

**CASE REPORT****Minimal Invasive Technique for The Esthetic Management of Midline Diastema: A Case Report**NORAH AL-AJAJI<sup>1</sup>, ALI BARAKAT<sup>2</sup>, PRADEEP KOPPOLU<sup>3</sup>, LINGAM AMARA SWAPNA<sup>4</sup><sup>1</sup>Specialist, Restorative and Esthetic Dentistry, Private Practice, Riyadh – KSA.<sup>2</sup>Lecturer, Restorative and Prosthetic Department, College of Dentistry – Dar Al-Uloom University, Riyadh – KSA.<sup>3</sup>Assistant Professor, Department of Preventive Dental Sciences, College of Dentistry – Dar Al-Uloom University, Riyadh – KSA.<sup>4</sup>Assistant Professor, Department of Surgical and Diagnostic Sciences, College of Dentistry – Dar Al-Uloom University, Riyadh – KSA

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**ABSTRACT**

It is a case report of a minimally invasive technique for diastema restoration with sectional veneer fabrication. It involves a technically demanding procedure and less time with minimal disruption and stress to soft tissue. The method presented in this case report depicts the closure of anterior spacing by an aesthetic sectional veneer. Successful restoration in present-day dentistry includes minimal biological cost, promising longevity and esthetic integration in addition to traditional criteria. However, several other factors influence patient acceptance, such as the uncomplicated technique, possible intraoral repair, reduced soft tissue trauma, and affordable financial cost. The clinical procedure of sectional veneers, presented in this case, introduces an additional treatment option to produce a minimal invasive diastema restoration in a single appointment, with a reduced number of clinical steps.

**Keywords:** Midline Diastema, Maxillary Anterior Diastema, Minimal Invasive Techniques, Esthetic Management, Partial Veneers.

**INTRODUCTION**

The condition of midline diastema is defined as a gap or space between maxillary central incisors. This space is one characteristic of average growth that occurs at the time of primary and mixed dentition, and usually, it will be closed by the time maxillary canines erupt. In most children, the medial erupting path of maxillary lateral incisors and maxillary canines naturally close this space. But in some cases, diastema won't close spontaneously <sup>(1)</sup>.

Some individuals may have the continuous presence of a diastema between maxillary central incisors. This problem is considered an anaesthetic or malocclusion problem. In such cases, diastema can be treated, but still, not all conditions of diastemas can be treated in the same terms. In some individuals, who has the issue of mixed dentition, post-interceptive therapy can give positive results. The timing, aetiology, mobility and extend of diastema must be evaluated appropriately to design an accurate treatment plan. Correct treatment plan or selection, proper case selection, patient cooperation, and proper oral hygiene are vital factors <sup>(2)</sup>.

The prevalence of midline diastemas occurs primarily in children. Still, the number drastically decreases between the ages of 9 to 11 and continues a gradual decrease up to 15 years of age. Gender and racial differences may also play a vital role in developing diastemas. According to some reports, maxillary median diastema prevalence was observed greater in Africans when compared with Caucasians or British population and Mongoloids (Chinese who are from Malaya & Hong Kong) <sup>(3)</sup>. Black children, who are around the age of 10 to 12 years old, may also have a higher prevalence of nearly 19% of midline diastema compared with white children with a prevalence rate of 8%. As an ethnic norm, most blacks and Mediterranean whites exhibit midline diastema <sup>(4)</sup>.

**Review of Literature:** The presence of a diastema is an aesthetic problem that ultimately spoils a pleasing smile and overall dental composition. Various factors and causes result in Diastema, but there is a broad range of treatment

options available to treat Diastema regardless of the reasons. But most people will learn to live with Diastema, as these gaps won't cause any oral health issues in any way, and individuals who are facing any oral issues may choose to seek treatment to treat Diastema. Before restoration, orthodontic treatment is required to treat Diastema; various factors include smart aesthetic orthodontics and wise space management. The combined approach gained a good result, in which a combination of both minor orthodontics and minimal invasive will be used in therapeutic treatment. Given below are some of the most commonly performed treatment options for Diastema <sup>(5)</sup>.

**Dental Bonding:** It is one of the most prominently used treatments for diastema, which is a non-invasive procedure and can perform within several hours. Patients need not have any hospital stay. In this process, the bonding material will be applied to the existing teeth to fill the gap between each tooth. Material which is used in dental bonding is indistinguishable and tooth coloured from natural enamel. Dental bonding is a very less expensive treatment option for diastema when compared with other treatments, but it may not last as long as dental veneers <sup>(6)</sup>.

**Dental Veneers:** These are the most popular treatment methods for diastema. Dental veneers are fragile and tooth-coloured shells applied to the surface of a tooth to fill in gaps. These are durable and can last for more than a decade without any need for replacement. Since they are tooth-coloured, they provide patients with a natural look and a full smile of beautiful teeth. This treatment method is much more of a permanent solution than dental bonding because they last longer and are not intended to be removed after the replacement <sup>(7)</sup>.

**Braces and Aligners:** Braces and aligners are generally used to treat a specific type of diastemata, such as when an abnormality is caused due to misalignment of teeth or a missing tooth that may not be necessary for a complete smile.

Braces and aligners work by pulling the teeth into a straighter position, further closing the gap between teeth to

have a complete smile without additional space between each tooth. However, this method is not suitable for all diastema cases. Before choosing this method as a preferred solution for diastema, ensure that the suggestion of an orthodontist is considered<sup>(8)</sup>.

**Dental Crowns:** In sporadic cases of diastema, dental crowns may work to fill in the gaps between a tooth. Such cases are especially the conditions due to damaged and eroded teeth. They cause the restoration of the size and shape of natural teeth as they can widen the surface of every tooth and provide a smile without any gaps in between the teeth.

These dental crowns are not a workable solution when the condition is caused due to natural and healthy teeth.

**Case Description:** A 27-year-old female came to the dental clinic seeking a conservative treatment of the maxillary anterior diastema. Clinical and radiographic examinations revealed maxillary diastema, chipped incisal angles for the maxillary lateral right and left incisors with multiple diastemas and irregular incisal edges for the maxillary right lateral incisor. Figure 1, 2 depicts the midline diastema before operation in a frontal view photograph while the patient is smiling.

As the patient is in her twenties and young, a treatment with minimal invasion by sectional veneers was recommended to close the gaps between the teeth and restore the natural smile. However, as the size of the spaces to be completed can be a contraindication for restoration with sectional veneers, the increased tooth width could result in an altered length to width ratio and below ideal tooth proportions. Various ratios have been introduced, such as the perfect tooth proportions, and these can be used as aesthetic guidelines for the tooth dimensions. However, these ratios rarely coincide with the smiles, which are considered beautiful by common people.

In this case report of the above person, it is revealed in a diagnostic wax-up that there is a favourable width-to-length ratio. And it is inferred that despite given the moderate size of the diastemas observed in this case, restoration with the help of sectional veneers could be done properly and that too by not disturbing the natural tooth proportions.

After the preliminary measurements were taken, the patient approved the treatment plan, i.e. treatment with sectional veneers. The clinical procedure started by fixing the prefabricated sectional veneers to match the size of the diastema.

**Clinical Management:** This clinical report shows to describe a case in which minimally invasive therapeutic techniques were used. The treatment plan started with in-office vital teeth bleaching using the light-activated hydrogen peroxide zoom in office. The in-office whitening was performed using 25% hydrogen peroxide (Zoom Day White, Discus Dental, Stamford, USA) for four 15-min sessions with supplemental light (Philips Zoom, Stamford, USA).

Two weeks after in-office bleaching, followed by incisal edge preparation and composite build-up for the maxillary left. Right lateral incisors using (IPS Empress Direct Enamel and IPS Empress Direct Dentin light-curing nanohybrid composite shade A1, Ivoclar Vivadent, Schaan,

Liechtenstein), incisal reshaping for the maxillary left and right canines, and finally, the maxillary incisors were prepared to remove the sharp irregularities on the incisal edges.



Figure 1: Preoperative Extraoral frontal photograph of the case while smiling.



Figure 2: Intraoral Preoperative frontal photograph of the case.



Figure 3: Intraoral frontal photograph showing the minimal partial veneer preparation.

Figure 3 shows the intra oral frontal photograph showing minimal partial veneer preparation.

The indirect veneers were fabricated using the (IPS E max® Press Ivoclar Vivadent, Schaan, Liechtenstein) on a refractory dye which is shown in Figure 5. The veneer was cut along the marker line with a diamond separating disc, and this cut-partial veneer exactly fit the space to be closed. A retraction cord was packed around the tooth by setting the partial veneer in its eventual position, sealing the gap. It is used to avoid contamination of crevicular fluid and also to ensure gentle displacement of softer tissue. This cord was placed tooth to tooth when the veneer is ready and removed when isolation is no longer required. A thin retraction cord was used to avoid further stressing soft tissue that is very delicate.

The indirect veneer was tested on the laboratory cast, and Figure 4 shows the frontal photograph of the same.



Figure 4: Frontal photograph showing the fitting of the partial veneers on the laboratory cast.



Figure 5: Photograph showing the handling of the partial veneers.

The indirect partial veneers were cemented using esthetic resin cement (Variolink Esthetic DC System Kit, Ivoclar Vivadent, Schaan, Liechtenstein). According to the manufacturer instructions, the frontal photograph depicted in Figure 6 and light-cured using Bluephase N Light Cure unit, Ivoclar Vivadent, Schaan, Liechtenstein).

In most cases, the veneer manufacturer recommends that internal conditioning be done with a resin primer called a veneer bond. It is done to increase the chemical adhesion and bond strength of the veneer. After this internal conditioning, the prefabricated veneers are bonded with the help of complimentary composite resin or bond. After loading the sectional veneer by using this composite resin, the tooth was etched as per the manufacturer's instructions.

Then first, the sectional veneer is placed in the proper position, and gently pressed unit contact with the adjacent tooth was made. A thin spatula was used to sculpt the excess composite, and once the optimal adoption was done between the sectional veneer and the tooth, the veneer was cured using high power cutting light.

After the curing process was completed, the sectional veneer margins were polished with conventional composite instruments. In a typical case, the tested prefabricated veneers do not require specific equipment and can be effectively polished with the most commonly available commercial polishing systems using nanohybrid composite resin. In the above case, a 50-micron needlepoint diamond bar (Brasseler DET3F, GA, USA) was used to smooth the extra composite, followed by a silicone cup (Identoflex Composite Polisher, Ravelli, Milan) to remove the residual scratches and a 3M paper finishing strip was used to polish the interproximal area. The above finishing and polishing are only limited to the margins of the sectional veneer, and no other instrumentation is required for buccal and lingual surfaces as prefabricated veneers are pre-polished to the ideal anatomic form with a high-gloss and laser-sintered surface.



Figure 6: Intraoral postoperative frontal photograph showing the cemented partial veneers. Post process no gaps will be visible for the person's full smile.



Figure 7: Intraoral postoperative frontal photograph showing cemented partial veneers after rehydration.

The post-operative intraoral frontal photograph after cementing of veneers and after rehydration is shown in Figure 7. The final photograph, i.e. Figure 8, shows the extraoral frontal picture with a smile after the minimal invasive clinical management of multiple diastemas.



Figure 8: Extra-oral postoperative frontal photograph with smile.

Finally, oral hygiene instructions are recommended, and the interproximal dental spaces were reviewed when the person was scheduled for a regular 6-month follow-up visit.

It is visible from Figure 8 that the high glossy surface of the veneer had produced optimal esthetics, and there is no transition visible between the veneer and the teeth. In this procedure, there is a lack of tooth preparation. Further, there are no impressions combined with less stress on the soft tissue with a single appointment had reduced the patient discomfort and increased acceptance among the patients.

## DISCUSSION

Diastema is a space  $>0.5$  mm between the two central incisors. Popularly in the Middle Ages, women with a gap between their front teeth were considered attractive <sup>(9)</sup>.

A high prevalence of diastema was observed among the Nigerian population created by artificial means <sup>(10)</sup>. In the 1960s and 1970s, Caucasians from Western societies considered it aesthetic <sup>(10)</sup>. MMD was regarded as a disturbance in occlusion that results in an unattractive smile <sup>(11)</sup> <sup>(12)</sup> <sup>(13)</sup> <sup>(14)</sup>. In Saudi Arabia, a space in the anterior region of the mouth is a recognizable major esthetic problem. A majority of female students in Saudi Arabia considered MMD results in an unattractive smile <sup>(15)</sup>.

A small minority of female students in Saudi Arabia considered MMD a trait of beauty. It may have been a cultural preference previously <sup>(15)</sup>. MMD was presented as unattractive by Saudi Arabian dentists and layman people <sup>(16)</sup>. MMD higher prevalence in the maxilla than in the

mandible <sup>(16)</sup>. Spacing in the anterior region was the most significant factor associated with maxillary midline diastema, followed by increased over-jet <sup>(17)</sup>. More common in males (7.7%) than in females (5.3%) <sup>(17)</sup>. Females are more concerned with MMD than males <sup>(17)</sup>.

The above mentioned clinical procedure for restoration of diastema with minimal invasion by the usage of ceramic sectional veneers. In the above case, the sectional veneer technique was reinterpreted using a prefabricated composite veneer. Despite the benefits of excellent esthetics combined with no sacrifice of the tooth structure, the ceramic sectional veneers have failed to enter the mainstream of general dentistry. The main reason behind this is the technically demanding clinical procedure and also the delicate laboratory fabrication process <sup>(17)</sup>. Further, there is a limitation to the popularity of the ceramic sectional veneer method, such as the high risk of accidental breakage and crack formation after bonding over the knife-edged margins due to the reduced ceramic thickness and unfavourable composite thickness ratio.

However, for many patients and dentists, the benefits of the restoration by less clinically demanding and single visit procedure with an affordable cost is always preferred over longevity.

## CONCLUSION

Two weeks after in-office bleaching, they were followed by incisal edge preparation and composite build-up for the maxillary left. Right lateral incisors using (IPS Empress Direct Enamel and IPS Empress Direct Dentin light-curing nanohybrid composite shade A1, Ivoclar Vivadent, Schaan, Liechtenstein), incisal reshaping for the maxillary left and right canines, and finally the maxillary incisors were prepared to remove the sharp irregularities on the incisal edges.

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