



Digital Prosthodontics, CAD/CAM and 3D Printing

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Introduction

Digital prosthodontics represents a transformative shift in restorative and prosthetic dentistry, integrating advanced digital technologies to improve precision, efficiency, and patient outcomes. Traditional prosthodontic workflows relied heavily on manual impressions, laboratory procedures, and multiple clinical visits. The introduction of computer-aided design and computer-aided manufacturing (CAD/CAM) and three-dimensional (3D) printing has revolutionized this field. These technologies enable accurate digital impressions, customized prosthesis design, and rapid fabrication of dental restorations, significantly enhancing the quality and predictability of prosthodontic treatments [1,2].

Discussion

CAD/CAM technology forms the foundation of digital prosthodontics. The process begins with digital data acquisition using intraoral scanners, which capture highly accurate three-dimensional images of the patient's dentition and oral structures. These digital impressions eliminate the discomfort and inaccuracies associated with conventional impression materials. The acquired data are then used in CAD software to design restorations such as crowns, bridges, inlays, onlays, and implant-supported prostheses with exceptional precision and customization [3,4].

Once the digital design is finalized, CAM systems manufacture the restoration through subtractive or additive methods. Milling machines, a subtractive technique, carve restorations from solid blocks of materials such as zirconia, lithium disilicate, or resin composites. This approach offers high strength and excellent fit. In contrast, 3D printing, an additive manufacturing process, builds restorations layer by layer using materials such as resins, ceramics, and metal powders. 3D printing has expanded the scope of prosthodontics by enabling the fabrication of surgical guides, provisional restorations, denture bases, and even frameworks with complex geometries that are difficult to achieve through traditional methods.

Digital prosthodontics improves workflow efficiency and

reduces treatment time by enabling same-day restorations and minimizing laboratory errors. The digital environment also enhances communication between clinicians and dental technicians, ensuring accurate transfer of information and consistent results. Furthermore, digital records facilitate treatment planning, simulation, and long-term follow-up [5].

Despite these advantages, challenges remain, including high initial investment costs, the need for specialized training, and material limitations in certain 3D printing applications. Ongoing advancements in software, hardware, and printable materials continue to address these limitations.

Conclusion

Digital prosthodontics, driven by CAD/CAM and 3D printing technologies, has significantly advanced modern dental practice. By improving accuracy, efficiency, and customization, these digital tools enhance both clinical outcomes and patient experience. As technology continues to evolve, digital workflows are expected to become increasingly accessible and integral to prosthodontic care, shaping the future of restorative dentistry.

References

1. Jomezadeh N, Babamoradi S, Kalantar E, Javaherizadeh H (2014) Isolation and antibiotic susceptibility of *Shigella* species from stool samples among hospitalized children in Abadan, Iran. *Gastroenterol Hepatol Bed Bench* 7: 218.
2. Sangeetha A, Parija SC, Mandal J, Krishnamurthy S (2014) Clinical and microbiological profiles of shigellosis in children. *J Health Popul Nutr* 32: 580.
3. Ranjbar R, Dallal MMS, Talebi M, Pourshafie MR (2008) Increased isolation and characterization of *Shigella sonnei* obtained from hospitalized children in Tehran, Iran. *J Health Popul Nutr* 26: 426.
4. Zhang J, Jin H, Hu J, Yuan Z, Shi W, Yang X, et al. (2014) Antimicrobial resistance of *Shigella* spp. from humans in Shanghai, China, 2004–2011. *Diagn Microbiol Infect Dis* 78: 282–286.
5. Pourakbari B, Mamishi S, Mashoori N, Mahboobi N, Ashtiani MH, Afsharpaiman S, et al. (2010) Frequency and antimicrobial susceptibility of *Shigella* species isolated in children medical center hospital, Tehran, Iran, 2001–2006. *Braz J Infect Dis* 14: 153–157.