

## Clinical Technique/Case Report

# Individualized Wedge

S González-López • MV Bolaños-Carmona  
JM Navajas-Rodríguez de Mondelo

### Clinical Relevance

The use of an individualized wedge with resin allows proximal contours to be reproduced and an adequate contact point to be obtained in Class II composite esthetic restorations.

### SUMMARY

**The preparation of an individualized wedge in the gingival embrasure before cavity preparation using photo-cured resin permits rehabilitation of the interproximal space and the original contact point position. Because the individualized wedge completely fills the embrasure, the adaptation to the gingival and proximal walls of the molar to be restored is perfect, avoiding any overextension of obturation material during insertion. Furthermore, the original position of the contact point is preserved.**

### INTRODUCTION

The widespread application of preventive procedures, especially fluoride, has drastically reduced the prevalence and progression rate of caries (Liebenberg, 1996).

\*S González-López, MD, BDS, PhD, associate professor, Department of Pathology and Dental Therapeutics, School of Dentistry, University of Granada, Granada, Spain

MV Bolaños-Carmona, MD, BDS, PhD, associate professor, Department of Integrated Clinical Pediatric Dentistry, School of Dentistry, University of Granada, Granada, Spain

JM Navajas-Rodríguez de Mondelo, MD, BDS, PhD, professor, Department of Pathology and Dental Therapeutics, School of Dentistry, University of Granada, Granada, Spain

\*Reprint request: Campus de Cartuja, E- 18071, Granada, Spain; e-mail: sglopez@ugr.es

DOI: 10.2341/05-58

Most proximal lesions develop below an apparently healthy surface. At the time of diagnosis, 60% of surfaces with radiographic caries on the external aspect of the dentin appear to be intact (Hintze, Wenzel & Danielsen, 1999).

The decision to restore proximal lesions often requires removal of the marginal ridge and contact point in order to gain access to the caries lesion. In these cases, it is mandatory to reestablish the anatomic conditions that preserve the horizontal and vertical stability of the arch (González-López & others, 1999; Keogh & Bertolotti, 2001).

Since the introduction of resin composites to fill Class II cavities in the posterior sector, the most important technical challenge has been to obtain a suitable shape that includes the proximal contact. A correct selection of the wedge is essential if this objective is to be met. The wedge must also be able to adapt the matrix to the gingival wall to avoid overextension of the obturation material (Eli & others, 1991).

The necessity of using a matrix hampers the achievement of a good contact. Usually, the pressure with which the wedge is inserted produces adequate internal displacement to compensate for the thickness of the matrix. However, this pressure can also deform the matrix towards the interior of the cavity, altering the contour of the tooth and shifting the contact point from its original position (Keogh & Bertolotti, 2001; Chan, 2001).

Although there are different sizes of wedge, they do not always match the specific characteristics of the interproximal space in each case. This problem has been addressed by the use of different matrix and attachment systems (Keogh & Bertolotti, 2001). Proposed approaches have included the insertion of small composite cylinders (Doukoudakis, 1996), use of orthodontic separators (Kraus, 1998), withdrawal of the matrix during the last moments of the restoration (Derrick, 2000), use of elastic cords (Chang, 2001) and insertion of small ceramic preforms (Bowen, Eichmiller & Marjenhoff, 1991; el-Badrawy & others, 2003) or a small amount of precured composite (Dunn, 2004).

The use of a wedge-resin system to produce an individualized wedge allows an impression to be taken of the interproximal space, transferring the tooth's original contours and contact point position to the restoration.

### TECHNIQUE

Figures 1–7 illustrate the technique for preparing an individualized wedge for the correct rehabilitation of the gingival embrasure in an upper first molar with mesial caries diagnosed from a bite-wing X-ray image. Figure 1 depicts the clinical appearance of the tooth before the restoration.

An individualized matrix is made after completely isolating the tooth with a rubber dam and before opening the cavity. A 1-cm piece of 0.045 mm metallic matrix without shape memory is cut (Hawe Stell Matriz Band, Hawe Neos Dental SA, Bioggio-Switzerland), then placed in the interproximal space and adapted to the mesial wall of the molar to be restored (Figure 2). LC Block-Out blue-pigmented light-cured resin (Ultradent Products, Inc, South Jordan, UT, USA) is then injected into this space. Before curing, an orangewood wedge (Hawe Sycamore Interdental Wedges, Hawe Neos Dental SA) on which Optibond Solo Plus (Kerr, Orange, CA, USA) dental adhesive has been applied is placed into the embrasure. The wedge-resin system is then light-cured for 10 seconds using an Optilux 401 lamp (Demetron Research Corp, Danbury, CT, USA), thereby binding the wedge to the resin. By this method, an individualized wedge is obtained that reproduces the gingival embrasure and preserves the contact point position (Figure 2). The wedge is then withdrawn to test that the resin has remained bound to the wedge. The wedge is replaced in the interproximal space, and a check is carried out on the stable positioning of the wedge in the proximal space on the adaptation of the individualized matrix and on the complete filling of the embrasure with blue resin (Figure 3). Once the matrix and individualized wedge are in place, a

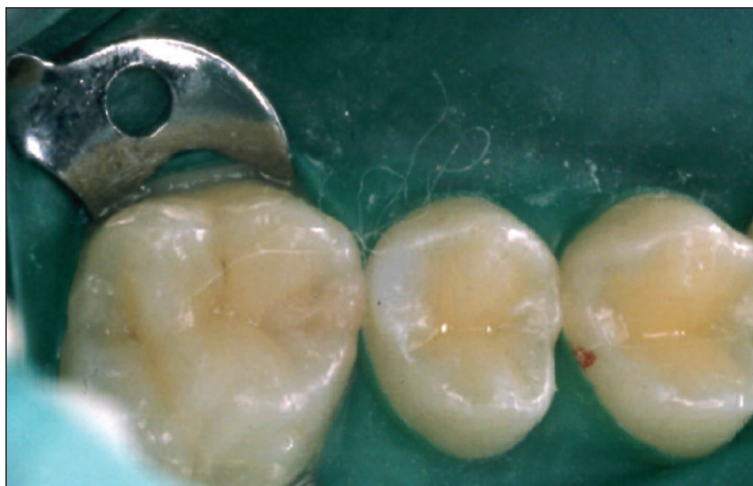


Figure 1. The typical dark appearance below the marginal ridge corresponds to caries diagnosed by wing-bite X-ray. Observe the vestibular displacement of the contact point.

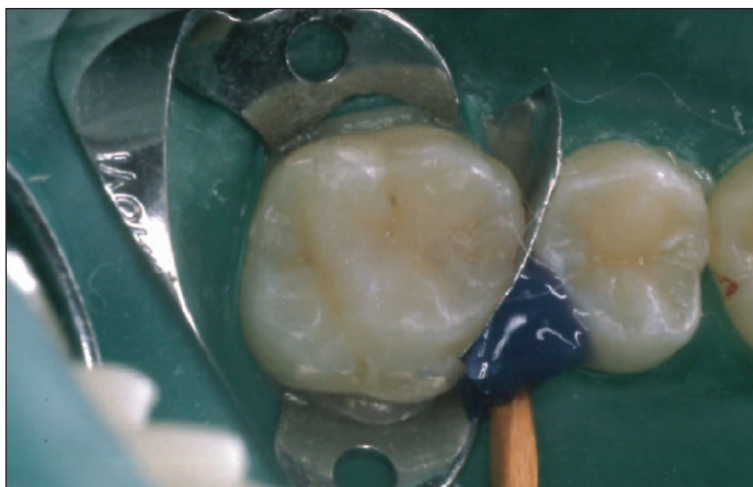


Figure 2. The individualized wedge completely fills the proximal space. A piece of matrix adapted to the proximal contour is used.



Figure 3. The wedge resin system accurately reproduces the shape of the proximal space.





Figure 4. Cavity opening maneuvers are performed with the matrix and wedge in place. In this way, the gingiva and adjacent tooth are protected.



Figure 5. Note the good adaptation of the matrix to the gingival wall.



Figure 6. The good adaptation of the matrix impedes overextension of the composite.



Figure 7. Completed obturation. Compare the position of the contact point with the contact point in Figure 1.

cavity opening is made to facilitate excavation of the decayed dentin with low-speed round-tip tungsten burs until no dentin is stained with caries indicator (Caries Detector, Cavex Holland BV). By performing the cavity preparation while the interproximal space is filled with the wedge-resin system, the gingival and proximal walls of the premolar are protected from possible iatrogeny.

If the piece of matrix deteriorates during cavity preparation maneuvers, it is replaced (Figure 5); alternatively, the matrix can be burnished towards the proximal contact. The cavity is disinfected by placing 2% chlorhexidine gluconate for 1 minute (Consepsis, Ultradent Products Inc) (Say & others, 2004). After etching the enamel and dentin surfaces with 37% phosphoric acid for 20 seconds, the dental adhesive Optibond Solo Plus (Kerr Manufacturing Company, Romulus MI, USA) is applied. The obturation is performed with hybrid composite in increments  $\leq 2$  mm thickness, which is light-cured for 40 seconds (Figure 6).

Finally, the restoration is finished with multi-blade tungsten burs, limiting the action to the cavity-surface margin, then polished with Pogo polishing system (Dentsply International Inc, Milford, DE, USA) (Figure 7).

(Received 18 April 2005)

## References

- Bowen RL, Eichmiller FC & Marjenhoff WA (1991) Glass-ceramic inserts anticipated for "megafilled" composite restorations. Research moves into the office *Journal of the American Dental Association* **122**(3) 71,73,75.
- Chan DC (2001) Custom matrix adaptation with elastic cords *Operative Dentistry* **26**(4) 419-422.
- Derrick RE (2000) Establishing a tight contact in a Class II resin-based composite restoration *Journal of the American Dental Association* **131**(9) 1326-1327.

- Doukoudakis S (1996) Establishing approximal contacts in Class II composite resin restorations *Operative Dentistry* **21**(5) 182-184.
- Dunn WJ (2004) Establishing proximal contacts with pre-polymerized composite inserts *Operative Dentistry* **29**(4) 473-476.
- el-Badrawy WA, Leung BW, el-Mowafy O, Rubo JH & Rubo MH (2003) Evaluation of proximal contacts of posterior composite restorations with 4 placement techniques *Journal of the Canadian Dental Association* **69**(3) 162-167.
- Eli I, Weiss E, Kozlovsky A & Levi N (1991) Wedges in restorative dentistry: Principles and applications *Journal of Oral Rehabilitation* **18**(3) 257-264.
- González López S, Vélchez Díaz MA, DE Haro Gasquet F & Pulgar Encinas R (1999) [Restauraciones de clase II con resina compuesta. Rehabilitación del espacio interproximal] *Odontología Conservadora* **2**(1) 1-8.
- Hintze H, Wenzel A & Danielsen B (1999) Behaviour of approximal carious lesions assessed by clinical examination after tooth separation and radiography: A 2.5-year longitudinal study in young adults *Caries Research* **33**(6) 415-22.
- Keogh TP & Bertolotti RL (2001) [Creación de contactos interproximales ajustados y anatómicamente correctos] In: Freedman GA, Brucia JJ (eds invitados) Nuevas Técnicas en Odontología estética y reconstructiva *Clinicas Odontológicas de Norte América* **1/2001** Mexico: Mac-Graw-Hill-Interamericana SA de CV 87-107.
- Krauss S (1998) Achieving optimal interproximal contacts in posterior direct composite restorations *Journal of the American Dental Association* **129**(10) 1467.
- Liebenberg WH (1996) Direct access to equivocal approximal carious lesions *Quintessence International* **27**(9) 607-617.
- Say EC, Koray F, Tarim B, Soyman M & Gulmez T (2004) *In vitro* effect of cavity disinfectants on the bond strength of dentin bonding systems *Quintessence International* **35**(1) 56-60.