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Conservative Management of Grade III Tetracycline Staining Using Ultra-Thin Ceramic Veneers Assisted by Microscopy: A Clinical Case Report

ABSTRACT

Tetracycline-induced dental discoloration represents a significant challenge in esthetic dentistry due to its intensity and difficulty in masking. This case report describes the conservative management of a 41-year-old female patient with severe tetracycline staining (grade III) using ultra-thin lithium disilicate ceramic veneers (e.max Impulse Opal 1). The procedure was performed under dental operating microscope magnification, allowing for homogeneous tooth preparation of 0.3–0.5 mm and precise interproximal adjustments. The veneers included 0.3 mm interproximal extensions to optimize masking with minimal material thickness. Cementation was achieved using Variolink Esthetic Light Plus resin cement, resulting in a satisfactory esthetic outcome while preserving dental tissue. This approach demonstrates the feasibility of a minimally invasive strategy for severe tetracycline staining, achievable only through the precision afforded by dental microscopy.

INTRODUCTION

Tetracycline-induced dental discoloration represents one of the most challenging esthetic concerns in dentistry due to its chromatic intensity and difficulty in masking. Clinical classification ranges from grade I to grade IV, with advanced grades presenting greater esthetic and functional compromise. Conventionally, restorative treatment often involves aggressive tooth preparations to allow sufficient ceramic material thickness to block the underlying substrate.

Advances in adhesive dentistry, coupled with the development of high-strength ceramics with enhanced optical properties, have enabled minimally invasive treatments. The key to success in severe cases is operative precision. In this context, the use of the dental operating microscope is fundamental, as it facilitates ultra-conservative preparations of 0.3–0.5 mm with sharp and homogeneous finish lines, ensuring controlled optical behavior and predictable marginal fit.

This article presents the management of a case of severe tetracycline staining (grade III) using ultra-thin lithium disilicate ceramic veneers (e.max Impulse Opal 1), cemented with a light-cured resin cement, highlighting the indispensable role of microscopy in executing the treatment.

CASE PRESENTATION

A 41-year-old female patient presented with severe dental discoloration, characterized by diffuse brownish bands indicative of grade III tetracycline staining. The patient expressed no desire to alter the shape or position of her teeth, valuing the existing anatomy and occlusal harmony. Her sole objective was to improve tooth color in a minimally invasive manner.

Clinical and radiographic evaluation confirmed vital teeth, adequate structural integrity, and absence of periodontal or carious pathologies. The definitive esthetic diagnosis was grade III tetracycline staining, significantly compromising esthetics.

A conservative restorative treatment was planned using ultra-thin lithium disilicate ceramic veneers, employing homogeneous micro-preparation of 0.3–0.5 mm under dental operating microscope magnification to ensure precision in finish lines and interproximal f it. The veneers included 0.3 mm interproximal extensions to optimize masking of the discoloration with minimal material thickness. Cementation was performed using Variolink Esthetic Light Plus resin cement, ensuring a predictable esthetic and adhesive outcome.

This case demonstrates the feasibility of a minimally invasive approach in severe tetracycline staining, achievable only through the precision afforded by dental microscopy.

DISCUSSION

The minimally invasive approach allowed for effective masking of tetracycline stains, visibly improving esthetics without compromising the original dental anatomy or position. Preservation of healthy dental tissue represents a notable advantage over traditional methods requiring aggressive preparations.

Control of veneer thickness and opening of interproximal spaces favored a satisfactory esthetic result, optimizing the optical integration of the ceramic material. Although the esthetic outcome did not reach an outstanding level, the patient experienced a significant and stable improvement over time.

The execution of this procedure was possible only due to the precision of the dental operating microscope, which enabled homogeneous micro-preparations and 0.3 mm finish lines, unattainable by the naked eye. This case highlights the critical role of microscopy in conservative treatment of severe tetracycline staining.

CONCLUSION

The use of the dental operating microscope enabled a minimally invasive approach in a case of grade III tetracycline staining, achieving satisfactory esthetic results with ultra-thin ceramic veneers while preserving dental tissue. This approach demonstrates that optical precision is key for conservative treatment in severe staining cases, offering a reliable alternative to conventional aggressive preparations.

REFERENCES

1. Yu, H. et al. (2019). Minimal invasive microscopic tooth preparation in esthetic dentistry. Journal of Esthetic and Restorative Dentistry, 31(5), 419–424.
2. Ahmed D, Ghoneim MM. Masking tetracycline stained teeth: Effect of translucency and thickness of multiple CAD-CAM veneer materials and shades of resin cements. Egypt Dent J. 2020;66(2):1037-1044.
3. Li Z, Zhang Y, Zhang Y, et al. Effects of porcelain layer thickness and luting resin cement on the optical properties of porcelain veneers for tetracycline-stained teeth. BMC Oral Health. 2024;24(1):57.
4. Peumans M, Van Meerbeek B, Lambrechts P, Vanherle G. Porcelain veneers: A review of the literature. J Dent. 2000;28(3):163-177.