Aesthetic and functional restorations with Panasil impression materials

Fig. 1. The correct application of the gingival retraction technique depends on the health of the surrounding periodontium. An average of approx. three weeks is required following preparation and fitting of the temporary restoration to ensure formation of a stable, compact tissue. — Fig. 2. The good periodontal tissue entailed placement of a second retraction cord, which was placed carefully over the first cord (Fig. 1). The gingival retraction technique used was purely mechanical. The first retraction cord was replaced immediately next to the sulcus and moved smoothly around the prepared tooth. — Fig. 3: Panasil initial contact light was applied to the sulcus using a dispenser fitted with an application tip. The very fine tip of the dispenser enabled accurate application of the impression material. The papillae will remain fully intact, as Fig. 1 demonstrates the importance of the temporary restoration for preserving and regeneration of the gingiva following tooth preparation. A new impression of the preparation must be taken with all the details once gingival growth is complete, which normally requires an average of three weeks (Fig. 1) to ensure stable, compact tissue. The preparation margin must first be exposed using a retraction cord before taking the impression. Gingival retraction is of crucial importance when taking an impression of the preparation margin, as a fluid-free sulcus is essential for producing a good impression. Various gingival retraction techniques are used in clinical practice. The technique used in this case consisted of mechanical-chemical retraction with a double cord. The retraction cords were placed with the aid of an applicator, whereby the first retraction cord (thickness 0.60 mm), which was impregnated with an astringent in the form of quercetin-rich agricultural waste, was placed below the preparation margin. The second, unsaturated retraction cord (thickness 0.80 mm) was then placed stress free on the first cord (Fig. 2).^

The gingival retraction technique has a significant impact on the influx of fluid into the sulcus during impression taking. Pure cotton-wool retraction cords without a styptic agent are ineffective in preventing the influx of fluid into the sulcus.^

Successful isolation of the sulcus can only be achieved using chemical agents, while purely mechanical techniques using only cotton-wool retraction cords lead to increased formation of sulcus fluid.^

The clinical success of a fixed restoration depends on a precise impression of all the details of the prepared tooth (Fig. 5). In summary, it can be stated that an accurate fit of crowns and fixed partial dentures depends on the impression. Inaccuracies during impression-taking can only be corrected with difficulty or not at all during the subsequent fabrication stages, which has an effect on the marginal adaptation of the restoration we fabricated.^

The one-step putty-wash technique was used in this case.
for fabricating the restoration. It has been proven in vitro stud-}
ies that impressions fabricated using this technique exhibit a higher detail definition than two-step putty-wash impressions.13,14 As the initial contact of the impression material with the oral mucosa is the critical moment clinically, we focused on a material that becomes hydrophilic within the entire working time. We therefore selected the impression materials Panasil tray soft and Panasil initial contact light (Kettenbach).15 Panasil initial contact light was applied to the sulcus using a dispensing gun fitted with an applicator tip (Figs. 4 & 5), while a non-perforated metal impression tray with a reinforced edge was coated thinly with Panasil adhesive beforehand using a brush (Fig. 6), prior to being loaded with Panasil tray soft (Fig. 7).

The flowability of the light material, viscosity of the tray soft and the pressure produced by the dispenser ensure that the impression material flows uniformly onto the tooth surface, including infra-gingivally.

Another characteristic of this material is that it is easily removed from the mouth, which may be a problem when using polyether materials. The thixotropic properties (positional stability) of Panasil initial contact light prevent the material flowing into the oral cavity when the impression tray is inserted into the oral cavity. The intra-oral working time of 1 minute and intra-oral setting time of 2 minutes and 50 seconds are very practice friendly. The combination of Panasil tray soft and Panasil initial contact light is imperative: the products ensure perfect reproduction of all details of the tooth in the impression (Figs. 8, 9 & 10).

Fig. 10: The one-step putty-wash impression enables intimate contact between the flowable and viscous material; the light material is used for optimally reproducing the details.

Technical procedure

The most commonly used material for fabricating models is dental stone, owing to its compatibility with all types of impression materials, low expansion and high compressive strength. The use of Class II dentin that have a volumetric expansion of approx. 0.08% is preferred, e.g. Tewerock and Tevesstone (Kettenbach; Figs. 11 & 12). Careful pouring of the impression using vacuum-mixed dental stone ensures precise reproduction of all the details (Fig. 15). A precise, stable working model should be fabricated that can reproduce the anatomical features (occlusal surfaces, proximal contact points). The gingival section was removed under a stereomicroscope to expose the preparation margin (Figs. 14 & 15).

It is difficult to recreate the natural aesthetics with metal-bonded restorations, particularly when there is little space available. Apart from the search for materials with improved aesthetic characteristics, development concentrates on new technologies, e.g. fabrication with semi-finished products using the CAD/CAM technique, which eliminates certain working stages that are normally completed manually. In this case, the patient was treated with a zirconia crown, which was veneered using low-fusing porcelain. Zirconia, with a flexural strength of 900 MPa and a fracture resistance of 0 MPa, has better mechanical properties than conventional porcelains without a metal core,16 zirconia is partly stabilised with strontium, which further enhances its mechanical properties.

In addition to aesthetics and fracture resistance, an important requirement for the long-term success of a restoration is also a high degree of marginal adaptation (Fig. 16). The majority of researchers agree that marginal gaps of 100 µm are clinically acceptable with regard to the service life of a restoration.17,18 In our opinion, however, the overall goal should be to attain a marginal adaptation in the region of 20 to 50 µm.

Clinical finishing

Cementation is the final stage of prosthetic treatment. It should be noted that while the luting cement does not provide the dentist with the possibility of correcting inaccuracies in the restoration, it does contribute to clinical success. The luting cement influences the functional performance of a prosthodontic restoration; should the wrong cement be selected or used incorrectly, it can have an adverse effect on the service life of the crown. A high compressive strength is one of the most important properties.

As luting material is distributed in very thin layers, it must be capable of withstanding compressive loading in order to prevent fractures. We used glass ionomer cement that has not only a high compressive strength, but also the advantage of fluoride release. A comparative study of various cements established that the glass ionomer cement we used in this case produced the lowest film thickness of 20 µm.19 A follow-up examination was completed one week after permanent cementation to check the integration of the prosthodontic restoration into the tissue. The clinical procedure was completed with a further follow-up examination to check the occlusal relationship, which in most cases cannot be completed satisfactorily when fitting the restoration, owing to stress to the patient. The correct use of a temporary restoration and an adequate morphological design of the permanent restoration contributed to good adaptation of the incisor tooth papilla, as was established at intervals of 30, 60 and 90 days (Fig. 17).

Fig. 17: The gingival section was removed under a stereomicroscope to expose the preparation margin. In this case, no spacer was required with the selected prosthodontic restoration, a zirconia crown.

Editorial note: A complete list of references is available from the publisher.

Author Info

Dr Ugo Torquati Gritti and Giancarlo Riva are founders members of the international laboratory association “Dental Excellence – International Lab-oratory Group”. They currently live and practice dentistry in Milan, Italy.