# Expanding the limits: Successful anterior rehabilitation with feldspathic veneers beyond conventional guidelines


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*Received: 11 August 2024; Accepted: 13 September 2024; Published: 30 September 2024*

## Abstract

This case report aims to detail our experience in regards to the management of the options for anterior dental rehabilitation using feldspathic ceramic veneers when preparation extends beyond guideline recommendations. Porcelain laminates are translucent, shade-matched to resemble enamel more than any other dental material, but there has always been equivocation about their mechanical integrity, particularly when applied over a severely reduced dentin. This work presents a clinical case where feldspathic veneers have been applied on all the anterior teeth, both centrals, laterals and canines, with veneer being made 0.5m thick, more than the recommended guidelines for such veneers. Despite the invasive preparation which extended beyond the 2mm of unsupported dental hard tissue infiltration the veneers showed that they were long term physiological stable. Some of the reasons that have put into practice are very rigid bonding procedures and good understanding of the properties of feldspathic ceramics. The case also debunks the concept that feldspathic veneers are not suitable in cases which require massive amounts of tooth reduction and indicates that this material will also do well especially if the technique that is implemented does not call for ideal conditions. Consistent with the latter statement, the present study emphasizes the effectiveness of feldspathic ceramics for remaining dental thickness and call for further investigation into more challenging clinical applications.

**Keywords:** ceramic masses, minimal invasive, treatment plan

## INTRODUCTION

The use of feldspathic ceramic veneers as a means of modulating the appearance of the anterior dentition has become popular because of the characteristic that makes these veneers resemble dental enamel. These veneers are especially well loved for their ability to be as transparent as the natural teeth' enamel and for the ability to replicate the light reflection thus suitable for the smile's visible zone. However, there has been controversy about their mechanical strength particularly when there is heavy preparation of the teeth to which the veneer will be bonded, and there is likelihood that parts of it will have no substrate support from the tooth surface (1,2).

A multiple of factors affects the outcome of feldspathic veneers as the tooth reduction, the thickness of the ceramic and the quality of the bonding process (3,4). Traditionally, as much enamel as possible is reduced in order to have sufficient substrate on which the veneer will rest on (5). However, there are some clinical situations in which more dentin has to be reduced, and one may end with a position where the veneer ends beyond the enamel margin that conventional practice defines as safe for mechanical retention (6).

In the present paper, a case report is described that discusses how feldspathic ceramic veneers were bonded satisfactorily in natural teeth where preparation invasive exceeded the usual 2 mm of unsupported dental hard tissue. However, the veneers provided all these results for the whole anterior region including the centrals and the laterals, as well as the canines for the long-term patients' outcome in the centrals and the laterals, the veneers presented long term stability and durability. This case gives an opportunity to evaluate the possibility of the feldspathic ceramics to remain intact even in situations where the preparation norms act as bar that cannot be crossed (9,10).

Feldspathic ceramics contain a large portion of glass and leucite crystals resultant in low flexural strength of 100-140 MPa (11,12). Nonetheless, when well cemented, these ceramics are capable of handling the forces of mastication, and this is so even if the veneer thickness is beyond standard limits (13). They further observe that, when good bonding procedures are used, feldspathic veneers have high prognosis with over 90% of the cases been reported to be still in place after 10 years (14,15).

In this case study, feldspathic veneers were applied on all the anterior teeth with the emphasis on proper bonding regime that would enable the veneers to serve as long as necessary given the fact that all anterior teeth were veneered and the veneering material had a thickness superior to that of the standard veneering ceramics (16,17). The results presented here can be considered to question the paradigm that feldspathic ceramics have restricted applications in restorative dentistry, and point toward a different course of the investigation. The clinical findings indicated here demonstrate the long-term potential of feldspathic veneers for even more extrovert aesthetic and, at times, they could provide more aggressive treatments ascending appeal without affecting resilience (20,21). This, in turn, serves to further stress the potential of utilizing sophisticated adhesive systems in harmony with the understanding of material characteristics to demonstrate effectiveness in aesthetic dental restorations.

It is probably due to unparalleled bonding of the restorations that other factors have made these restorations most successful. It is confirmed that good adhesion to the enamel increases the mechanical retention of ceramic veneers, which are rather brittle by their nature (23). The bond strength between feldspathic ceramic and enamel has been seen to play an important role with regards to the durability of these restorations (24). In this case, however, it might well have been this very bond that made an important contribution towards preserving the stability of the veneers, including in relation to occlusal forces. The preference

for feldspathic ceramic over other ceramic materials with higher flexural strength as lithium disilicate or zirconia, was due to the esthetic properties of feldspathic ceramics that are critical in anterior ones. It has been established that feldspathic ceramics allow for translucency and color matching to the extent of providing a natural appearance, which is quite relevant in anterior cases (26).

In addition, the study result of this case agrees with what is demonstrated by other research that feldspathic veneers have the potential to perform excellently when traditional preparation guidelines are exceeded (27). These studies imply that proper case selection, meticulous preparations and emphasis on bonding techniques may allow successful use of feldspathic ceramics even in more difficult clinical scenarios.

Material properties of feldspathic ceramics and their interaction with dental tissues should be comprehensively understood as exemplified in this case. By utilizing advanced adhesive techniques during treatment as well as careful clinical application, satisfactory results can be achieved within aesthetic dentistry even in less-than-ideal conditions.

### *Aim and objectives*

This article seeks to review the clinical performance of feldspathic ceramic veneers in the anterior dentition in terms of aesthetics and mechanics in preparations that involve massive reduction, as well as to determine the effectiveness of bonding in increasing veneer wear resistance and to discuss the wider prospects for feldspathic ceramics in contemporary restorative dentistry.

## MATERIAL AND METHODS

The patient came to us with a request to replace the maxillary central incisors. Considering the esthetic and the functional requirements the material of choice for the restoration was feldspathic ceramic. However, prior to finalising this decision, it was crucial to make sure that the clinical situation served such restorations.

Since there is no hard dental substrate on the mesial slopes of the central incisors another method to calculate the supported enamel area was used. This was done using a periodontal probe and according to the criteria of Alberta gum and bone chart. In particular, if the unsupported enamel was more than 2 mm, then feldspathic ceramic could not be used; lithium disilicate had to be employed. During the procedure, more material was removed from the diastema because the patient had overhanging composite restorations from previous treatments that were not properly finished. Upon calculating the area, it was found that the unsupported enamel exceeded 2 mm. Specifically, when measuring the area where the hard dental substrate ends from one incisor to the other at the incisal edge, the maximum unsupported zone exceeded the 2 mm threshold, reaching 2.3 mm on tooth 1.1 and 2.1 mm on tooth 2.1. Additionally, more preparation was done on tooth 2.1, extending 0.2 mm vestibularly due to the discoloration. This additional preparation was needed to allow the feldspathic ceramic to effectively cover the discoloration, even with the reduced thickness. Due to the direct visibility of the aesthetic zone, simple restoration leading to alteration of some of the parameters of the two central incisors may lead to the creation of unevenness between the natural teeth and the restored ones. Consequently, the decision was made to restore the entire anterior group up to the canines to have the same appearance.

While the premolars were also very evident in the profile pictures the decision was made to whiten professionally rather than use feldspathic ceramic to mask the teeth. This decision was made in compliance with the primary policies of the minimal and non-interventional treatment approach. Although the crowns of the premolars were not covered with ceramic, esthetics were restored by using whitening, as, the adjacent tissues affect the

color of the teeth and one cannot distinguish between them under social conditions. But even here a specialist may see the difference. The color which was used on the restorations was A1, the patient's natural teeth were assessed and determined to be A3 at the beginning. This was done by doing professional whitening before the final color selection to move from A3 to A1 (a two-shade difference). It helped to also make the feldspathic ceramic restorations match the newly whitened natural teeth.

The veneers were cemented by Variolink Aesthetic Light Cure Neutral (Ivoclar Vivadent, Liechtenstein). That is why a rubber dam provided a dry working field, when there could be no slippage, and the procedure has to be done again. Most importantly the veneers were cemented only on enamel thus helping in improving the mechanical mode of retention and thereby also longevity. This approach built on the idea that the adhesive bond between the enamel and adhesive had high bond strength and that the restorations could therefore withstand occlusion forces. Due to the adherence to the bonding protocol, there was tremendous esthetics without having to devitalize the natural dentition.

a) b)

Figure 1. a). The Patient's Initial Extraoral Smile. b). The Patient's Initial Intraoral Smile

Figure 2. (A). A Guided Mockup Was Performed

a) b)

Figure 3. a), b) The Preparation Was Guided Using the Mockup. To Properly Visualize the Dimensions of the New Restorations and the Permissible Thickness of the Feldspathic Ceramic in Millimeters

a) b) c)

Figure 4. (a, b, c, d,) The fixation of the Mockup

a) b) c)

Figure 5. Patient Appearance with Mockup, a) Right Semiprofile, b) Frontal view, c) Left Semiprofile

a) b)

Figure 6. (a, b) Guided preparation through mockup

a) b)

Figure 7. (a, b) Finishing the Teeth on Which Veneers Have Been Placed

Figure 8. (A) The Fixation of Feldspathic Ceramic Veneers

Figure 9. (A) The Final Extraoral Result

Figure 10. (A) Intraoral Aesthetic Appearance

## RESULTS

This case demonstrated that feldspathic ceramic veneers can be successfully placed even when the tooth preparation exceeds typical standards, especially in cases involving more than usual tooth reduction. The patients had high esthetic satisfaction and stability over time and as seen no veneer failure even though they had invasive preparation.

The bonding procedure was also very much significant in determining the effectiveness of the veneers. The adhesion procedure to the enamel surface enhanced retention and reduced the brittleness of feldspathic ceramics, hence occlusal loading. The definitive cementation was made with Variolink Aesthetic Light Cure Neutral (Ivoclar Vivadent, Liechtenstein) and for this an isolation with a rubber dam was essential to provide the best adhesion.

The aesthetically pleasing outcome was significantly enhanced by the professional bleaching, which achieved an excellent color match. The veneers seamlessly blended with the patient's natural teeth, maintaining their flawless appearance even under magnification.

From this case, it can be concluded that if careful preparation and the adhesive systems are employed, feldspathic ceramics might be used in more complex restorative situations.

## DISCUSSIONS

The favorable outcome of the present case thus contradicts the general restrictions about the application of feldspathic ceramic veneers especially when the preparation entails more than anticipated reduction of tooth substance as per the principles of feldspathic ceramic veneers. As it has been stated for a long time, it is highly important to reduce the amount of space of the ceramic that is not supported to minimize the risk of mechanical failure (22).

Nevertheless, in this case, even though the thickness of the unsupported dental hard tissue was more than the conventional 2 mm, the feldspathic veneers were very robust throughout the anterior region.

It is probably due to unparalleled bonding of the restorations that other factors have made these restorations most successful. It is confirmed that good adhesion to the enamel increases the mechanical retention of ceramic veneers, which are rather brittle by their nature (23). The bond strength between feldspathic ceramic and enamel has been seen to play an important role with regards to the durability of these restorations (24). In this case, however, it might well have been this very bond that made an important contribution towards preserving the stability of the veneers, including in relation to occlusal forces. The preference for feldspathic ceramic over other ceramic materials with higher flexural strength as lithium disilicate or zirconia, was due to the esthetic properties of feldspathic ceramics that are critical in anterior ones. It has been established that feldspathic ceramics allow for translucency and color matching to the extent of providing a natural appearance, which is quite relevant in anterior cases (26).

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Material properties of feldspathic ceramics and their interaction with dental tissues should be comprehensively understood as exemplified in this case. By utilizing advanced adhesive techniques during treatment as well as careful clinical application, satisfactory results can be achieved within aesthetic dentistry even in less-than-ideal conditions.

## CONCLUSIONS

In conclusion, this case report demonstrates the application of feldspathic ceramic veneers that were carried out in a case of a significant amount of tooth structure reduction. Veneers can provide predictable long-term stability and aesthetic health. This means that feldspathic ceramics can be used in almost any clinical situation, provided that proper attention is given to bonding techniques and careful selection of cases. This challenges traditional paradigms of veneer placement in restorative dentistry.

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