

## SHORT COMMUNICATION

### SC7 - EVALUATION OF TWO DENTAL IMPRESSION MATERIALS USING A ROBOT ARM

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#### KEYWORDS

Implant impression, robotic, open tray

#### INTRODUCTION

One of the vital problems associated to dental implantology is the exact alignment between the implants placed in the patient's mouth and the prosthetic structure supported by those implants. Even small errors produce harmful effects that could be just a slight discomfort during mastication and abrasion of the materials; or in worst scenarios, severe pain and even fracture of the prosthetic structure.

The technique used in the clinical setting to transfer the positions and alignments of the implants from the patient's mouth to the prosthetics structure is the dental impression. This method employs materials that have memory characteristics since they are deformable during a short period of time, after which their shape becomes stable. Unfortunately, several error due, namely, to the material, the type of tray and the orientation of the implants are accumulated during the process in an unpredictable way. That's why numerous studies [1][2][3][4][5][6][7][8] have been made attempting to understand the behaviour of each of the variables involved in the dental impression.

In this study we compared two impression materials: a polyether, Impregum™, 3M ESPE and a vinyl polysiloxan, Express2™ 3M ESPE using an open tray.

We concluded that with the open tray the vinyl polysiloxan, Express2™ 3M ESPE presents ( $p < 0.05$ ) a smaller gap and thus is more indicated to the tested situation.

#### MATERIALS AND METHODS

We built a model of human mandible made of an acrylic resin (master model). Over this model we placed 4 implants (Branemark™) making a 90° angle with the alveolar bone crest. We screwed transfer pillars to the implants and we used an open tray for the impression. Impression procedures were performed by a dedicated robot (ABB™) which guaranteed high reproducibility.

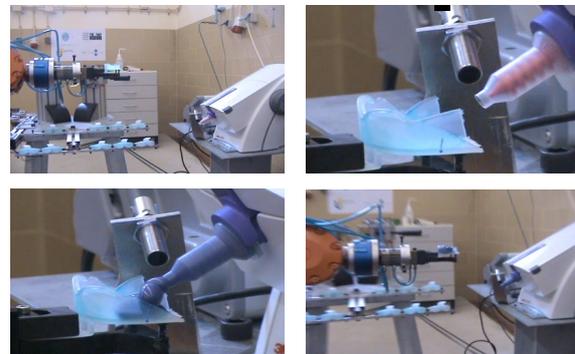


Figure 1 – Robotic procedure of the impression technique.

In order to obtain the final model we manually transfer the impression material to the dental plaster (Vel-Mix Stone Kerr™). Regarding statistical significance we performed 3 impressions for each of the materials which were precisely manipulated according to the manufacturer instructions. We then screwed a zirconia prosthesis (passive in the master model) to the implants and we took 6 photos off each implant aiming at evaluate the accomplishment of the impression. These photos were utilized to measure the gap between the prosthesis and the implants. We perfor-

med an independent samples t-test ( $\alpha = 0.05$ ) to evaluate the statistical significance of the results.

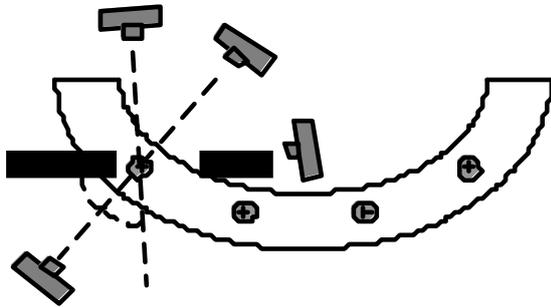


Figure 2 – Left) Schematic representation of the setup to take the photos; the camera was placed in 6 different positions. Right) real view of the setup.

### Results

Figure 3 shows the error bar obtained with all the results for the two materials, including the gap measured for all the 4 implants at each one of the 6 photos

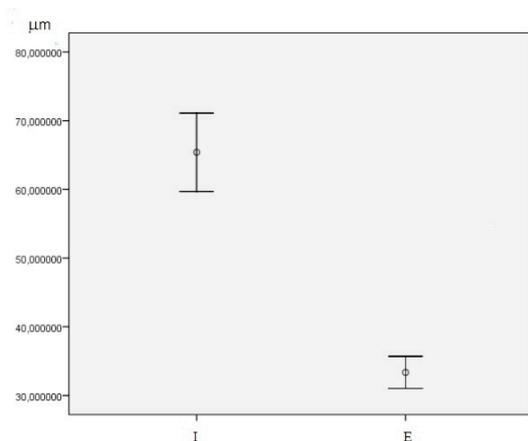


Figure 3 – Error bar (CI 95%) of the measure gap. In the chart I stands for Impregum™ whereas E stands for Express2™.

The results show ( $p < 0.05$ ) that Express2™ is better than Impregum™. The average gap is

65.40  $\mu\text{m}$  for the polyether and 33.36  $\mu\text{m}$  for the vinyl polysiloxan

### Conclusions

Both materials present small gaps that are tolerable to the clinical practice however the vinyl polysiloxan is preferable for the tested arrangement.

### Acknowledgements

We would like to acknowledge 3M ESPE Portugal for all the materials.

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