EVALUATION OF SURFACE ROUGHNESS OF TITANIUM CASTINGS AFTER SANDBLASTING WITH DIFFERENT ABRASIVE POWDERS- AN INVITRO STUDY.

by

Dr. SONALI ARORA

Dissertation Submitted to the
Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore

In partial fulfillment
of the requirements for the degree of

MASTER OF DENTAL SURGERY(M.D.S)

in

PROSTHODONTICS

Under the guidance of
Dr. RAMESH K. NADIGER
Professor and Head

DEPARTMENT OF PROSTHODONTICS
S.D.M COLLEGE OF DENTAL SCIENCES AND HOSPITAL
DHARWAD

2011

ABSTRACT

Background and Objectives: A study was carried out to compare sandblasting with three different powders (Aluminium oxide, Glass beads and 1:1 mixture of aluminium oxide and glass beads) when titanium castings were removed from the investment mold and also to compare surface characteristics of the castings before and after sandblasting.

Methodology : A total of forty five wax patterns square in shape measuring 1cm in length and width and 2mm in thickness were prepared . They were invested and casted in Grade IV commercially pure titanium . After casting the samples were removed from the investment mold and investment was removed using hammer. All the samples were then immersed in acid solution to remove the residual investment material. They were then divided into three groups and the samples in each group were to be subjected to sandblasting treatment using three different powders. Before sandblasting the surface characteristics of the samples in each group were analysed using optical profilometer and Scanning Electron Microscopy. The samples in each group were sandblasted using three different powders . Group A samples were sandblasted using Aluminium oxide powder (120μm) , Group B samples were sandblasted using Glass beads (125μm) and Group C samples were sandblasted using 1:1 mixture of Aluminium oxide and Glass beads.

The surface characteristics of samples from each group were evaluated using optical profilometer and Scanning Electron Microscopy. A sample from each group was also subjected to EDS analysis. The data obtained before and after sandblasting was subjected to ANOVA and Duncan's multiple range test with significance set at $P<0.05$.

Results : Statistical comparison of the mean and standard deviation of the surface roughness before and after sandblasting treatment by ANOVA within and between each group was done.Also the difference between the mean surface roughness values before and after the sandblasting treatment within and between the groups was statistically evaluated by ANOVA test. The values were statistically insignificant at 5% level of significance.Scanning electron microscopic images showed that glass bead blasting produced least surface scarring as compared to the other two powders.EDS analysis of the samples showed no elements of investment left after sandblasting treatment with any of the powders .

Interpretation and conclusion: Sandblasting Titanium castings with Glass beads produced smoothest surface . Also EDS analysis showed that all the three powders removed investment residues but Aluminium oxide contaminated the surface of titanium casting.