In situations in which healthy tooth structure would have had to have been sacrificed in the past for the purpose of performing an indirect restorative procedure (e.g. inlay or partial crown), patients can now be offered a direct restoration with composite resin. The polymerisation shrinkage of composite resin restoratives, however, still remains a considerable challenge for both clinicians and dental manufacturers.

Bonding problems, microleakage, enamel fracture and post-operative sensitivity are just some of the risks that come with the process. Traditionally, dentists have resorted to incremental layering to better control the shrinkage stresses that occur in composite resin restorations, a method that can be very time-consuming, depending on the individual situation. Currently, traditional layering techniques are increasingly being replaced by the bulk-filling technique, which has made direct restorative procedures significantly easier. Some readers might argue that this technique could result in an increased risk of stress build-up. However, this problem can be controlled with many of the restorative materials available on the market today.

The dental industry has been pursuing the development of low-stress composite restoratives for many years. To date, only a few dental manufacturers have succeeded in doing so. Ivoclar Vivadent, for example, launched the new bulk-fill composite Tetric N-Ceram Bulk Fill, which can be placed in increments of up to 4 mm and contains an innovative photoinitiator (Ivocerin), as well as shrinkage stress relievers. The clinical case described here demonstrates restoration of a Class II cavity using the composite.

Clinical case

A 16-year-old patient presented to our clinic with a provisionally restored maxillary first molar (Fig. 1). Owing to a very deep carious lesion, her dentist feared that pulps might develop and referred her to a specialist. Percussion testing, bite testing and electronic

Fig. 1: Pre-op situation: the maxillary first molar had been temporised. — Fig. 2: Cavity preparation: the temporary restoration and the carious dentine were removed with great care.— Fig. 3: After rubber dam isolation and the placement of a sectional matrix, the adhesive was applied. — Fig. 4: Tetric N-Flow was applied in the deepest area of the proximal box.— Fig. 5: Then the marginal ridge was moulded using Tetric N-Ceram Bulk Fill.— Fig. 6: The remaining cavity was filled with Tetric N-Ceram Bulk Fill. Occlusal depressions and cusp slopes were shaped to match the natural tooth anatomy.— Fig. 7: Verification of occlusion: the premature contact could easily be adjusted using finishing instruments.— Fig. 8: Final polishing was performed with OptraPol Next Generation and Astrobrush.— Fig. 9: The Tetric N-Ceram Bulk Fill restoration blended seamlessly with the natural surroundings in terms of occlusal anatomy and shade.
pulp testing did not reveal any irregularities, and therefore a restoration with composite resin was considered the best option.

After administering local anaesthetic, the temporary restoration and the carious dentine were removed with great care (Fig. 2). A rubber dam was placed to prevent contamination of the treatment field with saliva or other substances, such as blood. Rubber dam isolation is generally recommended to ensure a contamination-free bonding procedure. In this case, a sectional matrix was used for convenience, as it can be tightly adapted to the teeth by means of ring retainers and wedges in most cases. However, complete sealing of the buccal and lingual walls of the proximal box is not always possible, so that anatomical contouring can be difficult to accomplish.

As an alternative, composite resin can be applied to a wedge and light cured. As a result, the matrix will stay in close contact with the cavity walls during the entire restorative procedure (Fig. 3). In order to ensure that the marginal ridge is located at exactly the same level as that of the adjacent tooth, the upper edge of the matrix should be positioned 1 mm above the marginal ridge of the adjacent tooth. In this case, the proximal box was prepared in such a way that a tight contact and an anatomical shape could be accomplished (Fig. 3).

Once the matrix band had been placed, the bonding procedure was performed according to the instructions of the manufacturer. The enamel margins were selectively etched using 35% phosphoric acid (N Etch, Ivoclar Vivadent) and rinsed thoroughly. Then Tetric N-Bond Self-Etch (Ivoclar Vivadent) was scrubbed into the entire cavity surface for 30 seconds, blown dry and the entire cavity surface for 30 seconds, blown dry and rinsed thoroughly. Then N-Etch, Ivoclar Vivadent) was applied to the enamel (modelling) had been done promptly. Finishing and polishing demanded only little time, as the preliminary work (modelling) had been done with great dexterity.

A premature contact was noted when the occlusion was verified (Fig. 7). Since an appropriate occlusal anatomy had already been created, this high-occlusion spot could easily be adjusted during the finishing step. Final polishing was performed with OptraPol Next Generation and Astrobrush (both Ivoclar Vivadent; Fig. 8).

Tetric N-Ceram Bulk Fill allowed an optimum restorative result to be obtained. The shape and shade of the final restoration blended seamlessly with the natural oral environment (Fig. 9). A premature contact was noted when the occlusion was verified (Fig. 7). Since an appropriate occlusal anatomy had already been created, this high-occlusion spot could easily be adjusted during the finishing step. Final polishing was performed with OptraPol Next Generation and Astrobrush (both Ivoclar Vivadent; Fig. 8).

Tetric N-Ceram Bulk Fill was contoured to meet the height of the adjacent tooth, the marginal ridge was extended to 1 mm short of the upper end of the matrix band (Fig. 5). The remaining cavity was filled with a bulk increment of Tetric N-Ceram Bulk Fill (Fig. 6).

The material’s viscosity and long working time (approximately 5 minutes) render the restorative procedure convenient and precise. The time was sufficient to sculpt and contour the individual increments (approximately 5 minutes). Morphological details such as cusps and fissures could be anatomically reproduced so that adequate masticatory function and food spillway were ensured. The restoration was contoured to meet the functional and aesthetic requirements. Finishing and polishing demanded only little time, as the preliminary work (modelling) had been done with great dexterity.

Margins of composite restorations are often irregular and therefore can be challenging to achieve optimal marginal adaptation. Today, hybrid composites are recommended for Class II cavities, as they are indicated for recurrent caries and restorations adjacent to pulps. The advantage of hybrid composites is that the bulk of the composite resin is filled in the cavity, while the polymerization shrinkage is reduced significantly, resulting in a more predictable marginal adaptation. Therefore, the use of bulk fill composites is recommended for Class II cavities, as they provide a more predictable marginal adaptation and reduce the risk of microleakage.