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Multiple space closure using thermoplastic tray- Create a beautiful smile – One shot away

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ABSTRACT

To smile is easy to gift others a beautiful smile it's a blessing. An important aspect of a beautiful smile is a dentition with no spaces¹. A diastema can be defined as a space >0.5mm between the proximal surfaces of two adjacent teeth. Midline diastemata (or diastemas) occur in approximately 98% of 6-year old's (maxillary growth and ugly duckling stage), 49% of 11-year old's and 7% of 12-18-year old's⁴. But mostly after the late transitional period it regresses on its own. The continuing presence of a diastema between the maxillary central incisors in adults often is considered anaesthetic or malocclusion problems³. Multitude of techniques have been employed to improve the smile by closing Diastema. Orthodontic treatment is a good choice for space closure and alignment correction, but the duration of the treatment and the multiple visits often appears hectic⁷. And let's not forget about the expenses in ortho treatment⁷. On the other hand, recent studies also showed that direct composite resin restorations are considered functional, stable, aesthetical, and cheaper restorations completed in less chair time by using appropriate techniques for patients with appropriate occlusion. Closure of midline diastema using free handed composite restoration is helpful, but this is tedious when there is multiple diastema⁹. With the emergence of advanced and contemporary techniques, the time required for performing restorative procedures have drastically reduced². Means like just in 'ONE SHOT'. This is a case report presenting the closure of multiple diastema using a thermoplastic bleaching tray that would make closure of multiple spaces in the anterior region easier and esthetic².

Keywords— Aesthetic, Thermoplastic Tray, Composite, Diastema

1. INTRODUCTION

Composite resin bonding can be a fast, minimally invasive and inexpensive option for the beautiful smile you're looking for⁸. Composite bonding is a cosmetic technique wherein a type of dental material – in this case, composite resin – is shaped and molded on your teeth to give the appearance of straighter, whiter smile⁸. It can be used as a cosmetic solution to chipped teeth, gapped teeth and staining in both teeth and fillings. But a chairside technique often challenges the clinician with regard to the required time and skills, as well as meeting the expectations of the patient⁴. The advantage of using a thermoplastic tray is composite can be placed at one go and the tray can be adapted just as the way we do to make an impression².

2. CASE REPORT

A 27-year-old male patient reported to the department with a complaint of spacing in the anterior teeth region. With accurate history taking it reveals that he had the spacing from the time of permanent dentition and he had socialising issues for that. Patient wanted an aesthetic correction for the closure of the multiple spaces because it restrained him from his self-confidence. Medical history was non-contributory. On oral examination there was gap in between his social six from canine to canine in the maxillary arch. Overjet was more than 3mm. Bolton's discrepancy was done. The patient was explained about the reason for his diastema being tooth material arch length discrepancy. Various treatment modalities were explained to the patient such as:

- Fixed orthodontic therapy
- Ceramic veneering
- Direct composite builds up
- Full coverage restorations (crown)
- Composite veneering

The treatment cost, time on treatment and outcome were explained to the patient and he chose to go for a direct composite restoration as it was a minimally invasive and can be done in a short span of time. Periodontal consultation was done to evaluate the frenal attachment. On periodontal examination the frenum was not papilla attached so the patient was not advised to go for frenectomy. Oral prophylaxis was done. Two sitting appointments were given for the entire procedure.

In first appointment pre-operative intraoral photographs were recorded (Fig. 1a,1b,1c) and shade selection was done and primary impression was made using irreversible hydrocolloid.



Fig. 1a



Fig. 1b



Fig. 1c

Impression was poured then diagnostic casts were made using die stone (Fig. 2). The diagnostic models were checked and removed of irregularities. A mock-up was prepared in lab using composite from tooth no. 13 to 23 (Fig. 3).



Fig. 2



Fig. 3

The contacts and contour were maintained by using cellophane strips in between the tooth (Fig. 4).

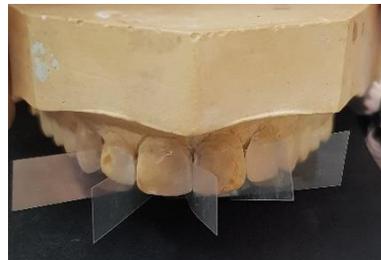


Fig. 4

Template for the treatment was made on this mock up cast using thermoplastic sheets (ashvac thermoplastic sheets of 1mm thickness) (Fig. 5a and 5b). The base of the models was trimmed flat and it was loaded to the vacuum former to create the thermoplastic tray.



Fig. 5a



Fig. 5 b

The tray was trimmed 1mm above the cervical region of the teeth inspected for any rough borders which was later removed (Fig. 6). Interdentally the tray was cut longitudinally from 13 to 23 using a No 15 BP blade and the passage of cellophane strip was confirmed. (Fig. 7)



Fig. 6



Fig. 7

Teeth from 13 to 23 on the proximal aspects were etched using etchant (d-tech 37% phosphoric acid etching gel) (Fig. 8), facial and palatal surfaces were avoided. Teeth were dried and watched for the frosty white appearance.



Fig. 8

After isolation Bonding was done using bonding agent (GLUMA BOND 5 KULZER) and light cured for 20s according to the manufacturer's instructions. Composite of shade A2 (CHARISMA SMART KULZER) as selected earlier was placed on teeth's etched surfaces by free handed technique. The thermoplastic template was adapted (Fig. 9). The excess composite which came out through the interdental spaces were removed, and cellophane strips were passed interdentally (fig.10). Light curing was done for 2 mins (fig-11). The remaining flashes were removed and finishing and polishing was done using (shofu polishing kit CA).



Fig. 9



Fig. 10



Fig. 11

Post-operative photograph showing satisfactory results (fig-13)



Fig. 12: Pre-treatment photograph



Fig. 13: Post treatment photograph

3. DISCUSSION

A space between adjacent teeth is called a "diastema"². Maxillary midline diastema is one of the most frequently seen malocclusions and its incidence ranges from 1.6% to 25.4%⁷. Maxillary anterior spacing is often considered unaesthetic by the general population. Treating the midline diastema is a problem for the dental practitioner as many different etiologies are reported to be associated with it⁶. Midline diastema usually is part of normal dental development during the mixed dentition⁵. However, other factors can cause a diastema that may require intervention. An enlarged labial frenum has been a reason for most persistent diastemas, only a small proportion of cases are there⁵. Other etiologies includes oral habits, physical impediments, abnormal maxillary arch structure, thumb sucking, tongue thrusting habits muscular imbalances and various dental anomalies⁵.

When to treat and how to treat is a major problem in the case of diastema?

Sanin-et-al predicted that for 1mm space in the early mixed dentition the possibility of spontaneous space closure is 99%; For a 1.5 mm space the possibility is 85%; For a 1.85 mm diastema it is 50%; For a 2.7 mm space the possibility of closure without treatment is only 1%⁷. The measurement should be made after the eruption of the lateral incisors. Hence it is advisable to intervene early if the midline diastema is more than 1.85 mm after the eruption of the permanent lateral incisors¹³. The treatment of diastema is depends on the etiology and the patients decision, whether an orthodontic intervention or restorative approaches can be done. Direct composite restoration is the simplest among all procedures for diastema closure.

In terms of aesthetic dentistry, composite procedure offers numerous advantages that other possible treatment options such as ceramic veneers and orthodontic treatment do not have. They do not lead to abrasion of the opposing dentition compared to ceramic materials. Tooth material loss is also negligible. They are also cost - effective unlike the orthodontic treatment. Doing a free handed composite is the easiest for a well experienced practitioner for the closure of spaces¹¹. The scenario is different when there is multiple diastema and for a beginner it is difficult to go for a free-handed technique. With the help of template like putty matrix the accurate measurements can be recorded added or divided using biometric guidelines¹⁴. But putty has a problem of incremental addition to each tooth and mould it at the chair side.

3.1 Advantages

Advantage of using a thermoplastic tray is:

- Composite is placed at one go and the tray is adapted just like impression making.
- Less time consuming
- Mock up cast is prepared so inter operator bias is minimal.

3.2 Limitations

- Multiple shades or mixing up of the shades cannot be done.
- Composite materials possess less fractural toughness, shear, and compressive strength
- Not ideally suited for ultra-high-stress areas.

4. CONCLUSION

This is a novel approach for the closure of multiple diastema in an accurate way with less fatigue for the patient and the operator. Utilizing this technique, it is possible to achieve marked improvement in esthetics and time can also be respected⁴. Recent aesthetic composite resin materials have similar physical and mechanical properties to that of the natural tooth and possess an appearance like natural dentin and enamel³. So now for a composite treatment even if you are not as artistic as your contemporaries you can always impress yourself and the patient in just "ONE SHOT".

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