and prosthodontics were needed for this patient. Becker studied the placement of implants with flapless technique over 57 patients. The study concludes that the use of the minimally invasive approach is a predictable procedure (Becker et al., 2005). Similarly, in this case report, the mentioned technique was successfully proven.

Qamhey mentioned that ceramic materials have been able to achieve high esthetic requirements and overcome the undesirable properties in conventional materials and methods includes low tensile strength, sintering shrinkage, excessive

Fig. 9  Comparison between pre-operative and post-operative maxillary teeth.

Fig. 10  Post-operative photo of the teeth in the maximum intercuspation.

Fig. 11  A. Post-operative orthopantomogram radiograph. B. Post-operative Full mouth radiographs.
brittleness, wear of opposing, crack propagation and marginal gaps (Moharir et al., 2016). In the present case, the use of high translucency ceramic restorations following the natural tooth characterization, surface texture and contour emulate the natural teeth appearance and can be imperceptible from the natural teeth.

The use of laminate veneer is considered a conservative resolution to an esthetic concern. The long term clinical success of laminate veneers relies on the cementation process with other factors. The revolution of the multistep total-etch adhesive systems enhances the bonding efficiency to both enamel and dentin. Luting cement is a versatile material that enables achieving exceptional esthetic outcomes (Lovadino et al., 2012). In this case, the use of light-cured luting composite cement has an advantage in increasing the working time in comparison with dual-cure or chemically curing materials. Offers more time for the dentist to get rid of the excess cement before curing and significantly reducing the time for finishing. Additionally, it has superior color stability compared with the dual-cured or chemically cured systems.

The treatment objectives were to perform crown lengthening, manage and modify the shape and contour of the teeth, spaces closure with the most conservative method of lithium disilicate crowns/veneers in the maxillary and mandibular anterior teeth, extraction of unrestorable teeth and placing dental implants.

The treatment of 8 months’ follow-up, the lithium disilicate restorations appeared to be an effective clinical solution as they had favorable esthetic and functional properties. Maintenance of gingival health constitutes one of the keys for tooth and dental restoration longevity (Fig. 12).

4. Conclusion

This clinical report emphasizes the multidisciplinary approach required for comprehensive treatment planning. A thorough knowledge of the relationship between the periodontal tissue and restorative dentistry is critical for ensuring adequate shape, function, esthetics and health of the dental tissues.

Competing interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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