Flexible partials: aesthetic retention for the removable dental prosthesis

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 mucosal meniscus 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 is often difficult to take advantage of the retentive contours of tuberosities, tori, alveolar 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 hyperpolyamide, an improved relative of the ‘nylon’ family of plastics.

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

The superpolyamides were the result of further research in an attempt to improve the negative qualities of nylon by ether modification of the starting formula or by copolymerisation. (Fuller, Coffman, Calfin 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 transluency. It bleeds 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 fatigue 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 acrylic are shown in the accompanying chart.

The wonder of this new material as a denture base is that it maintains unyielding grip on the denture teeth, yet finger-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, torus, tuberosity, protrusion etc (Figures 1, 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 frenum) as well as the reflexions of the muco-

This is a revised and updated version of an article by Maurice N. Stern DDS, originally published in the New York State Dental Journal in February 1964.

Physical characteristics comparing methyl methacrylate and Valplast

<table>
<thead>
<tr>
<th>Physical Characteristics</th>
<th>Methyl Methacrylate</th>
<th>Valplast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity</td>
<td>1.16-1.20</td>
<td>1.04</td>
</tr>
<tr>
<td>Water Absorption (24hrs)</td>
<td>0.4%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Saturation by immersion</td>
<td>1.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Young’s modulus (kg/sq mm)</td>
<td>280</td>
<td>150-180</td>
</tr>
<tr>
<td>Tensile Strength (kg/sq mm)</td>
<td>5-7</td>
<td>8</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>8.6</td>
<td>10.3</td>
</tr>
<tr>
<td>Bonding strength (kg/sq mm)</td>
<td>8.5</td>
<td>8-10</td>
</tr>
<tr>
<td>Vickers hardness</td>
<td>20</td>
<td>14.5</td>
</tr>
<tr>
<td>Impact strength (kg/sq mm)</td>
<td>10.5</td>
<td>10-150</td>
</tr>
<tr>
<td>Process softens</td>
<td>275°F</td>
<td>437°F</td>
</tr>
<tr>
<td>Polymerizes (in 6 hrs)</td>
<td>160°F</td>
<td>460°F</td>
</tr>
<tr>
<td>Combustion</td>
<td>Burns</td>
<td>Non-inflamable</td>
</tr>
<tr>
<td>Resistance to acids, bases</td>
<td>Weak</td>
<td>Very strong</td>
</tr>
<tr>
<td>Discoloration</td>
<td>(According to Tschemik and Habib)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None, no deformation due to water absorption</td>
</tr>
</tbody>
</table>
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 cleaning 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 cavities and odours in check.

SUMMARY
A superpolyamide is described as a
valuable new potential to prosthetic
dentistry. It fulfills the 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 "elastic 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, tons or bulging
alveolae.

REFERENCES
Hocking, R. (1945) Materie Plastiche
Mansfield, B. (1944) Fabrication of plastic
materials (Italian). Hoepli.
Chicago Vol II.
Pulci, S. (1947) Trattato dentario e
Odontostomatologico, Chapter I, XXX.
Ed Ambrosiana.
Roldai divisive Soc. (1950) Injection molding
of polyamides (Italian). Rhotatoce, Milan.
Tammas, G (1933) Die Glasuren (The
Vitreous state), Leipzig.

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.

The Happy Patient Maker
with a lifetime guarantee**
Genuine Valplast® Flexible Appliances
made in the UK only in Valplast Certified Labs

Natural Appearance
Non-invasive
Metal Free
Acrylic Free

FREE Practice Info Pack
and location of your nearest
Valplast® certified laboratory
from
R D T Technology Ltd
01903 700037
www.valplast.info

*Genuine Valplast® rdp’s are only made in Certified Valplast® laboratories
*against breakage in normal use - excludes teeth