Flexible partials: aesthetic retention for the removable dental prosthesis

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CONVENTIONAL metal and acrylic partials dentures or nesbit bridges (side plates) are usually anchored to abutment teeth by metal clasps that are designed to work with vertical stops to create a balanced retentive and supported removable appliance. These clasps, in most instances are conspicuous and often unacceptable to the patient.

Metal clasps on abutment teeth also induce caries in many cases. Such metal clasps 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 contribute to movement of the abutment tooth, while the imbalance of pressures on the residual ridge may lead to loss or modelling of the supportive bone, and the disproportion of pressure on the mucous membrane may traumatise soft tissue. These results are more likely to occur when the typical dental patient fails to return routinely for maintenance, modification and adjustment of the partial denture.

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

It is now more than 70 years since the dental profession has been able to offer the benefits of the discovery of plastic methyl methacrylate.

However, while there have been needed requirement in the above mentioned situations.

The Alternative

In 1953, an alternative denture base material became available to the dental profession. The material was found to have astonishing physical characteristics and has been used in several million cases. The material is a superpolyamide, an improved relative of the "nylon" family of plastics.

The original nylon is a product of the synthesis od linear calcium polyamide and derivatives of coal (fraction distillation). The nylon polyamides were the result of research by W.Caruthers and his associates in 1931.

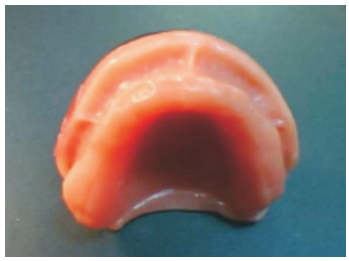
The superpolyamides were the result of further research, in attempts to improve the negative qualities of nylon by either modification of the starting formula or by co-polymerisation (Fuller, Coffman, Catlin and Baker).

The superpolyamide of interest here is known under the brand name of "Valplast", which is available in four gingival colour-fast shades that are "live tissue tones" with life-like translucency. It blends into the gingival colour 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 fatifue limit, and near perfect "elastic memory". It takes and holds a high polish and can be carved easily. Other physical characteristics in comparison with those of the acrylics are shown in the accompanying chart.

The wonder of this new material as a denture base is that it maintains unfailing grip on the denture teeth, yet fingure-like extensions of the material into any undercut area acts as clasps 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, toru, tuberosity, protruberance etc **(Figures1, 2 and 2a)**.

For best retention, there should always 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 attachments (labial, buccal, or lingual frenums) as well as the reflexions of the mucco-



extension is always to be avoided.

Full dentures in cases of pronounced tori, tuberosities or extremely bulging alveolar process, in the anterior (labial) area, have always posed problems of aesthetics 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.

In block form of a cube, which is more than 10mm on each edge, this material is practically non flexible, but in thin extensions of about 2mm or less, it acts as a flexural finger with perfect rebound to its processed form.

Properly designed retention fingers perform a perfect aesthetic service plus retention without pressure. Restorations are processed by pressure injection moulding. The plastic is heated to 375°F, at which temperature it is a limpid fluid that is easily injected into the prepared 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 retention fingers are designed, clearance of the attached end of the finger must be planned by starting the finger far enough away from the protruberance used for retention. Keep in mind that the amplitude of yiel 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 aesthetic aid post-surgically after periodontal curettage and

Physical characteristics comparing methyl methacrylate and Valplast

Physical Characteristics	Methyl Methacrylate	Valplast
Specific Gravity	1.16-1.20	1.04
Water Absorption (24hrs)	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	10.3
Bonding strength (kg/sq mm)	8.5	8-10
Vickers hardness	20	14.5
Impact strength (kg/sq mm)	10.5	10-150
Process 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 (According to Tschemik and Habib)	Possible in time	None
		No deformation due to water absorption

Figure 5.

Figure 6.

Figure 7. A conventional metal RPD in the patient's mouth.

Figure 8. The traditional metal RPD has been replaced with a Valplast Flexible Partial

in the anterior part of the mouth, especially when the exposed roots of the teeth and broad interspaces **(Figure 4)**.

These can be hidden behind a beautifully carved veneer gum section of resilient plastic **(Figure 5)**. The wide open interproximal spaces and the arch curvature give more than ample retention for the highly aesthetic restoration **(Figure 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 (after each meal and at bedtime) to hold caries and odours in check.

SUMMARY

A superpolyamide is described as a valuable new potential to prosthetic dentistry. It fulfils 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 exceptional "eleastic memory", abrasion resistant, and highly aesthetic with colour-fast tissue tones.

Its use makes it possible to have positive retention without pressure: (1) in partial dentures where gentle but firm retention is obtained by the resilient fingers resting in recessed areas of supporting alveolar contours, effecting both an aesthetic 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 stabilisers in the recessed contours over protuberances such as tuberosities, tora or bulging alveolae.

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