Esthetic Retention

For Modern Dental Prosthesis

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Esthetic Retention for Modern Dental Prosthesis

by Maurice N. Stern, D.D.S.

- Heretofore, partial dentures or nesbit bridges were usually anchored to abutment teeth by metal clasp. These clasp, in most instances, were conspicuous and often unacceptable to the patient. Metal clasp on abutment teeth also induce caries in many cases, resulting in full coverage of the abutment tooth. Such metal clasp can be especially destructive where there are no distal abutment teeth to maintain full support of the restoration. The resulting torque on the abutment teeth may cause loss of the supporting bone, and the disproportion of pressures on the mucous membrane may traumatize soft tissue.

In the case of full denture prosthesis, it is also often difficult to take advantage of the retentive contours of tuberosities, tori alveolar bosses, or any unyielding undercut areas, due to the rigidity of the methyl methacrylate denture base material.

It is now more than twenty years since our profession has been able to offer the benefits of the discovery of plastic methyl methacrylate. However, while there have been refinements and modifications in the manufacture of methyl methacrylate, it still does not qualify to fulfill the needed requirement in the above-mentioned situations.

In 1956, a new denture base material was place at the writer's disposal for evaluation and use. The material was found to have astonishing physical characteristic and has been used in several hundred cases.

Te material is a superpolyamide, an improved relative of the "nylon" family of plastics. The original ***nylon*** is a product of the synthesis of linear calcium polyamide and derivates of coal (fraction distillation). The nylon polyamides were the result of research by W. Carothers and his associates in 1931. The superpolyamides were the result of further research, in attempts to improve the negative qualities of nylon by either modification of the starting formula or by co-polymerization (Fuller, Coffman, Catlin and Baker). Several of the polyamides of dental interest, from these researches, were Mailonplast, Protamide, Superprothenyl, Supolyd, and Valplast.

Valplast* is available in three gingival color-fast shades which are " live tissue tones" with life-like translucency. It blends into the gingival color so that it is difficult to differentiate the tissue and the denture. It has extremely high tensile strength, is abrasion resistant, and is highly resilient. It has unbelievable flexural strength with an infinite fatigue limit, and a perfect "elastic memory." It takes and holds a high polish and can be carved and stipple easily. Other physical Characteristic in comparison wit those of the acrylics are shown in the accompanying chart.

* Valplast was the superpolyamide used by the writer.

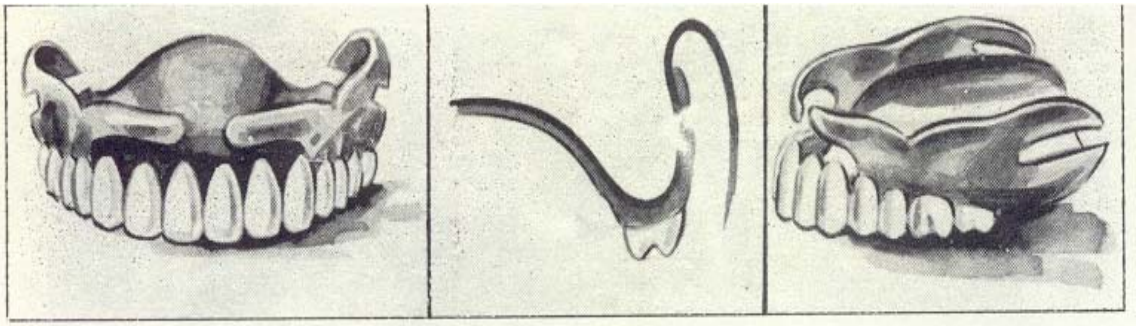

Fig. 1.

Fig. 2.

Fig. 3.

PHYSICAL CHARACTERISTICS COMPARING METHYL METHACRYLATE AND VALPLAST

Physical Characteristics	Methyl Methacrylate	Valplast*
Specific gravity	116-1.20	1.04
Water absorption (24 Hrs)	0.4%	0.4%
Saturation by immersion	1.4%	1.2%
Young's modulus (kg/sq mm)	280	150-180
Tensile strength (kg/sq mm)	5-7	8
Compressive Strength	8.6	10.5
Bending Strength (kg/sq mm)	8.5	8-10
Vickers hardness	20	14.5
Impact strength (kg/sq mm)	10.5	10-150
Processed softens	275 °F	437 °F
Polymerizes (in 6 hrs.)	160 °F	460 °F
Combustion	Burns	Non-inflammable
Resistance to acids, bases	Weak	Very strong
Discoloration	Possible in time	None
(According to Tscherniak and Habib)		No deformation due to water adsorp-

* According to Tscherniak and Habib.

The wonder of this new material as a denture base is that it maintains un failing grip on the denture teeth, yet tin finger-like extensions of the material into any undercut areas act as clasp in a firm, pressureless retention of the restoration.

Proper denture design places the “finger” for retention on areas immediately beyond the greatest horizontal diameters of any bulge, boss, torus, tuberosity, protuberance, etc. (Figs. 1 and 2). For best retention, there should be one retention finger in each quadrant of the denture coverage (fig. 3). In designing and positioning the fingers, care must be exercised to avoid placement on what would be movable tissue in the mouth, such as muscle attachment (labial, buccal, or lingual frenums) as well as the reflexions of the mucco-labial, mucco-buccal, and mucco-lingual membranes. Over-extension is always to be avoided. Retention fingers should never be placed where they may impinge on the free margin of the gingivae.

Full dentures in cases of pronounced tori, tuberosities, or extremely bulging alveolar process, in the anterior (labial) area, have always posed problems of esthetics as well as retention. Surgery can be avoided with the denture base material. The Valplast fingers, highly resilient, thin and flexural, pass gently over the largest dimensions of bulge, boss, tuberosity or protruding contour and return to their relaxed positions (due to elastic memory) to retain the denture *without pressure*.

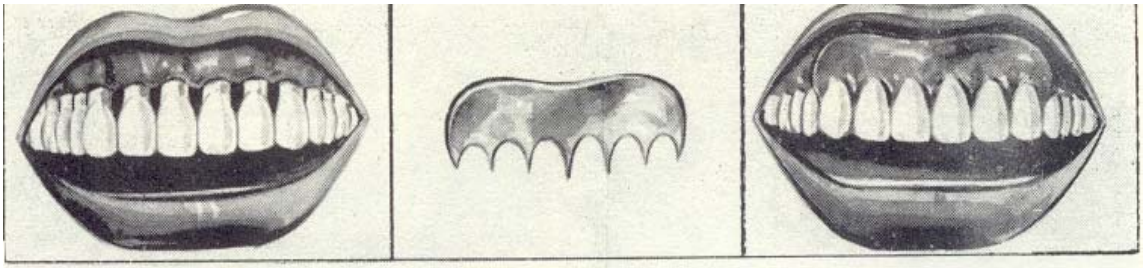

Fig. 4. Fig. 5. Fig. 6.

In block form of a cube, which is more, than 10 mm on each edge this material is practically *not* flexible, but in thin extensions of about 2 mm or less, it acts as a flexural finger with perfect rebound to its processed form. Properly designed retention fingers perform a perfect esthetic service plus retention without pressure. Restorations are processed by pressure injection molding. The plastic superpolyamide is heated to 460 °F, at which temperature it is a limpid fluid that is easily injected into the prepared mold (flask). This technique result in mucostatic detailed reproduction of the mouth tissue of the model. This also enhances the retention and stability of dentures due to retained atmospheric pressure.

When thin sections are required or demanded in areas such as lingual of the lower anterior teeth, in the case of lower partials, or the palatal of upper partials, this material can and should be used in combination with chrome-cobalt castings for the thin sections. For example: lower partial-use chrome-cobalt lingual bar and grids in the edentulous areas for superpolyamide attachment. In the upper, the palatal (thin section) can be chrome-cobalt with grids in the edentulous areas for the

denture base attachment. When combinations of superpolyamide and chrome are used, half clasp of chrome-cobalt can be used on the lingual of the abutment teeth supplemented with denture base fingers on the labial or buccal gingiva for retention *plus* esthetics.

When retention fingers are designed, clearance of the attached end of the finger must be planned by starting the finger far enough away from the protuberance used for retention. Keep in mind that the amplitude of yield of the finger is minimal at the attached end of the finger.

The material may also be used for obturators for cleft palates, and as an esthetic aid post surgically after periodontal curettage and gingivectomy in the anterior part of the mouth, especially when there are exposed tooth of the teeth and broad interspaces (Fig. 4). These can be hidden behind a beautifully carved and stippled veneer gum section of resilient plastic (fig. 5). The wide-open interproximal spaces and the arch curvature give more than ample retention for the highly esthetic restoration (Fig. 6).

With this type of restoration meticulous mouth cleanliness is mandatory. Thorough cleansing of the veneer and brushing of the teeth should be done at least four times per day (immediately after each meal and at bedtime) to hold caries and odors in check.

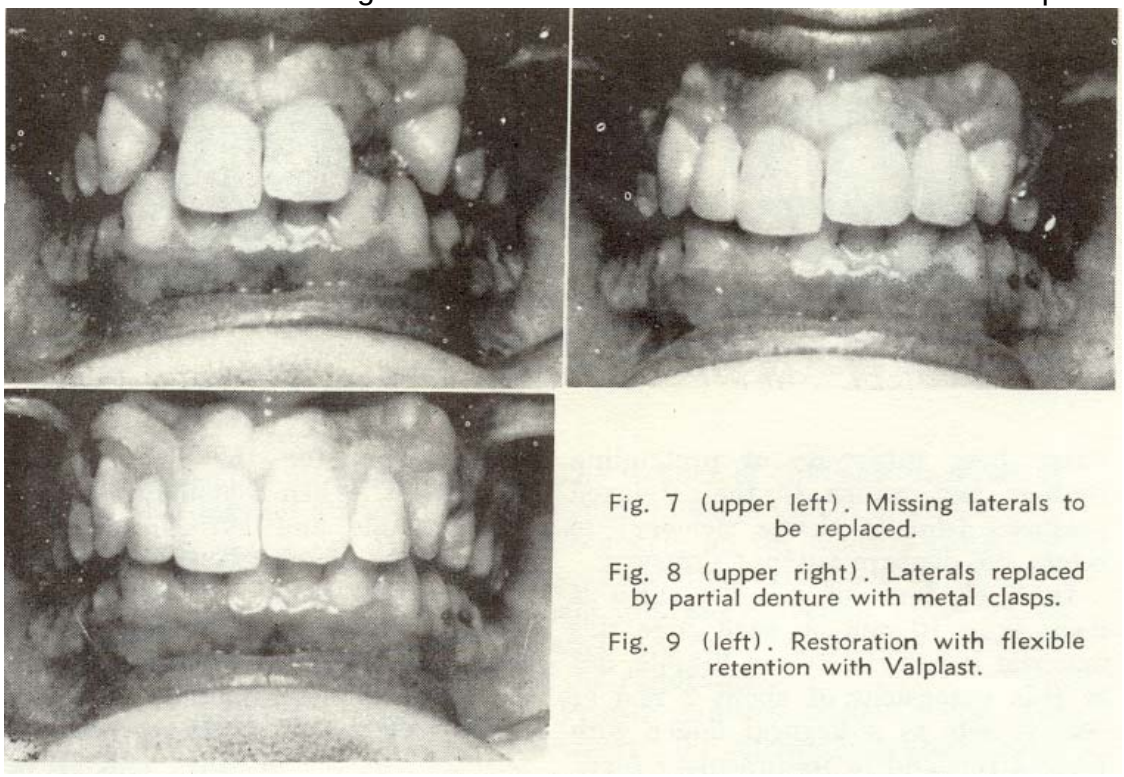

Fig. 7 (upper left). Missing laterals to be replaced.

Fig. 8 (upper right). Laterals replaced by partial denture with metal clasps.

Fig. 9 (left). Restoration with flexible retention with Valplast.

Summary

A superpolyamide is described as a valuable new potential to prosthetic dentistry. It fulfills a need not heretofore met by methyl methacrylate or chrome-steel used singly or jointly. The material is rugged, not rigid, highly resilient in thin sections, with perfect “elastic memory”, abrasion-resistant,

practically unbreakable, and highly esthetic with color fast tissue tones. Its use makes it possible to have positive retention without pressure: (1) in partial dentures where gentle but firm retention is obtain by the resilient fingers resting in recessed areas of supporting alveolar contours, effecting both an esthetic ideal and the safeguard of the remaining teeth from damaging stresses and caries; and (2) in full dentures, by the use of thin fingers of plastic denture base materials gentle stabilizers in the recessed contours over protuberances such as tuberosities, tori or bulging alveolae.

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