Clinical Considerations for Adhesive Bridgework

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Abstract: **Many dental practitioners do not use adhesive bridges because of concerns over high failure rates. Techniques for these restorations should be based on the fundamental principles of bridge design which require rigid, accurately fitting frameworks and careful control of the occlusion. The abutments generally require little if any tooth preparation. Greater security will result from more extensive coverage of abutment teeth: the routine use of relative axial tooth movement is a predictable method for creating the space that this approach requires.**

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Clinical Relevance: **The adhesive or resin-bonded bridge should be one of the routinely-used methods for replacing missing teeth, based upon traditional principles for fixed bridgework and relative axial tooth movement.**

Many dentists are deterred from providing adhesive bridges for their patients on the grounds that they fail. Some reports in the literature support this depressing picture.[1] In a multi-centre study in Europe, debond rates increased with time following placement up to nearly 50% after five years.[2] Faced with such data, even the greatest enthusiast for this type of prosthesis could find themselves wondering if the adhesive bridge is such a good idea. However, the experience gained over nearly 20 years of providing adhesive bridgework for patients, coupled with useful information accumulated from research, may be helpful to practitioners who feel that these restorations have a part to play in their own clinical practice. The modern adhesive bridge is very different from the first ones described by Howe and Denehy in 1976.[3]

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This paper will consider adhesive bridges and their successful use under the following major headings:

- Case Selection;
- Framework Design;
- Bridge Design;
- Occlusal Management;
- Try-in, Cementation and Finishing.

CASE SELECTION

Indications and Contra-indications

The adhesive bridge has wide application, particularly where potential abutment teeth are sound and the occlusion is well controlled. It may be favoured by patients who have an appreciation of the disadvantages inherent in the tooth preparation required for a conventional metal-ceramic bridge using full coverage retainers.

The adhesive bridge is not appropriate in all situations where a fixed bridge is the treatment of choice. Adhesive bridges should not be used in patients who have significant bruxist or parafunctional activity. The loads are considerably higher than in normal function and this is likely to have adverse consequences for the retention of the framework and its ability to withstand distortion.

Adhesive bridges are generally contra-indicated when the abutment teeth are heavily restored. The presence of restorations is not an absolute contra-indication but, where large amounts of the functional surfaces of the abutment teeth consist of restorative material, conventional retainers may be a better option: these are better able to provide stable occlusal contacts and protection for the remaining tooth.

One further contra-indication is a lack of clinical crown height in the abutment teeth. Adhesive bridges are often described as being suitable for the young patient: this is true in so far as they avoid significant preparation of the abutments. However, lack of crown height is a contra-indication to any fixed bridge as it limits both the production of good retention and resistance in the retainers and rigidity in the bridge as a whole: fixed bridges on short teeth do not perform very well.[4]

Figure 1. Labial view of an adult showing a missing maxillary lateral incisor and a large vertical overlap of the anterior teeth.

Figure 2. Palatal view showing the presence of proximal restorations.

Common Reasons for Failure

Figures 1 and 2 show a 35-year-old man who presented in the early 1980s requesting that a bridge be made to replace his missing maxillary lateral incisor. The prospective abutment teeth had Class III restorations but the patient was anxious to avoid having a bridge made that used conventional retainers. A significant difficulty was the depth of vertical overlap of the anterior teeth. However, the decision was made to provide an adhesive bridge using the maxillary canine and central incisor as abutments. Figures 3 and 4 show the bridge in place. It was a perforated framework in the old Rochette style, but the most notable feature is the small amount of metalwork remaining on the abutment teeth, particularly the palatal aspect of the maxillary canine. It had proved impossible to retain more metal on this tooth owing to the extent of the vertical overlap of the anterior teeth.

The bridge remained cemented for 6 months before becoming uncemented on the maxillary canine. There are three possible theories as to why this may have occurred. If these are identified and avoided in adhesive bridge design, the likelihood of successful outcomes is considerably increased.

The three most likely reasons for the detachment of the retainer from the canine were:

- Insufficient coverage of the canine and therefore a lack of retention.
- Every time the mandible made a left lateral excursion, the mandibular canine rubbed from the metal-work onto the maxillary canine and eventually pushed the tooth buccally out of the framework.
- There was considerable difficulty in finding space for the framework on the palatal aspect of the maxillary canine with the result that the framework was very thin: this allowed it to flex leading to failure of the cement lute.

This paper concentrates on three aspects of the design and construction of adhesive bridges that are important to their success. These are:

- Framework design;
- Bridge design;
- The fit of the framework.

FRAMEWORK DESIGN

Modern Frameworks

The design of frameworks has changed radically since the early days of these bridges. The retentive wings of early adhesive bridges often resembled little more than pads of metal tacked onto the palatal surfaces of maxillary anterior teeth. Such bridges were often surprisingly successful but a considerable proportion, unsurprisingly, failed rapidly and completely.

Good framework designs have:

- Retainers that cover as much of the crown of the abutment tooth as possible. There is no doubt that an anterior adhesive bridge would be extremely well retained if it covered both the palatal surface of the abutment tooth and the labial surface down to the survey line, although aesthetics would prohibit

Figure 3. Labial view of the Rochette bridge immediately after cementation.

Figure 4. Palatal view of the Rochette bridge showing the extent of the framework that could be retained after occlusal adjustment.

Figure 5. A modern framework for an anterior adhesive bridge.

this. However, the principle of maximal coverage is an important one. For anterior retainers, the framework should cover from the incisal edge to the area of the anatomical crown apical to the cingulum (Figure 5).
- Retainers that wrap around the tooth as much as possible. The retainer should extend onto the proximal surface of the abutment adjacent to the pontic area while, if possible, coverage of the tooth's other proximal surface will also enhance retention and resistance form. The use of occlusal rest seats is essential for adhesive bridges supported by premolar or molar teeth: extension of the framework to cover a greater part of the occlusal

Figure 6. *A posterior adhesive bridge where the framework has reasonable extension but is thin.*

Figure 7*. The lingual view showing how the relative lack of crown height compromises the thickness of the framework and connector height.*

Figure 8*. An occlusal view of the bridge showing extensive occlusal coverage.*

Figure 9. *An adhesive bridge made on teeth with useful crown height facilitating a framework having appropriate thickness.*

surface can be beneficial in increasing retention. Such coverage contributes towards rigidity of the prosthesis, but this will only be the case if the retainer has appropriate thickness. (Figure 6).

- Frameworks that are as rigid as possible. The thickness of the retainers should not be less than 0.7 mm. Rigidity is also maintained by having height in the connectors of the bridge.[5] As the span or the loads increase, the greater become the requirements for connector height. Two millimetres is the minimum that is acceptable in a reasonably short span. Figures 6 and 7 show a 16-year-old patient for whom an adhesive bridge was made to replace a first premolar. The patient had undergone a surgical crown lengthening procedure because the teeth would have been too short to allow adequate strength to be produced in the connectors. The lingual view of the final bridge shows that, despite the surgery, there was only just enough crown height for provision of the bridge with a connector of appropriate height with an adequate embrasure for cleaning. The need to keep the embrasure open, together with the lack of crown height, has resulted in a thin framework: this bridge was consequently likely to fail. A thicker and stronger framework is shown in Figures 8 and 9, but there is more available crown height than in Figure 6.

Framework Design for Anterior Bridges

Minor Abutment Modification

Techniques where minimal preparation, if any, is undertaken are based on covering as much of the functional surface of the tooth as possible such that the teeth are not pushed out of the framework. Features of preparations designed to increase retention and resistance form have been shown *in vitro* to increase retention and resistance.[6] However, clinical studies do not confirm these benefits.[7,8] The preparation of anterior teeth should only be undertaken after due thought as to its consequences. The enamel on the palatal surfaces of maxillary anterior teeth is relatively thin[9] and any significant degree of preparation is likely to penetrate dentine. Resin cements generally remain less effective on dentine than enamel, while adhesive bridges continue to carry a failure rate. The cement failure at the framework-enamel interface is virtually always between the metal and the resin. Where

Figure 10. *Two abutments requiring preparation of the proximal surfaces facing the pontic area if connector height is to be appropriate.*

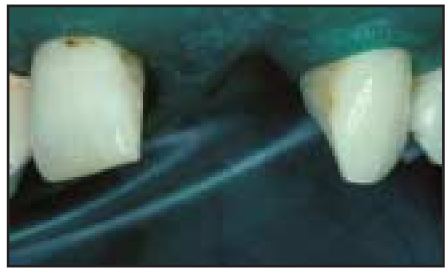

Figure 11*. Following preparation of the mesial surfaces of the maxillary right central incisor and the maxillary left canine.*

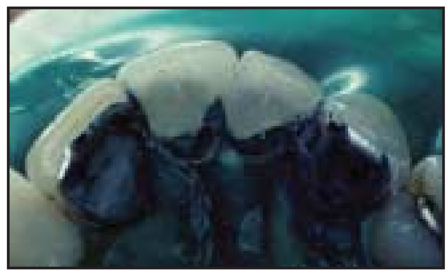

Figure 12. *Cementation of the bridge. The framework is well extended.*

the resin is bonded to the dentine, this is less likely to be the case and there may be an increased risk of secondary caries.

Tooth preparation can be limited to little or none for the vast majority of anterior adhesive bridges. The only area where preparation is sometimes necessary is on the approximal surfaces of the abutments adjacent to the pontic area. Figure 10 shows a situation where the abutments are inclined towards each other; it would have been impossible to establish connector height without preparation of the proximal surfaces. This was carried out and the proximal surfaces made as parallel as possible (Figure 11). The final bridge shows the extension of the framework into the proximal areas adjacent to the pontics (Figure 12).

Figure 13. The maxillary central incisor has been prepared to receive an adhesive bridge by creating a cingulum rest seat, a chamfer finishing line and an axial groove mesially.

Significant Tooth Preparation

Tooth preparation to enhance retention of a framework was first described in detail by Simonsen *et al*.[10] Any increased coverage of the crown of the tooth that can be reasonably easily achieved is helpful,[8] for example, the extension of the framework onto the approximal surface of the abutment teeth adjacent to the pontic area. The shape and inclination of the abutments can sometimes make preparation essential if good coverage of axial surfaces is to be achieved. In addition to guide planes, they described the use of axial grooves, cingulum rests and other resistant features prepared in anterior teeth to improve retention of the framework. Simonsen *et al*.[10] also described the preparation of axial finish lines to create definite margins and minimize axial contours.

Preparation of anterior teeth to produce axial grooves, extension of the framework onto both the mesial and distal surfaces of the abutments, axial finishing lines and cingulum rest seats is based on a particular concept of framework design (Figure 13). Many of these features are intended to ensure that the framework is retained on the abutment teeth. Significant tooth preparation will help framework rigidity and may permit less incisal extension of the framework, thereby reducing the potential for the framework to change the colour of the anterior teeth after cementation. The latter is, however, less of a problem with modern opaque luting cements.

Any auxiliary retentive features need to be definitively prepared. Reproduction of axial grooves when cast in a nickel-chromium alloy is not likely to be good unless the preparation depth is over 0.5 mm. Whilst asking a technician to wax and cast in a non-precious alloy to a fine finish line will often result in a margin no finer than when no preparation was made.

When the palatal surface of a maxillary anterior tooth has been prepared, contact with the antagonist in the intercuspal position may have been removed. It was suggested that this space could be maintained whilst the bridge was being constructed by bonding composite resin to the preparation.[10] This does not work: as the thin layer of composite is usually either lost through wear or fracture before the bridge is ready. There are better ways of dealing with occlusal contacts and these will be described later.

Framework Design for Posterior Bridges

Tooth preparation is generally, although not always, necessary for adhesive bridges in the posterior part of the mouth. The shape and inclinations of the teeth often dictate that, without preparation of axial surfaces, little coverage can be achieved. The original suggestions made by Simonsen *et al*.,[10] that 180 degrees of the circumference of the axial surfaces should be covered, make good sense. However, if there is an opportunity to increase this, more coverage is likely to be helpful. For example, it is very often possible to extend the framework to the disto-buccal line angle of the more mesial abutment without compromising aesthetics. Proximal guide planes should be parallel to each other, or very nearly so. An average tapered diamond bur used to make axial reduction in a crown preparation carries about 6–8 degrees of total convergence: this is more than enough to allow a framework to be seated. Keeping tapers minimal improves resistance form. Opposing guide planes with approximately 6 degrees of taper will appear undercut when viewed from the occlusal surface. Therefore, it is helpful to use the bur in the handpiece as a surveying instrument and, if this indicates a lack of undercut of the prepared surfaces, they are not undercut even if they appear so to the naked eye. It is helpful to view the guide planes from the side, either buccally or lingually, as their relative parallelism will be much easier to see.

Figure 14. A framework for a posterior adhesive bridge showing good proximal surface coverage with the occlusal rests adjacent to the pontic area.

Occlusal coverage is important. This may be in the form of rest seats or can be more extensive if the contacts with antagonist teeth allow. Rest seats may not require preparation if the occlusion permits but, if it is necessary, they must be definitive. The rests should always be adjacent to the pontic area (Figure 14). It is wrong to place them at the mesial and distal extremities of the bridge. They are required to resist axial displacement of the bridge: placed too far from the pontic area they will not be able to contribute usefully. They also make the framework more rigid by providing bulk of metal at the connectors, hence the need for them to be positioned correctly and to have adequate bulk.

There must also be sufficient crown height to develop adequate resistance form in the framework. Crown height is important for rigidity through increased height in both the retainers and connectors. Adhesive bridges made on short abutment teeth do not work.

BRIDGE DESIGN

Principles

There have been changes in the design of fixed bridges which use conventional retainers. These have been based on research data where available and an improved understanding of the bio-mechanics of fixed bridgework. In

***Figure 15**. Two adhesive bridges, one a cantilever, the other of fixed-fixed design replacing three maxillary incisors.*

contrast, it seems that much of this information has not been incorporated into designs of adhesive bridges.

A fixed bridge is most stable when it is supported at each end of the span. In the anterior part of the mouth, a single missing tooth may often be replaced by a cantilevered bridge using only one abutment. Such a design spares the use of a second abutment. Single unit cantilevers have proved very successful, not only for conventional but also adhesive bridges. Tay and Shaw[11] showed that, where single missing anterior teeth were being replaced with adhesive bridges, this design worked best.

There has been a curious extrapolation of this concept to recommend that all adhesive bridges are best made either as cantilevers or relative cantilevers. For example, if the bridge span is longer and demands an abutment at each end, the suggestion is made that a movable connector should be incorporated somewhere in the span. Such recommendations misinterpret the research data whilst such designs are from first principles without sound foundation. The available data indicate that cantilevers work best when a single missing anterior tooth is to be replaced and the span is short.[9,11]

Designs for Adhesive Bridges

Fixed-fixed and Cantilever Designs

The principles of bridge design should be the same using either adhesive retainers or conventional ones. The earlier discussion has highlighted the essential mechanical requirements for both types of prosthesis. Cantilevers work well for replacing a single missing anterior tooth using either adhesive castings or crowns as retainers. Where the span is of a length such that an abutment is needed at both ends of the span, then two retainers should be used. For a conventional bridge in the anterior part of the mouth where the arch is curved, this would generally be of a fixed-fixed design. There is every indication for making the adhesive bridge using the same design criteria. Figure 15 shows adhesive bridgework replacing one maxillary central incisor and two laterals. The features are:

- There are two bridges. If the retainers were made conventionally, it would be done in the same way. A one-piece bridge would make the right central incisor a pier abutment and would increase the likelihood of loss of cementation on either of the canines.
- The right lateral has been replaced as a cantilever. It is a short span anterior bridge and, were it to be made conventionally, the same design would be chosen.
- The left central and lateral incisors have been replaced by a fixed-fixed bridge. The span is certainly long enough to demand an abutment at each end. It would be possible but wrong to make the bridge as two cantilevers. It would also be incorrect to place a movable connector in the middle of the pontic area between the upper central incisor and upper left lateral to create a cantilevering effect.
  In cases where cantilever bridges are made, the pontic should provide an intercuspal contact for the antagonist tooth, but it should not be involved in the excursive movements of the mandible. If this patient had been provided with three cantilever bridges to replace the missing teeth, the anterior guidance would have been virtually disabled, being confined only to the right central incisor and possibly the canines. This would have left it poorly distributed with the possibility of high loading of the right central incisor.
- The framework demonstrates good inciso-gingival coverage and good wraparound onto the areas of the abutment teeth facing the pontic areas. The framework is extended onto the incisal edges of the abutment teeth to provide greater security, whilst the anterior view shows that such extension can, in some cases, be compatible with reasonable anterior aesthetics. The important feature is that the metal has been finished in this area intra-orally and is angled palatally much as it would be in an old-fashioned anterior gold partial veneer.
- The only tooth preparation carried out was a small amount of modification of the proximal surfaces of the abutment teeth adjacent to the pontic areas. This moved the survey line further gingivally allowing the development of appropriate connector height.

Fixed-Movable Designs

The use of fixed-movable designs should be limited to hybrid bridges where one of the retainers is conventional and the other adhesive. The desirability of these being fixed-movable is not related to mechanics but rather to the practicalities of what happens if the adhesive retainer becomes uncemented. The removal of a hybrid bridge made of a fixed-fixed design would require the conventional retainer to be tapped off, a procedure best avoided as there is risk of damaging the abutment.

Short span hybrid bridges containing movable connectors have proved reasonably successful,[8] but their use anteriorly does conflict with the general principle that such bridges should be of fixed-fixed design (Figure 16). In the posterior part of the mouth they should observe the basic essentials of conventional fixed-movable designs such that the female part of the connector is placed in the distal of the more mesial abutment. Together with the need to ensure that the adhesive portion is retrievable in the event of cementation failure, this means that they are most easily used when the more mesial abutment requires the conventional retainer and the more distal one the

Figure 16. *An anterior hybrid bridge showing retrievability of the adhesive portion. There is a movable connector in the mesial of the maxillary right lateral incisor which has a ceramo-metal retainer.*

adhesive.

The Use of Multiple Abutments

Double abutments at one end of a bridge span have been traditionally employed where either the loads on the bridge are high or where retention is in short supply. Their use in bridgework is generally contra-indicated. If there appears to be a lack of surface area for retention this will usually be because the abutment teeth are short. Most bridges do not fail because of a lack of retention; it is resistance form that is more likely to be inadequate. They very rarely fail because of a lack of 'straight pull' retention, they will fail by being twisted or torqued off the teeth. Adding a second abutment at one end of the span increases the surface area for retention but also increases the radius of rotation of the bridge, thereby decreasing resistance form, making loss of cementation of the more distal abutment more likely.

The solution lies in increasing the available crown height of the primary abutment: not only does this increase retention but, by increasing the height available for the retainer, a significant increase in resistance will be produced. It also allows taller connectors which make the bridge more rigid. These considerations apply as much to adhesive bridges as they do to those using conventional crowns as retainers.

OCCLUSAL MANAGEMENT

Most early papers describing indications for anterior adhesive bridges suggested that they should be used where there was inter-occlusal space between the abutments and their antagonists. This was a reasonable suggestion but greatly limited the situations where they could be used. Most patients have contact between their incisors on closure into the intercuspal position and there is often a need to create space for the framework.

Ways of Creating Space

There are a number of ways of creating space:

- Preparation of the abutments;
- Adjustment of antagonists;
- Relative axial tooth movement.

Preparation of the Abutments

One suggestion was the creation of space by preparation of the abutment. The potential difficulties with this approach have been discussed earlier. Adhesive retainers should generally not be less than 0.7 mm in thickness if resistance to flexure is to be adequate. Removing this amount from a maxillary tooth, not only from the site of intercuspal contact but also from the guidance pathway, can often mean the loss of significant amounts of tooth structure.

Adjustment of Antagonists

A regularly employed way of creating space for the framework in the anterior part of the maxillary arch and allowing control of the anterior guidance was by reducing the antagonist teeth at the time of cementation of the bridge. Dentists generally view such suggestions with concern, being anxious about taking up to 0.7 mm from the length of a group of lower incisors but, in contrast, being happy with taking equivalent amounts or perhaps more from the abutment teeth. There is little wrong with a planned reduction of antagonist teeth if there is no alternative and as long as both the patient and the dentist understand what the final result will be. The patient must be forewarned otherwise it will appear that the dentist is trying to compromise for an error in the bridge construction by adjusting the opposing teeth. The use of study casts and a diagnostic wax-up to assist planning has much to recommend it.

If antagonist teeth are to be reduced, it should be done correctly. Dentists are often concerned that the teeth, particularly mandibular incisors, will look shorter and try to minimize this by bevelling the incisal edges towards the labial. This approach results in space being created in the intercuspal position but, because the lingual part of the incisal edge has hardly been reduced at all, excursive movements will allow this part of the tooth to contact the framework. The maxillary tooth is thicker than it was previously owing to the presence of the framework whilst the lingual portion of the mandibular tooth's incisal edge is barely shorter than it was originally. This produces a protrusive interference with the resultant increased loading making the chances of loss of cementation of the bridge more likely.

The opposing mandibular incisors must be shortened across the width of their incisal edges. The motto is level not bevel!

Relative Axial Tooth Movement

The original works of Dahl *et al*.[12] and Dahl and Krogstad,[13] together with subsequent clinical practice, have demonstrated that moving teeth axially is a conservative and reliable way of creating inter-occlusal space. The technique can be applied to adhesive bridgework and represents the most conservative method for creating the space necessary for the framework as no tooth reduction is necessary.

There is evidence that increasing the amount of coverage of the abutment teeth leads to increased success with adhesive bridgework.[8] Using the framework to create the space necessary provides the opportunity to produce a high level of coverage of the abutment teeth. It may be used to create space either anteriorly or posteriorly and practitioners should not be deterred from making these small planned changes to the vertical dimension of occlusion. Figure 17 shows two adhesive bridges replacing the first maxillary premolars in a 17-year-old patient. The bridges incorporated coverage of the palatal

Figure 17. Two adhesive bridges with full occlusal coverage replacing missing maxillary premolars.

Figure 18. The patient was unable to achieve maximum intercuspation on mandibular closure following cementation.

Figure 19. Three weeks later, full occlusion has been restored.

surfaces of the canines and the occlusal surfaces of the second premolars: the retainers were of the order of 0.7 mm thickness. This resulted in all the other teeth being out of contact with their antagonists on mandibular closure when the bridges had been cemented (Figure 18). Figure 19 shows the teeth three weeks later, when all teeth had re-established intercuspal contact. During this period the patient suffered no pain or discomfort from the teeth, the temporo-mandibular joints or their associated musculature. Tooth movement tends to take place more quickly in the young than the old, mainly because the teeth in the young have greater eruptive potential: whereas in the older patient there is relatively more intrusion of the teeth in contact with the bridge and less eruption of the teeth not in contact.

Precautions

There are few contra-indications to this form of treatment. The only ones are:

- It is sensible to avoid using this method in patients who have suffered from temporo-mandibular dysfunction.
- Patients who are unable to co-operate with treatment that will result in their tooth contacts feeling slightly strange during the first 48 hours after the bridge is cemented.

Planning and Fabrication of the Framework

This involves:

- Using mounted casts to design the framework and to rehearse the effect of increasing temporarily the vertical dimension.
- Designing the framework to provide stable contacts on mandibular closure.

When the framework is made, the technician increases the vertical dimension by an amount sufficient to allow the functional surface of the tooth to be covered by the amount of wax necessary to provide a rigid framework. At the increased vertical dimension, the occlusal contacts on closure and excursive movements are checked for desirability. The framework is subsequently cast, finished and the porcelain applied in the usual way.

TRY-IN, CEMENTATION AND FINISHING

Metal Preparation

The history of methods of preparing the framework has been a generally logical progression from Rochette's original perforated framework in 1973,[14] followed

Figure 20. An adhesive bridge framework waxed-up on a refractory cast.

by electrolytic etching of base metal alloys[15] and methods of increasing surface roughness.[16] The development of surface-active resin cements[17] used in combination with sandblasted cast nickel-chromium frameworks has provided a consistent method for securing the framework to the teeth. Additionally, the development of intra-oral sandblasting or 'micro-etching' devices enables the final preparation of the framework to be carried out immediately prior to cementation. This is a major advantage as a delay between sandblasting and cementation has been shown to be deleterious to the bond achieved.[18]

Fit of the Framework

The framework should fit the teeth precisely. This applies not only to the margins but also to the overall adaptation of the framework to the teeth. It is not correct that the composite luting agent will effectively compensate for a poorly adapted framework. Research has indicated that, as the thickness of the composite luting agent increases, the bond strength decreases.[19] In a further study, it was shown more accurately fitting cast nickel-chrome castings could be made on refractory casts (Figure 20) when compared with a traditional lift-off technique of a wax pattern from a stone die.[20] A well-adapted framework will be stable when tried-in. If the clinician suspects that the framework does not seat positively, it is worthwhile using a fast-setting temporary cement or low viscosity impression material to check how thick the cement lute will be. If the film

Figure 21. *Rubber dam isolation prior to cementation.*

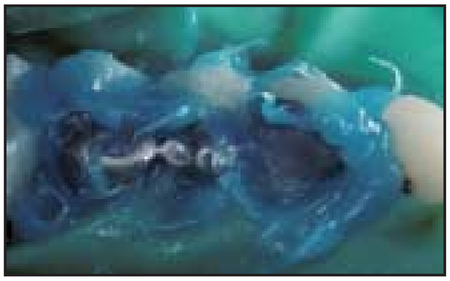

Figure 22. *The bridge having been cemented: glycol gel prevents air reaching the curing resin cement.*

beneath the framework is thick, the bridge should be remade.

Cementation and Finishing

At the time of cementation, control of the operating field is essential. Adhesive bridges are best fitted with a rubber dam in place (Figures 21 and 22): anything other than this represents a compromise. Rubber dam makes removal of the excess luting cement easier, keeping it out of the gingival crevice. Clearance of the uncured excess from the proximal areas is helped by wrapping a length of *Superfloss* (Oral-B, Gillette Group UK Ltd, London) around the pontic prior to cementation. Once the bridge is fully seated, the dentist can hold the bridge in place whilst the nurse uses the floss to clear the embrasure areas.

Minimal finishing should be carried out at the cementation visit. Embrasures should be clear and excess cement removed but there should be little if any finishing with rotary instruments. These generate heat and stress and may damage the composite bond to both metal and tooth structure. Final finishing, which should be done in all cases, is directed towards blending metal margins into the tooth structure using a friction grip handpiece and rotary instruments under copious water-spray.

Where the bridge is employing relative axial tooth movement, the patient should have been previously advised that the tooth contacts will feel strange. This should be reinforced and the patient reassured before being dismissed from the surgery. In most cases, full occlusion will be re-established within a couple of months: the timing of this is not particularly important as the patient is not inconvenienced after the first two to three days. Once full occlusion has been re-established, the occlusal contacts, both on mandibular closure and during excursive movements, should be reassessed to establish that they are appropriate.

CONCLUSIONS

The adhesive bridge has a useful part to play as one of the restorative methods for the replacement of missing teeth. The principles for the design of the frameworks are no different from those for bridgework that uses crowns as the retainers. There is a requirement to consider the area of coverage of the retainers, their thickness and control of the occlusal contacts. More recent studies give data indicating survival times that are good enough for these restorations to be considered permanent, whilst their non-invasive nature is an added benefit because, in most instances, there is no need to carry out significant preparation of the abutment teeth. The principle of relative axial tooth movement facilitates appropriate framework design and minimizes the need for preparation. The techniques for their construction and cementation are, in many respects, more demanding than those for conventional fixed prostheses.

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