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Biomimetic Esthetic rehabilitation of anterior teeth: A case series

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Abstract
Trauma affected tooth structure and malocclusions such as midline diastema pose a serious esthetic problem and stagnant a person confidence. Apart from its esthetic font, other problems associated could be impaired phonetics and hindered oral hygiene maintainence. Biomimetic composite resin material provided the required esthetic and strength value, along with its desired consideration to minimal preparation and less time consuming. This case series highlights the esthetic rehabilitation of fractured anterior teeth and the spacing present between them with direct composite resin material.

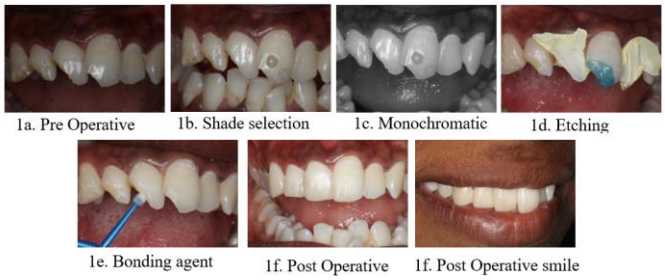
Keywords: Trauma, midline diastema, esthetics, biomimetics

Introduction
With an ever growing demand and compliance to esthetic dentistry, a change in an outlook to restorations has occurred, giving importance to biomimetics [1]. Esthetic dentistry involves an interplay and compatible integration of material selection and smile rehabilitation [2]. In mode to all dentition, the maxillary incisors, primarily the central incisors are the visual focal point for the smile, keeping in mind it is symmetry and dominance [3]. The common complaints given by patients related to esthetics are caries, trauma, anatomic alterations, discoloration/staining, malocclusion or hypoplastic problems [4].
Oro-facial trauma is quite common cause of tooth loss with crown fracture accounting to 92% of all traumatic injuries to the permanent dentition [5]. Coronal fracture requires urgent functional and esthetic repair as along with physical it tends the person's confidence [6]. Coronal fractures of permanent incisors represent 18-22% being simple (enamel & dentin) and 11-15% complex (with the inclusion of pulp) [21]. Another common anomaly with hiders the esthetic appearance of an individual, is the presence of malocclusion like midline diastema, which is the presence of space of more than 0.5mm between the proximal surfaces of adjacent teeth [7]. Common causes for this defect could be extremely wide arch, congenital tooth absence, anomalous tooth size and labial frenum hypertrophy [8]. It can be closed by indirect or direct restorations or orthodontically, however the latter presents with the time and economic constraints [11]. The demerits of the indirect treatment being it leads to excessive tooth preparation, damage to surrounding gingival tissues and the abrasiveness of ceramic to the tooth structure [22]. Direct composite restoration technique is minimally invasive, economical and promotes a conservative dramatic esthetic change in repairing tooth fracture and correcting malocclusion problems like midline diastema [11].
The present case series discusses the restoration of anterior fractured tooth and a midline diastema with direct composite resin.

Case Report 1
A 23 year old female patient reported to the Department of Conservative dentistry and Endodontics with chief complaint of fracture in the upper front tooth region. Patient had given a history of trauma 4 weeks back. On clinical examination, an Ellis class III fracture was seen with respect to the right and left maxillary central incisors, right lateral incisors and canines. Pulp sensibility tests revealed normal response as compared to adjacent and contralateral tooth structure. Intraoral periapical radiographs showed enamel and dentin involvement with no pulpal involvement and no periapical pathology was noted with complete root formation. Oral prophylaxis was performed and patients occlusion was noted with no discrepancy.

Shade matching was done using VITA Lumina shade guide with a dentin shade of A3, body shade of A2 and enamel shade of A1. An alginate impression was made and a cast was poured, following which a silicone putty index using polyvinyl siloxane impression material was made. The excess was removed and was tried on the patient for proper fit and adaptation. Following isolation, partial bevels were made on the tooth structure and selective etching technique was done for 20 seconds for enamel and 10 seconds for dentin. Following this, the etchant was washed away and dried and the bonding agent was applied and light cured for 20 seconds. The silicone putty index was then placed in the patients upper dentition and a palatal shelf was created, post which composite restoration was done for 40 seconds. Excess composite material was removed and 24 hours later, the restoration was contoured and proper finishing and polishing was done.

Case Report 1



Case Report 2

A 26year old patient reported to the Department of Conservative dentistry and Endodontics with a chief complaint of spacing in the upper anterior teeth. On clinical examination, patient had a spacing of 1mm in between the maxillary central incisors with Angles Class 1 occlusion and normal overjet and overbite. The labial frenum associated with the diastemma was normal in size and position. Various treatment options were given to patients including venners and orthodontic treatment. Patient opted for a non-invasive direct composite procedure. Following oral prophylaxis, shade matching was done with VITA Lumina shade guide and A2 enamel shade was chosen. A maxillary and mandibular alginate impression was made and poured with dental stone. Diagnostic wax up was done on 11 and 21 and their width was increased by 0.5 mm by adding inlay wax on the mesial aspects of both the teeth, thus closing the space. A silicone putty index was made on the diagnostic cast using polyvinyl siloxane impression material. Excess putty was removed was tried in the patients dentition for proper fit and adaptation. The mesial aspects of 11 and 21 were etched for 20 seconds in enamel and thoroughly washed and dried. Bonding agent was applied and cured for 20 seconds. Silicone putty index was placed in the patients mouth and a palatal shelf was made, following which composite restoration was done and cured for 20 seconds. Finishing and polishing was done using Soflex (Dentsply) to achieve esthethically pleasing diastemma closure. Oral hygiene instructions were given to the patients.

Discussion

Along the years, several changes have been seen in the restoration of the tooth structure with the evolution of adhesive techniques, giving functional and esthetic outcomes [10]. Several treatment modalities are present related to anomalies of shape, size, texture and position [11]. A complete understanding of the desire of the patient is absolutely critical for success. Proper planning in the initial stages along with complying with the protocol gives the best result predictability [11].

Case Report 2

Direct composite restorations are an excellent choice of restoration for anterior dentition. It presents with several advantages over indirect restorations such as its minimal to no-tooth preparation, economical and can be done in a single appointment [12]. Large class IV defects should not be restored with ceramic veneers because of large amount of unsupported porcelain and lack of tooth coloured backing [9].

Dental trauma of central incisors are subject to direct visual access hence requiring immediate dental care as its continuous neglect would cause considerable negative effect on the patients self esteem [13]. In the same way, midline diastemma deters an individual from gaining social and cultural confidence and considers it as a disfiguring dental figure [14]. Several factors associated with the occurrence of midline diastemma are tooth material-arch length discrepancy along with missing teeth, microdontia and peg shaped laterals. Along with this, several habits (thumb sucking, tongue thrusting) and midline pathologies (cysts, tumors and odontomes) can also cause midline diastema [15].

Direct composite resin possesses similar physical and mechanical properties to tooth structure and increases the longetivity of the treatment [16]. Due to the polychromatic nature of the natural tooth, layering technique is indicated for anterior composite restoration as it enables complete light curing of resin increment, mimics naural tooth esthethics and reduces the polymerization stresses [18]. Longetivity of the restoration along with its esthethic content is of paramount importance and is affected by several parameters such as type of substrate, location and size of restoration, the restorative material being used and the conditions provided. Special considerations should be given to the bonding procedure along with proper isolation as any compromise in its context would lead to fracture of the restoration [19, 20]. Therefore, Biomimetic restorative materials promote a long term effective option and gives high esthetic results with minimal invasive procedure.

Conclusion

Direct composite resin serves as an effective biomimetic restorative material for the management of traumatized or malocclused tooth structure. Proper treatment planning and clinical protocol usage provides effective long term results.

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