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Editorial

Recent Advances in Prosthodontics: Embracing Innovation for Precision and Patient-Centered Care

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Prosthodontics, a core specialty in dentistry, continues to evolve dramatically in response to emerging technologies and changing patient expectations. The past decade has witnessed transformative advancements that not only enhance clinical precision but also improve patient comfort, satisfaction, and oral health outcomes. This editorial highlight the significant recent developments in prosthodontics, emphasizing their implications for clinical practice, education, and future research.

1. Digital Dentistry and CAD/CAM Integration

The digital revolution in prosthodontics has been primarily driven by Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM) systems. These technologies enable clinicians to fabricate crowns, bridges, dentures, and implant prostheses with unmatched precision and efficiency. Digital impressions, obtained via intraoral scanners, reduce patient discomfort, eliminate the need for conventional impression materials, and improve the accuracy of restorations [1]. Furthermore, CAD/CAM milling and 3D printing allow for chairside restorations and rapid prototyping, streamlining the workflow in both clinical and laboratory settings [2].

2. Implant Prosthodontics and Osseointegration Enhancements

Implant-supported prostheses have redefined the rehabilitation of partially and completely edentulous patients. Recent advances include Osseodensification techniques, which preserve bone density during implant site preparation and promote greater primary stability and long-term success rates [3]. In addition, zirconia-based prostheses and hybrid abutment designs offer improved aesthetics and biocompatibility compared to traditional metal-based systems [4]. Digital implant planning software and guided surgical templates have further enhanced predictability and reduced intraoperative complications. These systems allow prosthodontists to visualize the ideal prosthetic outcome and reverse-engineer the surgical plan accordingly [5].

3. Evolution in Maxillofacial Prosthetics and Biocompatible Materials

Maxillofacial prosthodontics has benefitted from advances in material sciences, particularly the use of RTV silicone elastomers and 3D printing for craniofacial prosthesis fabrication. These materials offer superior flexibility, coloration, and adaptability to patient-specific defects [6]. Moreover, digital facial scanning and rapid prototyping have enabled non-invasive, quick, and cost-effective production of extraoral prostheses, significantly improving the psychological and social rehabilitation of affected individuals.

4. Regenerative Prosthodontics and Tissue Engineering

The integration of stem cell biology and tissue engineering into prosthodontics has ushered in a new era of regenerative prosthodontics, aiming to biologically restore lost tissues rather than merely replacing them with artificial materials. Efforts in bone grafting, scaffold fabrication, and growth factor delivery are showing promising outcomes for the reconstruction of alveolar ridges and peri-implant tissues [7].

5. Artificial Intelligence (AI) and Machine Learning

AI is increasingly being incorporated into prosthodontic diagnostics and treatment planning. Algorithms can now analyze occlusal relationships, detect wear patterns, and predict prosthetic failures, facilitating more informed decision-making [8]. AI-driven tools also assist in customizing prosthesis designs, minimizing human error, and optimizing the fabrication process.

6. Flexible Dentures and Bio functional Prosthetics

Flexible denture base materials like nylon-based thermoplastics have emerged as alternatives to conventional acrylic resins for specific clinical scenarios. These materials offer improved comfort, esthetics, and adaptation, particularly in patients with undercut areas or acrylic allergies [9]. Additionally, biofunctional prosthetic systems (BPS) are being recognized for their ability to mimic natural oral function by incorporating dynamic occlusion and anatomical tooth morphology.

7. Education, Virtual Simulation, and Skill Enhancement

With digital simulation tools and virtual reality (VR) platforms, prosthodontic education is undergoing a significant transformation. VR modules allow students and residents to practice clinical procedures in a risk-free environment, improving their hand skills and conceptual understanding [10]. These technologies also provide a solution to the challenge of limited patient availability in academic institutions.

Conclusion

The field of prosthodontics stands at the forefront of technological innovation in dentistry. From digital workflows and biocompatible materials to AI integration and regenerative techniques, the discipline is evolving into a science that harmonizes esthetics, functionality, and biological health. As we embrace these advancements, continuous education, ethical integration, and patient-centered application remain vital. The future of prosthodontics lies in a collaborative approach that bridges technology, biology, and artistry.

References

1. Mangano F, Gandolfi A, Luongo G, Logozzo S. Intraoral scanners in dentistry: A review of the current literature. BMC Oral Health. 2017;17(1):149.

2. Alharbi N, Wismeijer D, Osman RB. Additive manufacturing techniques in prosthodontics: Where do we currently stand? Int J Prosthodont. 2016;29(5):474–85.

3. Huwais S, Meyer EG. A novel osseous densification approach in implant osteotomy preparation to increase primary implant stability. Compend Contin Educ Dent. 2017;38(2):e13–e17.

4. Martínez-Rus F, Prieto M, Özcan M, Pradíes G. Clinical performance of zirconia-based implant-supported restorations: A systematic review. Clin Implant Dent Relat Res. 2018;20(6):903–16.

5. Joda T, Brägger U. Complete digital workflow for the production of implant-supported single-unit monolithic crowns. Clin Oral Implants Res. 2015;26(11):1304–6.

6. Ciocca L, Fantini M, De Crescenzio F, Scotti R, Persiani F. CAD/CAM and rapid prototyped scaffold construction for surgical simulation: A new method for improving medical training. J Craniomaxillofac Surg. 2009;37(8):482–7.

7. Zaky SH, Cancedda R. Engineering craniofacial structures: The combination of stem cells and biomaterials. Oral Dis. 2009;15(4):285–91.

8. Schwendicke F, Samek W, Krois J. Artificial intelligence in dentistry: Chances and challenges. J Dent Res. 2020;99(7):769–74.

9. Singh K, Aeran H, Kumar N, Gupta N. Flexible thermoplastics as an alternative to conventional denture base resins. J Clin Diagn Res. 2013;7(10):2372–3.

10. Revilla-León M, Özcan M. Additive manufacturing technologies used for processing polymers: Current status and potential application in prosthetic dentistry. J Prosthodont. 2019;28(2):146–58.

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