

## The influence of the mucosa thickness and implant number on the peri-implant bone strain

**Purpose:** Mini dental implants (MDI) supported dentures have become popular therapeutic option for very resorbed edentulous mandibles. Increased strain in the peri-implant bone can lead to microfractures and bone resorption. The aim of this study was to investigate the strain of the peri-implant bone around Straumann® Mini Implants from Roxolid® alloy in relation to their number and mucosa thickness.

**Materials and methods:** Eight mandible models were 3D printed based on a CBCT scan. One, two, three or four MDIs made of Roxolid® alloy (Ti85Zr15) were inserted into the designated sites in the interforaminal space of each model and artificial mucosa from polyvinyl siloxane in 2 mm and 4 mm thickness was created. Strain gauges were placed to the vestibular and the oral peri-implant region to each MDI. Overdentures were manufactured for each model and loaded with forces of 50, 100 and 150 N bilaterally, unilaterally in the right molar region and frontally. Peri-implant strain was recorded for each force using strain gauges and computer analysis in the appropriate software program.

**Results:** There was a significant difference depending on the load location, the increase in force, and different mucosa thickness ( $p < 0.001$ ). In general, as the force applied to the overdenture increased, so did the strain in the peri-implant bone. The average vestibular, oral and average strains around the MDIs showed a tendency to decrease with increasing the number of MDIs and mucosa thickness (4 mm) ( $p < 0.01$ ).

**Conclusion:** Thicker mucosa ensures a greater transfer of force to the mucosa and lower peri-implant strain while four MDIs represent the optimal number of implants to support an overdenture in terms of peri-implant bone strain.

**Keywords:** mini dental implants, Roxolid®, overdenture, peri-implant strain