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A Comparative Evaluation of Flexural Strength of Titanium Alloy Bar Fabricated By Electrical Resistance Welding And Plasma Welding: An In Vitro Study

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ABSTRACT:

Introduction: The goal of this research was to look into and compare the suitability of two different ways to fuse titanium in dentistry: electrical resistance welding and plasma welding. The flexural strength of the welded connections was employed as a comparison metric.

Objectives: To evaluate the flexural strength of titanium alloy bar fabricated by electrical resistance welding and plasma welding.

Materials and Methodology: The materials used in this study was an austenitic, nonmagnetic stainless-steel milled fixture into which two standard titanium implants were brazed. Ti abutments were screwed onto this and Grade 5 ti wire of 2mm and 3mm diameter and 15mm length was used. A total of 20 of these frameworks (50 weld joints) were welded and based on the type of welding used and the thickness of the titanium wire they were divided into four different groups which were subjected to 3-point bend test followed by SEM analysis of the fractured weld joints.

Results: The mean flexural strength of PW (3mm) was the highest 1635.16±0.59 followed by PW (2mm) 1535.04±0.58, ERW (2mm, two) 795.59±38.69 and ERW (2mm, single) 739.19±0.45.

Conclusion: Within the limitations of the study, it was concluded that in ERW, when a double titanium bar was welded, there was considerable increase in the flexural strength of the framework as compared to welding a single titanium bar. Whereas in PW, when a 3mm titanium bar was used, there was increase in the flexural strength of the weld joints when compared with a 2mm titanium bar.

Keywords: Electrical resistance welding (ERW), Plasma welding (PW), Flexural strength, 3-point bend test, Scanning Electron Microscopy (SEM), Titanium, Hybrid prosthesis.

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