



From Virtuality to Reality: The Digital Era of Prosthodontics

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The technicalities involved in any prosthodontic procedure are virtually supported by the digital technologies. Gone are the days when we as prosthodontist were totally dependent on the conventional techniques and procedures. Digitalization is turning in the new "Golden era in Prosthodontics". It has totally influenced both clinical as well as laboratory procedures. Not only this, a greater effect has been observed in relation to imparting training of the students, better patient motivation and rapport building, better management of the clinical practices and also in the field of dental research. It enhances the approach, reduces treatment time, minimizes error potential and allows better quality assurance. The transition from old to new is essential for enhancing the benefit of patient and the expansion of the dental profession as a whole.

There has been a paradigm shift from the past decade in the field of prosthodontics. Digital Dentistry particularly "Digital Prosthodontics" which first emerged as CAD/CAM dentistry for restorations such as inlays. In this early phase, the technique was not very popular because of the poor accuracy of fabricated restorations, technical complexity, and higher costs when compared with traditional methods. However, great efforts were made to improve CAD/CAM dentistry, which created innovative technologies, allowing CAD/CAM based restorations to be put into practice. They eventually gained popularity and have now become indispensable in clinical dentistry. The most important impact of CAD/CAM on dentistry was the change that it caused in the traditional laboratory workflow, so-called lost-wax technique, which had been the standard procedure for fabrication of metal restorations. This was lately followed by Three-dimensional (3D) printing to overcome the limitations of CAD/CAM as it offers efficiency, affordability, accessibility, reproducibility, speed, and accuracy.

Moreover, it should be noted that one of the most important innovations responsible for popularizing CAD/CAM based restorations was the introduction of zirconia, which can only be processed by CAD/CAM. Because of its excellent mechanical properties, which include a high fracture strength and toughness when compared with other ceramics, the application of ceramic restorations can be expanded to the molar region or to fixed partial dentures. In addition, escalating precious metal prices and concerns regarding metal allergies facilitated the rapid increase in popularity of zirconia, which in turn contributed to the promotion of Digital Dentistry.

As per review of literature, various companies using particularly digital technology are coming up and have already been established providing thereby better treatment options in relation to fabrication of complete dentures in only two clinical steps as compared with the conventional clinical techniques. Conventional complete dentures are always associated with some form of polymerization shrinkage not seen in milled dentures fabricated digitally thereby accounting to more accuracy of the complete dentures. Furthermore, it is easy to duplicate the dentures using the 3D technology. Many innovative denture fabrication techniques have already come up thereby reducing the chances of both fungal as well as bacterial colonization, better aesthetics and comfort, having better mechanical properties and even form as easy way to mark the dentures for better patient identification. All these advantages have definitely overpowered the harmful effects of conventional complete dentures leading to better patient compliance ultimately leading to increased life expectancy of the patient.

Recently, the digital impression technique has attracted a lot of attention and has rapidly expanded the popularity of this tech-

nique in the market. Digital impressions created using intra-oral optical scanners will play a central role in digital dentistry in the near future, because this method has the potential to change the whole traditional prosthodontic treatment workflow. Conventional impression techniques followed in the clinical practices routinely are always associated with dimensional inaccuracies particularly in the form of impression distortion. The dimensional changes such as setting expansion may also occur because of pouring the cast with any gypsum product thereby resulting in misfit of dentures. This is unlikely seen with the 3D technology for denture fabrication. Furthermore, digital impression data has the potential for use in combination with other types of digital data. For example, they can be combined with CT data of bone images to virtually and morphologically reconstruct the masticatory system. Moreover, jaw-tracking data can be combined, which allows functional reproduction of jaw movement, so-called virtual articulator. These technologies enable morphological and functional simulation of prosthodontic treatment on the computer screen, which patients, dentists, and co-dental staff can share, and clinical treatment would then follow this simulation with the aid of the latest technology, which also depends upon digital technology.

Digitization not only helps in effective patient communication but will also provoke changes in the educational field ultimately beneficial for students as well as teachers. While teaching, the students expect proper information and 24/7 access. Mainly, these students are better oriented towards the audio-visual teaching approaches. Teachers bring the clinical experience and students add the value of new technology, especially by producing teaching material using new means (videos, apps, etc.) thereby making this process very challenging.

Summarily, the ultimate merit of digital dentistry should be evaluated according to patient-oriented outcomes, as stated before. Theoretically, digital workflow brings a variety of advantages for us and also for patients, which should be proven by high quality studies that use patient-reported outcomes and I expect and eagerly hope that it would not take long before such evidence is established by future studies. On the other hands, digital technology should be regarded as a supplement or one of the available tools to support prosthodontic treatment. Digitization of the entire pro-

cess of prosthodontic treatment will not be possible, not because of technical complexity but because a patient's perception of treatment is not digital.

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