IMPROVING SMILE DESIGN WITH CERAMIC VENEERS ON TETRACYCLINE - STAINED TEETH: CASE REPORT

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REZUMAT
Acest articol prezintă cazul unei tinere paciente cu discromie tetraciclinică severă, care a solicitat o alternativă cât mai conservatoare pentru îmbunătățirea esteticii. Adevărata provocare a constăit-o mascarea împregnărilor tetracicline prin tehnici minim invasive și estefizarea design-ului zâmbetului pacientei.

Cuvinte cheie: discromie tetraciclinică, tehnici de albire, fațete ceramice

ABSTRACT
This article presents the case of a young female patient with anterior teeth severely stained by tetracycline, who was seeking conservative alternatives to improve her appearance. This severe staining was a challenge to mask with minimal invasive techniques in order to improve the patient smile design.

Key words: tetracycline stained teeth, bleaching, ceramic veneers.

INTRODUCTION
In cases requiring esthetic rehabilitation of discolored teeth, those involving tetracycline stains are among the most challenging. Tetracycline treatment during tooth development (last half of pregnancy, infancy and childhood to age of 8 years) may cause tetracycline dyschromia, a permanent yellow-gray-brown discoloration of the teeth. This adverse reaction is more common during long-term use of the drug, but has been observed following repeated short-term courses. Tetracycline and antibiotics from its class have a selective affinity for bone and tooth surface deposition. Due to its ability to chelate calcium ions and to be incorporated into hydroxapatite as a stable orthophosphate complex tetracycline promotes discoloration of both primary and permanent dentition. The color and severity of stains are variable and are influenced by the duration of tetracycline use and the stage of tooth development. When the affected teeth first erupt, they have a bright yellow band-like appearance, that becomes fluorescent under ultraviolet light. The teeth affected by tetracycline appear to have a yellowish or brownish-grey discoloration that gradually becomes more brownish after exposure to light.

In 1983, Boksman and Jordan described four levels of tetracycline discoloration. (Table 1)

Table 1. Tetracycline stain classification

<table>
<thead>
<tr>
<th>Score</th>
<th>Clinical presentation</th>
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<tbody>
<tr>
<td>0</td>
<td>No tetracycline staining evident</td>
</tr>
<tr>
<td>1</td>
<td>Uniform light yellow, brown, or gray stain confined to incisal three quarters of the crown</td>
</tr>
<tr>
<td>2</td>
<td>Deep yellow, brown or gray stain, without banding</td>
</tr>
<tr>
<td>3</td>
<td>Dark grey or blue stain with marked banding</td>
</tr>
<tr>
<td>4</td>
<td>More severe or extreme staining</td>
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</tbody>
</table>

Depending on the severity of teeth discoloration, there are several treatment alternatives: bleaching (“at home”, “in office”), porcelain veneers, all-ceramic crowns or porcelain fused to metal crowns.

The rate of success in long-term bleaching varies, depending on the severity of tetracycline staining. Bleaching vital teeth is a conservative and safe
procedure, but results are hard to predict, especially in case of severe dyschromia.4

In such severe cases, either an all-ceramic or porcelain fused to metal crowns are methods of choice, but they are less conservative.

Correcting tetracycline stains using a conservative procedure is one of the ultimate tests for porcelain veneers. In the early 1980’s, the bonded porcelain veneer was introduced to the profession with skepticism regarding its potential for longevity. However, masking the underlying tooth color and obtaining a natural appearance of the veneers, could be quite challenging.5

**CASE REPORT**

We report the case of a 24-year old female with severe tetracycline stained teeth who sought dental care to improve her smile design. The patient examination revealed extreme tetracycline staining, with dark grey and brown stains and with marked banding. (Fig. 1)

The perception of her appearance had a detrimental influence on her self-confidence; she was reluctant to smile due to appearance of her teeth. At the same time, she was afraid to alter her teeth, and wanted a conservative treatment alternative.

We decided to try initially a bleaching technique for a period of three month with Opalescence (Ultradent) in night-guard, only at the maxillary arch. After three months of “at home bleaching”, we noticed an improvement compared with the mandibular teeth. This improvement provided the patient with an initial idea of how her smile would appear with whiter teeth. However, this approach did not produce the desired bleaching, due to the severity of the discoloration. The shade of frontal anterior teeth was darker than C4 (Vita Lumina Vacum), or 5M2 (Vitapan 3DMaster shade guide). (Fig. 2)

Once the patient had seen the impact on her appearance of this small color change, she was excited about completing the restorative treatment with ceramic veneers.

The following technique was used. The preparation was conservative, but the space for porcelain should be of at least 0.5mm. After marking the facial preparation, with indelible pen, we used a depth cutting diamond (Brasseler USA) for providing the proper depth reduction. (Fig. 3)

Incisal reduction is an important factor in the long-term fracture resistance of veneers. The incisal edge was reduced by 1.5 mm, and a lingual chamfer was prepared. This chamfer exposes porcelain to compression instead of shearing, during the initial phase of protrusive movement, and as long as forces are against the tooth, fracture resistance is high.

The facial reduction was 0.75 mm incisal and 0.5 mm cervical, with a chamfer finish line in a slightly supragingival location. After displacement of gingival tissues with a retraction cord, we made the impression with polyvinyl siloxane.

Selection of the shade posed us a difficult problem.
The patient wanted her teeth to be an A2 shade. To convince the patient that A2 was not an appropriate shade, we made a provisional restoration from A2 shade composite resin (Tetric Ceram, Vivadent). The patient realized that for a good looking and natural smile, the ceramic veneers needed to be a darker shade. The selected shade was B3 cervical, D3 in the middle third and B2 incisal, with some pigmentation in proximal areas.

On the master cast, the ceramist made the ceramic veneers using Vitadur Alpha (Vita). (Fig. 4)

![Figure 4. Ceramic veneers (Vitadur Alpha, Vita) on the master cast](image)

When returned from the laboratory, the veneers were tried for fit and shade matching. For cementation of the ceramic veneers we used a medium viscosity resin luting agent (Nexus 2, Kerr), because it provides superior esthetics, strength and optimal wear resistance. The shade of resin cement was selected by using the glycerin based gel shades (Nexus Try-In). The cementation consisted of several steps: etching the veneers with hydrofluoric acid, applying the silane coupling agent, preparing the teeth (isolation, etching, bonding), preparing and applying the resin cement, and photo-curing. After finishing and polishing, both the patient and the dentist were satisfied with the final esthetic result. (Fig. 5)

![Figure 5. The final esthetic result, 2 weeks after bonding the ceramic veneers](image)

DISCUSSIONS

In an esthetically driven treatment plan, the diagnosis includes understanding the patient desires and expectations. Will the patient accept natural looking teeth, or does he or she want what is commonly referred to as a “Hollywood smile”, with white monochromatic teeth and artificial esthetic parameters? If the patient’s expectation are not realistic, he/she should be informed of the limitation of the treatment and dental care provider should demonstrate the final esthetic result, prior to beginning treatment. Avoiding the patient’s disappointment is one of the primary goals in esthetic driven treatment. A computer smile design simulation prior to beginning the esthetic restorative treatment would improve the communication between clinician, patient and the laboratory.

According to some reports, tetracycline stained teeth are the most resistant to bleaching. Some studies report that 97% of cases have experienced successful tooth lightening when carbamide peroxide whitening gel was used in nightguard, but in cases of severe tooth dyschromia, the results of bleaching technique was not satisfactory, after a three month period.

An important factor in successfully covering tetracycline-stained teeth, is the area of tooth that is affected and the severity of stain. Staining the incisal third or the middle third of the teeth is relatively easy to cover. Staining the gingival third and extreme staining is a difficult situation for veneers.

Some longitudinal studies reported that porcelain veneers could provide successful esthetic and functional long-term service for patients. It is important to understand the limits of the porcelain veneers in cases of extremely dark, stained teeth, such as with severe tetracycline staining. Because it was mandatory to use underlying opaque porcelain, the veneers are exhibiting very high value and lack of vitality.

Even when veneers are the ultimate goal, bleaching lightens the underlying tooth, decreasing the masking needs of the veneers, which results in a more vital final restoration.

CONCLUSIONS

In this case of severe tetracycline stained teeth, the results of bleaching techniques were not satisfactory. Shade selection of ceramic veneers was problematic, since it was mandatory to mask the underlying dark teeth structures and to obtain a natural smile design and the satisfaction of both patient and doctor.
REFERENCES