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A Brief Discussion about the Use of Technologies in Life Sciences: Review and Future Perspectives

Fabio APR[1,2]*, Sérgio K[1] and Gustavo M[2]

[1]Department of Operative Dentistry, University of São Paulo, Brazil

[2]Department of Biologic and Material Sciences, University of Michigan School of Dentistry, USA

***Corresponding author:** Fabio Antonio Piola Rizzante, Department of Operative Dentistry, University of São Paulo, Brazil, E-mail: FabioAntonio_7@hotmail.com

Mini Review

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Introduction

The introduction of digital technologies in dentistry is changing the workflow inside dental offices and laboratories, expanding the possibilities for each clinical case through introduction of new materials and techniques [1,2]. Despite the fact that computer-aided design/ computer-aided manufacturing (CAD/CAM) and digital scanning systems are not exactly new, their accuracy and reliability are under fast improvement and probably, in a few years, will dominate dental offices and dental schools. The versatility and possibility of a faster workflow since the prosthesis can be digitally fabricated, reducing the necessity of specific and expensive impression materials, associated with faster and more comfortable clinical sessions [1,3-9] should be enough to sell this kind of technology. In fact, the use of digital models as diagnostic tool in USA has been used by around 40% of the clinicians, with a decrease of conventional impressions [6,8,10]. In order to allow the use of the CAD/CAM systems, professionals can choose between direct digitalization (intraoral digital impression) and indirect digitalization (stone cast/impression material scanning) [1,11].

Another advantage consists in eliminating some errors that are inherent to the impressions and cast materials such as impression distortion, gypsum hygroscopic expansion, as well as laboratory errors that could lead to a failure (misfit) of the final prosthesis. In addition, It could eliminate the risk of cross-contamination due to contaminated impressions sent to laboratories [1,3-8,12-14]. Nevertheless, one of the main questions about the use of direct (intraoral scanners) or indirect (impression or cast scanners), despite all those advantages, relies on its accuracy, [15] which consists in the interaction between the trueness (how close the scanned image is to its reference) and the precision (how reproducible the scanned dimension are with repeated scans) [1]. There are several reports in literature showing that digitizing process, despite being technical sensitive, shows similar-to-higher accuracy when compared with conventional impressions [15,16]. However, the accuracy for implant cases is still limited and under investigation [8,17,18]. It is clear that further controlled studies are still necessary to address the reliability of those technologies in very complex cases, but analyzing how fast those technologies develop, it seems to be safe to state that is “just a matter of time”. It is also interesting to note the different approaches for those technologies and the interaction with the previously existing ones, such as the possibility of development of a prosthesis (dental and medical) based on computer-tomography (CT) scans and CAD/CAM designs, even in complex cases [19]. Use of 3d printed models based on CT scans is also a reality that dentists and medical doctors are using to plan and prepare for surgical procedures before getting to the operation rooms.

More recently, the use of 3D printing and similar methods also has been used for creation of artificial organs and prosthesis. The authors believe that its application in Dentistry will happen soon. In fact, some authors have already been using such technologies to create dental models and surgical guides with success. In addition, some researchers reported great adaptation

results comparing 3d printed and milled crowns [20]. Another future possibility is the use of CAD/CAM based implants and grafts, [21] reducing the surgical time and morbidity, with potential to increase the results due to an improved adaptation between the material and the surgical site. Also, the possibility of confectioning 3D printed or milled biomaterial-based scaffold with steam-cells and/or drugs can lead to a great improvement in dental and medical sciences in the future, enhancing the outcomes of different treatments.

Conclusion

In conclusion, it is exciting to observe how the technologies developed so far, and the future perspectives with potential to contribute to development of treatments, techniques, and materials, allied to saving costs, enhancing the patients comfort as well as the outcomes.

References

1. Kim JE, Amelya A, Shin Y, Shim JS (2016) Accuracy of intraoral digital impressions using an artificial landmark. J Prosthet Dent 13(16): 30465-30466.

2. Koch GK, Gallucci GO, Lee SJ (2016) Accuracy in the digital workflow: From data acquisition to the digitally milled cast. J Prosthet Dent 115(6): 749-754.

3. Londono J, Abreu A, Baker PS, Furness AR (2015) Fabrication of a definitive obturator from a 3D cast with a chairside digital scanner for a patient with severe gag reflex: a clinical report. J Prosthet Dent 114(5): 735-738.

4. de Lima LM, Borges GA, Luiz HB, Spohr AM (2014) In vivo Study of the Accuracy of Dual-arch Impressions. J Int Oral Health 6(3): 50-55.

5. Ahlholm P, Sipila K, Vallittu P, Jakonen M, Kotiranta U (2016) Digital Versus Conventional Impressions in Fixed Prosthodontics: A Review. J Prosthodont.

6. Burhardt L, Livas C, Kerdijk W, van der Meer WJ, Ren Y (2016) Treatment comfort, time perception, and preference for conventional and digital impression techniques: A comparative study in young patients. Am J Orthod Dentofacial Orthop 150(2): 261-267.

7. Joda T, Bragger U (2016) Patient-centered outcomes comparing digital and conventional implant impression procedures: a randomized crossover trial. Clin Oral Implants Res 27(12): 185-189.

8. Flugge TV, Att W, Metzger MC, Nelson K (2016) Precision of Dental Implant Digitization Using Intraoral Scanners. Int J Prosthodont 29(3): 277-283.

9. Tordiglione L, De Franco M, Bosetti G (2016) The Prosthetic Workflow in the Digital Era. Int J Dent 2016: 9823025.

10. Schepke U, Meijer HJ, Kerdijk W, Cune MS (2015) Digital versus analog complete-arch impressions for single-unit premolar implant crowns: Operating time and patient preference. J Prosthet Dent 114(3): 403-406.

11. Guth JF, Keul C, Stimmelmayr M, Beuer F, Edelhoff D (2013) Accuracy of digital models obtained by direct and indirect data capturing. Clin Oral Investig 17(4): 1201-1208.

12. Schaefer O, Schmidt M, Goebel R, Kuepper H (2012) Qualitative and quantitative three-dimensional accuracy of a single tooth captured by elastomeric impression materials: an in vitro study. J Prosthet Dent 108(3): 165-172.

13. Wilk BL (2015) Intraoral Digital Impressioning for Dental Implant Restorations Versus Traditional Implant Impression Techniques. Compend Contin Educ Dent 36(7): 529-530.

14. Wismeijer D, Mans R, van Genuchten M, Reijers HA (2014) Patients preferences when comparing analogue implant impressions using a polyether impression material versus digital impressions (Intraoral Scan) of dental implants. Clin Oral Implants Res 25(10): 1113-1118.

15. Ender A, Mehl A (2013) Accuracy of complete-arch dental impressions: a new method of measuring trueness and precision. J Prosthet Dent 109(2): 121-128.

16. Ender A, Attin T, Mehl A (2016) In vivo precision of conventional and digital methods of obtaining complete-arch dental impressions. J Prosthet Dent 115(3): 313-320.

17. Andriessen FS, Rijkens DR, van der Meer WJ, Wismeijer DW (2014) Applicability and accuracy of an intraoral scanner for scanning multiple implants in edentulous mandibles: a pilot study. J Prosthet Dent 111(3): 186-194.

18. Stapleton BM, Lin WS, Ntounis A, Harris BT, Morton D (2014) Application of digital diagnostic impression,

virtual planning, and computer-guided implant surgery for a CAD/CAM-fabricated, implant-supported fixed dental prosthesis: a clinical report. J Prosthet Dent 112(3): 402-408.

19. Charette JR, Goldberg J, Harris BT, Morton D, Llop DR, et al. (2016) Cone beam computed tomography imaging as a primary diagnostic tool for computer-guided surgery and CAD-CAM interim removable and fixed dental prostheses. J Prosthet Dent 116(2): 157-165.

20. Mai HN, Lee KB, Lee DH (2017) Fit of interim crowns fabricated using photopolymer-jetting 3D printing. J Prosthet Dent.

21. Luongo F, Mangano FG (2016) Custom-Made Synthetic Scaffolds for Bone Reconstruction: A Retrospective, Multicenter Clinical Study on 15 Patients 2016: 5862586.