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Editorial

Oral Implantology: Current Aspects and Future Perspectives

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In recent years, dental implantology has significantly improved with the development of more advanced techniques which have greatly increased the reliability of dental implant therapy while reducing patient morbidity. In line with this evolution, the biological process of osseointegration has been deeply studied and innovative surface treatments have been introduced, as well as new surgical techniques based on regenerative procedures which allow for implant positioning even in patients with reduced bone. The introduction of a digital workflow for both oral surgery and the subsequent prosthetic phase has completely changed clinical practice. On this basis, the aim of the present Special Issue was to collect research papers which highlight the continuous evolution of oral implantology and to focus on new perspectives in this field [1,2].

One study in this Special Issue aimed to clarify the presence or absence of functional differences between chewing sides in implant-supported denture wearers; it highlighted that there is a functional difference between habitual and non-habitual chewing sides in the masticatory movement and masticatory performance of implant-supported denture wearers. An in vitro study aimed to evaluate the influence of the printing orientation on parallelism, distance, and thickness between adjacent cylinders of 3D-printed surgical guides. The results of the study evidenced that all printing orientations influence the angle, the distance, and the thickness between adjacent cylinders of a surgical guide; printing at 90 degrees produced the best global correspondence with the master model [3,4].

A clinical study aimed to compare stock and individual CAD/CAM full-form abutments after one year in function and showed that custom CAD/CAM abutments performed slightly better than stock abutments. Also, mandibular overdentures were studied. Regarding the marginal bone loss and complication rates of these prostheses when retained on two implants with conventional and immediate loading protocols, no differences were evidenced in the primary and secondary stability of immediately loaded versus conventional implants; however, in the conventional loading group, stability increased significantly between implant placement when compared at both 6 and 12 months post placement. A new protocol involving the application of bioengineering methods was proposed which provides for the combination of radiographic images and three-dimensional files to obtain predictable results on possible rehabilitation, guiding its planning in the best possible way. Additionally, a same-day digital dentistry restorative workflow for the single immediate provisionalisation of narrow-diameter implants was evaluated in a study which reported the two-year clinical outcomes of implants that were immediately provisionalised and later restored using same-day dentistry. Despite the explanatory nature of the study, immediate provisionalisation and a same-day restorative dentistry digital workflow protocol for narrow-diameter implants appear to be predictable clinical procedures with no reported surgical complications and minimal prosthetic complications. Moreover, a case series reported the clinical and radiographic outcomes of 22 one-piece zirconia dental implants positioned in 19 patients to restore single edentulism who were followed-up for at least

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2 years. In addition to that, the clinical outcomes of dental implants with two different internal connection configurations were studied, with better outcomes in cases of conical internal connection with respect to the internal hexagonal. Dental implant abutments debonded from monolithic zirconia restorations using heat treatment were also submitted to scanning electron microscopy analyses, showing that treatments carried out on titanium-base abutments seemed not to alter the structure and properties of the material or to create phase changes or the birth of oxides to induce fragility, thus allowing these abutments to be reused after debonding. In addition to SEM evaluation, Finite Element Analysis was used to analyse zirconia dental implants, which are a recent option promising better aesthetics [5,6].

A retrospective study was conducted to examine the efficacy of a superhydrophilic and bioactive implant for the treatment of the edentulous maxillary anterior area. Moreover, an observational cohort study evaluated the effect of the implant diameter on the peri-implant bone, on the attached mucosa, and on the associated probability of implant success and survival. Finally, cone beam computed tomography (CBCT) was used to investigate possible differences between the bone densities of various edentulous sites in the maxilla and mandible, suggesting that an objective assessment of site-specific bone density before the installation of dental implants may provide valuable clinical information for the selection of implant size and the planning of a patient-specific drilling protocol.

In addition to the research mentioned above, the present Special Issue collected reviews related to implant prosthesis. A first comprehensive review aimed to present the most recent data on the latest comparisons between CAD/CAM and stock abutment applications. The study evidenced that the advantages associated with the use of stock abutments mainly concern the risk of corrosion, time spent, cost, and fit, evaluated in vitro, in the implant–abutment connection. Equal conditions are present regarding the mechanical characteristics during dynamic cycles, screw loss, radiographic fit, and the degree of micromotion. The second systematic review aimed to evaluate the survival rate of single immediately placed implants and to describe the factors influencing their failure. The survival rate for immediate single implant placement ranged from 83.7 to 100%. Implant failure was not consistently reported and, when reported, failure due to lack of osseointegration prior to placement of the definitive restoration was the most common descriptor. Other attributed reasons included infection abscess, mobility after immediate loading, and iatrogenic complications. Other reviews were conducted, respectively, to evaluate the use of narrow implants and overdentures in the total rehabilitation of atrophic edentulous jaws, to study whether guided surgery techniques for dental implant placements result in greater precision than freehand placement, and to describe the main findings in recent years regarding patient-specific mesh produced by CAD/CAM and 3D-printing workflows applied to GBR surgeries. A further review was conducted to explore the mechanical complications of the implant–abutment connection and their biological effects in a titanium dental implant system. Finally, the results of in vitro studies assessing the distortion generated by intraoral scanning systems for oral rehabilitation with more than three implants were systematically reviewed, showing that digital impression systems generate significant errors during scanning in extensive implant restorative treatments. This is influenced by scanning technology, inter-implant distance, and scanning body type [7–10].

The field of implant prosthesis needs to be further considered as a research topic in order to guarantee more reliable therapeutic protocols. Future research on the topic is needed in order to complete an overview of materials and techniques. Future studies are welcome evaluating preventive techniques [11], risk models [12], surgical techniques [13], and postsurgical complications [14]. Additionally, it would be useful in the future to analyse the mechanical properties of surgical devices [15], stress distribution [16], and surface treatments [17]. Moreover, it would be interesting to evaluate peri-implant microbiota testing adjunctive treatments, such as probiotics, postbiotics, and natural compounds [18]; anti-infective materials [19] and bioactive molecules [20]; or ozonised water [21] and

gels [22], on long-term implant health. Finally, recently introduced augmented reality [23] and deep learning [24] would also be interesting future research fields.

In light of the considerations mentioned above, the Editors of the current Special Issue would like to thank all researchers and clinicians who contributed their research to this collection; we await future submissions which aim to complete the present overview about oral implantology.

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References

1. Jain, M.; Bin Shaffa'ee, M.S.; Uppoor, A.; Pralhad, S.; Nayak, S.U.; Saldanha, S. Evaluation of Risk Factors of Peri-Implant Disease Using a New Manual Risk Assessment Model: A Clinical study. *Int. J. Dent.* **2022**, *2022*, 1347569. [CrossRef] [PubMed]
2. Atieh, M.A.; Almutairi, Z.; Amir-Rad, F.; Koleilat, M.; Tawse-Smith, A.; Ma, S.; Lin, L.; Alsabeeha, N.H.M. A Retrospective Analysis of Biological Complications of Dental Implants. *Int. J. Dent.* **2022**, *2022*, 1545748. [CrossRef]
3. Huang, G.; Wu, L.; Hu, J.; Zhou, X.; He, F.; Wan, L.; Pan, S.T. Main Applications and Recent Research Progresses of Additive Manufacturing in Dentistry. *BioMed Res. Int.* **2022**, *2022*, 5530188. [CrossRef] [PubMed]
4. Hall, M.A.; Karawia, I.; Mahmoud, A.Z.; Mohamed, O.S. Knowledge, awareness, and perception of digital dentistry among Egyptian dentists: A cross-sectional study. *BMC Oral Health.* **2023**, *23*, 963. [CrossRef]
5. Cinquini, C.; Alfonsi, F.; Marchio, V.; Gallo, F.; Zingari, F.; Bolzoni, A.R.; Romeggio, S.; Barone, A. The Use of Zirconia for Implant-Supported Fixed Complete Dental Prostheses: A Narrative Review. *Dent. J.* **2023**, *11*, 144. [CrossRef] [PubMed]
6. Chiou, L.L.; Panariello, B.H.D.; Hamada, Y.; Gregory, R.L.; Blanchard, S.; Duarte, S. Comparison of In Vitro Biofilm Formation on Titanium and Zirconia Implants. *BioMed Res. Int.* **2023**, *2023*, 8728499. [CrossRef] [PubMed]
7. Bihn, S.K.; Son, K.; Son, Y.-T.; Dahal, R.H.; Kim, S.; Kim, J.; Hwang, J.H.; Kwon, S.-M.; Lee, J.H.; Kim, H.D.; et al. In Vitro Biofilm Formation on Zirconia Implant Surfaces Treated with Femtosecond and Nanosecond Lasers. *J. Funct. Biomater.* **2023**, *14*, 486. [CrossRef] [PubMed]
8. Krastev, T.; Payer, M.; Krastev, Z.; Cardelles, J.F.P.; Vegh, A.; Banyai, D.; Geczi, Z.; Vegh, D. The Utilisation of CAD/CAM Technology Amongst Austrian Dentists: A Pilot Study. *Int. Dent. J.* **2023**, *73*, 430–434. [CrossRef]
9. El Meligy, O.A.; Elemam, N.M.; Talaat, I.M. Ozone Therapy in Medicine and Dentistry: A Review of the Literature. *Dent. J.* **2023**, *11*, 187. [CrossRef]
10. Lee, J.; Bae, S.R.; Noh, H.K. Commercial artificial intelligence lateral cephalometric analysis: Part 1-the possibility of replacing manual landmarking with artificial intelligence service. *J. Clin. Pediatr. Dent.* **2023**, *47*, 106–118.
11. Preda, C.; Butera, A.; Pelle, S.; Pautasso, E.; Chiesa, A.; Esposito, F.; Oldoini, G.; Scribante, A.; Genovesi, A.M.; Cosola, S. The Efficacy of Powered Oscillating Heads vs. Powered Sonic Action Heads Toothbrushes to Maintain Periodontal and Pe-ri-Implant Health: A Narrative Review. *Int. J. Environ. Res. Public Health* **2021**, *18*, 1468. [CrossRef] [PubMed]
12. Yu, Y.; Liao, Y.; Guo, J.; Zhang, Y.; Khan, M.; Lin, X. Computer-designed surgical templates improve the extraction of impacted supernumerary teeth in the hard palate. *J. Clin. Pediatr. Dent.* **2022**, *46*, 38–43. [CrossRef] [PubMed]
13. Al-Quisi, A.F.; Mohammed Aldaghir, O.; Al-Jumaily, H.A. Comparison between Rolled and Nonrolled U-Shaped Flap in the Second Stage of Dental Implant Surgery: A Randomized Clinical Trial. *Int. J. Dent.* **2022**, *2022*, 1329468. [CrossRef] [PubMed]
14. Jang, D.H.; Chae, Y.K.; Lee, K.E.; Nam, O.H.; Lee, H.S.; Choi, S.C.; Kim, M.S. Determination of the range of intervention timing for supernumerary teeth using the Korean health insurance review and assessment service database. *J. Clin. Pediatr. Dent.* **2023**, *47*, 67–73. [CrossRef] [PubMed]
15. Sfondrini, M.F.; Gandini, P.; Alcozer, R.; Vallittu, P.K.; Scribante, A. Failure load and stress analysis of orthodontic miniscrews with different transmucosal collar diameter. *J. Mech. Behav. Biomed. Mater.* **2018**, *87*, 132–137. [CrossRef] [PubMed]
16. Jia-Mahasap, W.; Rungsiyakull, C.; Bumrungsiri, W.; Sirisereephap, N.; Rungsiyakull, P. Effect of Number and Location on Stress Distribution of Mini Dental Implant-Assisted Mandibular. *Int. J. Dent.* **2022**, *2022*, 4825177. [CrossRef]
17. da Cruz, M.B.; Marques, J.F.; Fernandes, B.F.; Pinto, P.; Madeira, S.; Carvalho, Ó.; Silva, F.S.; Caramês, J.M.M.; da Mata, A.D.S.P. Laser surface treatment on Yttria-stabilized zirconia dental implants: Influence on cell behavior. *J. Biomed. Mater. Res. B Appl. Biomater.* **2022**, *110*, 249–258. [CrossRef]
18. Butera, A.; Maiorani, C.; Gallo, S.; Pascadopoli, M.; Venugopal, A.; Marya, A.; Scribante, A. Evaluation of Adjuvant Systems in Non-Surgical Peri-Implant Treatment: A Literature Review. *Healthcare* **2022**, *10*, 886. [CrossRef]
19. Costa-Pinto, A.R.; Lemos, A.L.; Tavaria, F.K.; Pintado, M. Chitosan and Hydroxyapatite Based Biomaterials to Circumvent Periprosthetic Joint Infections. *Materials* **2021**, *14*, 804. [CrossRef]
20. Divakar, D.D.; Jastaniyah, N.T.; Altamimi, H.G.; Alnakhli, Y.O.; Muzaheed Alkheraif, A.A.; Haleem, S. Enhanced antimicrobial activity of naturally derived bioactive molecule chitosan conjugated silver nanoparticle against dental implant pathogens. *Int. J. Biol. Macromol.* **2018**, *108*, 790–797. [CrossRef]
21. Butera, A.; Gallo, S.; Pascadopoli, M.; Luraghi, G.; Scribante, A. Ozonized Water Administration in Peri-Implant Mucositis Sites: A Randomized Clinical Trial. *Appl. Sci.* **2021**, *11*, 7812. [CrossRef]

22. Scribante, A.; Gallo, S.; Pascadopoli, M.; Frani, M.; Butera, A. Ozonized gels vs chlorhexidine in non-surgical periodontal treatment: A randomized clinical trial. *Oral Dis.* 2023, *in press*. [CrossRef] [PubMed]
23. Oh, S.; Kim, Y.J.; Kim, J.; Jung, J.H.; Lim, H.J.; Kim, B.C.; Kim, K.G. Deep learning-based prediction of osseointegration for dental implant using plain radiography. *BMC Oral Health* **2023**, *23*, 208. [CrossRef] [PubMed]
24. Başaran, M.; Çelik, Ö.; Bayrakdar, I.S.; Bilgir, E.; Orhan, K.; Odabaş, A.; Aslan, A.F.; Jagtap, R. Diagnostic charting of panoramic radiography using deep-learning artificial intelligence system. *Oral Radiol.* **2022**, *38*, 363–369. [CrossRef]