Basic Clinical Considerations and Comparison of 3-D Printed Surgical Guides in Digital Implant Dentistry

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Advancements in computer-generated surgical guides have significantly enhanced the accuracy of dental implant placement while minimizing surgical invasiveness. Key clinical benefits include reduced operative time and lower intra- and postoperative morbidity. However, the long-term impact of guided surgery on marginal bone loss and peri-implantitis remains unclear. Furthermore, the additional costs associated with digital planning and guide fabrication remain a significant consideration for practitioners.

In our department, various 3D-printed surgical guide systems have been integrated into the digital workflow. Currently, we primarily utilize the MegaGen and Osstem systems. MegaGen provides a versatile digital workflow from diagnosis to final placement, offering customizable universal kits compatible with multiple implant systems. Conversely, the Osstem OneGuide system is optimized specifically for its proprietary implants, featuring unique side-open sleeves to facilitate precise drilling in restricted spaces.

While 3D-printed guides enhance precision, they do not guarantee absolute accuracy. Based on current systematic reviews, a safety margin of 2 mm in depth, 3 mm in 3D bodily position (coronal/apical), and a 4-degree angular deviation should be maintained. Clinicians must also consider anatomical constraints; in patients with limited intermaxillary space, shorter drills are required to accommodate the guide sleeve height. Additionally, flapless guided surgery should be avoided if soft tissue thickness exceeds 7 mm to prevent inaccuracies caused by the excessive distance between the sleeve and the alveolar bone.

This presentation aims to compare the concepts and technical differences of commercially available surgical guide systems and provide essential clinical precautions for successful digital implant therapy.

Profile

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