

DIGITAL PROTOCOLS IN CONTEMPORARY IMPLANTOLOGY: THE VALUE OF OPEN-SOURCE SOFTWARE

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Abstract

The adoption of digital technologies has significantly transformed contemporary implantology, enhancing diagnostic accuracy, treatment planning, and clinical predictability. Digital workflows integrating cone-beam computed tomography (CBCT), intraoral scanning, and computer-assisted implant planning enable prosthetically driven implant placement. While many systems rely on proprietary platforms, open-source software has emerged as a flexible, cost-efficient, and interoperable alternative.

Case Presentation:

This case series demonstrates the clinical applicability of an open-source digital implantology protocol in three partially edentulous patients (ages 65, 67, and 84 years). CBCT datasets were merged with intraoral scans using open-source planning software to facilitate prosthetically driven implant positioning. Virtual planning allowed precise anatomical assessment, implant angulation optimization, and appropriate implant selection. Digitally designed surgical guides were fabricated via 3D printing and used for fully guided implant placement. In one case, partial extraction therapy was incorporated to preserve buccal hard and soft tissues. Definitive restorations were fabricated following digital impressions. All treatments were completed in three clinical appointments, with uneventful healing and satisfactory functional and esthetic outcomes.

Conclusion:

Within the limitations of a case-based report, open-source digital workflows achieved predictable implant positioning and prosthetic rehabilitation comparable to proprietary systems. These protocols enhance efficiency, clinical control, and accessibility while supporting evidence-based and minimally invasive implant practice.

Keywords

Digital implantology; Open-source software; Digital workflow; Computer-guided implant surgery; Implant planning.

