IJACT, Volume 2, Issue 5, 2024 ISSN: 2995-5378
http://medicaljournals.eu/index.php/IJACT

INTERNATIONAL JOURNAL OF ALTERNATIVE AND CONTEMPORARY THERAPY

Digital Complete Dentures Vs. Traditional Dentures: a Comparative Analysis

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Annotation. The field of prosthodontics has seen transformative advancements with the integration of digital technologies, particularly in the design and fabrication of complete dentures. This comparative study examines digital complete dentures and traditional dentures across multiple dimensions, including fabrication processes, accuracy, patient satisfaction, clinical outcomes, time efficiency, and cost considerations. Traditional dentures, crafted through manual techniques involving impressions, wax try-ins, and laboratory processes, have been the standard for many years. However, digital complete dentures, utilizing computer-aided design and manufacturing (CAD/CAM) and 3D printing or milling, offer a modern alternative that promises enhanced precision and efficiency. This article explores the superior accuracy and fit of digital dentures, their impact on patient satisfaction, and clinical outcomes such as retention and stability. It also addresses the reduced fabrication time associated with digital methods, contrasting the initial higher costs with potential long-term savings. Despite their benefits, digital dentures present challenges, including the need for significant investment in technology and training. This article concludes by highlighting the future potential of digital dentures to further revolutionize denture fabrication and improve patient care in prosthodontics.

Keywords: analysis, accuracy

Introduction

Complete dentures are a conventional solution for edentulous patients, providing functional and aesthetic restoration of teeth. Traditionally, these dentures have been fabricated using manual techniques involving impressions, wax try-ins, and laboratory work. [1,2] However, the integration of digital technology has introduced a new paradigm, promising enhanced precision and efficiency. This article aims to explore the differences between digital complete dentures and traditional dentures, highlighting the benefits and limitations of each approach.[3]

Fabrication Processes:

Traditional dentures are created through a multi-step process involving:

1. Preliminary Impressions: Initial impressions are taken using alginate or similar materials.
2. Custom Trays: Custom trays are made for more accurate final impressions.
3. Final Impressions: Final impressions are taken to capture detailed anatomy.
4. Jaw Relations: Recording of vertical dimension and centric relation.
5. Wax Try-In: A wax model is tried in the patient's mouth to check fit and aesthetics.
6. Processing: The final dentures are processed in acrylic resin.

Digital dentures, on the other hand, leverage computer-aided design and manufacturing (CAD/CAM) technology [4]:

1. Digital Impressions: Intraoral scanners capture the oral anatomy.

2. Digital Design: Software is used to design the dentures, incorporating patient-specific data.
3. 3D Printing/Milling: The dentures are fabricated using 3D printing or milling machines.

Accuracy and Fit:

Digital dentures are often touted for their superior accuracy due to the elimination of manual errors and material distortions that can occur in traditional techniques. Studies have shown that digital impressions and CAD/CAM fabrication can produce dentures with better fit and reduced adjustments .

Patient Satisfaction:

Patient satisfaction encompasses fit, comfort, aesthetics, and overall functionality. Research indicates that patients often report higher satisfaction with digital dentures due to their precise fit and reduced number of appointments needed for adjustments. However, patient preferences can be subjective and influenced by individual experiences and expectations. [5,6]

Clinical Outcomes:

Clinical outcomes such as retention, stability, and masticatory performance are critical in evaluating denture efficacy. Digital dentures generally demonstrate favorable clinical outcomes comparable to, and sometimes better than, traditional dentures. The precise fabrication process ensures better adaptation to the mucosal tissues, enhancing retention and stability. [7,8]

Time Efficiency:

The digital workflow significantly reduces the time required for denture fabrication. Traditional dentures can take several weeks due to the multiple appointments and laboratory stages involved. In contrast, digital dentures can be produced within days, streamlining the overall treatment process .

Cost Considerations:

The cost of digital dentures can be higher initially due to the investment in technology and equipment. However, the reduced number of clinical visits and adjustments can offset these costs over time. Traditional dentures, while potentially lower in upfront costs, may incur additional expenses due to the need for more frequent adjustments and remakes .

Limitations and Challenges:

Despite the advantages, digital dentures face certain limitations, including:

- Learning Curve: Dental practitioners need to acquire new skills and training to effectively use digital tools.
- Initial Costs: High initial investment in digital equipment and software.
- Material Limitations: The materials used in digital dentures are continually evolving, and long-term data on their durability is still being gathered.

Conclusion:

Digital complete dentures represent a significant advancement in prosthodontics, offering enhanced accuracy, efficiency, and patient satisfaction. While traditional dentures remain a viable and effective option, the benefits of digital dentures make them an increasingly popular choice among both practitioners and patients. Future developments in digital technology are expected to further improve the quality and accessibility of denture treatments.

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