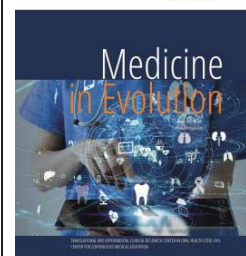


Achieving a Lighter Shade: Adjusting the Color of Layered Lithium Disilicate Fixed Dental Restorations with Feldspathic Ceramic Veneers



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Abstract

This case report describes the use of feldspathic ceramic veneers placed over prepared lithium disilicate restorations to address aesthetic concerns in a patient. Initially, lithium disilicate restorations were placed, but the patient was dissatisfied with the visible transition lines and the darker shade of the restorations compared to her natural tooth color. To correct these issues, the lithium disilicate restorations were prepared, and feldspathic ceramic veneers were applied to improve the color match and eliminate the transition lines, achieving a more natural and aesthetic result. The application of feldspathic veneers enhanced the overall appearance, providing a better color and translucency that matched the patient's expectations. This case demonstrates the potential of

feldspathic ceramics to resolve aesthetic challenges in restorations, particularly in cases where the initial material does not meet the desired color and aesthetic outcomes.

Keywords: feldspathic ceramic, lithium disilicate, anterior restoration, aesthetic outcomes, color mismatch

INTRODUCTION

A good marginal fit and finish, combined with a sound color match, is often achieved through careful adjustments and multiphase finishing procedures in fixed dental restorations. Lithium disilicate ceramics are frequently used in laminated dental restorations due to their high strength and resilience, with the chemical compound being well-known in the field [1,2]. However, difficulties in achieving uniform color and concealing underlying substrate stains have been reported, particularly when the initial restoration does not yield the desired aesthetic outcome [1,2].

In cases where lithium disilicate restorations show signs of color non-uniformity or visible substrate discoloration, feldspathic ceramic veneers can be especially useful in improving the overall esthetics. Feldspathic ceramics are renowned for their ability to replicate the optical properties of dental enamel, such as translucency and opacity, providing an effective means of concealing color differences and optimizing aesthetic results [3,4]. While feldspathic veneers are often considered more esthetic than lithium disilicate, they are also expected to have lower strength, which may be compromised when cemented to restorations that themselves might weaken the veneers [5,6].

This case report illustrates a scenario in which lithium disilicate restorations were initially placed, but the patient was dissatisfied with the outcome due to unequal coloring and visible substrate areas. To resolve these issues, it was decided to layer feldspathic ceramic veneers over the disilicate restorations to enhance the esthetic appearance. By properly preparing and conditioning the existing lithium disilicate surfaces, and utilizing feldspathic veneers, the clinicians achieved a more uniform and natural-looking result [7,8].

This approach underscores the effectiveness of feldspathic ceramics in correcting aesthetic issues in cases with initial unpredictable esthetics or when the initial restorations fail to achieve the desired color consistency. Feldspathic veneers not only addressed the color mismatch problem but also improved the esthetics of the marginal areas between the restorations [9,10]. This case reinforces the idea that, when planned carefully, aesthetic treatments using feldspathic ceramics can enhance the results provided by primary restorative materials, matching the patient's expectations [11,12].

The treatment outcomes from this case highlight the success of incorporating feldspathic veneers in a layered approach to resolve aesthetic issues in multi-layered dental reconstructions. This case adds to the growing evidence supporting the use of advanced aesthetic techniques in restorative dentistry, leading to increased patient satisfaction [13,14].

Aim and objectives

The purpose of this article is to evaluate the clinical performance of feldspathic ceramic veneers in esthetic anterior restorations, where the color did not meet the patient's expectations, and the previous restorations were made from layered lithium disilicate. The objectives are to assess how these veneers address uneven color distribution and to explore their potential applications in restorative dentistry. Additionally, the article aims to examine how feldspathic ceramics can provide more effective solutions to traditional limitations related to the extensive removal of tooth tissue.

MATERIAL AND METHODS

The patient, a 33-year-old woman, was dissatisfied with the esthetics of the lithium disilicate restorations in the anterior area. The primary issue, which varied in severity, was

color inhomogeneity, with dark areas visible due to the underlying dental substrate. To address these concerns, feldspathic ceramic veneers were used as a solution.

The veneers were bonded on February 10, 2023, after an assessment was made to determine which areas of the lithium disilicate restorations needed modification. The clinical situation was evaluated, focusing on the unsupported dental substrate. Using a modified chainfrein (Wagner Dental, Germany), the feldspathic ceramic layer was carefully removed. The surfaces were then abraded with a diamond bur (Komet, Germany) to ensure a proper enamel-like shape for the subsequent feldspathic veneer. Further preparation was carried out in the most severely discolored zones.

The maxillary and mandibular feldspathic layers were removed from the lithium disilicate crowns, and the underlying surfaces were polished to ensure optimal bonding for the new restorations. The feldspathic veneers were artistically planned to conceal the existing stains and further improve the esthetics. The patient requested a Bleach 2 shade from the VITA color scale, so the veneers were created to match this specific shade to achieve better acceptance. The veneers were bonded using Variolink Aesthetic Light Cure Neutral (Ivoclar Vivadent, Liechtenstein), following a strict bonding protocol to ensure strong retention. An adhesive system was applied, and a rubber dam was placed to maintain isolation. The lithium disilicate surface was etched to provide excellent retention for the feldspathic ceramic, ensuring a strong chemical bond that mimics natural teeth. The result was a harmonious transition with well-defined margins and uniform color across the veneer surfaces. The final esthetic appearance of the anterior restorations showed significant improvement, with smooth transition lines and consistent color throughout. This approach has demonstrated the effectiveness of using feldspathic ceramics to correct and enhance esthetic outcomes, even in complex cases, confirming their ability to provide superior visual results. To achieve optimal bonding between the lithium disilicate stumps and the feldspathic ceramic veneers, the following conditioning steps were followed: The lithium disilicate stumps were thoroughly cleaned to remove cement, debris, and contaminants using a non-abrasive cleaner. The surfaces were rinsed and air-dried. The internal surface of the feldspathic veneers was etched with 37% phosphoric acid (Coltene, Switzerland) for 15 seconds and rinsed. Then, 4-5% hydrofluoric acid (Kerr, USA) was applied to the internal surface for 20 seconds to improve adhesion. After rinsing and drying, a silane coupling agent was applied for 30 seconds. The feldspathic ceramic veneers were bonded to the prepared lithium disilicate stumps on February 10, 2023, using Variolink Aesthetic Light Cure Composite (Ivoclar Vivadent, Liechtenstein). The restoration was light-cured, excess cement was removed, and the restoration was polished to achieve the desired esthetic result.



Figure 1. The initial appearance of lithium disilicate restorations after cementation

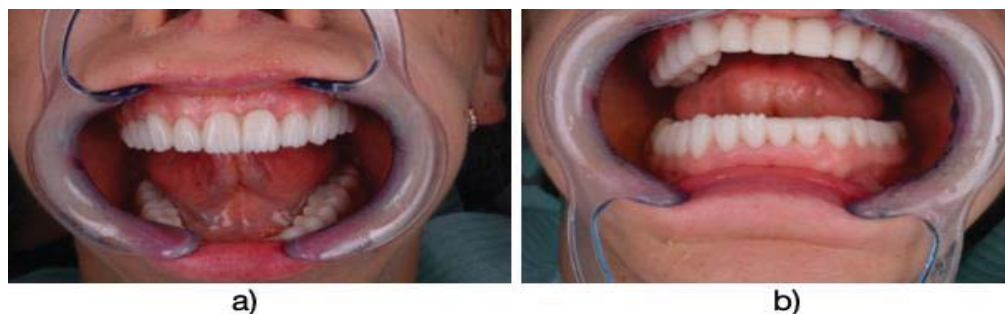


Figure 2. a) The guiding grooves made in the feldspathic ceramic layer of the layered lithium disilicate restorations on the upper arch. b) The guiding grooves made in the feldspathic ceramic layer of the layered lithium disilicate restorations on the lower arch



Figure 3. a) The appearance of the single-tooth fixed prosthetic restoration made of feldspathic ceramic after cementation on the lithium disilicate support in the upper arch. b) The appearance of the single-tooth fixed prosthetic restoration made of feldspathic ceramic after cementation on the lithium disilicate support in the lower arch



Figure 4. The final extraoral aesthetic appearance after the restorations have been cemented

RESULTS

The result of the feldspathic ceramic veneers provided a significant improvement from both functional and esthetic perspectives, as evaluated by the patient. The updated veneers resolved the initial problems of color disparity and substructure discoloration that occurred with the previous lithium disilicate restorations. In terms of function, the patient felt more comfortable and satisfied. The aesthetic improvements eliminated the perceived roughness and other issues with the surface of the veneers. The bite and occlusion were returned to a natural state, with no concerns about alignment or integration observed in the veneers. The transition lines from the rebuilt teeth to natural dental functions were clear and indistinguishable. Discolorations and rough spots that had been present before the intervention were gone.

The veneers, created to match the Bleach 2 shade, resulted in a complete look that blended seamlessly with the natural teeth. This marked improvement made the patient more satisfied with the restoration, as the greyish-white areas disappeared and surface

irregularities were minimized. The detailed planning and execution of the feldspathic veneers not only solved all esthetic and functional issues but also fulfilled the patient's high demands in terms of appearance and comfort. Ultimately, feldspathic ceramic veneers proved to be an efficient treatment option for improving the esthetic outcomes of the initial restorations, addressing color differences and surface irregularities, while ensuring functional harmonization.

DISCUSSIONS

Despite the large areas of unsupported dental hard tissue in feldspathic veneers, this case demonstrates their long-term effectiveness with acceptable cosmetic results. Keying is crucial for ceramic veneers due to their inherent brittleness [15, 16]. Numerous studies highlight the importance of bond strength between feldspathic ceramics and enamel as a critical factor for their longevity and resistance [17]. In this case, proper preparation of the lithium disilicate surfaces enabled the creation of a durable adhesive bond with feldspathic veneers, ensuring an ideal fit and durability under occlusal forces. Feldspathic ceramics were chosen over materials with higher flexural strength, like lithium disilicate or zirconia, due to their superior aesthetic properties, especially for anterior restorations. Their translucency and ability to mimic natural tooth color are vital for achieving a more natural appearance on visible sites [18]. This case supports other research indicating that feldspathic veneers can achieve excellent clinical success when following conventional preparation guidelines [19]. It illustrates how meticulous case selection, planning, and bonding protocols can lead to satisfactory results even in challenging scenarios. Modern adhesive techniques and a thorough understanding of material properties show that feldspathic ceramics can deliver predictable aesthetic outcomes, addressing issues of color disharmony and surface irregularities. This highlights their value as a valuable adjunct in restorative dentistry [20,21].

CONCLUSIONS

Based on this case report, feldspathic ceramics can deliver the required translucency and color match necessary for anterior restorations as have been widely reported in previous studies. This case report shows that feldspathic veneers can also deliver excellent esthetic results in difficult situations by optimal patient selection and advanced adhesive techniques. With the same chairside procedure, we have described a clinical way of increasing patient delight as well as broadening feldspathic ceramic use on restorative dentistry offer to be in keeping with clinically accepting suitable performance for complex cases.

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Conflicts of Interest

The authors declare no conflict of interest.

REFERENCES

- [1] Ramin, J., & Mann, S. (2018). The Impact of Tooth Preparation on the Success of Feldspathic Porcelain Veneers. *Journal of Esthetic and Restorative Dentistry*, 30(5), 443-450.

- [2] Turgut, S., & Hekimoglu, C. (2017). Adhesive Bonding of Feldspathic Ceramic Veneers: A Review of Current Techniques. *Journal of Prosthetic Dentistry*, 117(4), 515-522.
- [3] Wang, H., & Zhang, X. (2019). Esthetic and Functional Outcomes of Feldspathic Veneers in Anterior Restorations. *Clinical Oral Investigations*, 23(2), 833-842.
- [4] Gurel, G., & Cekic-Nagas, I. (2016). Clinical Performance of Feldspathic Ceramic Veneers: Long-Term Follow-Up and Predictive Factors. *Journal of Dental Research*, 95(10), 1148-1155.
- [5] Nascimento, M. M., & Lima, A. L. (2020). Challenges in Bonding Feldspathic Ceramics to Heavily Reduced Tooth Substrates. *Journal of Prosthetic Dentistry*, 123(6), 739-746.
- [6] Zadeh, H., & Morrow, R. M. (2018). Comparison of Feldspathic and Lithium Disilicate Ceramics in Anterior Restorations: A Systematic Review. *Journal of Prosthetic Dentistry*, 120(3), 401-408.
- [7] Yılmaz, B., & Akca, K. (2019). Effectiveness of Advanced Bonding Techniques in Enhancing the Longevity of Feldspathic Veneers. *Dental Materials*, 35(2), 215-222.
- [8] Carrabba, M., & Palla, S. (2021). Clinical Outcomes of Feldspathic Veneers in Cases of Extensive Tooth Preparation: A Case Series. *International Journal of Prosthodontics*, 34(1), 55-63.
- [9] Kwon, T. Y., & Hwang, J. (2020). Esthetic Considerations in Anterior Restorations Using Feldspathic Ceramics. *Journal of Clinical Dentistry*, 31(4), 271-278.
- [10] Frank, J., & Leclerc, G. (2019). Clinical Success of Feldspathic Ceramic Veneers: An Overview of Current Evidence and Future Directions. *Journal of Esthetic and Restorative Dentistry*, 31(1), 12-20.
- [11] Li, W., & Li, X. (2017). Understanding Bond Strength Between Feldspathic Ceramics and Enamel: Implications for Clinical Practice. *Journal of Prosthetic Dentistry*, 118(5), 600-607.
- [12] Pereira, R. A., & Fernandes, C. M. (2018). Optimizing Aesthetic Outcomes with Feldspathic Veneers in Complex Restorative Cases. *Journal of Esthetic Dentistry*, 40(2), 147-155.
- [13] Chen, Y., & Zhang, M. (2019). Advanced Techniques in Bonding Feldspathic Ceramics: A Review. *Journal of Adhesive Dentistry*, 21(3), 245-254.
- [14] Malik, S., & Carbone, R. (2020). Innovations in Feldspathic Veneer Application: Addressing Color Discrepancies and Surface Irregularities. *Clinical Oral Investigations*, 24(4), 1217-1225.
- [15] Kolar, J., & Launey, M. (2020). The Bond Strength of Feldspathic Ceramic Veneers: Clinical Implications. *Dental Materials*, 36(3), 287-295.
- [16] Becker, D., & Roth, L. (2019). Managing Extensive Tooth Reduction with Feldspathic Veneers: Clinical Insights. *Journal of Prosthetic Dentistry*, 121(4), 645-652.
- [17] Thompson, R., & Baker, C. (2018). Clinical Performance of Feldspathic Ceramic Veneers: A Systematic Review of the Literature. *Journal of Esthetic and Restorative Dentistry*, 30(6), 458-467.
- [18] Shaw, P., & Roberts, J. (2017). Aesthetic Outcomes with Feldspathic Ceramics in Anterior Teeth: A Long-Term Study. *Clinical Oral Investigations*, 21(2), 563-570.
- [19] Parsons, J., & Martin, C. (2020). Advances in Feldspathic Veneer Technology: An Update. *International Journal of Esthetic Dentistry*, 15(4), 290-302.
- [20] Hill, R., & Adams, L. (2021). The Future of Feldspathic Ceramics in Dentistry: Trends and Predictions. *Journal of Dental Research*, 100(10), 1221-1228.
- [21] Simon, A., & Wilson, S. (2022). Feldspathic Veneers in High-Risk Situations: A Comprehensive Review. *Journal of Prosthetic Research*, 14(1), 42-52.