Minimally invasive restorative dentistry

Shiraz Khan[1]

This case demonstrates a minimally invasive approach at improving the appearance of this patient's upper incisor teeth, including a single crown replacement.

Not only were we able to preserve the surrounding teeth, but the upper central incisors were also restored as composite veneers and the upper right lateral incisor as a class IV restoration.

This approach minimises full labial coverage, unless necessary, but significantly improves the patient's confidence and smile.

Case study

A 55-year-old female presented with severely worn teeth (Figures 1 and 2). In her own words, she wanted to have a 'refresh' to her smile.

Medically, the patient was fit and well and had no caries experience. Her oral hygiene was exemplary and was a regular attender to the hygienist.

The patient's aspirations were financially limited, which therefore made ceramic restorations not an option. Furthermore, her current situation was that she had a crown on her upper left lateral incisor, which had been completed some 15 years ago, and was now suffering with recession.

Her goals were to improve the base shade of the teeth, to improve the shape and edges of the front teeth and replace the ceramic restoration to mask the recession defect on the UL2.

The patient has a large overjet, and a discussion was had as to whether orthodontics would be feasible. However, this was not a priority for the patient, and had requested whether any treatment could be completed without orthodontics.

Preoperative periapical radiographs were

taken to assess the apical regions of the incisors and canines, which showed no apical pathology, approximately average bone levels and no obvious caries.

Treatment options

In this case, the treatment options discussed to improve the appearance were as follows:

1. Do nothing, which is not acceptable considering the aesthetic and functional compromise
2. Whitening only
3. Whitening with replacement restorations UR2, UR1, UL1 (composite) and UL2 (ceramic)
4. Orthodontics with replacement restorations
5. Composite veneers on upper three to three with UL2 as replacement crown
6. Ceramic veneers on upper three to three with UL2 as replacement crown.

As outlined by the GDC standards (GDC, 2013), an empirical aspect of consent is adequate communication of all of the options and discussion of the relative merits and downfalls of all of the options described.

Option number one is not really an option, as the patient had attended the surgery to improve the appearance of the teeth.

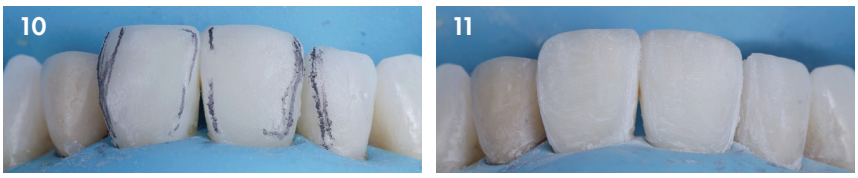
[1] Shiraz Khan, BDS MSC B(MED) SC (HONS) MFDS RCS (ENG) MJDF PG DIP PG CERT
Private Practice, Clapham, London, UK.
Winner of the Composite Smile Makeover category, Dentistry Clinical Case Awards 2023

Figures 1 and 2: Initial situation.

Figure 3: After home whitening.

Figures 4 to 6: Isolation.

Figure 7: Index taken of UR2 restoration.



Figures 8 to 11: Restoration.

Also, prolonged dentine exposure may lead to pulpal changes, therefore it is unacceptable to leave the patient unrestored.

Option two would be insufficient treatment as whitening the teeth would lead to the restorations not increasing in value, while the surrounding tooth would increase in value, leading to a mismatch between restorative and tooth structure.

Option number three seems to be the choice the patient is wishing for. Based on financial considerations, as well as her aspirations for her teeth, brightening the teeth along with replacement composite and ceramic restorations would significantly improve the patient's smile, while minimising invasion.

As the patient requested, orthodontics was not an option, and she had financial aspirations in which the restorative treatment would need to fit, therefore multiple ceramic, or indeed composite, restorations would be inappropriate.

It was therefore agreed that we would proceed with treatment option three.

Treatment sequence

After the full patient assessment and treatment plan summary, the patient was booked in for a full course of supra- and subgingival scaling and prophylaxis prior to commencement of treatment.

Figures 12 and 13: Polishing.

Figures 14 to 16: Removal of the UL2 crown.

Figures 17A and 17B: IPS e.max crown adhesively cemented under isolation.

The patient then undertook two weeks of home whitening using 16% carbamide peroxide (Figure 3). The system used in this case was LUMIWHITE.

There is an importance in ensuring there is a minimum period of seven to 10 days from cessation of whitening to start of bonding. Not only does the improved value of tooth substrate begin to stabilise, but there's also a statistically significant reduction in bond strength (Garcia-Godoy et al, 1993).

Following two weeks for stabilisation, the patient was booked in for the restorative appointment. A preoperative shade assessment was undertaken with EL enamel and B1 body shade (Ecosite Elements, DMG) composite being a mutually agreed shade match by the patient, dentist and dental nurse. The upper first molar to first molar were isolated using Unodent Heavy rubber dam (Figures 4 to 6).

It is imperative to air abrade the surface of the tooth to remove any aprismatic enamel, which has been identified to improve bonding protocols in adhesive dentistry (Hedge et al, 2010). An index was taken of the UR2 restoration, as the palatal contour was ideal and there was no place for significant shape modification, therefore a wax-up was not required (Figure 7).

The existing composite was removed from the UR1, UR2 and UL1 (Figure 5). The UR2 was restored using EL for the palatal shell, followed by B1 as the dentine, followed by EL for the final labial surface (Figure 8).

The UR1 and UL1 were restored using B1 to replace the labial erosion lesions and to level the incisal edges. This was followed by EL to be placed as full labial coverage veneers over the central incisors (Figure 9 to 11).

The final increments are cured under an oxygen barrier medium to remove the oxygen inhibition layers and optimised stability and hardness (Strnad et al, 2015). In this case, Liquid Strip (Ivoclar) was used.

The primary anatomy was created using Sof- Lex discs at low revolutions. The patient returned the following week for the final polish. Finally, a combination of Sof-Lex discs (3M) and Astropol were used (Ivoclar) as these have also proven to have the smoothest topography under SEM (Marghalani et al, 2010) (Figures 12 and 13).

This was followed by removal of the crown on the UL2, replacement of the margin to be 0.5mm subgingival (using retraction cord) (Figures 14 to 16). This was scanned using a Trios intraoral scanner (3shape), with the UR2 restoration to be used as a template for the shape of the definitive restoration.

This was provisionalised with a bisacrylic provisional crown and the definitive lithium disilicate (IPS e.max, Ivoclar) crown was adhesively cemented under isolation three weeks later (Figure 17).

Conclusion and reflections

This case demonstrates the power of the restorative materials that we have in our armamentarium as restorative dentists today. Not only are we able to restore the shape and form of the natural teeth to a high standard, these restorations can also be polished to a similar standard to ceramic restorations.

Figures 18 and 19: Final result.

Figure 20: One-year follow-up

It goes without saying that the polish retention may differ, however, the patient was extremely satisfied with the result achieved (Figures 18 to 20).

The communication with the patient in the initial discussions did make it clear that there may well likely be a differential in polish retention, including the need to potentially repolish the composites. Furthermore, the treatment plan may include replacement restorations whether they are like-for-like composites or even potentially using ceramic veneer restorations.

References

Garcia-Godoy F, Dodge WW, Donohue M, O'Quinn JA (1993)

Composite resin bond strength after enamel bleaching. Oper Dent 18: 144-144

General Dental Council (2013) Standards for Dental Professionals

Hegde VS, Khatavkar RA (2010) A new dimension to conservative dentistry: air abrasion. J Conserv Dent 13(1): 4-8

Marghalani HY (2010) Effect of finishing/polishing systems on the surface roughness of novel posterior composites. J Esthet Restor Dent 22(2): 127-38

Strnad G, Kovacs M, Andras E, Beresescu L (2015) Effect of curing, finishing and polishing techniques on microhardness of composite restorative materials. Procedia Technology 19: 233-238

This article first appeared in Clinical Dentistry and has been reprinted with permission. Khan S, Minimally invasive restorative dentistry. Clinical Dentistry 4(1): 18-20