

# Adhesive dentistry and the worn dentition

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Adhesive techniques and materials are increasingly being adopted in the management of tooth wear cases. Modern day composite resins exhibit excellent mechanical and aesthetic properties, are cost effective and provide a relative degree of reparability. This lends them to be an attractive choice of restorative material for generalised tooth wear cases.

This article describes the clinical techniques used in the restoration of the worn dentition with composite resin, as illustrated via a clinical case.

## Clinical case

The patient, a 35-year-old male, presented with generalised tooth wear, consistent with erosive and attrition aetiologies. The dentition was restored with a combination of direct and indirect composite resins, at an increased occlusal vertical dimension (OVD) (Figures 1-3).

Following a comprehensive case assessment, a full mouth diagnostic wax-up and intraoral mock-up were carried out. This allowed both myself and the patient to assess the final form and function of the proposed aesthetic and occlusal rehabilitation. The restorations placed were all based on the verified diagnostic wax-up.



*Figures 1-3:  
Preoperative  
occlusal and  
anterior  
retracted  
views.*

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### Restoration of the anterior teeth

The maxillary and mandibular anterior teeth were built-up using indirect and direct composite resin, respectively.

The mandibular anterior teeth were built-up first, to set the occlusal plane and facilitate later fabrication of the palato-incisal maxillary composite restorations. A silicone putty matrix was fabricated from the diagnostic wax-up. The teeth were built-up using a composite layering technique with a microhybrid restorative composite (Gradia Direct, GC) (Figures 4a-4c).

The maxillary anterior teeth were then prepared by smoothing over any sharp line angles and flattening of the incisal edges. Any exposed dentine was sealed using the immediate dentine sealing protocol described by Magne (2005).

A full arch impression was made in addition cure silicone. Retraction cord was used on the palatal aspect to allow exposure of the ring of enamel present. A jaw registration record in centric relation (CR) at the desired OVD and a facebow recording were made.

The casts were then mounted onto a semi-adjustable articulator for fabrication of the maxillary palato-incisal composite restorations (Figures 5 and 6).

These restorations were cemented under rubber dam. The fit surface of the composite restorations were prepared by sandblasting with 50 $\mu$ m aluminium oxide particles, cleaning with alcohol and wetting with a composite primer (GC).

The tooth surface was prepared by sandblasting with 50 $\mu$ m aluminium oxide particles, etching for 30 seconds with 30% phosphoric acid and wetting with adhesive resin (Optibond FL, Kerr).

The restorations were cemented using warm microhybrid restorative composite material matched to the shade of the underlying tooth. The direct composite additions to the maxillary posterior teeth were also carried out at this stage (Figures 7-9).

Prior to the restoration of the mandibular posterior teeth, the space between the posterior teeth was maintained with the use of pillars of composite restorative material spot-etched and bonded to the mandibular posterior teeth. An alternative approach would be to fabricate provisional acrylic onlays based on the posterior diagnostic wax-up, which can be shrink fitted and locked into place with acrylic resin.

### Restoration of the mandibular posterior teeth

The mandibular posterior teeth were prepared for indirect composite onlay restorations. Silicone reduction guides were used from the diagnostic wax-up to judge if any occlusal reduction was required, allowing for 2mm of occlusal composite.

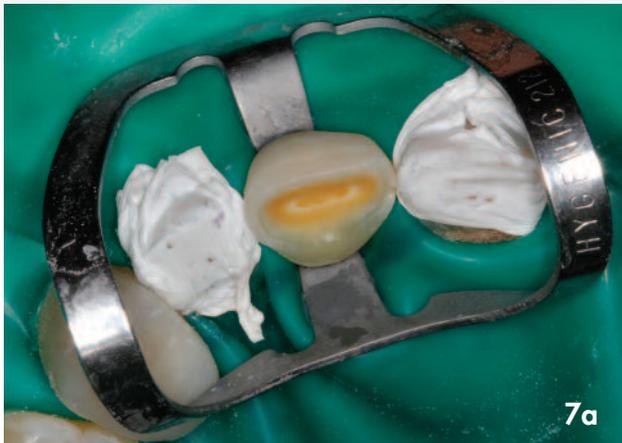
Definitive and smooth chamfer margins of about 1mm were prepared on the buccal and lingual axial walls to



Figures 4a-4c: Direct composite build-up of mandibular anterior teeth.



Figures 5-6: Maxillary palato-incisal composite restorations.



Figures 7-9: Cementation of the maxillary palato-incisal restorations.



Figures 10-11: Preparation of mandibular posterior teeth for indirect composite onlay restorations.

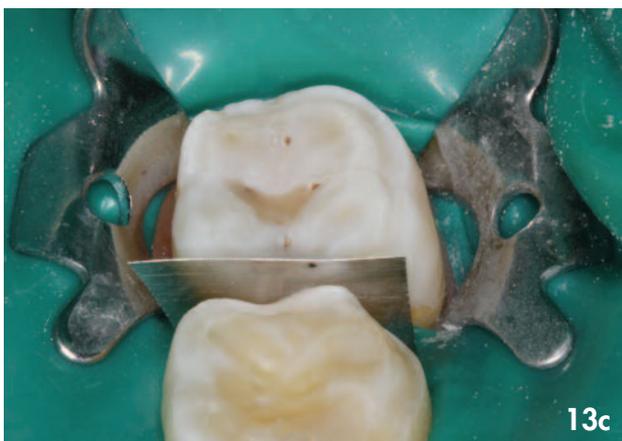
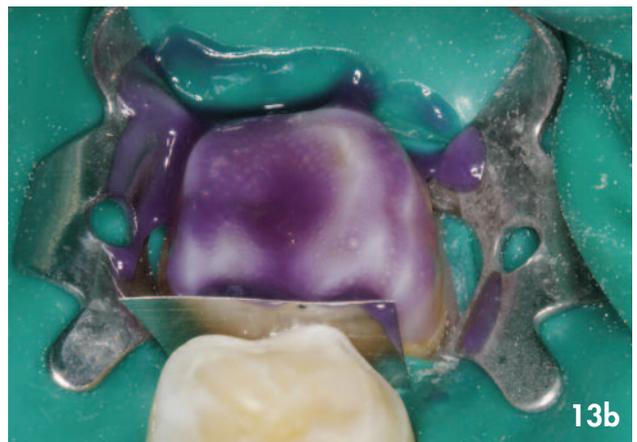
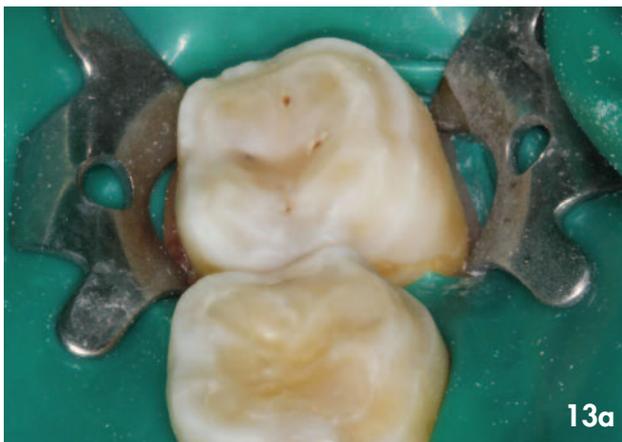
augment the preparations with some resistance form, and to facilitate location of the onlays at cementation.

The ideal interproximal preparation for occlusal onlays requires the preparation to be carried below the contact point, to facilitate access to the margin. However, as alluded to by Mizrahi (2008), in worn posterior teeth, a wide and broad contact area is often seen extending close to the

gingiva. Preparing through this contact area would result in excessive destruction of sound tooth tissue and, more importantly, a high risk that the base of the restoration in the interproximal region will finish onto dentine, giving an increased risk of microleakage (Tjan, Dunn, Sanderson, 1989). Therefore, in this case, the interproximal contacts were not cleared (Figures 10 and 11).



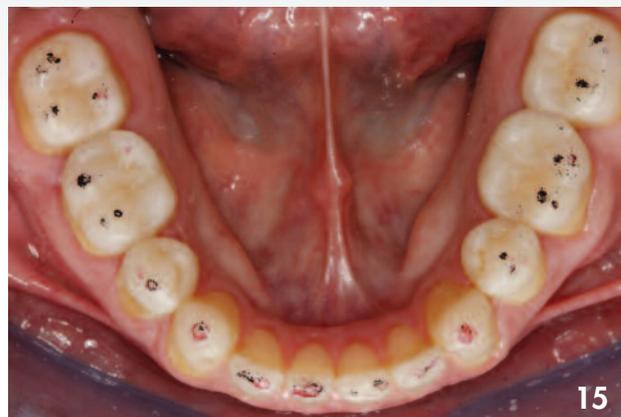
Figures 12a-12b: Mandibular composite onlay restorations.



Figures 13a-13d: Cementation of mandibular posterior indirect composite onlay restorations (note: substantial occlusal enamel remaining for bonding to).

The posterior restorations were cemented under rubber dam, again using a warmed restorative microhybrid composite

material matched to the shade of the underlying tooth, and using the protocol described above (Figures 12 and 13).



**Figures 14-16:** Postoperative occlusal and anterior retracted views.

The patient was provided with a fully restored dentition, with a mutually protected occlusion and improved aesthetics (Figures 14-16).

### Maintenance and future treatment

The decision was made at the start of treatment that a postoperative Michigan splint would be made. This will serve to maintain the occlusal stability and protect the restorations.

The patient was made aware that the restorations would be likely to require minor repairs in the future (Hemmings, Darbar, Vaughan, 2000; Gulamali et al, 2011) and he was happy to accept this.

Future planned treatment may include the placement of labial porcelain veneers on the maxillary anterior teeth. This might be necessary not only to improve the aesthetics of the maxillary anterior teeth, but also to strengthen and stiffen the teeth following biomimetic principles, especially if frequent cracks or breakages occur affecting the restorations on the anterior teeth.

At the two-year follow-up appointment, aesthetic and occlusal stability was evident, and no repairs have been required.

### Discussion

The advent of adhesive dentistry has revolutionised modern day dental practice. Its application in cases with tooth wear is most attractive, allowing conservation of already depleted tooth structure.

Composite resin has been shown to be a suitable restorative material for restoration of localised and generalised tooth wear, giving functional and aesthetic results. However, the forgiving and resilient nature of composite resin restorative materials should not be taken for granted.

For the most part, patients with generalised and excessively worn dentitions will be treated within a practice environment and will incur great costs to time and money, as well as personal stresses with lengthy and intrusive treatment.

It has already been noted that failures can, and will, occur with the use of composite resins to restore worn dentitions, and maintenance is required (Gulamali et al, 2011). Therefore, the occlusal management and planning of these cases to control the stresses placed on the restorations and minimise later intervention is essential. This goes hand-in-hand with meticulous bonding protocols using adequate isolation measures (ideally rubber dam).

It is important not to be complacent in the use of these materials. Plan and handle each restoration as if it is a brittle feldspathic ceramic and this will lead to precision and predictability in each case.

### Further information

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