Resin-bonded bridge — A patient-friendly prosthesis

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Although resin-bonded bridges were introduced over 30 years ago, there is little data on their longevity. However, recent systematic reviews have estimated their five-year survival rates to be 87.7 per cent.2

Although this is comparable to the 90 per cent survival rates of conventional bridges,3 dentists often question whether resin-bonded bridges are reliable for restorations. The main reason for the failure of this type of treatment is the debonding of the metal framework from the abutment teeth. The selection of non-mobile abutment teeth, preparation to enhance retention and resistance, the selection of appropriate materials, and tooth bonding technique are essential to success.4

In this article, a uniquely designed resin-bonded bridge, patented in the US (no. 6,394,810 B1) and Germany (no. DE 100 55 435), will be discussed. It is simple and only requires minimal tooth reduction, and is therefore a patient-friendly prosthesis.

Other advantages of this design include the minimisation of sensitivity after treatment, the absence of a gingival metal line typical of porcelain-fused-to-metal restorations, and the realistic shade simulation of the artificial tooth (pontic). In addition, should failure occur after bonding, the natural teeth can be restored easily.

As shown in Figure 1, the design consists of an artificial tooth (20) and a pair of small inlay-type metal wings (22) bonded at each abutment tooth separately. The prosthesis comprises an artificial tooth that replaces a missing tooth or teeth, which is secured and bonded between two abutment teeth.

In order to secure the artificial tooth and abutment teeth, a pair of coupling elements are used.

The artificial tooth includes female coupling elements at both sides and a pair of wings with a male coupling element, which are bonded to each abutment tooth independently with a resin-based cement.

In the artificial tooth, which is made of a suitable material such as metal or metal-ceramic combination, a pair of fitting grooves (21) are created at each side wall and serve as the female coupling elements. These elements are open at the lower end and extend upward to a point corresponding to about two-thirds of the height of the artificial tooth to resist occlusal forces.

As shown in the illustration, the artificial tooth is independently secured using a pair of inlay components (22), which are bonded to the abutment teeth. The two wings have pins that are inserted into holes drilled in the enamel, two male attachments, which are cast in one piece. Each inlay wing has an H-shaped key in cross-section (fitting part), which is inserted into the fitting groove in the artificial tooth.

Each inlay component has a fitting part (27) and a securing pin (24). In CBW,3 the pin design is similar to crownless bridge work (CBW),5 in which inlay components and an artificial tooth are fabricated separately. In CBW, ready-made inlay components (CBW anchors) are used instead of individually cast components of the current design, and the direction of the securing pin is parallel to the occlusal plane instead of downward.

With this pin design, resistance to occlusal forces is improved after the artificial tooth has been secured to the abutment teeth. In order to prepare the abutment teeth, two pinholes are made in the two abutment teeth. In other words, two pinholes are prepared in the adjoining surfaces of the abutment teeth so that the pulp of the abutment teeth is not damaged.

Each pinhole is prepared in such a way as to have an inner diameter of around 1.5 mm and a depth of around 1.5 mm. After drilling the pinholes in the abutment teeth, the inlay components are fabricated following the usual impression-taking procedures using a suitable elastic impression material, then making a wax-up and a cast with precious or base metal alloys. In case of the artificial tooth, a wax-up and cast are made, and/or porcelain build-up procedures are performed.

After fabrication of the inlay components and artificial tooth, close fit of the male and female coupling elements should be checked. Thereafter, the inlay components are bonded to the artificial tooth with resin-based cement, and the artificial tooth is bonded with the same cement.

The remaining procedures are similar to those of the conventional prosthesis.

This method is similar to crownless bridge work (CBW), in which inlay components and an artificial tooth are fabricated separately. In CBW, ready-made inlay components (CBW anchors) are used instead of individually cast components of the current design, and the direction of the securing pin is parallel to the occlusal plane instead of downward.

With the current design, the dovetail shape of the fitting part (27) and fitting groove (24) ensures that the artificial tooth is mechanically secured in addition to the cemental bonding.6

A complete list of references is available from the publisher.

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