Reviewer’s report

Title: Accuracy of four intraoral scanners in oral implantology: a comparative in vitro study

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Reviewer: Luigi Canullo

Reviewer’s report:

Good research article that focuses its attention on an interesting and highly debated topic in oral implantology and digital dentistry: are the intraoral scanners sufficiently accurate for use in oral implantology, in challenging situations? The title, abstract and the introduction are highly informative and pertinent. The methods are well described. The authors prepared two stone cast models, one of a partially edentulous patient with 3 implants and one of a totally edentulous patient with 6 implants. They tested the accuracy (trueness and precision) of the four most important (and expensive) devices that are currently available in the market and they did this in these two in vitro situations. To test trueness, they superimposed the stl files obtained with the different intraoral scanners with a reference stl file, obtained scanning the models with a powerful industrial desktop scanner. To investigate the precision, the authors superimposed the different scans obtained with the intraoral devices within each group (4 groups, 4 devices). I appreciate the design of the study, the rigorous scientific method, the wide knowledge of the literature. The methods were basically the same of the previous study of the authors and of previously published works on this topic (Prof. Strub and colleagues), so the methods have been already validated, and are reproducible by other research groups. I agree with the authors about the choice of stone cast models for the stability of the material in the long-term (as alternative, metal models should be employed as they could allow to use more accurate reference devices, like contact / probe scanners. in fact, probing the surface of the stone cast models may damage them. however, metal models are difficult to scan with the intraoral devices, because they have shiny surfaces that reflect light). I believe the two situations reproduced in the models of this study are really interesting and important for the clinicians. The superimposition method is sound and valuable, and well related to the present literature on the topic. Most of all, the results are very important and of broad interest for all the readers, because it is difficult to find scientific evidence today in a world (digital dentistry) that is new and mainly driven by the Producers of the devices and the implant Companies. The results are well presented in a clear manner, and they are of great importance because of the devices studied here and because they clarified some issues about intraoral scanners in general; in addition, further evidence is added on the literature by this study. The Discussion is simple and clear, there is nothing more to add since there are not a lot of studies on this selected topic. Finally, the Conclusion chapter summarizes the most relevant findings emerging from this research. The References are complete and the list is not unnecessarily long. The Tables and Figures are further informative. The supplementary material is not informative, but considering the good quality of the study, this is a secondary aspect.

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.
Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Yes

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

**Quality of written English**
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