The Use of UltraThineer 3D Printed Veneers in Masking Lifelong Tetracycline Staining: A No Prep Esthetic Approach

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Abstract

A common misconception in esthetic dentistry is that veneer placement inevitably requires significant tooth reduction. While conventional preparations do remove enamel, UltraThineer offers the world's first no-prep, 3D printed zirconia veneer. Created with advanced precision 3D printing technology, UltraThineer elevates the veneer market by uniting innovative materials with digital manufacturing. This case report documents the use of UltraThineer to rehabilitate a 49 year old patient dissatisfied with her smile due to tetracycline staining. A fully digital workflow consisting of intra-oral scanning, virtual smile design, and additive fabrication of 120μm (0.120mm) zirconia shells was employed. This case outcome suggests that 3D printed zirconia, paired with a no-prep strategy, can achieve predictable aesthetics while preserving 100% natural tooth structure. UltraThineer exemplifies how advanced materials and digital manufacturing can redefine veneer therapy, offering clinicians a non-invasive alternative to traditional reduction-based protocols.

Introduction

The pursuit of minimally invasive esthetic dentistry has intensified over the past decade, driven by patients' increased aesthetic expectations and clinicians' emphasis on long-term tooth preservation. Porcelain veneers remain the go-to solution for correcting discoloration, minor malalignment, and shape discrepancies; however, conventional protocols typically require removing 0.3–0.7 mm of facial enamel to accommodate ceramic thickness and ensure adequate translucency.[1] This irreversible step can elicit postoperative sensitivity, compromise bond strength, and deter otherwise eligible patients. Recent advances in digital dentistry and high-performance ceramics have opened alternative pathways. Additive manufacturing (3D printing) of zirconia now permits fabrication of ultra-thin restorations with mechanical properties surpassing those of traditional pressed or milled ceramics.[2] UltraThineer leverages this technology to deliver the first zero-preparation, 3D-printed zirconia veneer with a uniform thickness ranging from 80–250μm. This case report describes the digital workflow and six-week clinical outcome following placement of UltraThineer veneers on a 49-year-old patient exhibiting severe tetracycline staining. Tetracycline staining is a form of intrinsic tooth discoloration caused

by the use of broad-spectrum antibiotics, commonly prescribed during childhood in the mid-1900s. As the tooth matures and is exposed to light, the tetracycline oxidizes, resulting in permanent staining that appears yellow, brown, or gray.[3] This case report aims to illustrate the practical application of additive zirconia in a no-prep protocol, highlighting its potential to redefine veneer therapy for both clinicians and patients who prioritize conservative treatment.

Case Presentation

A 49-year-old female patient presented to Newport Beach Dental Studio, Newport Beach, California, with concerns of long-standing, generalized tooth discoloration. Despite multiple previous attempts with both at-home and in-office bleaching treatments, there was no significant improvement in the tetracycline staining resulting from prior antibiotic exposure.

Chief Complaint:
Discoloration due tetracycline exposure from childhood. Patient was happy with her smile and natural shape of her teeth, but desired a conservative solution to lighten the color of her “dark teeth.”

Clinical Findings:
Radiographic and clinical exam revealed no active carious lesions or infections. Patient has a history of restorative work, including a combination of composite and amalgam fillings. Patient had previously completed orthodontic therapy and is Class 1 occlusion. No signs of clenching or bruxism were observed.

Diagnosis:
Intrinsic discoloration induced by tetracycline.

Treatment Plan

A comprehensive case history was obtained, followed by pre-operative photography, radiographic imaging, intraoral scanning, and a detailed clinical examination. After a thorough discussion of the patient’s aesthetic goals, the digital records were submitted to UltraThineer for case design and initiation of the 3D printing process. A total of 20 no-prep veneers were designed, 10 upper and 10 lower. Shade BL1 was selected from the VITA shade guide to achieve a bright, natural esthetic desired by the patient.

Fig 1

Fig 2

Fig 3

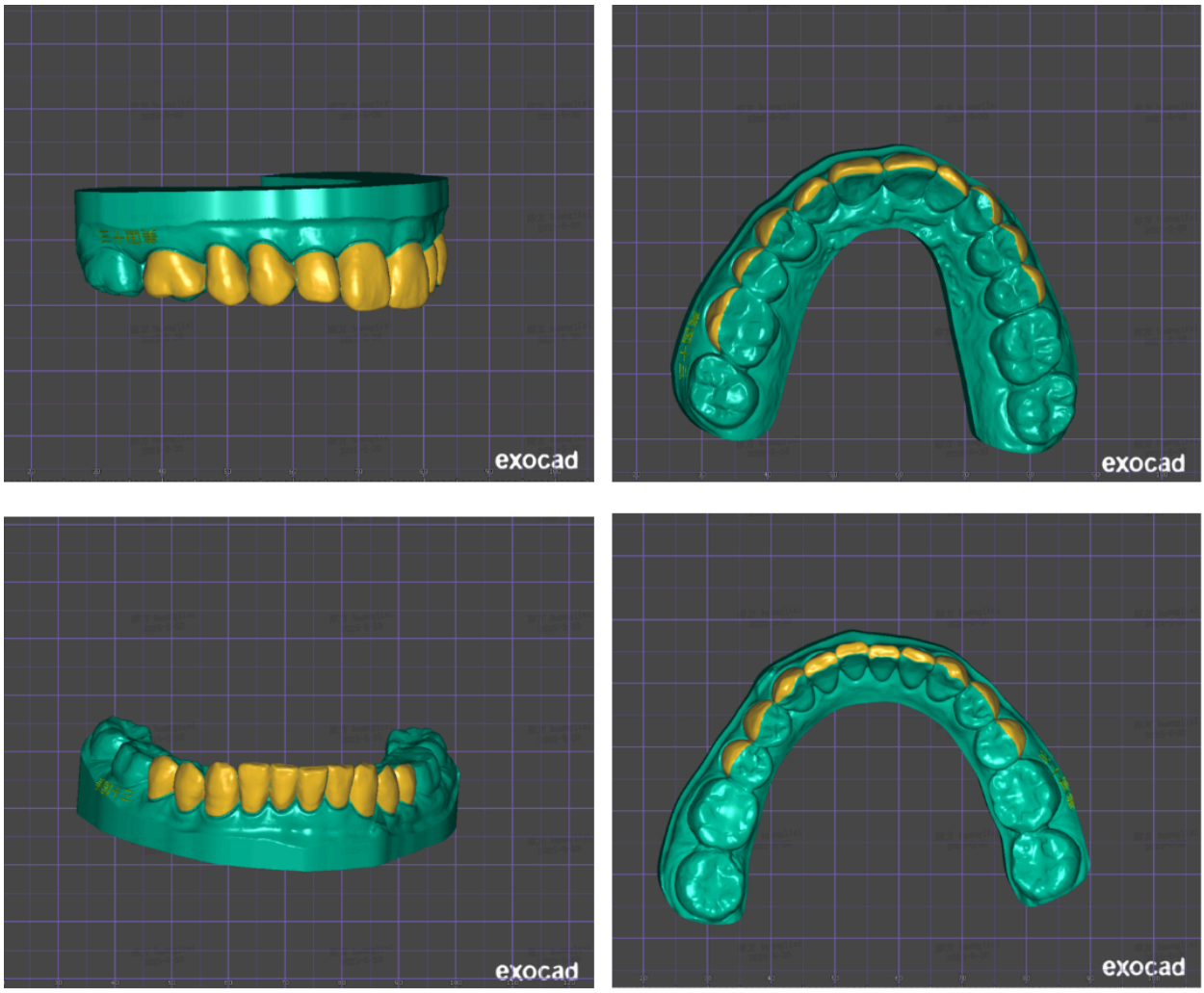

Fig 4

Fig 5

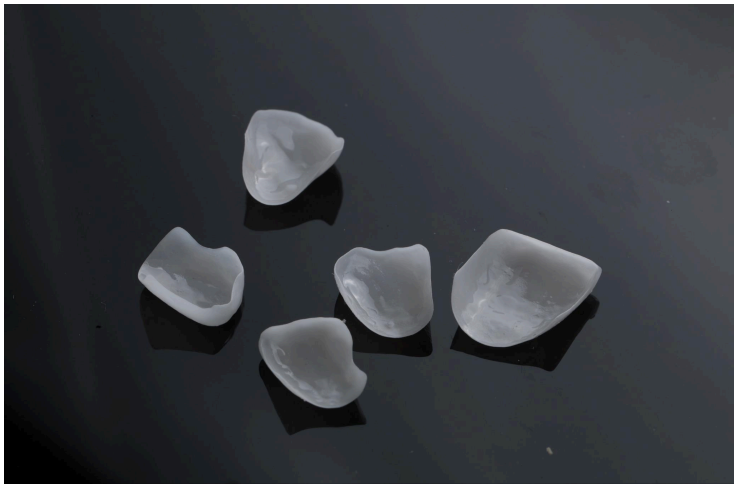

Fig 6

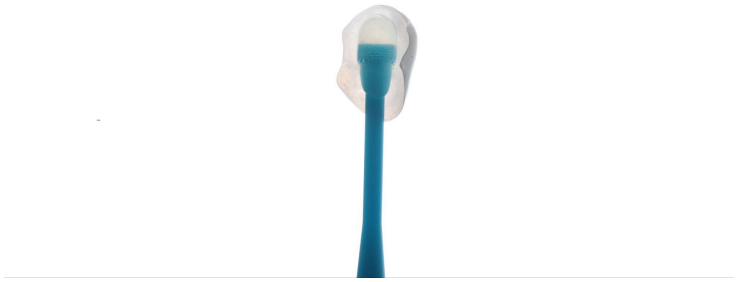

Fig 7

Treatment Procedure

Fig 8

The treatment began with a test fit **(Fig 8)** of the veneers using a selection of colored cements. The veneers were then cleaned in an ultrasonic bath for 3 minutes and air dried. Next, 9.5% hydrofluoric acid was applied precisely for 60 seconds, including the margins, followed by another 3-minute ultrasonic cleaning. Two layers of porcelain primer (silane) were brushed onto the veneers, allowed to sit for 5 minutes, then air dried for 30 seconds. A thin layer of porcelain bonding resin was applied without light curing. The veneers were preloaded with permanent cement and protected under an orange shield. On the tooth surfaces, a plaque indicator was applied **(Fig 9)**, followed by fluoride-free pumicing and microetching with 32% phosphoric acid. The teeth were then etched with 32% phosphoric acid for 30 seconds, rinsed thoroughly for 30 seconds, and 1 to 2 thin layers of All-Bond Universal adhesive were applied, air thinned, and light cured for a minimum of 10 seconds at 800 mW/cm². The veneers were seated, excess cement removed, and margins checked. A spot bond was applied for 1 second, followed by removal of residual cement. Glycerin was placed over the margins to prevent oxygen inhibition, and a final light cure was performed for 20 seconds. After rinsing, the excess cement was cleaned, contacts and occlusion were checked, and final radiographs were taken.

Fig 9

Outcome and Follow-Up

Fig 10

Fig 11

Fig 12

Fig 13

The patient was overjoyed with her new smile and the complete masking of the tetracycline staining. She returned for a follow-up 7 days after insertion, and again on day 14 for delivery of a custom night guard to protect her new veneers.

Discussion

The patient presented with generalized intrinsic discoloration consistent with moderate to severe tetracycline staining, characterized by grayish-brown horizontal banding across the anterior dentition. Given the etiology of tetracycline-induced staining, originating from deep within the dentin and enamel matrix, conventional whitening treatments are typically insufficient in achieving satisfactory esthetic outcomes. The patient's primary objectives were to (1) significantly enhance the esthetic appearance of her smile, (2) preserve natural tooth structure, and (3) maintain the flexibility to revise or reverse the treatment in the future if necessary. To address these goals, we proposed the use of UltraThineer 3D printed zirconia veneers, a contemporary solution that provides superior masking capabilities while supporting a conservative, minimally invasive approach.

UltraThineer zirconia veneers, fabricated using advanced 3D printing technology, provide exceptional optical properties and shade control. Due to zirconia's inherent opacity and customizable translucency, these veneers are highly effective in masking the deep discoloration associated with tetracycline staining; something that traditional feldspathic or lithium disilicate veneers may not adequately conceal without additional tooth reduction. Unlike conventional veneer preparations, UltraThineer veneers are ultra-thin (as little as 0.08-0.1mm) and often require little to no enamel reduction. In this specific case, the teeth were prepared with a no-prep approach, maintaining enamel integrity and avoiding unnecessary removal of healthy tooth structure. This approach aligns with the principles of biomimetic and minimally invasive dentistry.

A key feature of the chosen material and adhesive protocol is the option for future removal using erbium lasers. Unlike traditional ceramics, UltraThineer veneers allow for laser-assisted de-bonding without damaging the underlying enamel. This is an important consideration for patients seeking long-term flexibility in their dental treatment plan, especially younger individuals or those hesitant about permanent alterations.

The patient accepted the proposed treatment plan, and the final restorations demonstrated excellent esthetic and functional outcomes. The veneers exhibited harmonized shade and optimized opacity to effectively mask the underlying discoloration, along with natural surface texture and incisal translucency that closely mimicked natural enamel. Symmetry and smile design were enhanced through precise alignment, contributing to an overall improved facial esthetic. At follow-up, the patient expressed high satisfaction with the appearance, comfort, and functionality of the restorations. The potential for future removal or revision was thoroughly discussed and documented as part of the informed consent process.

Conclusion

UltraThineer 3D printed zirconia veneers offer a clinically effective and esthetically favorable solution for managing tetracycline-induced intrinsic discoloration. This treatment modality is particularly well-suited for patients seeking a conservative approach with the option for future reversibility. The material's unique combination of high masking ability, minimal tooth preparation requirements, and laser de-bondability makes it a compelling choice for preserving natural tooth structure while achieving significant esthetic improvement and maintaining long-term oral health.

References

1. Dumfahrt, H., et al. (2020). *Fractographic analysis of 35 clinically fractured bi-layered and monolithic zirconia fixed dental prostheses*. *International Journal of Prosthodontics*, 33(2), 123–130.

2. Zhang, Y., et al. (2023). *Two-step sintering suppresses grain growth and improves flexural strength of dental Y-PSZ ceramics*. *Dental Materials*, 39, 283–295.

3. Esthetic Management of Tetracycline-Induced Staining" – Decisions in Dentistry