Using Composites to Restore Worn Teeth

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This month's "Clinical Showcase" article was written by Dr. David Bartlett, a speaker at the 2006 FDI Congress. Dr. Bartlett will be participating in a symposium on tooth wear and abrasion sponsored by GlaxoSmithKline on September 24. His session is titled "The role of erosion in toothwear: etiology, prevention and management."

The treatment of tooth wear caused by erosion, abrasion and attrition is complex and demanding in terms of both the dentist's time and cost to the patient. The main complication is that teeth with severe wear have short clinical crown height, which makes conventional treatment extremely challenging. In general practice, using restorations to increase the vertical dimension of worn teeth is both reliable and predictable.[1] Considerable research and clinical evidence exist to support the use of composites to restore worn anterior teeth.[2–4] After stable occlusion has been achieved, the composite can be maintained by polishing and repairing, or it can be replaced with crowns.

This article illustrates the steps in restoring worn dentition.

Wear on Palatal Surface of Upper Incisors

In this series of 3 clinical cases, the wear was limited to the palatal (lingual) surfaces of the upper incisors and the composites were used for the definitive restorations.

In the first case, the cause of tooth wear was a combination of erosion and attrition (**Figs. 1a** and **1b**). This typical appearance was caused by the patient holding acidic drinks in the palatal vault. The exposed dentin was not sensitive. Composite restorations were placed on the palatal surfaces to replace the worn

Figure 1a: Worn anterior teeth have translucent incisal edges.

Figure 1b: Tooth wear was caused by a combination of erosion and attrition. Carious lesions are also apparent; they were treated conventionally.

Figure 1d: The composites have restored the appearance of the anterior teeth.

Figure 1c: Composites were placed on the palatal surfaces to replace the worn tooth tissue.

Figure 2a: Severe wear of the upper anterior teeth was caused by regurgitation of gastric contents into the mouth secondary to gastroesophageal reflux.

Figure 2b: Microhybrid composites have been added to the buccal and palatal surfaces of the upper anterior teeth to increase the vertical dimension.

Figure 2c: Palatal view shows microhybrid composites bonded directly onto the eroded anterior teeth.

Figure 3: Composites on the upper anterior segment, shown 5 years after initial placement, have been maintained by polishing and repair.

tooth tissue (**Fig. 1c**). This increased the vertical dimension and separated the posterior teeth. Reversal of alveolar compensation resulted in overeruption of the posterior segment and some intrusion of the anterior teeth. About 3 months later, however, the occlusion had stabilized, and the intercuspal position on the anterior teeth had returned to normal (**Fig. 1d**).

In a second patient, severe wear of the upper anterior teeth (**Fig. 2a**) was related to regurgitation of gastric contents into the mouth secondary to gastroesophageal reflux disease. In patients with this condition, the gastric juices (which have a pH of about 1) may cause severe erosive wear of the palatal surfaces of the upper anterior teeth. Microhybrid composites were added to the buccal and palatal surfaces of these teeth to increase the vertical dimension (**Figs. 2b** and **2c**). The carious upper bicuspid was extracted at a later time and replaced with an implant. Because the erosion was localized to the palatal surfaces of the upper anterior teeth, there was no need to restore the occlusal surfaces of the posterior teeth. The initial increase in occlusal vertical dimension led to separation of the posterior teeth; as in the previous case, alveolar compensation was reversed, and the occlusion stabilized. Normally, reversal of alveolar compensation occurs over 3 or 4 months, more quickly in younger people.

As seen in the third case, composite restorations placed on the upper anterior segment can be maintained by polishing and repairing as required (**Fig. 3**) and may last for many years.

Generalized Wear

Sometimes, the dentition exhibits more generalized wear (**Fig. 4a**). In the case illustrated here, the wear was classified as regurgitation erosion caused by gastroesophageal reflux.[5] Regurgitation of the gastric contents had resulted in erosion of both enamel and dentin on the palatal surfaces of the upper teeth[6] (**Fig. 4b**); the wear on the lower arch was less severe (**Fig. 4c**). The significant loss of tooth structure meant that, without elective endodontics, there would be insufficient support for conventional crowns. However, the dentist determined that an increase in vertical dimension would produce sufficient interocclusal space for restorations without further need for occlusal reduction; as such, this procedure would conserve tooth tissue.

Since the tooth wear was generalized, restorations were needed on both the anterior and the posterior teeth. The increase in vertical dimension was planned using a diagnostic wax-up mounted on a semiadjustable articulator (**Fig. 4d**). There was enough height of the palatal tooth tissue that crown lengthening was not required. The planned shape of the anterior teeth (on the basis of esthetic considerations) determined the increase in height of the posterior teeth. Patients with tooth wear typically adapt to the change in tooth shape over time, so increases in vertical dimension during restoration pose a further adaptive challenge. In this case, as in the others presented here, it

Figure 4a: Preoperative appearance of anterior teeth with generalized wear. There is some loss of the incisal edge of the upper anterior teeth.

Figure 4b: Significant erosion of the palatal (lingual) surfaces, caused by regurgitation of gastric contents, is evident. The shape and pattern of this wear is typical of dental erosion.

Figure 4c: The wear on the lower arch is not as severe as that on the upper arch.

Figure 4d: The increase in vertical dimension is planned with a diagnostic wax-up mounted on a semiadjustable articulator. The shape of the anterior teeth (which will determine the increase in height on the posterior teeth) was planned at the same time.

Figure 4e: Composites are placed on the anterior and posterior maxillary teeth. The contacts on the teeth are adjusted to ensure even contact in the new intercuspal position.

Figure 4f: Clinical photograph taken 3 years later shows several fractures. It was decided to convert the restorations to metal ceramic crowns.

Figure 4g: The anterior teeth were crowned first, to establish anterior guidance; the posterior teeth were prepared a few weeks later.

Figure 4h: Clinical photograph taken 4 years after the patient's initial presentation with tooth wear.

Figure 4i: Final result of restoration of the upper arch.

was anticipated that the planned increase in vertical dimension would be well tolerated by the patient. There are no reports of loss of tooth vitality or mandibular dysfunction as a result of increase in vertical dimension.

Composite restorations were placed on the anterior and posterior maxillary teeth (**Fig. 4e**) to establish the vertical dimension and reshape the worn teeth. The increase in tooth height increased the occlusal vertical dimension. The occlusion was adjusted until the posterior contacts in the new intercuspal position were even. Adjustments were made to the composites at chairside. If such restorations prove durable, they can be considered long-term restorations, as described above.

In this patient, the composite restorations remained functional for about 3 years. Once they started to deteriorate (**Fig. 4f**), the teeth were prepared for conventional restorations (**Figs. 4g** to **4i**) according to the occlusal scheme defined by the composites.

Conclusions

These cases show that composite restorations can be used to restore worn dentition. In some cases, such as the first 3 cases illustrated here, the composites produce the definitive restoration and can be polished and repaired over a period of many years. However, if the composites fracture, the teeth can be restored with conventional metal ceramic crowns. The advantages of composite restorations are conservation of tooth tissue and delay in the placement of crowns (which is a destructive procedure); furthermore, the basics of the occlusion will be established by the time a decision is made to convert from composites to crowns.

Practice Tips

The following tips are offered to assist in the restoration of worn or eroded teeth.

1. Use the dentin bonding agent carefully. Always follow the manufacturer's guidelines to maximize bond strength. Because tooth wear exposes significant amounts of dentin, the bond to this tissue is an important aspect of the restoration procedure.
2. Increase the occlusal vertical dimension by the amount of tooth lost. Use diagnostic wax-ups to determine tooth shape and then increase the amount of tooth tissue accordingly.
3. Before starting the treatment, warn the patient that his or her "bite" will change. This is particularly important when restoring anterior teeth with localized wear or erosion.
4. When adjusting the occlusion, ensure that there is even occlusal contact on the new restorations. The anterior guidance will be shared by more than one tooth.
5. If the teeth are worn to below 50% of original tooth height, consider crowns rather than composites.

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