Impact of 2D versus 3D Imaging on Pre-Implantological Diagnostics in the Posterior Jaw

Sebastian Rafael Galonska, DDS
Private Dental Practice, Seligenstadt, Germany

Abstract

Statement of the Problem: Accurate radiological assessment is essential for safe dental implant placement and the prevention of surgical complications. Reliable evaluation of available bone volume and precise identification of anatomical structures are critical for predictable implant planning, particularly in the posterior regions of the jaws where anatomical conditions may be complex. While panoramic radiography (orthopantomogram, OPG) is widely used as a standard imaging modality in implant dentistry, cone beam computed tomography (CBCT) provides three-dimensional visualization of anatomical structures and may therefore improve diagnostic accuracy and risk assessment.

Methodology:

A retrospective analysis was performed including imaging data from 76 patients in whom both OPG and CBCT examinations were available for the same clinical indication. The vertical bone height was measured and compared between both imaging modalities. In addition, the visibility of clinically relevant anatomical structures—including the maxillary sinus, Schneiderian membrane, sinus septa, inferior alveolar nerve, and adjacent teeth—was evaluated. Treatment planning decisions based on each imaging modality were also analyzed in order to assess whether imaging influenced implant indication or the need for additional procedures such as sinus floor elevation or bone augmentation.

Findings:

The results showed that measurements of the available bone height revealed no relevant differences between OPG and CBCT in the maxilla. In contrast, deviations were observed in the mandible, where panoramic radiography tended to underestimate the available bone height compared with CBCT. Furthermore, CBCT provided improved visualization of relevant anatomical structures. In particular, the Schneiderian membrane and sinus septa could be reliably assessed only with CBCT, while the inferior alveolar nerve was consistently identifiable in CBCT images but not always clearly visible in panoramic radiographs.

Conclusion & Significance:

The results indicate that CBCT provides additional diagnostically relevant information for implant planning in the posterior jaw. Three-dimensional imaging improves visualization of critical anatomical structures and may contribute to improved preoperative risk assessment, particularly in anatomically complex situations.

Recent Publications

Galonska SR. Impact of 2D versus 3D Imaging on Pre-Implantological Diagnostics in the Posterior Jaw. **Doctoral dissertation**, Ruhr University Bochum, Germany (**doctoral candidate**).



Biography

Sebastian Rafael Galonska is a dentist in private practice in Seligenstadt, Germany and a doctoral candidate at Ruhr University Bochum, Germany. He studied dentistry at the Christian-Albrechts-University of Kiel and obtained his dental license in 2011. Prior to studying dentistry, he trained and worked as a dental technician, which contributed to his strong interest in prosthetic rehabilitation and implant-supported restorations. After several years working as an associate dentist, he established his own dental practice in 2019. He completed the Curriculum in Implantology of the German Society for Implantology (DGI). His research focuses on radiological diagnostics, cone beam computed tomography, and evidence-based treatment planning in implant dentistry.

Email: s.galonska@zahnarztpraxis-seligenstadt.de