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FLEXIBILITY AND MICROSTRUCTURE OF ROUND AND HALF-ROUND CIRCUMFERENTIAL CLASPS IN COMPARISON WITH WROUGHT WIRE CLASP

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ABSTRACT

The objective of this study was to compare the flexibility and microstructure of 20 gauge round and half-round cast Ticonium clasps with that of the same gauge Ticonium wrought wire clasp. Cast and wrought wire test specimens were processed and prepared for flexibility testing which accomplished by a universal testing machine for recording the load displacement curves. Then, they were mounted, polished and etched for microstructure testing using the metallurgical microscope. The results indicated that wrought wire clasps showed the highest recorded flexibility value, followed by round and then half-round cast clasps. Microstructure photographs revealed a mild difference in granular structure between wrought and both cast clasps as regard grain size, shape and distribution which had been reflected obviously upon flexibility test results.

Keywords: Flexibility, Microstructure, Removable partial denture, Round clasp, Half-round clasp, Wrought wire clasp.

INTRODUCTION

Retention of the partial denture depends on the amount of the undercut engaged on an abutment tooth and the flexibility of the clasp[1].

The maximum flexibility is defined as the strain, which occurs when the material is stressed to its proportional limit. The relationship between maximum flexibility, proportional limit and modulus of elasticity (rigidity) may be expressed mathematically as follow: E_m (maximum flexibility) = P(proportional limit) / E(modulus of elasticity)[2].

The round wrought wire clasp has been advocated in removable partial denture construction because of its flexibility, adjustability, and appearance. The flexibility of wrought wire clasp is believed to reduce transmission of excessive force to the abutment tooth [3,4,5]. Nobusuke et al.[6] added that The wrought wire clasps exhibit some advantages because of their superior mechanical properties as compared to cast clasps.

The wrought -wire clasp arm has toughness exceeding that of a cast clasp arm. The tensile strength of a wrought structure is at least 25% greater than that of the cast alloy from which it was made. It may therefore be used in smaller diameters to provide greater flexibility without fatigue and ultimate[7].

A round cross sectional clasp form imparts omnidirectional flexure, while a half-round form allows only bidirectional flexure. Because of its cross-sectional form, a round clasp may flex in all spatial planes. Consequently, a clasp exhibiting a round cross-sectional form may permit dissipation of detrimental forces during functional movement of the prosthesis. A half-round clasp typically flexes in a plane that is a perpendicular to the flat surface of the clasp. Therefore, stress dissipation is somewhat limited[8].

The use of round cast clasp instead of wrought wire may result in fewer coasts since soldering is not required. The adaptation of a cast clasp to the abutment tooth may also be better than that of a wrought wire clasp since bending the clasp with pliers is eliminated. A round cast clasp would also be the advantageous when flexibility is desired, but soldering on a wrought wire is not possible. For example, a small edentulous apace between two abutment teeth may not provide enough space for soldering on a wrought wire clasp[9] . In addition, a solder joint near the origin of a wrought wire clasp reduces its flexibility and increases the likelihood of breakage[10].

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