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REVIEW ARTICLE

IMPRESSION TECHNIQUES IN REMOVABLE PARTIAL DENTURE

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ABSTRACT

Removable Prosthodontics treatment involves the replacement and restoration of teeth by artificial substitutes. The number of adultpatients wear removable partial denture (RPD) due to their partially dentate are keep increasing. The treatment is done to avoid further loss of tooth by prosthodontics rehabilitation. Removable Prosthodontics treatment can offer exceptional satisfaction for both patient and dentist. The trend of the removable partial dentures had changed across the time through evolution of prosthodontics. The changes of trend including the impression techniques used. The articles from various sources are reviewed for their content on impression techniques (Removable Partial Denture). Journals reviewed are Pubmed, Scopus Indexed, other Prosthodontics journals, Prosthodontics books that available online, and website of any Prosthodontics department from university worldwide.

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INTRODUCTION

Dentistry as a strength is accepted to have started around 3000 BC. (Tandon *et al*., 2010) Egypt was the therapeutic focus of antiquated world. The primary dental prosthesis was accepted to have been built in Egypt around 2500 BC. Skilfully outlined dentures were made as ahead of schedule as 700 BC. Amid medieval times, dentures were sometimes considered as a treatment choice. They were hand cut and tied set up with silk strings and must be uprooted before eating. (Rasidi *et al*., 2016) The removable partial denture (RPD) is one of the prosthesis that need maximum precision of impression making. (Prapotnich and Domken, 2000)

History of removable partial denture

In the sixteenth century, before the French transformation and conveyed to us by (Abul casim) and (Ambroise), the material was utilized as a part of expansion to bone was ivory, walrus, tusks and human teeth from corpuses. It was ladies first who attempted to supplant (rotted missed tooth or periodontal decay) with a touch of wax, skein of flax or bit of bone. The primary brilliant crown was set up at Mouton, Paris and the main gold base was attempted by Bourde. Notwithstanding this, first utilization of winding springs was conceived by Duboised de Chemant. In 1702, denture with gold spiral springs was finished by Laforgue. Towards the end of the century in 1798 the main gold plate was set up by Green Wood for George Washington (America). (Zarb *et al*., 2005) Toward the start of seventeenth century, in any case, Fauchard prescribed level steel springs for the obsession of finish upper prostheses and these were at last supplanted by and large by winding springs of gold or platinum as recommended by Bourdet. Amidst this century, presentation of the tube tooth by Ash occurred. A gadget called "Dentifactor" by Joun Tomes was presented for the produce of dentures. Promptly after this, in 1841 stamped gold denture with springs by Laforgue came into utilization. (Becker *et al*., 1994)

Physiologic impression techniques

Physiologic impression technique or also known as functional impression technique is a technique which record the position of ridge by placing an occlusal load on the impression tray during the making of impression in removable partial denture (RPD) patients. (Nallaswamy, 2003) This type of technique will produce a generalized displacement of changes in degree of mucosa, whether to the greater or lesser degree. The displacement occurred in this technique was intended to record any tissues in the correct configuration when occlusal loading was applied to the patients' denture. Physiologic impression technique can be further classified into McLean and Hindel's method, the functional relining method and the fluid wax method. (Jayaraman *et al*., 2016)

McLean's and Hindel's method

In McLean's impression technique, it is used to record the tissues of residual ridge that support a distal extension of

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denture base, or its supporting form and as the second impression of arch remainder. The second impression is also called as 'pick up' impression. This is due to its function, covering and picking up the functional impression.

Procedures

1. A fabrication of the custom-made impression tray over the edentulous areas of the preliminary cast. No need for adaptation of spacer.
2. Making of the occlusal rim on the custom tray. Occlusal rim is used to make sure patients are bite while making the impression.
3. Impression materials which loaded on the tray is inserted into the patient's mouth.
4. Patient need to be instructed to bite on the occlusal rim.
5. Custom tray should not be removed from patient's mouth after impression making.
6. An alginate over-impression is made by using a large stock tray.
7. The functional master impression will come along when the over-impression is removed and it is called as 'pick up' impression.
8. Finger pressure need to be used during over-impression making.
9. The teeth in the anatomical form and the tissues in the functional form will be produce after pouring the cast into the impression.

The weakness for using this method of impression is it use a finger pressure which could not produce the same function of tissue displacement of biting force produced.

In Hindel's modification of McLean's technique;

The disadvantages of this technique is if the action of the retentive clasps of RPD is sufficient in order to maintain the denture base in soft tissue displace, blood vessels interruption will occur with worst soft tissue destruction and bone resorption. Other than that, if the action of the retentive clasps of RPD is not sufficient in order to maintain the denture base in soft tissue displace, it will result in artificial teeth premature contact. This premature contact may become objectionable for almost all patients.

Procedures

1. Fabrication of the occlusal rim in a special tray using the primary cast. In order to avoid excessive pressure on the tissues, the stoppers need to be placed on the tray that extend over the stress-bearing areas.
2. The supporting tissues under rest – anatomical impression is recorded by special tray.
3. Large holes with over impression is made by a special stock tray. Steady constant pressure should be applied on the occlusal rim during the procedure. Till the alginate is set, the pressure should be held.
4. A pseudo-functional stress is gave by pushes the edentulous ridge by using the finger pressure on the special tray. A pseudo-functional is same to the functional impression.
5. Excessive tissue compression can be avoided by using the stopper on the custom stray.

The functional relining method

The functional relining method consists of addition of new surfaces to the inner side or tissue side in the denture base. The procedures of this technique should be done before the insertion of RPD. It also can be done later in future if the denture base having loose or no longer fits to the ridge due to bone resorption. (Steffel, 1954)

Procedures

The patients must maintain their mouth in a position of partially open during the border molding and impression taken. This is due to the border tissues, cheek and tongue are best controlled and there is a compulsory observation of the relationship between RPD framework and the patients' teeth.

Final impression making

In the final impression making by using the functional relining method, the free flowing Zinc Oxide eugenol paste is commonly used. However, if the undercuts are present on the ridge, the light bodied polysulphide or silicone rubber is used. (Harvey, 1962)

Advantages

The soft tissue amount displacement can be controlled by the relief given amount to modeling plastic before the final impression making. There will be less tissue displacement if the relief is greater.

Disadvantages

Disadvantages of this technique are the failure in maintaining the exact relationship between the abutment and the framework. It might fail in achieving the accurate occlusal contact in reline procedure. This is because in the reline procedures, all the occlusal discrepancies need to be correct.

The fluid wax impression technique

The fluid wax are waxes that firm at room temperature but it have an ability to flow when put in mouth temperature. There are two types of fluid waxes used in RPD, which are: Iowa Wax and Korrecta wax. Iowa wax was developed by Dr. Smith meanwhile Korrecta wax was developed by Dr. O.C. and S.G. Applegate. Korrecta wax used in RPD is known as Korrecta wax No. 4 which is slightly more fluid if compared to the Iowa wax. (Tan *et al*., 2009) The objective of this impression technique is obtaining maximum denture base peripheral borders extension which it will not interfered with the movable border tissues function. It also used in ridge stress-bearing areas recording for functional form and recording of non-pressure-bearing areas in anatomic form. In fluid wax impression technique, the key of using it are space and time. The borders made should be short for all movable tissues which is not more than 2 mm short. This is due to the insufficient strength of fluid wax to support itself beyond the distance. Moreover, when the tray must remain in place about 5 to 7 minutes upon introduced into the patients mouth. This allow the flow of wax and prevent the buildup pressure under the tray. (Vahidi, 1978)

Procedure

1. The first step when using this impression technique is trying in of work done frame.

2. Later, adopting the spacer within the use of base plate on cast.
3. After that, adapting the auto polymerizing resin and contouring over frame work the excess materials is removed.
4. The relief holes are prepared along the ridges crest.
5. The temperature of fluid wax should maintain between 51°C to 54 °C because the wax become fluid at this temperature.
6. The wax with fluid physical is painted to the impression tray on the tissue side using brush.
7. The dull surface is added with wax and the impression is placed back into the mouth for 5 minutes.
8. All the steps need to be repeated till the impression is completed, and need to be carefully handle.
9. The new cast need to be poured as soon as possible after the impression is completed. This due the wax fragile and might be distortion.
10. This impression technique need to use the open mouth technique in order to reduce the danger of over displacement of tissue, especially ridges by and forces of occlusal and vertical.

Disadvantages

The wax fluid technique is time consuming. There is needed of accurately followed timing of procedures. The excessive tissue displacement might be result to the impression if the timing period is not followed properly as mentioned.

Selected pressure technique

In the selective pressure technique, there are two type of impression are made. Anatomical impression and functional impression are made using this technique. The anatomical impression made is functioning in preparing a master cast. (Krol *et al*., 1999) It later will alter based on the selective pressure functional impression. In this technique, the tissue surface of relieving areas that lying over by special tray is reduced. The reduction is made as there is enough space available for not exert pressure by the impression materials. Therefore, the contact of the impression tray to the tissues is only at the stress-bearing areas during the impression taking procedures. In this technique, only the stress-bearing areas are compressed, which it is recorded properly. As there is only certain areas that exerted by pressure during the impression making, this technique of impression in RPD is called as selected pressure impression technique. (Dumbrigue and Esquivel, 1998)

Procedure

1. The fabrication of the special tray on the master cast from the anatomical impression. The fabrication of tray is without a wax spacer.
2. Trimming of the special tray tissue surface by using burs for adequate relief.
3. The prepared special tray is loaded by impression material, such as zinc oxide eugenol and inserted into the patients' mouth.
4. The patients need to open their mouth and the finger pressure is used to record the impression. Make sure that only the stress bearing areas are compressed during the procedures.

Advantages

The resorption rate of ridge will be lowered due to the non-stressed relieving areas. It will equalize the stress that act on the soft tissues and the abutment teeth.

Conclusion

The accomplishment of a removable partial denture, the patient's comfort, strength and particularly the mental acceptance rely on upon a progression of fundamental technicals factors. Likely the more fragile phase of the prosthetic innovation is the transfer of information from the mouth of the patient to the dental prosthodontist through the impression. In removable partial denture, impression need to consider into the harmony between uncompressible hard tissue and delicate structures with variable compressibilities. The assorted qualities of clinical cases is in charge for an extensive different qualities of impression techniques used in treatment. (Dumbrigue and Esquivel, 2000)

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