

Use of laminate veneers in pediatric dentistry: present status and future developments

Wallace W. Johnson, DDS, MS

Abstract

Methods for veneering vital teeth have progressed dramatically. The practicing dentist can now choose a veneering process that will best suit the esthetic needs of each of his patients. Patients who have dental esthetic problems can now find a reasonable solution to their problems without unnecessary reduction of tooth structure.

Healthy, but unsightly anterior teeth have long been a problem for practicing dentists and their patients. Many forms of treatment have been devised to alleviate the problems encountered with diseased, fractured, and malposed anterior teeth; however, the patient who has dark, discolored, and stained teeth (but teeth that are otherwise disease free), has always found it difficult to obtain an esthetic appearance. The reasons are obvious of course. The mode of treatment for problems of the anterior teeth caused by disease and trauma has either been that of restoring the separate diseased areas or that of full coverage. Not many dentists are willing to cut or reduce perfectly healthy teeth simply to enhance esthetics. In addition, full coverage procedures have not been advocated as a routine mode of treatment for the anterior teeth of young patients. Therefore, those young persons who have healthy but unsightly teeth are forced to wait until adulthood to find a solution to their problem.

Bleaching

For quite a period of time, bleaching teeth seemed to hold promise for gaining better esthetics. Bleaching was quite successful in upgrading the shade of endodontically treated teeth that discolored, so the technique soon became one of the methods advocated for treating discolored vital teeth. However, its success in changing the color of vital teeth varied considerably. Where the source of discoloration was in the dentin of the tooth, bleaching was not effective. A small change in shade could be obtained, but the change was in the enamel only, and the dark

discoloration in the dentin soon leached through. In one case report, vital teeth were endodontically treated for the purpose of bleaching the stained dentin in order to achieve satisfactory results.¹

Early resins

With the advent and acceptance of etching tooth enamel with phosphoric acid, a new era in dentistry was born. This process made possible the bonding of tooth-colored resins to the enamel. Because of acid etching, the terms "laminating" and "veneering" became commonplace. Dentists soon began to experiment with covering the facial surfaces of teeth with acrylic and composite resins in the hope that dark discolorations could be masked, thereby improving esthetics.²⁻⁷

Although these early attempts showed that the resin-enamel bond was a secure one, the resinous materials left something to be desired. It was very difficult to mask out dark discolorations in the tooth without making the veneer extra thick. Resulting veneers were apt to have a blotchy, opaque appearance. In addition, if the resins used for veneering were the filled composite resins, the exposed surfaces had a rough texture, and were easily stained and discolored. To many patients, however, these early attempts did represent an improvement over the appearance of their natural teeth.

Laminate veneers

In 1975 the laminate veneer restoration was first introduced.⁸ In this process, a denture tooth was hollow ground from the lingual aspect, preserving the facial resin surfaces. The hollow grinding was carefully done so that the veneer would fit snugly to the tooth to be covered. The advantage in using the denture tooth was that the final veneer had color, shade, and translucency. When bonded to a tooth, the result was good masking of the host tooth, a definite color and shade change, and a uniform, natural appearance.

The method of preparing and placing laminate

veneers opened another new era in dentistry. Dentists and dental laboratories began producing laminate veneers from denture teeth, or were processing veneers from tooth colored resins on stone models.⁹ Two dental manufacturing companies, the L. D. Caulk Co.^a and Den-Mat, Inc.^b began producing kits designed for chairside preparation and bonding of laminate veneers. As experiences with the veneering systems increased, so did the number of articles appearing in the literature.¹⁰⁻²³

Present Status

What then, is the status of laminate veneers now? For sure, this method of treatment is here to stay. In fact, with the recent availability of the new visible light cured composite resin systems, the practicing dentist now has several types of laminating processes from which to choose.

Direct Composite Resin Veneers

As mentioned earlier, the first method used to veneer vital teeth was bonding a layer of acrylic or composite resin directly to the etched facial surface of the tooth. The method soon lost favor however, because the early composite resins would not effectively mask the host tooth, they could not be polished, and it was difficult to establish and hold a suitable shade.

This has now been changed. Using the new visible light cured resin systems, it is a simple task to build a veneer composed entirely of composite resin and opaquer on moderately dark teeth, achieving a good result. The new light cured resin systems are easy to work with, have effective opaquing resins that bond well to the tooth and to the tooth colored resins, and there is no hurry to place and spread the resins before they polymerize. Curing is done with a special curing light when the dentist is ready. After curing, the veneers can be shaped, thinned, contoured, and given appropriate anatomy with composite finishing burs, stones, and discs. Then, these new resins can be highly polished, giving the tooth a pleasing appearance and luster.

Advantages of the direct composite veneer are excellent control of resin placement, no danger of polishing through a preformed veneer, complete control of laminate thickness, and better control of gingival thickness and contour. There is also only one bond, the resin to tooth bond, to be concerned about. This feature makes changes, additions, and repairs easy to do if necessary.

A disadvantage of the system is that it takes more chair time to do. There is no laboratory preparation for this type of laminate veneer. It is also advisable to not use the direct resin placement procedure on

cases of severe discoloration. Such cases are difficult to mask satisfactorily. A preformed veneer that has its own color and shade will give the better result.

The Den-Mat Laminate Paste Kit^c (Figure 1) is a direct composite resin placement system. The kit provides three shades of paste type, self polymerizing microfilled resin, catalyst pastes, opaquer pastes, a bonding agent, an etchant, a drying agent, and dead soft matrix material.

The instructions with the kit recommend the use of the labial part of a celluloid crown form or Den-Mat's labial crown forms (Figure 2) to aid in resin placement, and to obtain labial tooth form and anatomy.

These crown forms could also be used in the same manner with any of the light cured resin systems. In either case, the crown forms are removed after resin polymerization, and the remaining composite resin becomes the veneer.

Preformed Laminate Veneers

Preformed laminated veneers are prepared in the^cDen-Mat, Inc., Santa Maria, CA.

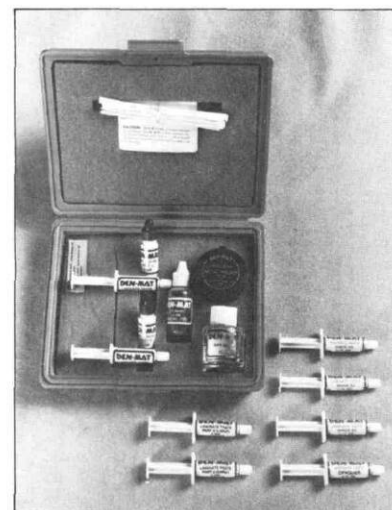


Figure 1. Den-Mat laminate paste kit.

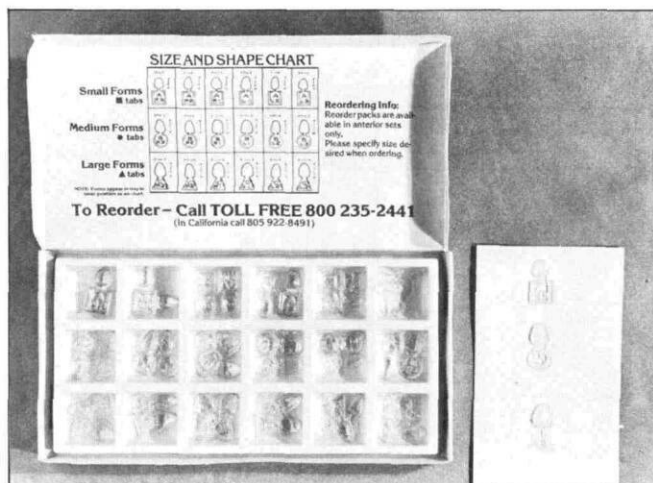


Figure 2. Den-Mat labial crown forms.

^aThe L. D. Caulk Company, Milford, DW.

^bDen-Mat, Inc., Santa Maria, CA.

laboratory, or are prepared commercially, and are then bonded to the host teeth after final adaptation at the chair.

Denture tooth veneers. These veneers are made by hollow grinding acrylic denture teeth. The teeth are selected according to their size and shade appropriate for the case. Preparation of the veneers is usually done utilizing a trimmed stone model of the host teeth as a guide for grinding and adapting. Adaptation of this veneer can be made quite accurate by lining the underside of the veneer with a thin layer of self-curing acrylic, then seating the veneer in its desired position against the tooth on the model. During this lining process, one must be careful to not add thickness to the veneer.

Laminate veneers prepared from denture teeth can give a good esthetic result. The veneers may be bonded to the host teeth utilizing either self-cure or visible light cured composite resin systems.

Disadvantages of these veneers are the time necessary for their preparation and adaptation, and the difficulty in keeping them thin enough, yet not fragile nor translucent.

Processed acrylic veneers. This type of veneer is fabricated on the mold of the teeth to be veneered. They may be processed from an autocuring acrylic or heat-curing acrylic. Many dentists prepare them at their offices in a pressure kettle. Laboratories may prepare them from denture tooth acrylics and a heat-curing process.

These veneers will have shade and color throughout the entire veneer, and may be prepared quite thin. Good masking and esthetics can be gained. They can be bonded to the host using either self-cured resin systems, or the visible light cured resin systems.

Disadvantages of these veneers may be a lack of density, unless the acrylic is processed under pressure, and lack of strength if prepared too thin.

Mastique laminate veneers. The L. D. Caulk Company has taken the lead among commercial companies in producing materials for the veneering process. The Mastique Laminate Veneer Kit^d is a complete system for veneer placement (Figure 3). The kit contains an ample supply of veneers in assorted sizes, opaquing resins, bonding resins, shade guides, cleaners, veneer adhesives, and brushes. The kit can be purchased with self-cure bonding resins, or their new Prisma Mastique visible light cured bonding resins. Excellent esthetic results can be obtained when using the Mastique system, and this can be said especially for the Prisma Mastique system.^e

Mastique veneers can be prepared for placement at chairside or they can be prepared on a model in the laboratory, conserving chairtime for bonding on-

^dThe L. D. Caulk Company, Milford, DW.

^eIbid.



Figure 3. Caulk's Mastique laminate veneer kit.

ly. Some commercial laboratories will do the initial preparation of the Mastique veneers, saving the dentist any preparation time.

A disadvantage to Mastique veneers is that the veneers do not have color or shade. All color changes and masking of the host tooth must be accomplished through the opaquer and bonding resins.

The Isosit laminate. The material Isosit^f (Figure 4) has been used quite successfully as an alternative to porcelain in fixed and removable prosthetics. It has also been used successfully as a laminate veneer.

Isosit is a filled resinous material that requires processing in special equipment. Since commercial laboratories are more apt to have this equipment, most — or all — of the Isosit laminate veneers will, of necessity, be processed away from the dental office.

The Isosit veneer offers excellent esthetic results. There is a wide selection of tooth colors and shades to choose from, and the color is distributed throughout the entire veneer. As a result, the veneer masks well, and the dentist can come quite close to the final shade desired. Although the material is somewhat brittle and fragile in the thinner sections of the veneer, it does show remarkable strength when handled carefully. Once bonded to the tooth, it can be thinned, and/or recontoured, and then repolished (Isosit will take and hold a high polish).

^fVivadent Company, Tonawanda, NY.



Figure 4. Isosit materials and curing unit.

Bonding to the Isosit material can be a problem. In its cured or polymerized state, it does not seem readily receptive to chemical bonding by composite resins. Possibly, the bond achieved is mostly adhesion, but an adequate and enduring bond can be achieved if the following steps are followed.

1) Scrub the bonding surface of each Isosit veneer thoroughly in clean ethyl acetate prior to bonding.

2) Place the filled (tooth-colored) composite resin that is going to be the bulk bonding resin for the veneer directly against the clean dry veneer surface. There should be *no* prior wetting of the veneer surface with the clear unfilled bonding agent. If the filled composite resin feels too viscous to flow onto, and to wet the Isosit surface, it may be thinned *ever so slightly* by spatulating it first with a touch of unfilled bonding agent until a feeling of better flow is achieved. This thinning also eases the problem of seating the veneer completely onto the host tooth. Avoid heavy pressure when seating the veneers. (Although the unfilled bonding agent is not to be used on the Isosit veneer, it should be used sparingly to wet and fill the tags of the clean and dry etched enamel surface of the tooth prior to seating the veneer.)

3) Use a visible light cured resin bonding system if possible. The Prisma Mastique system is recommended because the kit contains everything needed for cleaning and bonding, and the Prisma resins bond or adhere very well to the clean Isosit veneer surface. If the Prisma system is used, do not use the veneer primer solution on the veneer.

4) When the veneer is completely seated, hold it gently in place to prevent movement or rebound; clean away excess resin; check veneer for proper positioning, then cure the resin with light.

The Isosit veneer is of particular advantage when the tooth to be veneered is severely discolored. It would be well to keep this type veneer in mind just for that purpose.

The Pyroplast Veneer[®] (Figure 5). This is an acrylic veneer of good density and color. It is similar in many [®]H. D. Justi Co., Division of Williams Gold Refining Co., Philadelphia, PA.



Figure 5. Pyroplast materials and curing unit.

ways to the Isosit veneer, except that it is made of acrylic resin. It can probably be used with equal results, and under similar demanding esthetic conditions.

The pyroplast type veneer would probably have to be made in the commercial laboratory. However, many dentists have worked successfully with pyroplast in their office laboratories in the past, and could probably do the same again.

Bonding the pyroplast veneer would be done in the same manner as the Mastique veneer, using all of the cleaning and bonding agents included in the Mastique system.

All of the laminate veneers discussed so far in this article require no tooth reduction. Indeed, that is their advantage — not having to remove sound tooth structure to obtain esthetics. Most of the laminate veneers placed are on persons in their teens and early twenties. The majority of the teeth involved in these cases are not diseased. They are simply not esthetic, and in today's society such a problem can be a major handicap in a young person's life.

Gingival Inflammation

There is a concern that every dentist using laminate veneers must be aware of, however. That is, the possibility of inflammatory gingival tissue changes. All of the laminate veneers, as described, add thickness to the facial surface of the tooth. This thickness is often necessary to mask out a very dark host tooth. In addition, the dark discoloration in many of the cases we see is often most intense in the gingival third of the tooth. Therefore, it is necessary to work toward achieving an acceptable balance.

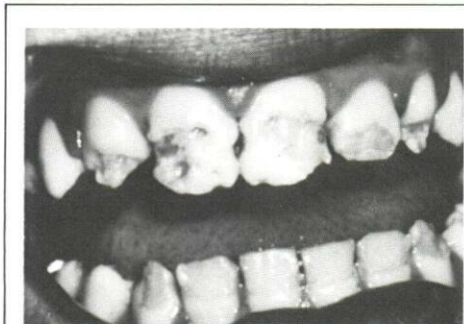


Figure 6. Severely hypoplastic and stained anterior teeth before (left) and after placement of laminate veneers. (see page 36)



Veneers should accomplish adequate masking and good esthetics, but should also have proper contouring in the gingival area of the tooth.

Each case will vary as to whether or not a gingival change will occur. Little or no change may be expected if the following preventive suggestions are observed.

1) Always keep the gingival thickness of the veneer at the minimum that will allow good esthetics.

2) Insure full seating of the veneer at the gingival margin before curing the resin.

3) Try not to place the veneer into the gingival sulcus, unless necessary for esthetics.

4) Carefully pursue and remove all resin flash that may have found its way into the gingival sulcus.

5) Be sure that the gingival third of the veneer has a very smooth and polished surface.

6) Reinforce the patient's oral hygiene care. Cleanliness of the gingival areas around the laminates is of utmost importance. It may also be helpful to have the patient brush or massage the gingival areas of concern with a carbamide peroxide product as an additional aid in daily cleansing.

Some dentists may refrain from using laminate veneers for fear of causing gingival problems in their patients. However, we should remember that these patients are seeking a solution to a perplexing problem. Minor gingival irritations can be prevented or otherwise treated and managed. To force a young person to live with a dental esthetic handicap can be the cause of personality and behavioral changes that can be far more damaging, and much more difficult to treat than gingival inflammation.

If that argument in favor of veneers has not been convincing, we should be aware that there is another method of veneering vital teeth whereby we can maintain close to normal tooth contours. The procedure as described by Jordan²⁴ is to remove enamel from the labial surface of each tooth to be veneered, leaving a chamfer border around the tooth. The normal outline of the tooth is maintained in enamel at all facial borders, i.e., the mesial and distal labial line angles, the labial incisal line angle, and a labial margin adjacent to and following the anatomical curvature of the gingival tissue. With the facial surface of the tooth reduced to a flat or concave form, there is now space to place bases, opaquer, and resins in sufficient quantity to achieve good esthetics, and not over-violate the normal contour of the tooth.

Although this procedure for veneering teeth is not reversible, it does produce a good result. It is of particular value where only one or two veneers need be placed, the additional thickness of the laminate veneer putting the tooth noticeably outside the contour of the dental arch.

Summary

At the present time, then, there are several choices of vital tooth veneering procedures from which to choose, and these choices offer a reasonable solution to a great many dental esthetic problems. This is because the changes and advances that have taken place in this procedure over the past decade have been outstanding. Yet, vital tooth veneering is in its infancy. The number of people becoming interested in this method of treatment are increasing, and this growth of participants will stimulate even greater future advances.

We will see better preformed veneers becoming commercially available. They will be thin, but more durable, and they will have their own color and shade. We will see advances in strengthening the bond to the veneer, and we will see improved opaquer resins that will effectively block out tooth discolorations. We will see devices that will aid in holding the veneers precisely in place for bonding, and someone will surely develop a matrix useful for gently retracting the gingival tissue around the anterior tooth during the seating and finishing of the veneer.

This article has reviewed the present status of treating discolored and unesthetic vital teeth with laminate veneers. Because of the method of retaining this type of restoration, every dentist will have moments of frustration and concern as experience is gained with their use. However, the rewards of the successes make this type of service very worthwhile (Figure 6, see page 35).

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

1. Hayashi, K., Takamizu, M., Momoi, Y., Furuya, K., Kusunoki, M., and Kono, A. Bleaching teeth discolored by tetracycline therapy. *Dent Surv* 56:17, 1980.
2. Portnoy, L. Use of paint-on composite to treat enamel erosion. *Dent Surv* 50:28, 1974.
3. Light, E. An esthetic transitional treatment for amelogenesis imperfecta: report of 2 cases. *JADA* 90:166, 1975.
4. Fox, D. Use of an acid-etch resin in hereditary enamel hypoplasia: report of a case. *J Dent Child* 42:137, 1975.
5. Spengler, H., et al. The resin veneer restoration, an aid in pedodontics. *Quintessence Int* 6:21, 1975.
6. Crabb, J. The restoration of hypoplastic anterior teeth using an acid-etch technique. *J Dent* 3:121, 1975.
7. Rakow, B. and Light, E. Evaluation of the acid-etch technique in concealing discolorations. *Quintessence Int* 7:23, 1976.
8. Faunce, F. The use of laminate veneers for restoration of fractured and discolored teeth. *Tex Dent J* 93:6, 1975.
9. Mouradian, W. A new approach to treatment of tetracycline-stained teeth: report of case. *J Dent Child* 43:103, 1976.
10. Faunce, F. and Myers, D. Laminate veneer restoration of permanent incisors. *JADA* 93:790, 1976.
11. Faunce, F. Tooth restoration with preformed laminate veneers. *Dent Surv* 53:30, 1977.

12. McDonald, R. and Avery, D. Dentistry for the Child and Adolescent, ed. 3. St. Louis, The C. V. Mosby Co. 1978, pp 65-67.
13. Rakow, B., Light, E., and Condello, P. Enamel-bonded mechanically retained laminate veneer. *Dent* 26:47, 1978.
14. Barkley, R. L., Gaw, A. F., and Faunce, F. R. Esthetic tooth restoration. *Dent Surv* 55:22, 1979.
15. McIlwain, J. B. Repair of severely fractured teeth using laminate veneers. *Fla Dent J* 51:46, 1980.
16. Faunce, F. R., Barkley, R. L., and Fleming, J. E. Report on a case of maxillary and mandibular veneers. *J Ind Dent Assoc* 59:15, 1980.
17. Carr, A. B., Robertson, M. R., and Fleming, J. E. Custom contour laminate veneers. *Dent Stud* 58:42, 1980.
18. Carr, A. B., Robertson, M. R., and Fleming, J. E. Color characterization of laminate veneers. *Dent Surv* 56:46, 1980.
19. Snawder, K. D. Handbook of Clinical Pedodontics. St. Louis, The C. V. Mosby Co., 1980, pp 119-120.
20. Avery, D. Improving esthetics with laminate veneers, in *Current Therapy*, Vol. 7. St. Louis, The C. V. Mosby Co., 1980, pp 432-437.
21. Avery, D. The use of preformed acrylic veneers for the aesthetic treatment of several discoloured anterior permanent teeth. *Int Dent J* 30:49, 1980.
22. Paterson, J. R. and Anson, R. A. Laminates — A practical approach to restoring tetracycline-stained teeth. *Pediatr Dent* 2:300, 1980.
23. Chalkley, Y. Clinical use of anterior laminates — construction and placement. *JADA* 101:485, 1980.
24. Jordan, R., et al. Restoration of fractured and hypoplastic incisors by the acid etch resin technique: a three-year report. *JADA* 95:795, 1977.

Quotable Quotes

The relationships of nutrition, diet, and cancer can be viewed from three perspectives: (1) diet as a factor in cancer causation; (2) the effect of cancer and its treatment on nutritional status; and (3) nutritional management of the cancer patient.

Various types of studies (epidemiologic, animal, case control) have described a number of highly suggestive associations between diet and cancer in humans, but there is as yet no absolute proof of a direct cause/effect relationship. The role that ingestion of food-borne carcinogens or carcinogen precursors has in causing major human cancers remains to be determined. It is likely that diet has an indirect role, modifying carcinogenesis. Several mechanisms are advanced to explain this effect. For example, it is theorized that excess dietary fat may promote carcinogenesis via its influence on altering bile acid production and/or gut microflora development in colon cancer, and secretion of endocrine glands in breast cancer.

Although there is probably no specific "preventive" diet for cancer, it may be advisable to eat a variety of foods, adjust energy intake to energy expenditure, and avoid moldy food, a deficiency of certain nutrients (e.g., vitamin A) and known dietary carcinogens such as alcohol. Cancer per se exerts both systemic effects (e.g., cachexia) and localized effects (e.g., malabsorption due to pancreatic insufficiency) which can lead to profound nutritional problems for the cancer patient. In addition, specific treatment modalities (e.g., surgery, radiotherapy, and chemotherapy), used singly or in combination, may compromise the patient's nutritional status.

Malnutrition need not be a necessary condition for the cancer patient. Advantages of nutritional intervention via oral, enteral, or intravenous hyperalimentation include improved well-being, enhanced weight gain, improvement in immunocompetence, and potentially a better response of the tumor to oncologic treatment. The effect of nutritional support on the overall outcome for the cancer patient is unknown. A concern is the possibility that nutritional support may harm the host by promoting tumor growth. Consequently, it is recommended that nutritional intervention be accompanied by adequate antitumor treatment. To date, there is insufficient evidence to support the suggestion that megadoses or reduced amounts of any essential nutrient, or removal or any normal dietary component, prevents cancer or has a useful role in its treatment in human beings.

From: *Diary Council Digest*, Vol. 51, No. 5,
p 25, September-October 1980.