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Cast anterior bridges utilizing composite resin

Gerald E. Denehy, DDS, MS

The loss of a permanent anterior tooth on a young patient poses unique problems in replacement for the pedodontic practitioner. Full crown coverage of the abutment teeth necessary for conventional fixed bridgework is often contraindicated due to the large size of the pulp chamber and the potential for pulpal damage. Even if possible, this reduction violates the current concepts of good conservative dentistry, since these teeth rarely have caries or restorations.

The care necessary for proper maintenance of a full coverage fixed bridge may often be neglected by a young patient, and dislodgement or damage is more possible during the accident prone years. As the patient ages, increased exposure of the clinical crowns of teeth also occurs, decreasing the esthetics of the gingival margins of anterior full coverage crowns.

Most young patients therefore, have missing anterior teeth replaced by a removable appliance, often of the "flipper" type. Although these appliances are conservative, they are often damaging to the supporting tissues of the teeth and an inconvenience to the patient.

The new composite resin systems, in combination with the acid-etch procedure, have offered the practitioner a wide range of esthetic techniques for the solution of anterior teeth problems.[1-3] One of these is a conservative, relatively inexpensive, and permanent method of replacing missing anterior teeth with little or no tooth structure removal.[4] The technique involves bonding a thin cast metal framework with porcelain pontic to the lingual surface of the anterior abutment teeth utilizing the acid-etch technique with composite resin as the bonding agent.

The use of acid-etch retained cast appliances has also been expanded to include applications other than anterior tooth replacement. These include posterior tooth replacement,[5] postorthodontic stabilization,[6] periodontal splinting,[7] and tooth recontouring.[8]

Clinical Procedures

The anterior acid-etch retained cast bridge normally requires two patient appointments with appropriate intervening laboratory time. The first appointment should involve a careful analysis of the patient's mouth to determine suitability for treatment. As with any restorative treatment, proper case selection is essential to ensure success (Figures 1 and 2).

Considerations of proper principles of design and support normally used with traditional fixed appliances should also apply to acid-etch retained cast bridges. Excessively long spans or periodontally compromised abutment teeth are definite contraindications. For an acid-etch bridge to be successful, sufficient enamel surface area must be present to provide adequate retention. Abutment teeth with short clinical crowns, lingual surfaces abraded into dentin, or large restorations are contraindicated.

Approximately one millimeter of clearance space in occlusion is necessary to provide adequate framework thickness. In limited clearance situations, this may often be achieved by selectively removing 0.5mm of enamel from both the lingual fossa of the abutment tooth and the incisal edges of the oppos-

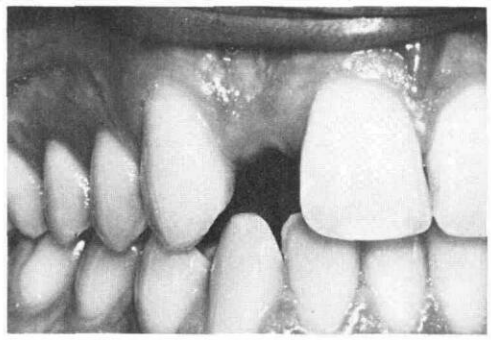

Figure 1. Maxillary three-unit acid-etch retained cast bridge — facial preoperative view. Patient was 18-year-old male with absence of lateral incisor due to partial anodontia. Patient was currently wearing a removable appliance.

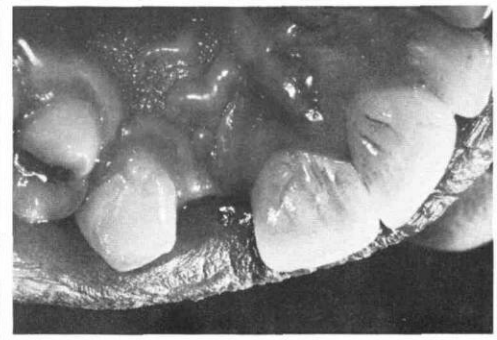

Figure 2. (right) Lingual preoperative view showing intact enamel surfaces.

ing mandibular teeth. Direct incisal forces on the pontic should be minimized, although the pontic may be kept in incisal function.

Once the dentist has determined that the case is appropriate for treatment, with sufficient space available, the teeth should be pumiced and a detailed impression made of the arch using an elastic impression material.

Selection of the shade for the pontic should take into account the degree of translucency of the incisal edge of the abutments. Shade variations and incisal "bluing" will result from metal reflection through translucent abutments. Minimal incisal extension with the framework and the use of an opaquer may be necessary when this problem is anticipated. After shade selection the patient may be dismissed.

The impression is poured in die stone and an outline of the framework drawn on the model (Figure 3).

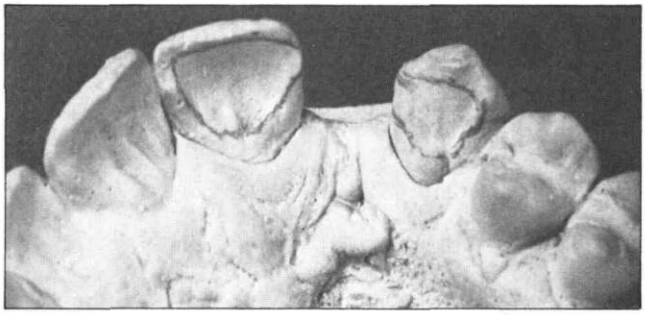

Figure 3. Stone working cast with framework outline.

Coverage of the lingual surface of the abutment teeth should be maximal with the retainer margins terminating proximally on the marginal ridges and supragingivally just inside the crest of curvature to prevent over contouring. Care should be taken to minimize incisal show of metal from either the connectors or the retainers.

The framework is constructed with thin metal plates over the lingual surface of the abutment teeth, the mechanical retention placed in the metal. The plates should be 1/2 to 3/4 mm thick and taper down to knife-edge margins. The connector bars joining the pontic to the plates should be located in a position to facilitate patient cleaning, and should have enough strength and rigidity to prevent metal fatigue. If multiple abutments are utilized, the connectors should be located at the contact area between the adjacent teeth to maintain the gingival embrasure space. Retention in the framework is achieved by the placement of six to eight round holes approximately 1.0mm in diameter in each retainer. The holes should be spaced in a manner that will not jeopardize the strength of the connector bar. A porcelain adaptable, non-precious alloy is recommended for framework construction because of its rigidity and low cost.

The pontic may be made of any laboratory adapted esthetic material. Porcelain is recommended, however, because of its excellent esthetics and durability. Construction of acid-etch retained cast anterior bridges is available at many commercial dental laboratories (Figure 4).

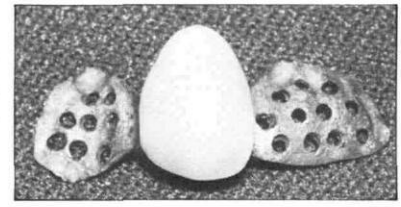

Figure 4. Cast anterior bridge with porcelain pontic showing retentive holes.

The second appointment with the patient involves the try-in and attachment of the appliance. The bridge is carefully checked for color, contour, and fit. Occlusion is checked in centric and excursive movements. A loop of dental floss may be used to hold the appliance in place while checking fit and incisal relationships (Figure 5).

Color change due to metal reflection through translucent abutment teeth becomes much more apparent when the bridge is seated with the resin. If a color change is suspected, the bridge may be trial seated with the unmixed universal filled resin. This should be done before etching, and both the tooth and framework should be cleaned following the trial seating. If discoloration is apparent, a composite resin opaquer should be used on the inside surface of the framework when attaching the bridge.

When the appliance is ready for attachment, the lingual and proximal surfaces of the abutment teeth are thoroughly pumiced (Figure 6). After rinsing, the teeth are isolated with cotton rolls and gauze to prevent contamination, then air dried. An etching solution of phosphoric acid is applied to all surface areas to be covered with the framework. The teeth are etched

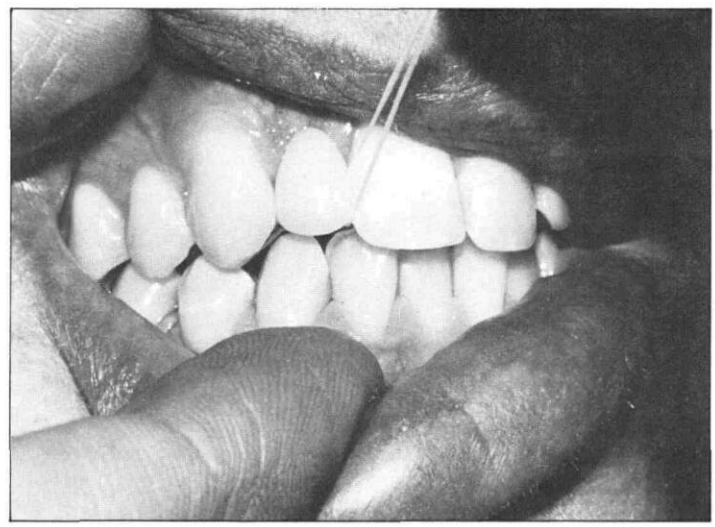

Figure 5. Dental floss used to support cast bridge during try-in for fit, function, and esthetics.

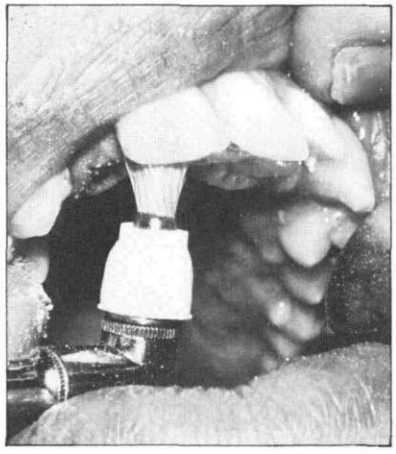

Figure 6. Enamel surfaces to be etched cleaned with pumice.

for sixty seconds, rinsed for twenty seconds, air dried, and reisolated.

A self-polymerizing composite resin system is used to attach the appliance. Although a commercially recommended system[a] works well, any of the self-polymerized systems containing both filled and unfilled resins may be used.

The unfilled resin is mixed for fifteen seconds, applied to the etched enamel surfaces (Figure 7), and the excess blown off with air. The filled resin is next mixed and applied in a thin layer to the inside surface of the appliance retainers (Figure 8). The appliance is immediately seated in place using finger pressure to insure stability. An explorer may be used to clear the gingival embrasures of excess resin if care is taken not to disturb the framework (Figure 9).

The resin is allowed to polymerize undisturbed for six minutes. The framework should then be carefully examined for deficiencies in the retentive holes or the peripheries. If any discrepencies are noted, additional filled resin should be added and polymerized before finishing procedures are initiated.

Polymerized excess resin is removed using conventional composite-resin finishing instruments such as finishing burs and discs (Figure 10); care must be taken to remove all excess in the gingival embrasure areas. Any metal surfaces scratched during finishing procedures should be repolished. The finished framework should exhibit composite resin only in the retentive holes (Figures 11 and 12). Before dismissal, the patient should be given thorough home-care instructions. [a]Comspan, The L. D. Caulk Co., Milford, DW.

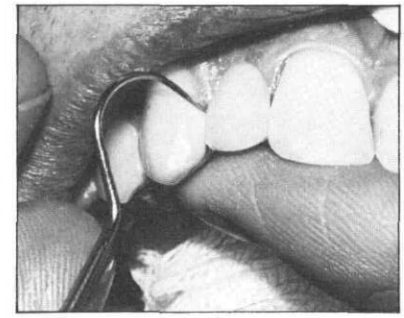

Figure 9. Explorer removing excess filled resin while framework is securely stabilized during polymerization of filled resin.

The appliances should be checked for looseness at routine recall examinations. If any looseness is noted, *the entire appliance should be removed and reattached.* All residual composite resin on the abutment teeth must be removed and the framework cleaned before reattachment. Careful analysis and correction of the reason for dislodgement should be made before the appliance is replaced.

Discussion

Over two-hundred and fifty acid-etch cast appliances have been placed with excellent results at The University of Iowa College of Dentistry over the past seven years. Cases have ranged from single tooth replacement to eleven unit appliances with five pontics. Dislodgements have been few in number and specific cause can usually be found for bonding failures. The majority of these cases have been reat-

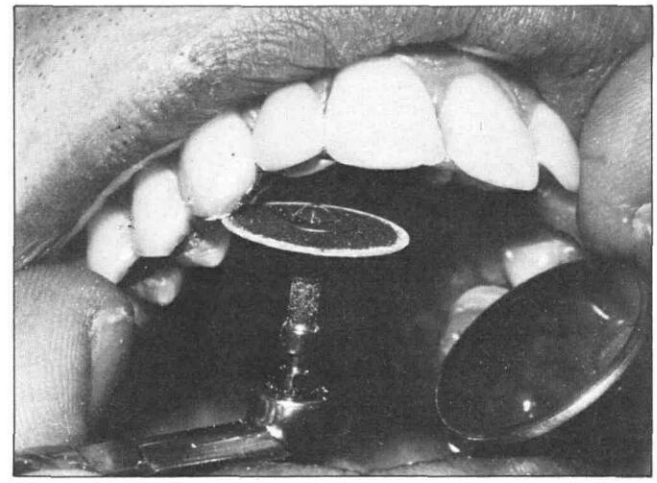

Figure 10. Sandpaper disc used to remove excess resin from framework.

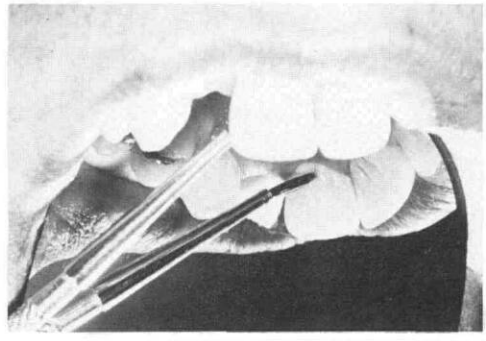

Figure 7. Unfilled resin applied to etched enamel surfaces of abutment teeth.

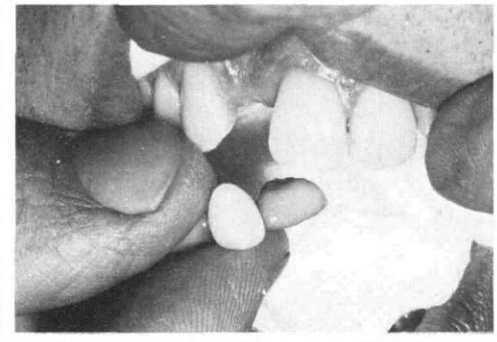

Figure 8. (right) Cast bridge with filled resin ready for insertion.

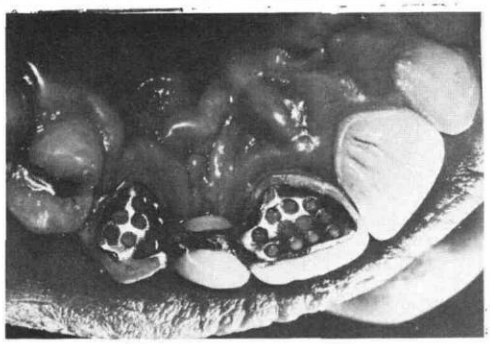

Figure 11. Maxillary three-unit acid-etch retained cast bridge — facial postoperative view.

Figure 12. Three unit bridge — lingual postoperative view.

tached and are currently functioning satisfactorily.

Although the acid-etch cast appliances have shown excellent retention, they still present the option of reversibility. If crown lengthening is necessary as the child grows older, the bridge may be removed, porcelain added to the pontic and the bridge reattached. Removal is also easy in the event of orthodontic treatment.

The procedure is relatively atraumatic, requiring no anesthesia and minimal chair time — both important factors for the pedodontic patient. Since the cost of the procedure is approximately one-third to one-half that of a conventional bridge, parents readily accept it.

Finally, the conservative service provided the patient is maximal in terms of tooth tissue relationship, esthetics, and pulpal vitality of the abutment teeth.

Dr. Denehy is professor, department of operative dentistry, University of Iowa College of Dentistry, Iowa City, Iowa 52242. Requests for reprints should be sent to him.

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Quotable Quote

With respect to nutrients, what is an inappropriate level of intake? All nutrients, of course, are required in the human diet at some minimum level in order to satisfy a wide variety of bodily functions. But we are now beginning to recognize that an excessive intake of nutrients may be harmful. When evaluating the effects of nutrients on the risk of cancer, we should attempt to identify the optimum intake — within some range — that produces the most beneficial nutritional results while minimizing the risk of cancer. One emerging concept is that those levels that optimize such traditional nutritional effects as healthy growth are the same levels that minimize cancer risk. We now know that inappropriately low intakes of some nutrients may cause an enhancement of the cancer process, whereas with other nutrients inappropriately high intakes create the same result.

From: Campbell, T. Colin: "The web of hunger-more is not necessarily better," Natural History 90(5) May, 1981.