Case Report

Aesthetic rehabilitation of post orthodontic treatment with lithium disilicate veneers: a case report

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ABSTRACT

Introduction: Treating malpositioned anterior teeth requires more than just prosthodontic intervention. A collaboration with orthodontic treatment is the preferred approach for patients with compromised cases. Due to their predictable results and tooth structure conservation, lithium disilicate veneers are indicated for the aesthetic rehabilitation of anterior teeth with malpositioning or anomalous appearance. This case report discusses the aesthetic rehabilitation of upper anterior teeth that were compromised by missing teeth and post orthodontic treatment, using lithium disilicate veneers. **Case Report:** A 25-year-old female patient came to the Department of Prosthodontics at Universitas Padjadjaran Dental Hospital seeking to improve her smile. The treatment history revealed that the patient had just finished her orthodontic treatment. Clinical examinations showed the absence of upper left central incisor, causing the lateral incisor to occupy the central incisor position, the canine to occupy the lateral incisor position, and the premolar to occupy the canine position. Lithium disilicate veneers were proposed and the patient consented to the treatment. A dental impression was taken, followed by a diagnostic wax-up, mock up and finally, lithium disilicate porcelain veneers were placed. Lithium disilicate was chosen due to its high aesthetic properties and minimally invasive preparation. **Conclusion:** Aesthetic rehabilitation of upper anterior teeth that were compromised by missing teeth and post orthodontic treatment with lithium disilicate veneers is highly technique- and material-sensitive. However, when used with proper knowledge and skill, these restorations provide excellent aesthetic and functional outcome.

KEYWORDS

Aesthetic rehabilitation, indirect veneer, lithium disilicate

INTRODUCTION

The aesthetic restoration of anterior teeth constitutes one of the greatest challenges in restorative dentistry. Patients today demonstrate greater concern for their aesthetic appearance, reflecting higher living standards and enhanced awareness of oral health care.[1] Aesthetic concerns predominantly revolve around the appearance of the anterior teeth, also known as the aesthetic zone, which is a primary concern for patients and a challenge for dental professionals.[2] The presence of anterior teeth problems, including discoloration, tooth loss, deformities, can negatively impact a patient's diet, communication, social activities, self-esteem, mental health, smile, and appearance.[3] A treatment option for correcting anterior teeth is veneers, which involve applying a thin layer of material to the labial surface to enhance colour, shape, and function.[1,4]

Veneer restoration can be done indirectly with porcelain material made in a laboratory and directly with composite material on the tooth surface. Porcelain laminate indirect veneers are the preferred restoration for anterior teeth rehabilitation due to their natural fluorescence and ability to accurately replicate the light absorption, reflection, and transmission of natural teeth.[5,6] Their finished surface closely resembles natural dentition and demonstrates good tissue compatibility.[7] Currently, several ceramic options are available to clinicians, such as lithium disilicate, feldspathic porcelain, feldspathic porcelain reinforced with leucite, and lithium disilicate reinforced with zirconia.[8]

The success of ceramic veneer restorations depends on many factors, such as preparation design, adhesive techniques, and adequate patient home care.[3] Ceramic veneer preparations can be challenging for clinicians with little experience, and the lack of proper clinical protocols may result in failed restorations.[9] The creation of a diagnostic wax-up is fundamental for both diagnosis and treatment for veneer restorations. The diagnostic wax-up can be transferred to the mouth as a diagnostic mock-up, allowing the patient to participate in a clinical evaluation of the tentative future restorations. This enables them to request any desired changes at this early step and also serve as a preparation reduction guide.[9,10]

Achieving optimal and predictable results with the use of veneers requires meticulous planning and precision in performing every single step of the treatment. The best aesthetic result largely depends on the ability of the members of the multidisciplinary team to work together.[11] Efficient communication between team members can present a challenge due to the requirement for continuous communication between the different specialists.[12] Prosthodontists, orthodontists, periodontists, and dental technicians must work together because understanding the various phases of the treatment is fundamental to achieving the desired result. The patient's needs, requirements and expectations must be taken into account in the treatment planning to ensure a satisfactory aesthetic result.[11-13]

The purpose of this case report is to describe the aesthetic rehabilitation of upper anterior teeth that were compromised due to missing teeth and post-orthodontic treatment using lithium disilicate veneers, with the goal of improving the shape of the anterior teeth and addressing the inconsistency between the position and shape of the teeth.

Case Report

A 26 year old female patient presented to the Department of Prosthodontics, Universitas Padjadjaran Dental Hospital with aesthetic concerns regarding the size and shape of the upper front teeth and she expressed a desire to improve her smile and appearance. The patient mentioned that she recently completed her four-year orthodontic treatment. Preoperative extraoral photographs were taken to document facial aesthetics, symmetry, profile, and smile dynamics, while intraoral photographs captured the patient's initial dental condition (Figures 1 & 2).

Figure 1 Facial photo of patient

Figure 2 Intraoral photo before treatment

The intraoral examination showed the loss of the central incisor in the upper left region, causing the lateral incisor to occupy the central incisor position, the canine to occupy the lateral incisor position, and the premolar to occupy the canine position. After treatment modalities were discussed with the patient, a decision was made to prepare indirect lithium disilicate veneers to restore the size and the shape of the teeth and, thereby enhancing the aesthetics of her smile.

The patient was informed about the necessity of a diagnostic wax-up, followed by a diagnostic mock-up with a self-cured bis-acrylic temporary composite material (Figure 3 & 4) in order to evaluate the future dimensions of the proposed ceramic restorations. Due to the absence of the left central incisor, the wax-up was planned to reshape the upper left region lateral incisor to mimic a central incisor, the canine to mimic a lateral incisor, and the labial surface of the first premolar to mimic a canine.

Additionally, the wax-up of the upper right central and lateral incisors was performed to harmonize proportions of the anterior teeth. During the second visit the diagnostic mock-up was placed in the patient's mouth. The patient was pleased with the result and asked to move forward with the treatment. The final treatment plan included lithium disilicate veneers on teeth 11, 12, 22, 23, and 24.

Figure 3 Diagnostic wax-up

Figure 4 Diagnostic mock-up with a self-cured bis-acrylic temporary composite material

At the following clinical appointment, tooth preparations were carried out. Whenever possible, tooth preparation for porcelain veneers was restricted entirely to the enamel. In order to achieve that, the previously approved mock-up of the self-cured material was created and placed in the patient's mouth. Horizontal and vertical depth grooves were cut into the teeth with a depth marker bur and marked with a pencil before (Figure 5).

The mock-up was then removed and the labial enamel surface, which has pencil marks, was reduced using a tapered-cylinder, round-end diamond bur (Figure 6). A chamfer finish line was preferred for the preparation and was positioned at the equigingival. All internal line angles were rounded with an extra fine, tapered-cylinder, round-end diamond bur to reduce stresses in the margins of the veneers. Incisal overlap preparation was performed and the teeth were polished and smoothed.

Figure 5 Preparation using a depth marker diamond bur through the mock-up,

Figure 6 Pencil mark on tooth after the mock-up was removed.

Before performing a one stage double impression technique, a retraction cord was placed in the gingival sulcus. Then, the final impression was made using light-body and heavy-body consistency polyvinylsiloxane after removal of the cord

(Figure 7 & 8). Provisional restorations were fabricated using a self-cured bis-acrylic temporary composite. Once the veneers were received from the technician, the patient was scheduled for cementation of the restoration. At the next visit, the veneers were carefully positioned in the patient's mouth to verify marginal adaptation, alignment, shape, and colour, yielding completely satisfactory results.

Figure 7 Placement of retraction cords for impression.

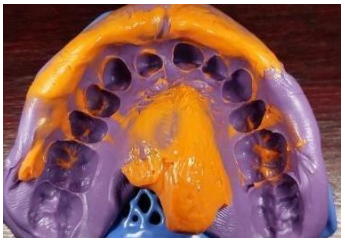

Figure 8 final impression was made using light-body and heavy-body consistency polyvinylsiloxane.

Prior to the luting procedure, teeth underwent prophylaxis with pumice. The conditioning of internal surfaces of the restorations was carried out by applying 9.5% hydrofluoric acid for one minute, followed by rinsing under running water and air-drying; afterward, a silane coupling agent was applied. After isolating the gingiva and the prepared tooth, teeth conditioning with 37% phosphoric acid, rinsing, and careful drying were performed. Next, a one-bottle bonding system was applied, and the surface was gently air-dried and polymerized.

The luting agent used in this case was flowable resin, which was applied to the internal surface of the veneer before positioning the veneer. After polymerization for five seconds, excess cement was removed using manual instruments, and the veneer was once more light cured at the labial and palatal sides. The cervical margins were verified, and any remaining excess cement was removed. The final result was assessed immediately and the patient was instructed to return in one week for further evaluation (Figure 9 & 10).

Figure 9 Facial photo of patient after treatment

Figure 10 intraoral photo after treatment

DISCUSSION

Achieving ideal tooth proportions is essential for a natural and harmonious smile, particularly in the anterior region, where aesthetics play a crucial role.[14] In this case, residual interdental spaces, uneven incisal edges, and disproportionate width-to-length ratios persisted despite successful orthodontic alignment. Similar findings have been reported in post-orthodontic cases, where residual spacing and tooth size discrepancies required additional aesthetic interventions to enhance the final outcome.[13] Studies highlight that orthodontic treatment alone may not always achieve optimal tooth proportions, particularly in cases of naturally small lateral incisors or uneven gingival contours, often necessitating restorative procedures for refinement and improved symmetry.[15]

To address these concerns, a diagnostic wax-up was performed to optimize tooth proportions and close residual spaces while incorporating the patient's aesthetic preferences. This technique is widely supported in the literature as an essential step in treatment planning, allowing both clinicians and patients to visualize the final outcome before irreversible procedures are performed.[15] The wax-up provides a blueprint for subsequent restorations, ensuring that adjustments can be made early in the process to align with functional and aesthetic goals. The diagnostic mock-up, fabricated using a silicone matrix derived from the wax-up, played a key role in patient communication, enabling feedback and ensuring that expectations aligned with the proposed restorations.[10] Prior research has emphasized that mock-ups significantly enhance treatment predictability, reduce patient anxiety, and improve overall satisfaction with the final outcome. Furthermore, studies have demonstrated that mock-ups facilitate a minimally invasive approach, allowing precise modifications before final tooth preparation.[5,16]

Minimally invasive preparation was prioritized to preserve enamel, a fundamental factor in the long-term success of veneers.[16] Enamel bonding provides superior mechanical stability compared to dentin bonding, as enamel offers a predictable and durable bond due to its homogeneous structure, low organic content, and absence of moisture.[18,19] Studies comparing different preparation techniques confirm that limiting reduction to enamel enhances restoration longevity, reduces postoperative sensitivity, and minimizes the risk of veneer debonding.[17,19] Research also indicates that excessive dentin exposure during veneer preparation compromises bonding strength, increasing the likelihood of marginal discoloration, microleakage, and premature failure. Therefore, by maintaining enamel integrity, the restorations in this case benefited from enhanced durability, improved adhesion, and reduced postoperative complications.[3]

Lithium disilicate veneers were selected for their exceptional mechanical and optical properties. With a crystalline concentration of approximately 70%, lithium disilicate offers a microstructure that balances strength and aesthetics, making it ideal for post-orthodontic rehabilitations where both function and appearance are essential.[20] Compared to composite resin, lithium disilicate provides superior colour stability, enhanced biocompatibility, and greater resistance to wear and fracture, reinforcing its suitability for cases requiring high aesthetic cases.[20,21] Clinical studies confirm that lithium disilicate veneers bonded to enamel exhibit excellent long-term survival rates, with reduced risks of chipping or debonding when proper adhesive protocols are followed. Additonally, its ability to mimic natural tooth translucency and shade variations has contributed to its widespread use in aesthetic dentistry.[9]

The patient expressed high satisfaction with the final outcome, reporting significant improvements in both smile aesthetics and self-confidence. The ability to preview the proposed restorations through the diagnostic mock-up was instrumental in fostering trust in the treatment plan, as it allowed the patient to visualize the anticipated changes and provide input before irreversible procedures were undertaken. This step not only enhanced patient involvement in decision-making but also alleviated concerns about the final appearance, emphasizing the importance of patient-centered treatment approaches.[15] Additionally, the patient reported no postoperative sensitivity or discomfort, underscoring the benefits of enamel preservation and proper bonding protocols. Research consistently shows that limiting preparation to enamel reduces postoperative complications, contributing to long-term restoration success.[19]

Beyond physical improvements, the psychological impact of the treatment was evident. The patient reported increased confidence in both personal and professional interactions, reinforcing the well-documented correlation between dental aesthetics and self-esteem.[23] Numerous studies have indicated that enhancing dental appearance can significantly improve an individual's social

perception and emotional well-being, further highlighting the role of aesthetic dentistry in improving overall quality of life.[22] The ability to achieve a natural, harmonious smile without excessive tooth reduction was particularly appreciated by the patient, reflecting a growing preference for conservative treatment options that preserve natural tooth structure while delivering optimal aesthetic results.[10]

Despite the favourable outcome, certain limitations should be considered. Although standard cementation protocols were followed, the absence of a rubber dam may have compromised isolation, increasing the risk of contamination during bonding. This factor could potentially affect bond strength and long-term retention of the veneers.[19] Additionally, incorporating digital technology, such as intraoral scanning, digital smile design, and CAD/CAM fabrication, could have further enhanced treatment precision and efficiency. Digital tools have been shown to improve communication between clinicians and patients, facilitate more accurate treatment planning, and optimize restoration fit and esthetics.[24] Future cases may benefit from integrating these advanced technologies to further improve workflow, accuracy, and long-term outcomes.

CONCLUSION

Esthetic rehabilitation of upper anterior teeth that were compromised due to missing teeth and post orthodontic treatment with lithium disilicate veneers is highly technique- and material-sensitive. However, when used with proper knowledge and skill, these restorations provide excellent aesthetic and functional outcome. The implications of these findings suggest that with careful planning, the use of advanced materials, and adherence to proper treatment protocols enable clinicians to achieve reliable, long-lasting aesthetic results in post-orthodontic rehabilitation, improving both function and patient satisfaction.

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