

**Assessment of some mechanical properties
of Imprelon and Duran thermoplastic Biostar
machine sheets in comparison with
some types of acrylic resins**

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Abstract

The Biostar foils (Imprelon[®]) are new alternative tray material that were introduced several years ago and has become increasingly popular as an alternative to autopolymerized acrylic resin for tray construction because of its several advantages.

(Duran[®]), is another type of Biostar foils which is used in splint therapy as a substitution to the heat cure acrylic and light cure acrylic resins, and since dentists who are frequently involved in treating TMD patients often like to be able to make and deliver a splint shortly (1 to 2 hours) after taking impressions rather than having them fabricated in a laboratory; the Duran[®] became widely used and popular, the wear resistant and strength of the splint materials are the most important properties that improve the splint therapy.

The present study was carried out to assess some mechanical properties of the (Imprelon[®]) Biostar foil (dimension stability, surface roughness and shear bond strength of tray material to zinc oxide impression material) and compare them to that of the other tray materials (autopolymerized and VLC) resin materials.

Also the study assessed the mechanical properties (wear rate and transverse strength) of the Duran Biostar Foil and compared it with that of the other splints materials (heat-cure acrylic and VLC) resins.

A total of 150 specimens were prepared, 30 specimens for each test, 10 for each group material, the results showed that:

The VLC had the highest mean value of surface roughness (6.382 μm) followed by autopolymerized acrylic resin, while the Imprelon[®] was the smoother one, the low value of (Ra) of Imprelon[®] might be because of the already smooth surface of the Imprelon[®] foil which processed under high temperature and high pressure; also it might be due to small particle size of polystyrol.

The Imprelon[®] showed highest dimensional stability (0.032mm), since the plastic is one that had no polymerization shrinkage followed by VLC, while the

autopolymerized acrylic resin was dimensionally unstable (the dimensional changes measured 24 hours post construction).

The Imprelon[®] had the highest value of shear bond strength to the zinc oxide impression material (0.244 N/mm²), this exceptional increase in ultimate bond strength can be attributed to acetic acid, which is one of the accelerator additives of zinc oxide eugenol impression material, VLC followed the Imprelon[®] then autopolymerized acrylic resin when used as custom tray.

The Duran[®] showed the highest mean value of transverse strength(160.35 N/mm²) followed by heat-cure acrylic then VLC resins, this result might be due to the modification of the poly(ethylene terephthalate) which is the main component of the Duran by glycol, which lead to improvement of mechanical properties.

The Duran[®] showed the highest value of wear rate(0.00510 gr/mm) and this might be due to the mild adhesion between particles of Duran[®] which might had a direct effect on the increasing the wear rate, while the VLC and heat-cure acrylic resins had the lowest mean value of wear rate with no significant difference between them.