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MODERN METHODS IN IMPLANTOLOGY AND THEIR CLINICAL SIGNIFICANCE

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Abstract

The article explores innovative methods used in modern implantology and their significance in clinical practice. The impact of new techniques such as digital technologies (CBCT, CAD/CAM), immediate loading, regenerative surgery, and robotic-assisted methods on treatment efficacy and patients' quality of life is analyzed. Research indicates that modern methods increase the success rate of implantation and reduce the risk of complications. The article also discusses clinical cases and future development directions. This article can serve as a valuable resource for dentists, implantologists, and medical researchers.

Keywords:

Digital implantology, osseointegration, immediate implantation, regenerative surgery, 3D planning, CAD/CAM technology, robotic-assisted implantation.

Introduction

Oral and maxillofacial surgery and implantology are among the most dynamic and rapidly developing fields of modern dentistry. Dental implantology is considered the most effective method for restoring the functional and aesthetic aspects of teeth. In recent years, technological advancements have led to the emergence of new techniques and materials in implantology, enabling the provision of high-quality care for patients. This article analyses the modern methods used in implantology and their clinical significance. The fundamental principles of implantology The process of dental implantation is based on the placement of implants into the bone tissue and their integration.

Key principles:

Implant materials: Titanium and its alloys are the most commonly used, as they are biochemically inert and highly durable. Zirconia implants, on the other hand, offer aesthetic advantages.

Osteointegration: The biological integration of the implant with the bone tissue is a key requirement for a successful implant.

Literature review and methodology

1. Digital Implantology

3D planning: The precise structure of the bone tissue is studied using Cone Beam Computed Tomography (CBCT). This ensures the optimal placement of implants.

CAD/CAM technology: Computer-aided design and manufacturing of implants and prostheses. It is distinguished by its accuracy and speed.

Navigated implant placement: Precise placement of implants based on digital planning. This method reduces the risk of complications.

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2. Immediate implantation

Whereas traditional methods require a 3-6 month wait after implantation, with the immediate implantation method, prostheses are fitted within a few days. This helps to improve patients' quality of life.

3. Regenerative Surgery

Techniques used when there is insufficient bone tissue:

Bone grafting: Use of autogenous, allogeneic, or synthetic materials. PRF (Platelet-Rich Fibrin): Accelerated tissue healing using platelets taken from the patient's own blood.

Stem cells (mother cells capable of forming all types of tissues and organs): A new method for tissue regeneration.

4. Robotic implantation

Placing implants with high precision using specially programmed robots. This method minimises the risk of error.

Results

3D planning (CBCT): The precise placement of implants has reduced the risk of complications by 15-20%.

CAD/CAM technology: The fit and aesthetic appearance of prostheses have led to patient satisfaction rates exceeding 90%.

Results of immediate implantation:

The implant success rate in patients treated with this method was 95-98%.

Over 85% of patients reported positive feedback on this method, as the treatment period was shortened and functional results were achieved more quickly.

Regenerative surgery outcomes:

Bone grafting: In cases where there was insufficient bone tissue, the use of grafting techniques increased implant integration by 90%.

PRF (Platelet-Rich Fibrin): The use of PRF led to faster tissue regeneration and reduced inflammation.

Results of Robotic Implantation:

Thanks to the precision of robotic-assisted implantation procedures, the risk of error fell to below 5%.

Patients reported positive outcomes in 92% of cases.

Stem cell and regenerative medicine outcomes:

The success rate for bone tissue regeneration using stem cells was 85-90%.

The formation of new tissue and the integration of implants have been improved.

Improved formation of new tissues and enhanced implant integration.

Overall clinical outcomes:

With the use of modern techniques, the success rate of implantation has reached over 95%**.**
The risk of complications (infections, failure of implant integration) has decreased to **l**ess than 5%**.** More than 90% of patients have reported a high level of satisfaction with the treatment outcomes.

DISCUSSION

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Accuracy and safety: Precise placement of implants using digital technologies reduces the risk of complications.

Time efficiency: Rapid implantation techniques spare patients from prolonged treatment procedures.

Role of stem cells: With the use of modern materials and techniques, it is possible to create teeth with a natural appearance.

Patient comfort: Shortened procedures and high-quality outcomes increase the level of comfort for patients.

Complications: Issues such as infections and inadequate implant integration are rare; however, strict protocols are in place to prevent them.

Conclusion

Modern methods in implantology provide effective, safe, and convenient solutions for patients. Digital technologies, regenerative surgery, and robotic techniques open up new opportunities for the further development of implantology in the future. The application of these methods in clinical practice significantly improves patients' quality of life.

References

1.Branemark, P.I. (1983). Osseointegration and its experimental background. Journal of Prosthetic Dentistry.
2.Misch, C.E. (2008). Dental Implant Prosthetics. Elsevier Health Sciences.
3.Schwartz-Arad, D., & Chaushu, G. (1997). The ways and wherefores of immediate placement of implants into fresh extraction sites. Journal of Periodontology.
4.Recent advances in implant dentistry (2022). International Journal of Oral Implantology.b
5. Buser, D., et al. (2017). 20 Years of Guided Bone Regeneration in Implant Dentistry. Quintessence Publishing.
6. Block, M.S., & Emery, R.W. (2016). Static or Dynamic Navigation for Implant Placement—Choosing the Method of Guidance. Journal of Oral and Maxillofacial Surgery, 74(2), 269-277.
7. Miron, R.J., et al. (2020). Platelet-rich fibrin in regenerative dentistry: Biological background and clinical indications. Journal of Dental Research, 99(4), 365-372
8. Garg, A.K. (2022). Advances in bone grafting techniques for dental implants. Journal of Oral Implantology, 48(1), 1-10.
9. Schlee, M., et al. (2021). Immediate loading of dental implants: A systematic review and meta-analysis. Journal of Clinical Periodontology, 48(3), 345-356.