could save the patient’s chairside waiting time; the biocopy technique can simplify the design process, milling the restoration with a 0.3 mm original thickness and polishing after milling will decrease the risk of milling defect.

The exact process can be concluded as:

1. Obtain a precise pre-op impression, and make the model. Use a CCRC scan to obtain information about the abutment teeth (Figs. 11 & 12).
2. Depending on the DSD result, make a wax-up on the pre-op model. The thickness of wax-up should be from 0.3 mm to 0.5 mm. Get the biocopy scan of the wax-up model, and match accurately with the pre-op model (Figs. 13–15).
3. Setting the margin of the abutment teeth, the marginal edge line is not fixed because of the no preparation technique. The direction of insertion should be identified first, which can cover most areas of the labial surface, incisor edge and adjacent surfaces. The border of the covered area should be the margin of the restoration (Fig. 16).
4. Shape formation of the restoration. Copy the target shape of the biocopy model, the restoration should be calculated automatically. If there is any defect, it can be adjusted and corrected by the tools. If there are any areas not thick enough for 0.5 mm, it should be added to 0.5 mm to avoid fractures during the milling process (Figs. 17 & 18).
5. Modulation and polishing of the initial restoration to 0.3 mm thick after milling. And fine polishing of the final restoration (Figs. 19 & 20).
6. Intracor try-in, fine adjustment and cementation (Figs. 21–24).
7. Four-year follow-up and recheck. The restorations are as excellent as before and the margins are tightly sealed, the colour is stable, there is no margin coloured or whole colour changing. The patient is very satisfied with the aesthetic performance and function. A charming smile appearance has given her more confidence and vigour (Figs. 25–32).

Conclusions

The no preparation veneer is a kind of restoration with high precision requirement and manufactured difficulty. It is usually finished in laboratory. Getting benefit from chairside CAD/CAM techniques, intermediate restorations in one appointment can be achieved, dentists can invite the patients to observe the process of restoration design and manufacturer, and even get involved into the design. Patients may feel that they are participating in the treatment, establishing an emotional connection with the restoration, which may also make them more easily accept and love their restoration. The value of increasing the satisfaction should not be ignored.

Biocopy design is the combination of traditional aesthetic design and digital virtual design. It is also the most convenient and fast technique nowadays. 3D virtual technique is becoming more and more established. Using 3D techniques directly to make a virtual design may also get wonderful restoration performance; it can be predicted that this pattern will become the mainstream of digital aesthetic design in future.

Restoring function and aesthetics with monolithic zirconia restorations

By Dr Ara Nazarian, US

With greater public awareness about cosmetic dental reconstructions, the dentist is often challenged with greater demands from the patient. This increased demand for aesthetic restorative treatment challenges the dentist, laboratory technician and dental manufacturers to develop techniques and materials to satisfy the discerning patient. Utilising digital planning, modern materials and effective techniques, the restorative team can succeed in restoring a patient’s dentition.

Case presentation

A woman in her early forties was referred to my practice by her dental provider because she was dissatisfied with the appearance of her smile. The patient explained that she felt that her existing teeth and restorations were unattractive because of recurrent caries, wear and colour (Fig. 1). Most importantly, she mentioned that she was suffering from tension headaches, grinding and a limited range of function.

Initial diagnostic evaluation at the first appointment consisted of a series of digital images with study casts, a centric relation bite record, a facebow transfer and a fullmouth set of radiographs. In the maxillary arch, the patient had several teeth with worn composite and veneer restorations, as well as abstractions with cervical caries. In the lower arch, several existing composite restorations had worn and exhibited caries on the facial cervical areas. Although there were no restorations present in the mandibular anterior teeth, there was severe wear of the incisal edges, possibly due to grinding and other parafunction.

Planning

After reviewing the clinical findings and the mounted models, the patient was diagnosed with a restricted envelope of function and decreased vertical dimension from continuous wear. In order to develop a treatment plan and determine whether the vertical dimension could be increased, a diagnostic 3-D White Wax-Up (Arrowhead Dental Laboratory) was fabricated (Fig. 4).

In the wax-up, the vertical dimension was increased by 1.5 mm. Also, based on information gathered from the initial consultation and digital images, it was determined that the maxillary central incisors could be lengthened by 1.3 mm to improve the aesthetics. The canines would also be lengthened to restore canine guidance in lateral excursions. Regarding the mandibular anterior teeth, the goal was to correct the length-to-width ratio and create a less worn appearance.

As a result of the information gathered from the diagnostic wax-up, it was determined that aesthetics and function could be enhanced by restoring the entire dentition. The final treatment plan would consist of crown restorations, placing composite cores where needed from teeth #12–27 in the upper arch and teeth #27–46 in the lower arch.

The material of choice for these crown restorations would be Zestoretar (Vieland/Vivadent). According to the manufacturer, the translucent zirconia material combines excellent flexural strength with the aesthetics of natural tooth shades.

With full-contour Zestoretar restorations, there are two methods of achieving the desired shade: the Zestoretar brush-infiltration technique or the Zestoretar staining technique. Six pre-shaded zirconia blanks—blue, light, medium, intense, sun and sun chrome—form the basis for reproducing the patient’s natural dentition. Owing to their warm, reddish hue, Zestoretar’s Translucency and sun chroma are suitable for restorations with individual colour characterisation and can therefore be used for patients whose original dentition deviates from the classical tooth shades.

Preparation

Once informed consent had been obtained from the patient, treatment was initiated. After anaesthetic had been administered, the existing veneer and crown restorations were removed and the teeth cored with composite if there was any indication of recurrent caries remaining in the respective tooth.

Adhesive Universal bonding agent (Vivadent Vivadent) was applied following the manufacturer’s protocol and cured using the Bluephase Series curing light (Vivadent). Using Multiple High Light (Vivadent Vivadent), build-ups were accomplishment on the teeth that required cores. A Clear Reduction Guide (Arrowhead Dental Laboratory) pro-
Most importantly, the patient said she no longer experienced discomfort in her temporomandibular joint and that her bite had never felt better. Since no adjustment or modification of the temporary was needed, the dental laboratory was instructed to replicate the White Wax-Up when fabricating the definitive restorations.

**Laboratory considerations**

The White Wax-Ups, colour photographs, imprints and bite relations were forwarded to the dental laboratory (Arrowhead Dental Laboratory). A scan of the White Wax-Ups was used to select an appropriate arch form, tooth size and occlusion from the library of teeth available in the 3Shape software (Fig. 7).

After the impressions had been completed, a bite relation jig fabricated on the White Wax-Up models was tried in the mouth. Medium-body impression material (Panasil, Kettenbach) was placed into the relation jig and seated in the patient’s mouth on to the prepared teeth (Figs. 5 & 6).

The patient was asked to bite into the relation jig until she reached the vertical stops and the material set. Instructions for the size, shape, colour and position for the definitive restorations were forwarded to the dental laboratory (Arrowhead Dental Laboratory), as were the White Wax-Up models. Also, a stump shade (Ivoclar Vivadent) was selected for shade matching of the preparations to assist the laboratory technician in creating natural-looking restorations.

**Provisionalisation**

Provisional restorations, which would aid in determining the best size, shape, colour and position for the definitive restorations, were made from Sil-Tech (Ivoclar Vivadent) impressions of the White Wax-Ups provided by the dental laboratory.

Using the 3Shape Communicate software, images of the proposed reconstruction were forwarded to my office by e-mail. Any minor adjustments in tooth shape and contour were communicated with the technical adviser to achieve the ideal aesthetics. Once approved, the milling process was initiated.

**Cementation**

Before try-in of the definitive restorations, the provisional restorations were removed using the Easy Pneumatic Crown and Bridge Remover (Dent Corp) and any remaining provisional cement was cleaned off the prepared teeth. The maxillary and mandibular zirconia restorations were tried in to verify fit, form and shade. After the patient had been shown the retracted view for acceptance, the cementation process was initiated.

A full-arch impression was taken using Instant Custom Trays (Good Fit). Made of a proprietary material (PMMA), this mouldable material, heated in boiling water, provides a quick, efficient way of capturing a dimensionally accurate impression with uniform thickness of the impression material.

Once moulded and customised to the patient’s maxilla and mandible, full-arch impressions were taken using a heavy and light polyvinylsiloxane impression material (Panasil, Kettenbach).

A full-arch impression was taken using Intraoral Scanner with the latest acquisition software. Updated capabilities include a patent-pending Hybrid Scan Workflow that’s designed to capture even the most challenging margin lines. The CS 3600 enables restorative dentists to obtain a more complete capture and thereby create better-fitting prosthetics. From scanning speed improvements to custom sound options, see what’s new at carestreamdental.com/CS3600.
riva luting plus (SDI), a resin-modified, self-curing glass ionomer luting cement, was used for the cementation of these zirconia restorations because it can be used without special preparation using cleaning agents, nor does it require any bonding agent (Fig. 9).

According to the manufacturer, riva luting plus utilises SDI’s proprietary ionglass filler. Ionglass is a radiopaque, high-ion-releasing reactive glass used in SDI’s range of dental cements. riva luting plus releases substantially higher levels of fluoride to assist with remineralisation of the natural dentition. This higher level of fluoride has a proven antimicrobial activity against three cariogenic bacteria: Streptococcus mutans, Streptococcus sobrinus and Lactobacillus. In addition, riva luting plus has low solubility in the oral environment, increasing the material’s ability to resist degradation and wear at the margins caused by oral acidity.

The preparations were washed and dried to the extent that they were still slightly moist. At this time, the cement capsules were depressed consecutively to activate and placed in the ultramat 2 (SDI) amalgamator for only ten seconds for trituration.

Using the applicator dispenser (SDI), the cement was loaded into the restorations (Fig. 8), starting from the midline and working distally. With a very low film thickness and creamy consistency, riva luting plus cement was dispensed into the restorations with easy insertion and seating.

Removal of excess cement was cleaned up in about two minutes at the gel phase. After the cement was fully set at five minutes, the occlusion was verified and adjusted.

The overall health and structure of the soft tissue and restorations were very good. The patient was extremely satisfied with the definitive results (Figs. 10–12).

Conclusion

In conclusion, having a systematic method for treatment planning, material selection, tooth preparation and cementation, the dental provider will be able to address the needs of the patient more effectively and efficiently. Because of this and more, the final outcome will be much more predictable aesthetically and functionally.

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Editorial note:

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