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Commentary

Emerging Trends in Minimally Invasive Dental Surgery: A Comprehensive Review of Recent Advances and Case Reports

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Abstract

Minimally invasive techniques in dentistry have revolutionized surgical outcomes, reducing patient morbidity and improving recovery times. This article explores the latest advancements in minimally invasive dental surgery, supported by recent case reports from the *Journal of Surgical Case Reports and Images*. Key areas include piezoelectric bone surgery, laser-assisted procedures, and computer-guided implantology. The discussion highlights clinical efficacy, patient benefits, and future directions in dental surgery.

Keywords: minimally invasive dentistry; piezoelectric surgery; laser dentistry; computer-guided surgery; dental implants; surgical case reports

Introduction

Minimally invasive dentistry (MID) has gained significant traction in recent years, driven by technological advancements and a growing emphasis on patient-centered care (1). The *Journal of Surgical Case Reports and Images* has documented numerous innovative techniques that minimize tissue trauma while enhancing precision (2). This review synthesizes current evidence on MID, focusing on piezoelectric surgery, laser applications, and digital workflows in implantology.

Piezoelectric Bone Surgery: A Paradigm Shift

Piezoelectric devices utilize ultrasonic vibrations to cut bone selectively, sparing soft tissues—a breakthrough in oral surgery (3). Recent case reports demonstrate its efficacy in sinus lifts, extractions, and ridge expansions (4). Compared to conventional burs, piezoelectric surgery reduces bleeding, swelling, and nerve damage (5). A 2023 study reported a 20% faster healing time in piezoelectric-assisted extractions (6).

Laser-Assisted Dental Surgery

Lasers have expanded the scope of MID, enabling precise soft and hard tissue procedures with minimal discomfort (7). Diode and erbium lasers are widely used for frenectomies, caries removal, and periodontal therapy (8). A case series published in 2024 highlighted successful laser-assisted treatment of oral leukoplakia with no recurrence at six-month follow-up (9).

Computer-Guided Implantology

Digital workflows, including cone-beam computed tomography (CBCT) and intraoral scanners, enhance implant placement accuracy (10). A 2024 case report detailed full-arch rehabilitation using dynamic navigation, achieving 98% implant survival at one year (11). Such techniques reduce surgical time and improve prosthetic outcomes (12).

Clinical Implications and Future Directions

The integration of artificial intelligence (AI) in treatment planning and robotic-assisted surgery promises further refinements in MID (13). However, cost and training remain barriers to widespread adoption (14). Future research should focus on long-term outcomes and cost-effectiveness analyses (15).

Conclusion

Minimally invasive dental surgery, as evidenced by recent case reports, offers significant advantages over traditional methods. Continued innovation and interdisciplinary collaboration will further optimize patient care in oral surgery.

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