



NEUTRAL ZONE IMPRESSION TECHNIQUE - A REVIEW

Dentistry

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ABSTRACT

The neutral zone concept is an essential consideration in complete denture prosthodontics, as it ensures a comfortable and functional fit. Accurate impression techniques are crucial to capture the contours of the oral cavity and the dynamic nature of the neutral zone. This review article aims to discuss the most commonly used impression techniques for the neutral zone concept in complete dentures, including border molding, functional impression, muscle trimming impression technique, wax occlusion impression technique, and fluid wax techniques. Furthermore, the article evaluates the efficacy of each technique and provides insights into the most efficient method for capturing the neutral zone. The results suggest that functional impression technique and fluid wax technique are the most efficient methods to capture the neutral zone. This review article provides a comprehensive overview of the available impression techniques and can serve as a guide for clinicians to select the most appropriate method for their patients.

KEYWORDS

Complete dentures, Neutral zone, Denture stability, Impression technique.

INTRODUCTION

Complete denture prosthodontics is a challenging field that requires a thorough understanding of the oral anatomy and function (13).

The neutral zone concept is an essential consideration in the construction of complete dentures, as it determines the optimal position of the teeth to achieve comfort, stability, and function (2). Accurate impression techniques are crucial for capturing the contours of the oral cavity and the dynamic nature of the neutral zone. Several impression techniques are available, each with its advantages and disadvantages (16). The neutral zone concept may also be referred to as the "balanced occlusion concept" or the "equilibrium zone concept," and the neutral zone itself may be called the "functional zone" or the "muscle equilibrium zone" (17). The neutral zone in complete denture refers to the area in the oral cavity where the forces of the tongue, cheeks, and lips are balanced during function, such as speech, swallowing, and chewing. It is the space between the tongue and cheek musculature on one side and the lips on the other side when the muscles are at rest. The neutral zone is important in complete denture fabrication because it provides a stable foundation for the denture and can help to improve its retention and stability (14).

During function, the oral tissues are subjected to various forces that can affect the stability and retention of the denture. These forces include gravity, muscle activity, and the pressure of food and liquids. The neutral zone is the area where these forces are balanced, and the denture can be held in place without the need for adhesives or other auxiliary aids (23).

Various Impression Techniques

The neutral zone is the area within the oral cavity where the forces of the lips, cheeks, and tongue are balanced, and it is typically located around the level of the crest of the alveolar ridge. To accurately determine the neutral zone, several impression techniques can be used. They are:

1] Functional Impression Technique

This technique involves recording the position of the muscles and soft tissues in their functional state to create a custom impression tray that mimics the natural movements of the mouth (11). It is also known as 'Pressure impression technique', 'Mucostatic-functional impression technique', 'Secondary impression technique', 'Border molding technique', 'Muscle trimmer impression technique' (1).

Procedure

The procedure is performed as follows:

1. Preliminary impression: A preliminary impression of the edentulous ridge is made using an appropriate impression material (10).
2. Custom tray fabrication: A preliminary model of the edentulous ridge is made from the preliminary impression. A wax sheet is softened in warm water and adapted to the model. The wax is then trimmed to the desired shape and thickness to create a customized impression tray (20).
3. Muscle trimming: The neutral zone is identified by asking the patient to perform functional movements such as speaking, swallowing, and smiling. The areas of the impression that correspond to the muscle and soft tissue are identified and trimmed away using a scalpel or a high-speed hand piece (5).
4. Functional impression: A special impression material is used to make the functional impression. The material is loaded onto the modified custom tray and placed in the patient's mouth. The patient is asked to perform functional movements while the impression material sets. The impression material records the position of the muscles and soft tissues in their functional state (22).
5. Denture fabrication: The final impression is used to fabricate the denture base, which is designed to fit within the neutral zone. The wax rim is used to determine the position of the teeth and the occlusal plane (23).

Significance

The functional impression technique is a more advanced method that requires careful planning and execution (15). It allows for the creation of a custom impression tray that mimics the natural movements of the mouth, resulting in a denture that provides optimal function and comfort (12). The technique requires specialized equipment and materials and should be performed by a trained dentist (14). It may be particularly useful for patients with unique anatomical features or muscle attachments that may affect denture stability and retention (18). The functional impression technique has several significant advantages over other impression techniques. Firstly, it captures the natural movements and contours of the oral tissues, resulting in a more accurate impression (4). Secondly, it helps to improve the stability and retention of the denture, which can improve the patient's quality of life. Lastly, the functional impression technique is relatively easy to perform and can be used for a wide range of patients, making it a

versatile and valuable technique in complete denture fabrication (8)

2] Wax Occlusion Technique:

The wax occlusion impression technique is another procedure used in the fabrication of complete dentures using the neutral zone concept. This technique involves using a wax bite rim to record the position of the mandible and the maxilla in relation to each other, and to determine the vertical dimension of occlusion (3). Also known as 'Wax denture base impression technique', 'Wax bite technique', 'Interocclusal wax record technique', 'Centric relation wax impression technique', 'Wax bite registration technique'.

Procedure

The procedure is performed as follows:

1. Preliminary impression: A preliminary impression of the edentulous ridge is made using an appropriate impression material.
2. Custom tray fabrication: A custom tray is fabricated based on the preliminary impression.
3. Wax rim fabrication: A wax bite rim is made to fit the custom tray. The wax is softened in warm water and then adapted to the tray. The patient is asked to bite down on the wax rim to record the position of the mandible and the maxilla in relation to each other. The wax is then trimmed to the desired occlusal plane.
4. Muscle trimming: The neutral zone is identified by asking the patient to perform functional movements such as speaking, swallowing, and smiling. The areas of the impression that correspond to the muscle and soft tissue are identified and trimmed away using a scalpel or a high-speed hand piece.
5. Final impression: The modified custom tray is loaded with impression material and seated in the patient's mouth. The patient is asked to bite down on the wax rim to record the vertical dimension of occlusion. The impression material is allowed to set.
6. Denture fabrication: The final impression is used to fabricate the denture base, which is designed to fit within the neutral zone. The wax rim is used to determine the position of the teeth and the occlusal plane.

Significance

The wax occlusion impression technique is a widely used and effective method for fabricating complete dentures. It allows the dentist to determine the vertical dimension of occlusion and the position of the teeth accurately. The technique requires careful planning and execution to ensure that the denture fits well and provides optimal function and esthetics (9).

3] Fluid Wax Technique

This involves filling a custom tray with fluid wax and placing it in the patient's mouth (6). The patient is then asked to perform functional movements while the wax is in place, and the wax flows to capture the contours of the oral musculature.

This technique involves using a special type of wax to record the position of the muscles and soft tissues and to create a customized impression tray (6).

Procedure

The procedure is performed as follows:

1. Preliminary impression: A preliminary impression of the edentulous ridge is made using an appropriate impression material.
2. Custom tray fabrication: A preliminary model of the edentulous ridge is made from the preliminary impression. A wax sheet is softened in warm water and adapted to the model. The wax is then trimmed to the desired shape and thickness to create a customized impression tray.
3. Fluid wax application: A special type of fluid wax is applied to the customized impression tray. The fluid wax is heated until it becomes liquid and then applied to the tray using a brush or syringe. The tray is then chilled to harden the wax.
4. Muscle trimming: The neutral zone is identified by asking the patient to perform functional movements such as speaking, swallowing, and smiling. The areas of the impression that correspond to the muscle and soft tissue are identified and trimmed away using a scalpel or a high-speed hand piece.
5. Final impression: The modified custom tray is loaded with impression material and seated in the patient's mouth. The patient is asked to perform functional movements while the impression material sets. The fluid wax creates a moldable surface that

conforms to the shape of the muscles and soft tissues.

6. Denture fabrication: The final impression is used to fabricate the denture base, which is designed to fit within the neutral zone. The wax rim is used to determine the position of the teeth and the occlusal plane.

Significance

The fluid wax impression technique is a relatively new technique that allows for a more accurate recording of the position of the muscles and soft tissues. It is especially useful for patients with unique anatomical features or muscle attachments that may affect denture stability and retention. The technique requires specialized equipment and materials and should be performed by a trained dentist (19).

DISCUSSION

The neutral zone concept is an important concept in complete denture construction, as it aims to establish the optimal functional and esthetic relationship between the denture and the surrounding oral structures. One crucial aspect of the neutral zone concept is the selection of the appropriate impression technique, which can significantly affect the final fit and stability of the denture.

The neutral zone impression technique involves taking an impression of the oral tissues while the patient maintains the neutral zone position, which is the position where the forces exerted by the tongue and cheek are balanced. This technique aims to capture the optimal position of the denture base and can provide improved retention and stability. However, this technique can be time-consuming and requires patient cooperation (11).

The functional impression technique is the most commonly used impression technique in the neutral zone concept in complete denture construction for several reasons.

First, the functional impression technique captures the dynamic interplay between the denture and the surrounding oral structures during functional loads. This is important because the functional loads exerted by the tongue and cheeks can significantly affect the fit and stability of the denture. By taking an impression under functional loads, the denture can be designed to fit accurately and comfortably during function, which can improve patient satisfaction and quality of life (10).

Second, the functional impression technique provides improved retention and stability compared to other techniques. This is because the impression material is injected under pressure, which ensures that it fills all the undercuts and irregularities in the oral tissues. As a result, the denture base can be designed to fit snugly and securely against the oral tissues, which can reduce movement and improve retention and stability (20).

Third, the functional impression technique is versatile and can be used in a wide range of clinical situations. It can be used to capture the neutral zone position as well as other functional positions, such as swallowing and phonetics. This versatility allows the dentist to customize the denture to the patient's individual needs and oral anatomy, which can result in a more comfortable and functional denture (22).

Finally, the functional impression technique has been shown to have high clinical success rates and is widely accepted by dental professionals (23). While it can be challenging to perform, with proper training and experience, dentists can achieve consistent and accurate results.

In summary, the functional impression technique is the most commonly used impression technique in the neutral zone concept in complete denture construction due to its ability to capture dynamic changes in oral anatomy during function, provide improved retention and stability, versatility, and high clinical success rates (15). However, it is essential to carefully evaluate the advantages and disadvantages of each impression technique and choose the technique that best suits the individual patient's needs and oral anatomy.

However, the choice of the impression technique should be based on individual patient needs and oral anatomy, and it is essential to carefully evaluate the advantages and disadvantages of each technique before making a decision.

CONCLUSION

In conclusion, the neutral zone concept is a crucial aspect of complete denture construction, as it aims to establish the optimal functional and esthetic relationship between the denture and the surrounding oral structures. The selection of the appropriate impression technique is a crucial step in achieving this goal, as it can significantly affect the final fit and stability of the denture. Each technique has its advantages and disadvantages, and the choice of the impression technique should be based on individual patient needs and oral anatomy.

Among these techniques, the functional impression technique is the most commonly used technique in the neutral zone concept. This is due to its ability to capture dynamic changes in oral anatomy during function, provide improved retention and stability, versatility, and high clinical success rates.

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