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LETTER TO THE EDITOR
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Advancements and challenges of facial scanners in dental practice: towards a digital future

Avances y desafíos de los escáneres faciales en la práctica estomatológica: hacia un futuro digital

Avanços e desafios dos escâneres faciais na prática odontológica: rumo a um futuro digital

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Dear Editor,

Three-dimensional (3D) facial scanners are revolutionizing the field of dentistry by enabling precise diagnosis and personalized treatment planning. These non-invasive optical devices create detailed 3D models of facial anatomy, offering significant advantages over traditional two-dimensional (2D) techniques such as photography (1).

The adoption of 3D facial scanners has enhanced diagnostic accuracy in key areas of dentistry. These devices are not only rapid and accurate but also versatile, making them suitable for patients of all ages and conditions, including those with complex facial deformities (1). In orthodontics and orthognathic surgery, these scanners allow for a detailed analysis of soft and hard tissue relationships, improving treatment planning and postoperative outcome prediction (1, 2).

Three-dimensional models are particularly valuable for identifying subtle facial asymmetries or malocclusions that may be overlooked in 2D images, facilitating precise interventions (1, 2). These models also support pre-surgical planning and post-operative assessment of facial symmetry. A recent study evaluated the practical accuracy of optical facial scanners in patients with facial deformities, demonstrating the reliability of 3D facial scanning technology in clinical practice, even for individuals with complex deformities (1).

Beyond diagnostics, 3D facial models improve communication among clinicians, dental laboratories, and patients. By visually simulating treatment outcomes, these models help explain treatment plans, thereby increasing patients' understanding and acceptance (2). Moreover, integrating facial scanners with technologies such as intraoral scanners and cone-beam computed tomography enables comprehensive planning that considers both facial and oral anatomy, leading to more effective treatments (1).

Emerging applications, such as using mobile devices to create 3D facial models for teledentistry, further highlight the potential of this technology to improve

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access to care. Patients can share high-quality images remotely, reducing the need for in-person visits and expanding care to underserved areas (2).

Despite their many benefits, 3D facial scanners face challenges, including high costs, the need for standardized image capture protocols, and technical training requirements. While portable devices simplify usage, high-precision scanners require substantial investment and expertise (3-5). Furthermore, research is needed to improve the accuracy of scans in cases involving severe facial deformities (1).

In summary, 3D facial scanners represent a powerful tool for advancing dental diagnostics and treatment. Their capacity to generate precise anatomical models supports personalized care, while their integration with emerging technologies promises further innovations. Addressing challenges related to cost, training, and standardization will be crucial to fully realize their potential.

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