

Case Report

DIASTEMA CLOSURE WITH DIRECT COMPOSITE: ARCHITECTURAL GINGIVAL CONTOURING

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Abstract:

Introduction: One of the main problems in esthetic dentistry is closing diastema between teeth with a direct technique without creating the black triangle (gingival embrasure lacking papilla). Black triangle will ruin the patients' smile and is not desirable. Composite resin used to close diastema should have adequate convexity from gingivo-incisal direction to avoid this problem. Various techniques have been introduced to close diastema, some of which are time-consuming or cannot provide proper contour. **Case report:** This article describes a case in which diastema between two teeth was closed with direct composite resin with minimum amount of time. Although closing diastema with direct composite depends on operator skill in most part, this technique is probably less dependent on operator skill compared to other techniques. **Conclusion:** Closing diastema between anterior teeth with composite resin with direct technique is conservative and timesaving, and the presented technique which provides adequate contour can be carried out very easily by many dental practitioners.

Key words: Diastema, Anterior teeth, Direct composite.

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INTRODUCTION

A space between adjacent teeth is called a “diastema”. Midline diastemata (or diastemas) occur in approximately 98% of 6 year olds, 49% of 11 year olds and 7% of 12–18 year olds. The midline diastema of the teeth is often a normal or developmental occurrence, due to the position of the teeth in their bony crypts, to the eruption path of the cuspids, and to the increase in size of the premaxilla at the time of eruption of the maxillary permanent central incisors. Eruption, migration, and physiological readjustment of the teeth, labial and facial musculature, development into the beauty-conscious teenage group, the anterior component of the force of occlusion, and the increase in the size of the jaws with accompanying

increase in tonicity of the facial musculature all tend to influence closure of the midline dental space. Since the frenum is considered a problem only if the teeth are separated, the effect of these natural forces is not only to close the midline dental space, but also automatically to eliminate the problem of the frenum. Relatively early in orthodontic literature, the superior labial frenum was listed as a cause of the midline diastema. Frenectomy was advised, and techniques for its removal were described. The number of frenectomies currently recommended by orthodontists is relatively small. Most of the respondents are treating the midline dental space Orthodontically without frenectomy. Often, people have a diastema treated for cosmetic reasons. They may be self-conscious about having a space

between their teeth. However, a diastema also can affect speech. In cosmetic treatment, the direct-bonding restoration technique re - presents the preferred therapeutic option. It preserves maximal tooth structure and helps to restore function and aesthetics in only a few clinical visits. In addition, the technique is economical and the possible need for sophisticated indirect restoration can be postponed. Direct-bonding restorations demand excellent clinical skills. The clinician is required to incorporate various clinical techniques, tips and tricks.

CAUSES

- **Genetic:** midline spacing has a racial and familial background.
- **Physiological:** midline diastema may be considered normal for many children during the eruption of the permanent maxillary central incisors. When the incisors first erupt, they may be separated by bone and the crowns incline distally because of crowding of the roots. With the eruption of lateral incisors and permanent canines, midline diastema reduces or even closes.
- **Supernumerary teeth:** The presence of supernumerary teeth and their effect on the developing occlusion has been investigated by numerous authors, but high proportion (38%) of patients with supernumerary teeth had delayed or failed eruption of permanent teeth, whereas inverted supernumeraries were more likely to be associated with bodily displacement of the permanent incisors, median diastema and torsion.
- **Abnormal frenum:** A maxillary midline diastema is often complicated by the insertion of the labial frenum into the notch in the alveolar bone, so that a band of heavy fibrous tissue lies between the central incisors³. A simple test, blanching test was performed for an abnormal high frenum by observing the location of alveolar attachment when intermittent pressure was exerted on the frenum. If a heavy band of tissue with a

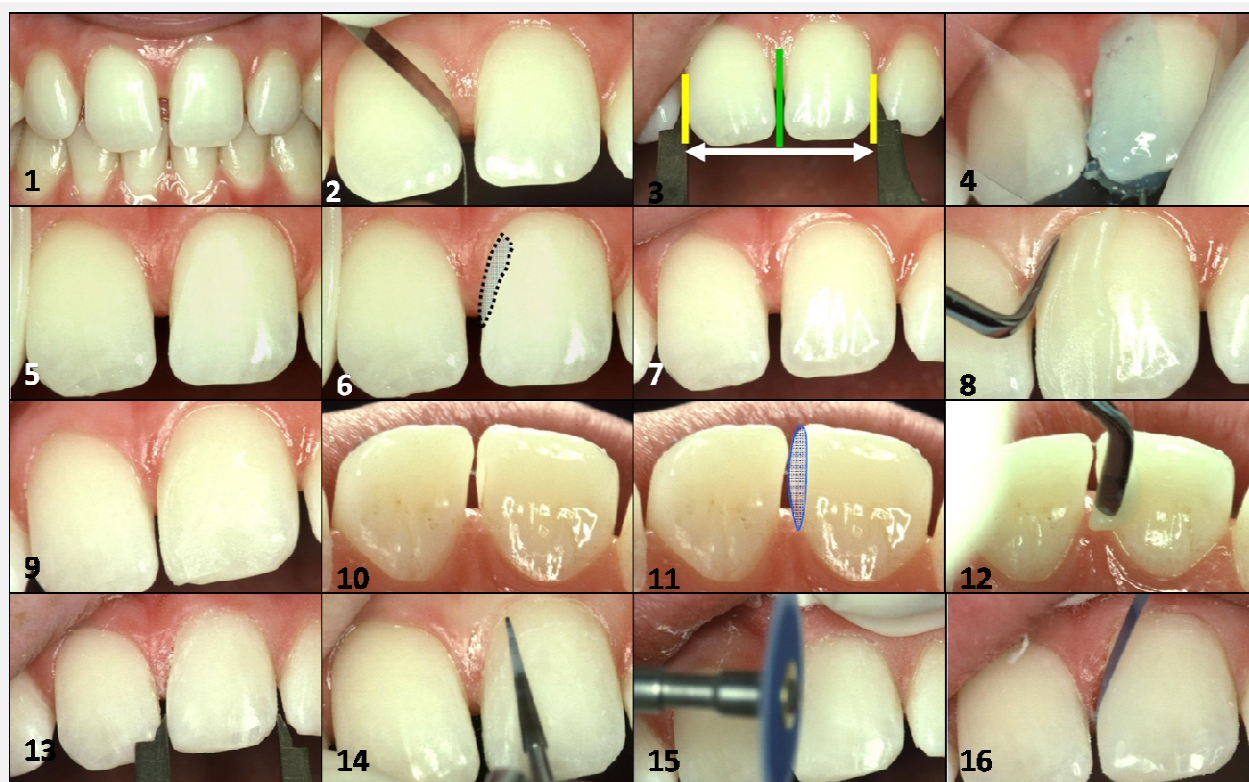
broad, fan like base is attached to the palatine papillae and produces the blanching of the papilla.

- **Tooth material-arch length discrepancy:** condition such as missing teeth, microdontia, peg shaped laterals, macrognathia. If the lateral incisors are small or absent, the extra space can allow the incisor teeth to move apart and create a diastema⁴.
- **Habits:** Habits such as thumb sucking or tongue thrusting can cause proclination of teeth, which causes midline diastema along with generalized spacing.
- **Midline pathology:** soft tissue and hard tissue pathologies such as cysts, tumors and odontomes may cause midline diastema.
- **Iatrogenic:** rapid maxillary expansion can cause midline diastema due to opening of the intermaxillary suture.
- Moyers stated that imperfect fusion at the midline of premaxilla is the most common cause of maxillary midline diastema. The normal radiographic image of the suture is a V-shaped structure.

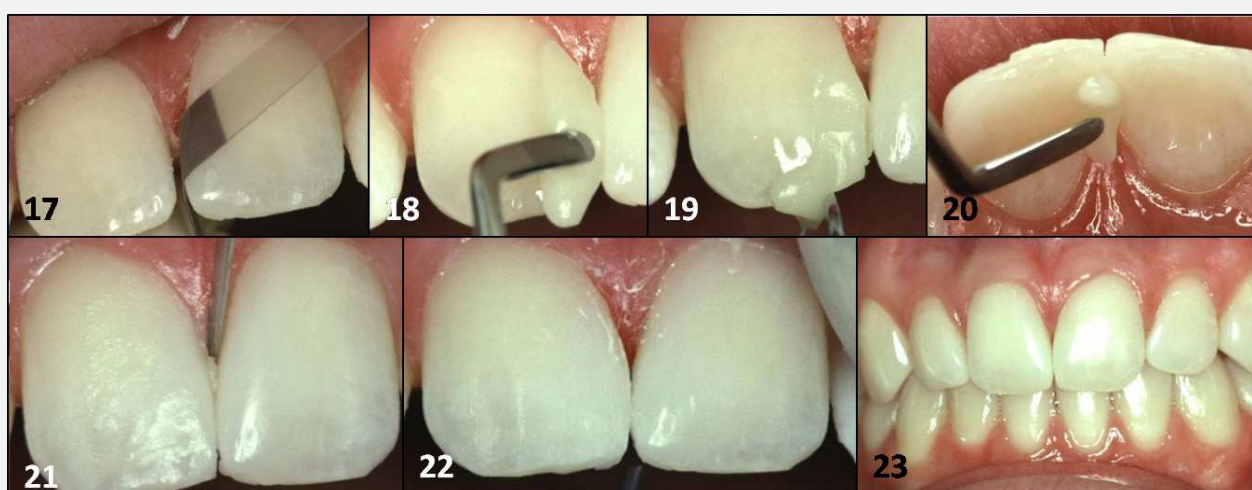
The literature has demonstrated that direct composite resin restorations, porcelain laminate veneers and crowns are good treatment options for correcting anterior diastema.. Before closing the diastema, the cause must be understood and the treatment should be well planned. Diastemas are commonly closed by preparing the tooth & restoring it with composite resin. Restorative method with composite resin is the least invasive, economical and aesthetic treatment which can be done in a single visit in comparison to all the other available treatment options.

CASE REPORT

A 29 year old male came to private dental clinic, Sinamangal for closing the gap in between his central incisors. Various treatment options were discussed with the patient, but due to lack of time, patient



Figures: 1) Diastema; 2) FlexiDiamond Strip: If at the gingival, use a narrow strip, if in the body, use a wide strip; 3) Measure for symmetry; 4) Etch the tooth to middle third of tooth both facially and lingually; 5) Frosty Etched Surface; 6) Notice lack of etch; 7) Bonding agent after curing for 20 seconds; 8) Facial application of Microfill; 9) Labial wall cured for 60 seconds; 10) Lingual view; 11) Notice lingual shelf; 12) Application of Renamel Microfill to lingual shelf; 13) Measure before finishing; 14) Contour using the ET9 bur from composite to tooth; 15) FlexiDisc Medium; 16) FlexiStrip Course/ Medium Narrow



Figures: 17) FlexiStrip Fine/SuperFine Wide. Now that we are done polishing we are ready to start the second tooth; 18) After etching and placement of bonding agent, Renamel Microfill is placed and sculpted, using the 8A instrument without matrix; 19) Defining interproximal; 20) After polymerization of facial surface, apply a layer of Renamel Microfill to the lingual surface; 21) Use the IPC-T to remove any extra composite interproximally; 22) The thinness of the FlexiDisc Medium helps to round out the incisal embrasure; 23) Final polish accomplished with FlexiDiscs, FlexiPoints, Enamelize polishing paste and FlexiBuffs.

decided to go for composite build up. Scaling of two central incisors was done and the shade of his anterior teeth was selected with Ceram.X duo shade system (Dentsply). Mesial aspect of both central incisors were roughened with coarse cut tapered fissure bur, tooth isolated and etched with Conditioner 36 (Dentsply) for 10 seconds. After washing the etchant, tooth was dried and then Prime & Bond (Dentsply) was applied with an applicator tip (Dentsply) and light cured. Composite build up from mesial aspect of the central incisors following the layered technique was done with Ceram.X composite (Dentsply) with the help of Mylar strip. With an articulating paper, bite was adjusted then finishing & polishing of the restoration was done with smooth tapered diamond bur (Shofu preparation set) and Enhance polishing kit (Dentsply).

DISCUSSION

Before the practitioner can determine the optimal treatment, he or she must consider the contributing factors. These include normal growth and development, toothsize discrepancies, excessive incisor vertical overlap of different causes, mesiodistal and labiolingual incisor angulation, generalized spacing and pathological conditions.⁹ A carefully developed differential diagnosis allows the practitioner to choose the most effective orthodontic and/or restorative treatment. Diastemas based on tooth-size discrepancy are most amenable to restorative and prosthetic solutions.⁹ The most appropriate treatment often requires orthodontically closing the midline diastema.

Treatment of diastema varies and it requires correct diagnosis of its etiology, and early intervention relevant to the specific etiology. Correct diagnoses include radiological and clinical examinations and possibly tooth size evaluation.

- No treatment is usually done, if the diastema is physiological/transient as it spontaneously closes after the eruption of permanent maxillary canines.

Spontaneous correction of a childhood diastema is most likely when its width is not more than 2mm.

- Pathological causes like supernumerary teeth, midline soft tissue anomalies can be removed surgically and spaces are closed orthodontically. Oral habits such as thumb sucking and tongue thrusting should be corrected before closure of the space.

ESTHETIC APPROACH: Patient demand for aesthetic dentistry with minimally invasive procedures has resulted in the extensive utilization of freehand bonding of composite resin to anterior teeth.

Dental patients are more conscious of their appearances and have raised the importance of the smile within society as a whole; this impacts full mouth restoration as well as more conservative restorative procedures that include class IV restorations, veneers and diastema closure.

The diastema presents itself to the dental office on a regular basis. It may be small or large. The papilla may be long and skinny or blunted. The size will have an effect on what material will be chosen to achieve the desired results. When dealing with a large space closure, orthodontist may be indicated to allow for a more esthetic outcome.

When the teeth are in proper orthodontic alignment, no preparation of the tooth structure is necessary. If there is an alignment problem, minor tooth preparation will be necessary to achieve proper arch form. Composite resin is an ideal material when restoring diastema closure. It is highly polishable, long lasting and mimics natural tooth structure. It is a conservative alternative to an indirect restoration.

Frazier-Bowers and Maxbauer listed various treatment options for diastema closure which are as follows⁷:

1. Keep the diastema
2. Diastema closure with direct composite resin

3. Orthodontic treatment to move the teeth and close the diastema
4. Use porcelain veneers to close the diastema
5. Crown and bridge to close the diastema, which is usually done in adults
6. Make the patient aware of the habit and plan for habit breaking appliance
7. Remove the underlying pathology surgically, and then continue with closure of diastema with restorative material.

Schwartz et al explained the Biomimetic Rules to create natural appearing diastema closure.⁹ According to the author, anatomically, the cusp of an anterior tooth is governed by the rule of three; which states that each cusp is composed of three developmental lobes mesial, distal and central; and each lobe possesses character that defines itself and its control over its anatomic position. First the space in between the teeth is measured, then that measurement is divided into half. The quotient is added to the existing width of each tooth which gives the new tooth width. This new width is divided into thirds, mesial lobe will occupy one third, and central and distal lobe will occupy the remaining two thirds. Author also stated that the width of the maxillary incisors are two millimeters less than their length, the contact of the anterior teeth is in lingual half of buccolingual dimension and the most apical aspect of anterior contacts should be between three to five millimeters to the interdental crestal bone to avoid black triangles and impingement of the biologic width. In cases which involve closure of complex diastema, determining the proper proportions dictates the amount of distal proximal reduction; whether to completely veneer the teeth or add to the interproximal zone; the number of teeth to be treated; and the position of prominences and concavities.¹⁰ Special attention must be made if there are any occlusal concerns like bruxing or deep bite as direct restorations may not be Successful.⁹ To close the complex diastema indirect techniques are

used, they generally require multiple visits to enable proper placement of the laminates, crowns, or bridgework, and such procedures may also involve significant financial expenses After the restoration if patient is not happy with the outcome, the restoration can be removed without damaging the tooth structure. The cost of treatment is very less in comparison with other treatment options like orthodontic treatment, veneers and crown. The time taken to close the gap is also very less as it can be done in a single visit when compared to other treatment option like indirect veneer and crowns which cannot be done in single visit and requires minimum of two to three visits whereas orthodontic treatment will take around few months to years. The composite resins is available in different shades therefore if the shade selection is done properly, only the operator and the patient knows about the treatment that has been done to close the space.

CONCLUSION

The esthetic problem of spaces in maxillary anterior teeth can be successfully dealt with the use of direct composite resin bonding. This painless conservative approach results in complete patient satisfaction leading to a successful outcome. Restorative method with composite resin is the least invasive, reversible, economic and aesthetic treatment which can be done in a single visit in comparison with all other available treatment options.

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