



INTRODUCTION

One of the most essential criteria to ensure the success of implant prosthodontics is precise transfer of dental implants positions to the laboratory to produce an accurate implant supported prosthesis. Currently, oral rehabilitation of partially or fully edentulous arches with dental implants is a routine clinical procedure. Unlike the natural dentition, the lack of periodontal ligaments, puts the dental implants in direct contact with bone, hence, any distortion or misfit at the implant- abutment level will not be tolerated. Therefore, implant supported fixed prosthesis require a passive fit between the abutment and the implant.

One of the most important approaches to minimize the gap between the implant and abutment is the fabrication of verification casts or verifying master casts with verification jigs prior to the fabrication of the implant supported prosthesis.

Authors have proposed a minimum gap or misfit at the implant-abutment interface that would be considered clinically acceptable. According to Brånemark, a gap of 10 microns is essential for the success of the prosthesis, however Jemt proposed that 150 microns or less of misfit is still considered clinically acceptable.

Despite the lack of clear guidelines on the degree of misfit admissible, a clinician should always aim to reduce this gap by using a verification device to prevent possible biological and technical complications that would jeopardize the longevity of the prosthesis, such as screw loosening, screw fracture, prosthesis fracture or peri-implantitis.

Various prosthodontic techniques have been proposed to improve accuracy and minimize errors that may occur throughout the process of fabricating implant supported fixed prosthesis. Verification devices are one of the approaches to ensure accurate reproduction of intraoral implant positions, the device can be either a cast that reproduces implant positions in the patient's mouth without the depiction of the intraoral soft tissue, or a jig that is fabricated by splinted impression copings fixed on master casts.

OBJECTIVES

1. What is a verification cast?
2. What is a verification jig?
3. What materials are utilized in their fabrication?
4. Which material is the most accurate?

METHODS

An electronic search of English language literature between 1989 to 2022 was performed by using PubMed/MEDLINE with the following specific terms "verification jig", "full-arch implant", "verification cast", "implant-supported prosthesis". The collected data was analyzed and organized further to select articles that provided insight on the subject. A total of 13 articles were included, 9 demonstrated different materials used to fabricate jigs necessary for verifying master casts, while the other 4 articles described the process of fabricating verification casts through intraoral splinting of temporary abutments with auto-polymerizing or photo-polymerizing resins.

RESULTS

Verification Cast

Advantages +

- + Ease of capturing; eliminates hard and soft tissue undercuts.
- + Reduces chair time; eliminating a clinical visit

Limitations -

- Extremely angulated implants
- Challenges with implant components that have minimal fit tolerance
- No soft tissue information

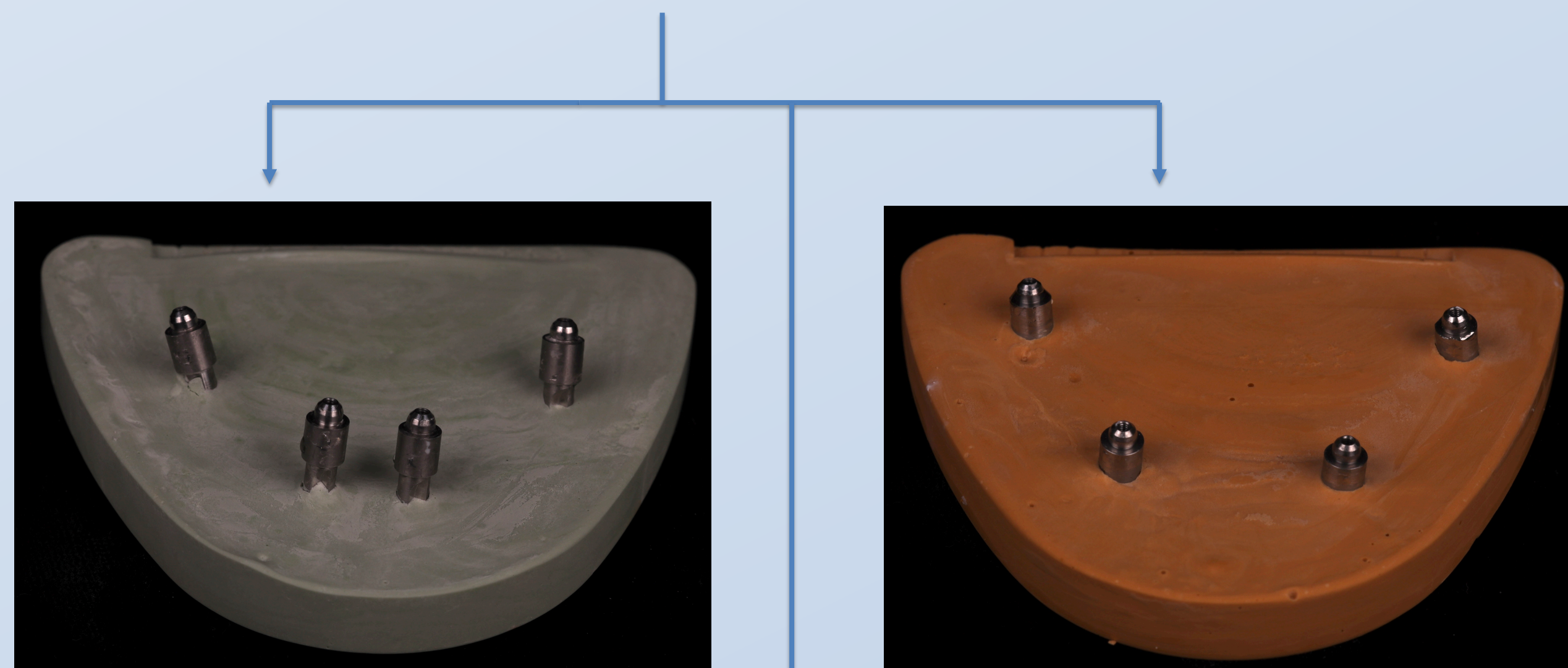


Figure 1.a: Verification cast made of type IV stone

Figure 1.b: Verification cast made of type III stone



Figure 1.c: Verification cast made of dental plaster

Material Recommendation

Type IV stone > Type III stone > Dental plaster

Verification Devices

Verification Jig

Advantages +

- + Ease of fabrication
 - + More material options
 - + Preservation of soft tissue on master cast
- Challenging intraoral trial; Implant placed subgingival
 - Extremely angulated implants
 - Challenges with implant components that have minimal fit tolerance
 - Increase chair time

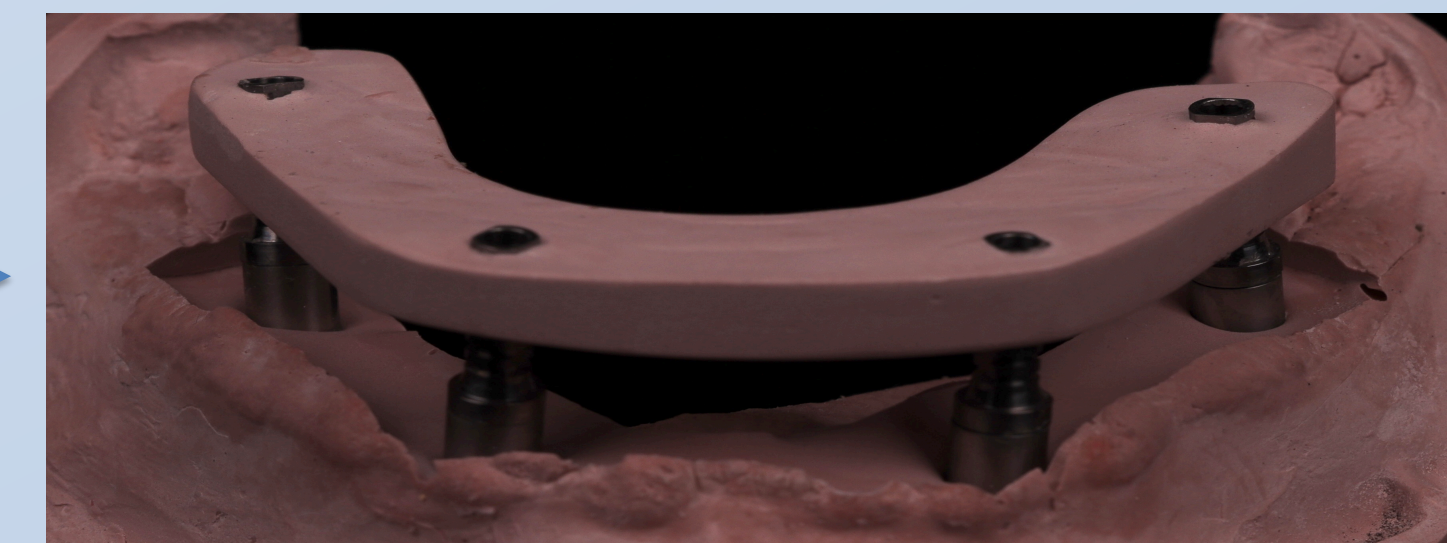


Figure 2.a: Verification jig made of type IV stone

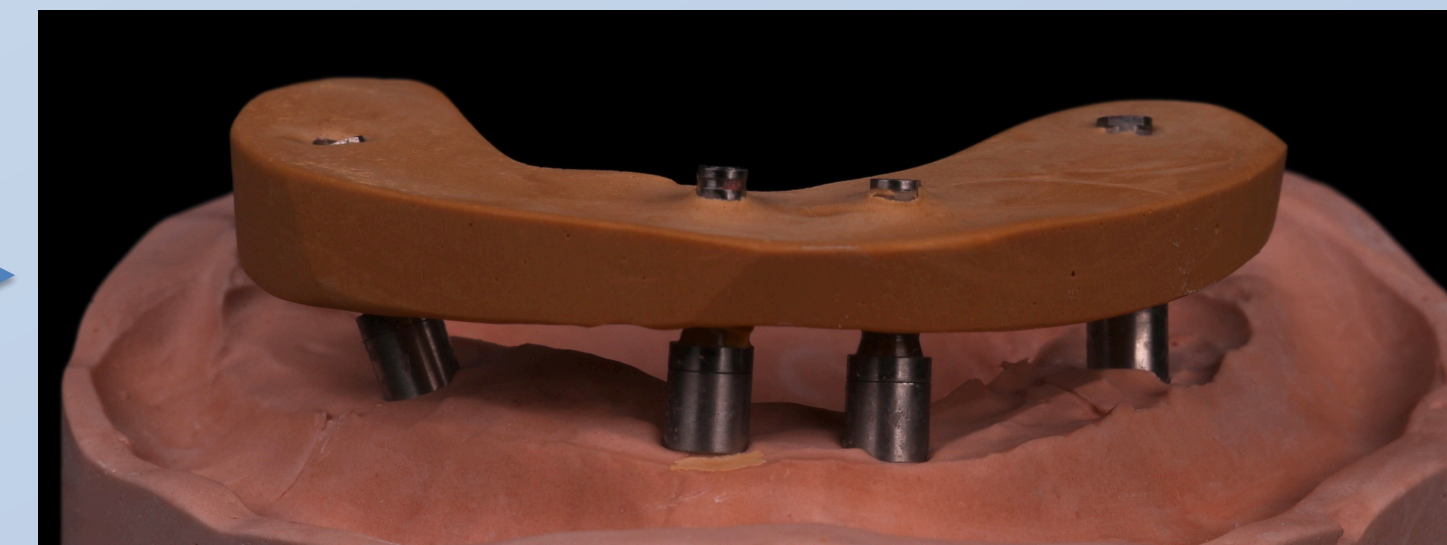


Figure 2.b: Verification jig made of type III stone



Figure 2.c: Verification jig made of auto-polymerizing resin

Material Recommendation

Type IV stone > Type III stone > Auto & photo- polymerizing resin > composite.

DISCUSSION

Verification devices have been used to ensure accurate transfer of the implant positions from the patient's mouth to the laboratory. This is considered a crucial step in implant fixed prosthodontics that should not be overlooked. Any misfit between the implant and prosthesis at the implant-abutment interface will result in catastrophic failure of the implant, prosthesis or both. Verification jigs are laboratory fabricated impression coping assembly that consists of splinted temporary copings fixed onto the master cast. Verification casts are clinically produced and resemble a reproduction of the implant positions intraorally irrespective to the intraoral soft tissue.

Regardless of which device a clinician wishes to use, attention should be directed towards the materials that are utilized in their fabrication. For verification jigs, using dental stone type 3 and 4 yield a more dimensionally stable jig than using photo-polymerizing resin, auto-polymerizing resin or composite. For verification casts, splinting impression copings and producing an accurate index will also depend on the material used in splinting the impression copings; photopolymerizing resin and autopolymerizing resin preformed better than the use of composite in reproducing the implant positions within the verification cast. Casts that are poured with type III and IV stone were more dimensionally stable than verification casts poured in dental plaster.

In cases where resin is used, it is advised to have the impression copings assembly splinted and sectioned on a primary cast at least 24 hours prior then rejoined in the patient's mouth. Although this may require an extra clinical step, it is necessary to minimize the overall shrinkage of the material and ultimately produce more accurate reproduction of the implant positions intraorally.

In the digital workflow, milled PMMA jigs have been used to verify master casts, however their accuracy have not yet been compared with other materials. To our knowledge, printed PMMA have not been used in the fabrication of verification casts or jigs.

In conclusion, a clinician should always aim to use a material that is reliable, accurate and dimensionally stable and try to reduce the errors that may occur throughout the fabrication process to ensure prosthesis longevity.

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