A Method of Producing Artificial Calculus on Typodont Teeth

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THE teaching of scaling technic to dental students is frequently accomplished with the aid of a typodont having Ivorene teeth and soft rubber gingiva. This method is very satisfactory for teaching instrument and hand position. The method is much more realistic and the accomplishment greater if artificial calculus can be placed on the teeth in a supra and subgingival position. By this method the student can be taught tactical skills which are so important in scaling.

There have been a number of attempts in the past to create an artificial calculus which could be applied to typodont teeth and would exhibit the physical properties of the natural substance.

As an initial list of requirements for an artificial calculus, it was decided that it should possess:

1. Good adhesion
2. Hardness
3. Some fracture tendency
4. A fairly rapid set
5. A grainy feeling under the scaler
6. No surface gloss on drying
7. Ease of application
8. Low cost

More or less empirically adhesives of various kinds were tested to determine what materials would adhere to the Ivorene typodont teeth. Many kinds of varnishes, shel-

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lacs, lacquers, cements, resins, glues, gums (synthetic and natural), and glazes were tested, but none of those tested possessed sufficient adhesion when modified to obtain the desirable physical properties.

From the Columbia Dentoform Corporation it was learned that the Ivorene plastic was a urea-formaldehyde resin. U.F. resins have widespread application in home and industry, but probably the best known is formica. The logical course then was to determine what was used to glue formica. There are two materials in common use, one a contact bond cement and the other known commercially as urea resin glue.* Contact bond cement dries to a sticky gum and could not be altered to yield hardness. Urea resin glue when mixed with water and allowed to set hardens very nearly as hard as the Ivorene tooth. This necessitated rather specific requirements for a diluting medium which would soften the mass yet not greatly inhibit the bond. Therefore it must:

1. Be insoluble but wettable in water
2. Have fairly uniform particle size
3. Be soft
4. Be compatible with urea resin glue
5. Be relatively non-hygroscopic

After some consideration it appeared that *powdered* asbestos would fulfill these requirements. A series of mixtures with resin/asbestos ratios of 1/0.5, 1/0.75, 1/1.0, 1/1.25, 1/1.50, 1/1.75 and 1/2.0 were mixed with sufficient water to yield a smooth paste and applied to typodont teeth. After twenty-four hours at room temperature there appeared to be no appreciable change in hardness. The resin/asbestos ratio of 1/1.75 appeared quite satisfactory but lacked grainy texture. Introducing pumice into the mixture and altering the resin/asbestos ratio finally produced a product which seemed ideal. The recommended mixture would contain:

Urea resin glue	1 part
Asbestos	1.5 parts
Pumice	.5 parts

After the powders are thoroughly mixed, they should be kept dry in a sealed container. In this manner the material can be kept indefinitely. When water is mixed with the powders in the proportion of 1.5 cc/level teaspoonful, a creamy paste results which may be easily applied to the typodont teeth. (Since oils or greases inhibit the bonding, prior cleansing of the typodont teeth with a little acetone or other organic solvent is recommended.) The teeth can be removed for the application of the material and may be replaced in the typodont two hours after application if desired. If the material is painted on the teeth while they are in the typodont, contact with any roughened areas on the rubber base should be avoided, or the rubber base may be coated with a thin film of cold cream, brushless shaving cream, or similar substance. A twenty-four hour period should be allowed for hardening at room temperature. If heat acceleration of the set is used, the period may be shortened to a half hour; but a harder end-product results and the resin/asbestos ratio must be altered depending on the temperature used. Too high a temperature will result in bubbling of the mixture and loss of desired physical properties.

*Urea-resin glue is a urea-formaldehyde resin powder which polymerizes after the addition of water. The polymerization proceeds fairly rapidly at room temperature and can be cold inhibited or heat accelerated.

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