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CASE REPORT

Diastema Closure - A Contemporary Approach using Injectable Composites

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ABSTRACT

Diastema, the spacing between teeth, presents as a common aesthetic concern. Maxillary midline diastema is a space greater than 0.5 mm between the proximal surfaces of the two central incisors. It is one of the most negative influencing factors in self-perceived dental appearance. The closure of diastema involves a multidisciplinary approach. In this case study, it is treated using digital tools such as intraoral scanners, and software to facilitate accurate diagnosis, treatment planning as per patient's aesthetic concern. Digital impression was taken, digital wax pattern mock-up was done, and a template (flexible orthodontic Essix retainer) was created to use injectable composites in the hope of easing clinicians work and enhancing outcome. Injectable composites offer a minimally invasive solution that can effectively close gaps without extensive procedures. Digital dentistry is highly preferred by patients as it promotes patients to be involved and enables them to preview their smile transformation before committing to treatment.

Keywords: Aesthetic; Diastema; Incisors; Patients; Software

1 INTRODUCTION

Maxillary midline diastema, space greater than 0.5mm between central incisors is a common aesthetic concern. Smile is a greatest asset used to express oneself. Smile designing, a cosmetic dental procedure considers both facial and dental components. Among various guidelines, Golden proportion is used in this case study [(1)].

Injectable composites have emerged as a significant innovation, enhancing both the efficiency and effectiveness of various dental procedures [(2)]. This material characterized by their flowable consistency and adaptability, are transforming how dentists approach cavity preparation, repair and aesthetic enhancements.

Digital dentistry has been a boon in the field of aesthetic dentistry. Digital dentistry gives accurate diagnosis, treatment planning, and fabrication of restorations as per patient's aesthetic concern. [(3)]

Digital dentistry and composite restoration are highly preferred by patients, because of minimal preparation of tooth and shorter duration of time. [(4)] It promotes patient's involvement and satisfaction as they can preview their smile transformation digitally before committing to treatment.

Thus, digital dentistry, which is very convenient right from scanning to delivering the result becomes the uniqueness in our smile designing case.

2 CLINICAL CASE REPORT

A 37-year-old female patient reported to the conservative and endodontics department with the chief complaint of spacing in the upper front tooth region. On clinical examination, spacing in the maxillary anteriors (canine to canine), overjet 3 mm, Open bite and Angles class I molar relation was found (Figure 1). Treatment plan was explained along with various other options and got signature in the informed consent from the patient.

To begin with the documentation, preoperative photographs were taken ($), shade selection was done using VITA Shade guide, intra oral scanner (Trios 5 wireless, 3 shape) was used (Figure 2) and digital wax mock-up was done.

Both occlusions obtained through the digital scan and digital wax [(5)] mock-up were overlapped to reveal tooth

shape, alignment, and contour according to Golden tooth proportion [1] (Figures 3, 4 and 5). A cast was 3D printed and a clear orthodontic essix retainer, was made with polyvinyl siloxane (Figures 6 and 7).

Oral prophylaxis was done followed by checking the fit of tray in patient (Figure 8). Then small access holes [4], sized to accommodate the flowable composite tips were created in the incisal edges of desired teeth facially in the tray for the material to flow (Figure 10). Alternate tooth isolation was done using polytetrafluoroethylene tape [6]. A 37.5% phosphoric acid semi-gel was applied for 15 seconds, rinsed for 5 seconds, and then gently air dried. An adhesive was applied, light cured according to manufacturer's instructions using an LED curing light. The template was placed over the arch and an A-2 shaded flowable resin composite (Giomer tech. Shofu Inc. Beautiful Injectable) (Figure 9) was injected and cured (Ivoclar Vivadent) through the clear matrix for 30 seconds (Figure 11). The excess was removed from undesired areas (Figure 12) And then to compensate for thickness of template, polymerization time recommended by the manufacturer was doubled to ensure adequate polymerization [7]. Finishing and polishing was done using colour coded SHOFU polishing kit [8] (Figure 13). Post restorative instructions were given. Postoperative photographs were taken to document (Figure 15). And then review was done after 3 months.

Fig. 1: Pre - Operative intraoral Picture

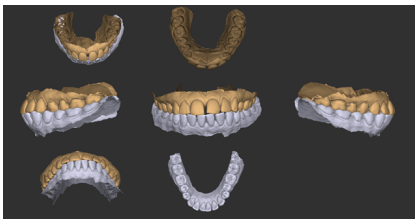

Fig. 2: Intraoral Scanning

3 DISCUSSION

The other treatment options available are composite front wing technique [9], orthodontic correction [10], rare earth magnets neodymium-iron-boron (Ne2Fe14B) [11], Porcelain veneers [12] and crowns. Among them, direct resin composite is non-invasive. The "composite injection technique" [4,13]

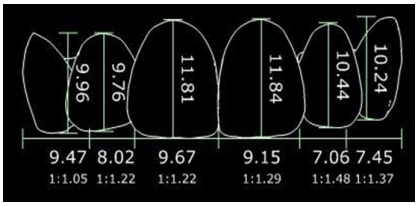

Fig. 3: Smile Designing according to Golden Proportion

Fig. 4: Smile Designing Result

Fig. 5: Smile Designing Result overlapped with the intraoral scanning image

Fig. 6: 3D printed cast

Fig. 7: Polyvinyl Siloxane material template

Fig. 8: Fit of the template checked

Fig. 9: Shofu Inc. Beautiful Injectable Composite [A2 shade]

Fig. 10: Injecting composite through the access holes created incisally

Fig. 11: LED light tack curing

Fig. 12: Excess to be removed

Fig. 13: Finishing and Polishing done using SHOFU polishing kit

Fig. 14: Pre Operative Photograph

Fig. 15:

has been introduced to improve time efficiency and reduce technique sensitivity for clinicians. However, in the case of multiple diastemata, the overflow of excess resin materials onto the adjacent teeth during injection poses challenges for recontouring the interproximal anatomy. The described non-invasive full digital workflow provides a predictable method to accurately recontour the multiple target restorations[3]. According to Golden proportion[1] (Lombardi): When viewed from the facial, the width of each anterior tooth is 60% of the width of the adjacent tooth (mathematical ratio being 1.6:1:0.6). It is difficult to apply as patients have different anatomy and proportions. Strict adherence to golden proportion calculations limits creativity and this may lead to cosmetic failure.[14]

As a general rule in composites, the more filler content and the smaller the filler particle, better the strength, more polishable and better marginal adaptability[15]. A new class of "flowable composite resins" was introduced in late 1996[16]. However, it is recommended that flowable composites should only be used in low stress-bearing areas.

Recently, newer and improved versions of flowable composites have been introduced that imply promising outcomes for aesthetic applications [18]. As more practitioners adopt injectable composites for diastema treatment, this method is poised to become a popular choice for achieving beautiful and confident smiles

So, it is evident that when we have our template for doing aesthetic corrections, injectable composites come handy. It is easy to bring desired contour quickly. Once flash curing is done, it is very easy to remove excess, and to finish and polish the composites.

Compared to standard composites, flowable composites could have a shorter lifespan and patients should be made aware of the treatment's anticipated duration and semi-permanent nature.

4 CONCLUSION

The advent of digital dentistry has revolutionized the way dentist's approach cosmetic dentistry, by offering a systematic and patient-centred methodology for achieving aesthetic outcomes. This cost effective method is much needed in this modern era when multiple teeth are involved. Since the smile result is previewed by the patient, the cooperation is good. If the patient follows post operative instructions and visits the clinic for regular follow ups, the work we did proves to be a promising and interesting way of smile designing. Though it's a reliable method, to guarantee the restoration's long-term success, careful treatment planning, occlusal factor consideration and regular follow up are essential.

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