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Denture repair

A Project Submitted to

The College of Dentistry, University of Baghdad, Department of Prosthodontics in Partial Fulfillment for the Bachelor of Dental Surgery

By

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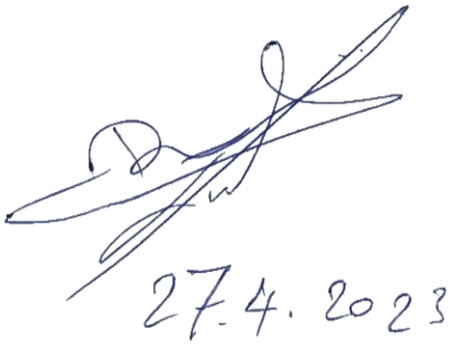
DECLARATION

I certify that this project entitled **"Denture Repair"** was prepared by the fifth-year student **Farah Falah Hassan** under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.



Assist. Lec. Dr. Zinah Salah Mawlood

27/4/2023

DEDICATION

All my success as well as everything I do, I'm honored to dedicate it to my parents, the two people who gave me the values and paved the path for my journey in life.

My mother, my mentor and role model for her constant support and for her generosity in love, knowledge, wisdom and life lessons.

My father, for always pushing me to shine and always trusting me, for being my backbone and my all times super hero.

My brother with the biggest heart, for being my number one cheerleader and for embracing me with his genuine care.

And my bestfriend Fatima, who shared the journey of learning with me, to our memories here and to the future we hold, may we grow and rise together.

Last but not least I dedicate this to all the young dreamers with hope for the future, this road may have obstacles but is worth each step.

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RPD	**Removable Partial Denture**
RCD	**Removable complete Denture**

INTRODUCTION

There are various treatment options for replacing missing teeth such as removable partial dentures (RPD) which are an effective and reasonable treatment modality to restore function and aesthetics. RPD success mainly depends on proper design and components selection and another option is removable complete denture (RCD) which replaces the all-missing teeth of the jaw **(Gad et al., 2021).**

Removable dentures are predominantly fabricated from acrylic resin, with the occasional use of porcelain teeth, and may incorporate metallic components. Acrylic resin is relatively weak and prone to fatigue and impact fracture. Porcelain teeth tend to chip and are prone to impact fracture, and both they and metallic components can lose their bond with the acrylic parts of the prosthesis. As a result, the dentist will be regularly called upon to repair dentures **(Zarb et al., 2012).**

The advantage of acrylic resin as a denture base material is its ease of processing and tinting, ready polishability, and ease of repair. Formerly, denture repairs had to be made with heat-curing resin but cold-cure materials are very satisfactory and their use reduces the risk of denture distortion during repair. The later introduced light-cured materials simplify the repair process. Because these materials are claimed to exhibit less fluid sorption and increased stain resistance than conventional cold- cure acrylics **(Von Fraunhofer, 2013).**

Regardless of the cause of the fracture or the mode of repair, the criteria for a satisfactory repair are clear. Possibly of greatest importance are the requirements of rapid processing and maintenance of dimensional

accuracy of the denture during and after repair. A quick repair ensures that the patient is without the denture for the shortest period possible. Dimensional accuracy of the repaired prosthesis is necessary if the denture is to have the same functionality, fit, and occlusal balance as that prior to fracture **(Von Fraunhofer, 2013).**

Educational efforts should be strengthened to increase patient and dentist awareness of the need for post-insertion prosthesis care so that removable prostheses are properly maintained and replaced when indicated **(Jones and Garcia, 2009).**

Aims of the review

1- Review the most common types and causes of denture fracture.

2- Review the best techniques and materials used in dentures repair.

CHAPTER ONE

Review Of The Literature

1.1 Removable Prosthesis

Removable prosthesis are all types of dentures that made with several steps in clinic and laboratory to replace the missing teeth and supporting tissues with a prosthesis designs. They named removable because they can removed and inserted easily in the mouth by the dentist or by the patient. They constructed to replace several missing teeth or all the teeth in edentulous patients **(Basker et al., 2017).**

There are two types of dentures;

1. Removable complete dentures.
2. Removable partial dentures **(Basker et al., 2017).**

1.2 Denture Fracture

Fractures in complete denture bases are a relatively common clinical occurrence. Therefore, the need to develop effective repair techniques is justified. Dentures can fracture from a variety of causes, commonly through dropping onto a hard surface although other causes include failure of inherent defects from poor processing. Other factors predisposing complete dentures to failure are a shallow palatal vault combined with severe flexure such as biting down onto a hard object or a deep incisal notch acting as a stress riser **(Von Fraunhofer, 2013).**

1.3 Causes Of Denture Fractures

Rangarajan and Padmanabhan, in 2017 classified the causes of fractures into:

1.3.1 Denture Factors

1. **Poor fit:** which include several factors like alveolar resorption which will cause the denture to be unevenly supported and cause fracture, dimensional changes in acrylic resin of repaired dentures, inadequate and excessive relief, failure to relieve bony prominences like tori and thin mucosa can cause denture to flex and fracture, inaccurate impressions or cast can induce considerable stresses in the denture base during mastication owing to the unevenness of its support and eventually the base will crack, inclusions such as porosity and plaster dust contribute to stress concentrations and rapid growth of crack.

2. **Incorrect tooth position:** The most common cause is setting upper teeth outside the ridge, which will lead to midline fracture of upper denture. This is because the force of mastication is applied outside the axis of the ridge and the ridge becomes a fulcrum point, causing a large component force to be transmitted to the midline of the denture. The problem can be countered by wide extension of the denture base to ensure a retentive force on the contralateral side, which shifts the fulcrum and distribute the load more evenly, arranging teeth in balanced occlusion and the use of metal denture base **(Rangarajan et al., 2017).**

1.3.2 Patient Factors

1. **Accident:** Accidental dropping of the denture by the patient is the most common cause of fractured denture due to impact.
2. **Anatomical Factors:** Anatomical problems like high labial frenum will require a deep labial notch, which can result in stress in the area leading to midline fracture of upper denture.
3. **High Occlusal Loads:** This is present in patients with powerful muscles of mastication, bruxers and single complete dentures **(Rangarajan et al., 2017).**

Whenever possible, the cause, or causes, of the fracture must be identified before the denture is repaired or replaced. Unless this is done and the cause attended to, the denture is likely to fracture again within a short period of time **(Basker et al., 2017).**

1.4 Types Of Fracture

1.4.1 Fatigue Of The Acrylic Resin

Fatigue fracture results from repeated flexing of the denture by forces too small to fracture it directly. Failure of the denture base is due to the progressive growth of a crack originating from a point on the surface where an abrupt change in the surface profile causes a localised concentration of stress many times that applied to the bulk of the denture **(Basker et al., 2017).**

The crack often starts palatally to the upper central incisors, grows slowly at first but undergoes an enormously increased rate of growth just before the denture fractures. A failure of this type most commonly occurs in

dentures that are about 3 years old. Midline fracture due to fatigue is the commonest type of denture breakage **(Basker et al., 2017).**

A survey was done by **Kizim in 2013** to determine the prevalence of the type of fracture. The questionnaire was distributed to three different dental laboratories, they concluded that the most common cause of fracture is fatigue failure which either causes loosening of teeth or fracture of the denture base itself.

AlQahtani and Haralur in 2020 published that fracture of the denture base often occurs by a fatigue mechanism in which small flexural stresses, over some time, lead to the formation of a small crack, which then propagates through the denture that was ill-fitted or badly designed.

1.4.2 Impact

Denture breakage might occur, for example, if the patient accidentally drops the denture while cleaning it. It might also result from an accident in which the patient receives a blow to the mouth **(Basker et al., 2017).**

This type of fracture usually happens when patients are coughing which pushes the denture out of the mouth. Or accidental dropping of the denture over the floor or sink or result from an accident in which the patient receives a blow to the mouth. Also, it may occur if the patient is involved in a violent accident involving the facial region **(Farret et al., 2013).**

1.5 Reducing The Incidence Of Fracture

If the fracture of the denture can be avoided, there will be major economic benefits to the community, reducing the inconvenience to the patient and reducing the possible hazard to the health due to swallowing or

inhalation of parts of the plastic denture. A majority of the midline fractures can be avoided by the application of established prosthodontic principles during construction including **(Salama, 2017):**

1) Maximum denture stability and good denture fitness **(Thomas, 2015).**
2) Providing a denture with completely balanced occlusion to reduce wedging effect and locking of occlusion **(Chowdhary and Chandraker, 2010).**
3) Adequate bulk and uniform thickness of the dentures increase the strength and stiffness of the denture **(Mccracken et al., 2016).**
4) Reduce the need for a deep frenal notch by a frenectomy **(Deepak et al., 2017).**
5) Slow cooling to minimize the internal stress in the denture during processing **(Chowdhary and Chandraker, 2010).**
6) Avoid any deep notches that should be shallow and rounded at the bottom **(Mccracken et al., 2016)**.
7) Good processing technique, which reduces residual stress within the denture and avoids surface defects and inclusions.
8) Relief over the non-compressive tissue in the center of the hard palate **(Takamiya et al., 2011).**
9) Increase the base thickness, which will increase the fracture resistance of the shallow palatal vault base **(Vikram and Chander, 2020).**

1.6 Denture Repair

Dentures may need to be repaired when serious damage is present or when they are just in need of some minor adjustments. Repairing a broken denture can be required for a variety of reasons. From a simple hairline crack that the patient can feel with their tongue, like a hair stuck to the denture, to a complete separation of the denture into two or more pieces with the teeth loss **(Steel et al., 2010).**

1.7 Materials Used In Denture Repair

The choice of material depends on the working time, the strength to be obtained with the repair material, and the degree of dimensional stability maintained during and after repair **(Dyer et. al, 1994).**

So that the fractured denture is repaired by using several types of materials as following:

1.7.1 Cold-Polymerized Acrylic Resin

Cold-Curing resin is the most commonly used material, but this material lacks the strength of heat-curing resin which makes a repeat fracture more likely **(Basker et al., 2017).**

1.7.2 Heat-Polymerized Acrylic Resin

The use of heat cured resin to repair a denture carries the risk of increasing the extent or result of twisted out of the shape of the denture base during processing **(Grant et al., 2016)**.

Even though the heat-curing resin has the better mechanical properties, also, it requires a complex and highly cost lab procedure **(Basker et al., 2017).**

1.7.3 Light-Polymerized Acrylic Resin

The advantages of visible light-polymerized resin include the reduction of chemical and thermal irritation to the patient, good color stability, and good physicomechanical properties. Conversely, the material also presents some limitations, such as increased water sorption, poor adhesion to plastic teeth, and increased brittleness resulting in reduced impact resistance **(Cunningham et al., 2000).**

1.8 Repair Techniques Of Removable Complete Denture

1.8.1 Midline Fractures

Repair of such fractures is not recommended if the fractured fragments cannot be accurately approximated. The techniques for maxillary or mandibular prostheses are similar **(Gleiznys, 2020).**

1.8.1.1 Causes of midline fracture

1. No or insufficient relief in the midline.
2. Ridge resorption with loss of relief effect **(Zarb et al., 2004).**

1.8.1.2 Midline repair technique

1. The two broken parts of the dentures are aligned together in their right position and fixed by a sticky wax on the polished surface.

2. Then the parts may be strengthened with burs or plastic sticks in their right position as in **Figure (1.1 B)**

3. Blocking out of undercuts is on the surface with wax as in **Figure (1.1 C)**

4. Then pour the stone into the fitting surface and allow the stone to set, then after that, the denture is removed from the cast, clean the denture from any traces of sticky wax.
5. Reducing the Fractured edges and widened for about (8-10mm) along the fracture line and beveled towards the polished surface to increase surface area for bonding as in **Figure (1.1 D)**
6. To increase the strength of the repair joint, the dovetail cuts should be made.
7. Painting the cast with a separating medium and securing the denture with rubber bands to the cast.
8. Applying Cold-Curing resin to the modified fracture area until the area is overfilled.
9. Relief of the median palate raphe **(Zarb et al., 2004).**

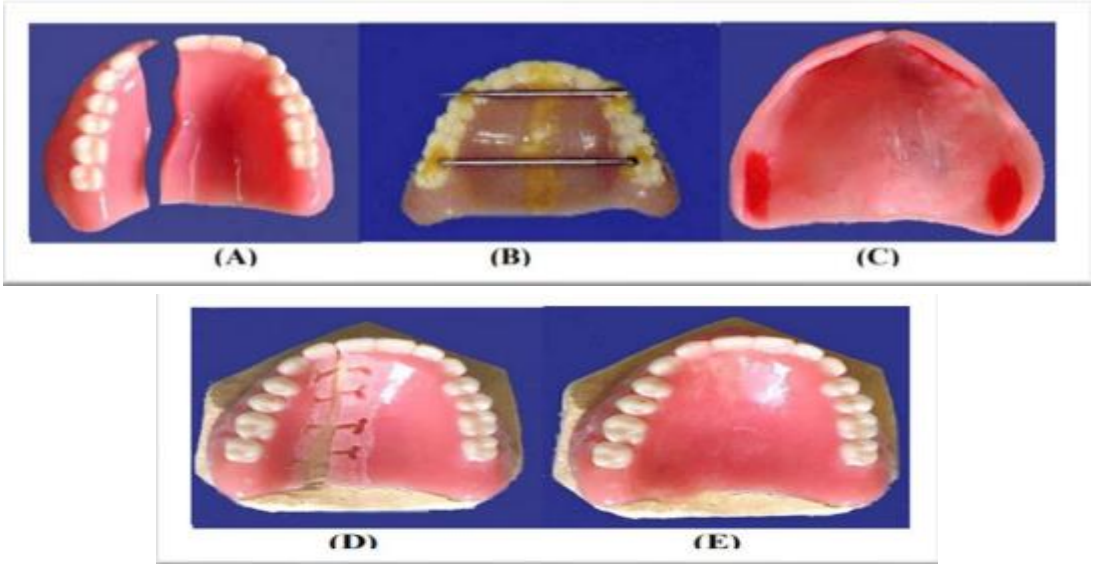

Figure (1.1): Midline fracture repair of the upper denture. (A) denture with midline fracture (B) fixed two broken parts together with sticky wax (C) block out the undercuts (D) reducing the area along the fractured line (E) completed denture repair (Zarb et al., 2004)

1.8.2 Replacing A Fractured Tooth/Teeth

1.8.2.1 Fractured porcelain teeth

The material of the denture base should be cut away from the lingual surface of the fractured tooth. Push the tooth fragment into lingual space and remove it. This technique will maintain the buccal / labial contour in order condition **(Sarandha et al., 2007).**

1.8.2.2 Fractured acrylic teeth

Fall away the remaining fragment of the acrylic teeth carefully and limit grinding of the tooth material. The buccal / labial contour should be maintained in order condition. Cold cure acrylic is used to reduce the reheating of old denture base. Modify the selected teeth to fit into the fractured tooth space and Cold-Cure acrylic is used to attach it to the denture base as in **Figure (1.2) (Sarandha et al., 2007).**

Figure (1.2) Replacement of fractured tooth in complete denture. (A)denture for fractured tooth (B) removal of fractured tooth (C) completed repair (Sarandha et al., 2007)

1.8.3 Lost Tooth Or Teeth

Occasionally, teeth are knocked off a complete denture by a traumatic blow, or because the denture tooth was not bonded adequately to the base **(Driscoll et al., 2020).**

If the denture opposes a natural dentition or a restored arch, then an impression of the opposing arch plus an interocclusal record will be required. The denture being repaired may thus be articulated against a model of the opposing arch, and the teeth set up without the creation of occlusal discrepancies as in **Figure (1.3) (Grant et al., 2016).**

Figure (1.3) Tooth replacement in complete denture. (A)(B) denture for tooth replacement (C)(D) tooth replacement by sprinkle on method (E) replaced teeth in the denture. (Grant et al., 2016)

1.8.4 Fractured Flanges

The deficient piece of the flange is replaced by forming a tracing compound onto the lost area of the flange. Then the cast is poured and the tracing compound is replaced with acrylic resin after a suitable separation of the cast **as in figure (1.4) (Grant et al., 2016).**

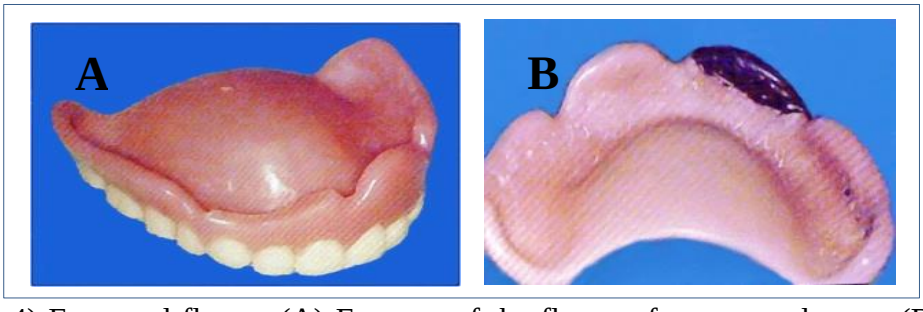

Figure (1.4) Fractured flange. (A) Fracture of the flange of an upper denture (B) flange replaced using impression compound (Choudhary and Shweta, 2019)

1.8.5 Fractured Flange Plus Tooth Or Teeth

This type of repair may be better combined with a re-base and it is often advantageous to replace the lost area of the flange with a tracing compound and to take an impression of the opposing arch plus an inter-occlusal record **(Grant et al., 2016).**

1.8.6 Replacement Of Posterior Teeth

This may be necessary because of a need to alter the vertical dimension of occlusion, due to a gross error in occlusion, or patient preference **(Ye and Sun, 2016).**

The Technique Of Replacing Posterior Teeth Is As Follows:

1. Ensure that both retruded contact position and occlusal vertical dimension are confirmed and that the casts are placed on a semiadjustable articulator following face-bow transfer and appropriate settings of sagittal and lateral condylar inclines.

2. Block out undercuts on the fitting surface, pour a cast onto the impression surface of the denture, and articulate the dentures.

3. Remove the appropriate posterior teeth; if acrylic, by grinding and if porcelain by heating the acrylic enveloping the teeth, and removing with an appropriate instrument as in **Figure (1.5 B)**

4. Remove sufficient denture base to accommodate replacement teeth.

5. Wax teeth to replacement position as in **Figure (1.5 C)**

6. Make indices of the buccal and occlusal surfaces of the teeth in their new positions as in **Figure (1.5 D)**

7. Remove indices plus teeth.

8. Remove wax, roughen the surface of the prepared denture base, replace indices with attached teeth and add acrylic, incrementally.

9. When curing has been completed as in **Figure (1.5 E)**, ensure occlusion is unaltered, polish the denture and re-confirm the occlusion clinically **(McCord et al., 2016).**

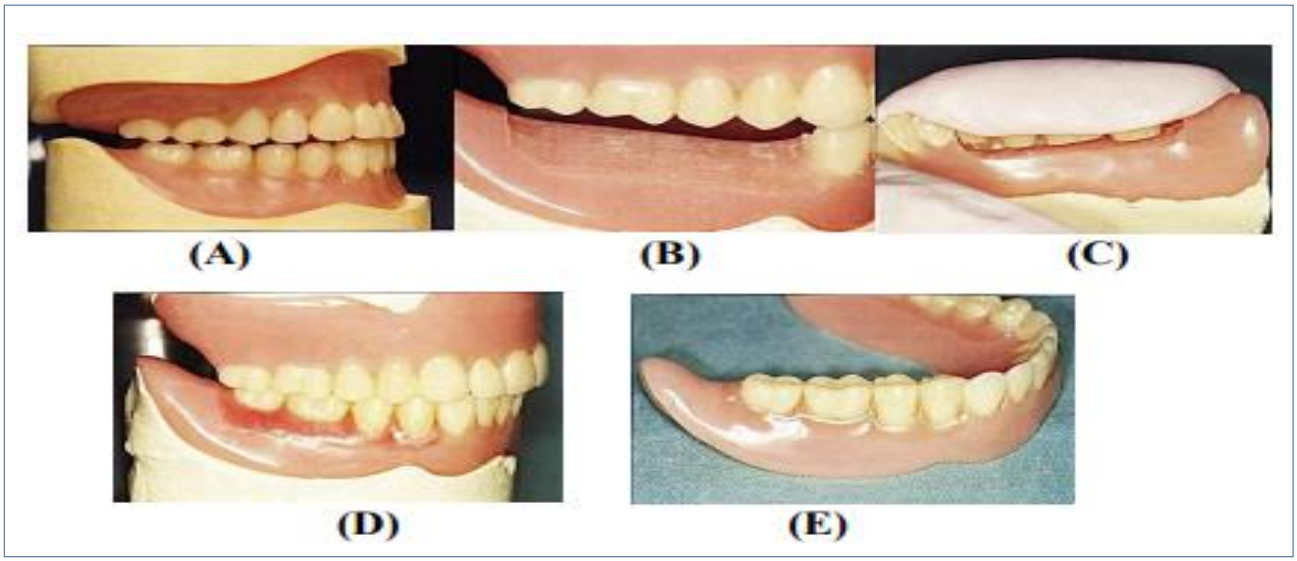

Figure (1.5) Posterior teeth replacement. (A) occlusal error requiring replacement of the lower posterior teeth (B) removal of the teeth (C) lower teeth waxed in position (D) silicone rubber index prepared (E) repair completed. (Grant et al., 2016)

1.9 Repair Techniques Of Removable Partial Denture

1.9.1 Denture Base Repair

1.9.1.1 Available broken segments

If the broken segments are available and can be accurately repositioned the following is done:

1. The sections are held together and luted with sticky wax along the fracture line as in **Figure (1.6 A)**
2. Dental stone is poured against the tissue side of the denture base, when the stone set, the denture is removed and the sticky wax is cleaned.
3. The denture is separated along the fracture line.
4. The fractured margins are dovetailed as in **Figure (1.6 B)**
5. The separating medium is applied over the cast.
6. The pieces of the denture are assembled and held in position. Auto-polymerizing resin is added along the fracture line by the sprinkle-on method as in **Figure (1.6 C)**
7. It is placed in a heated pressure pot to complete the curing **(Stig et al., 2013).**

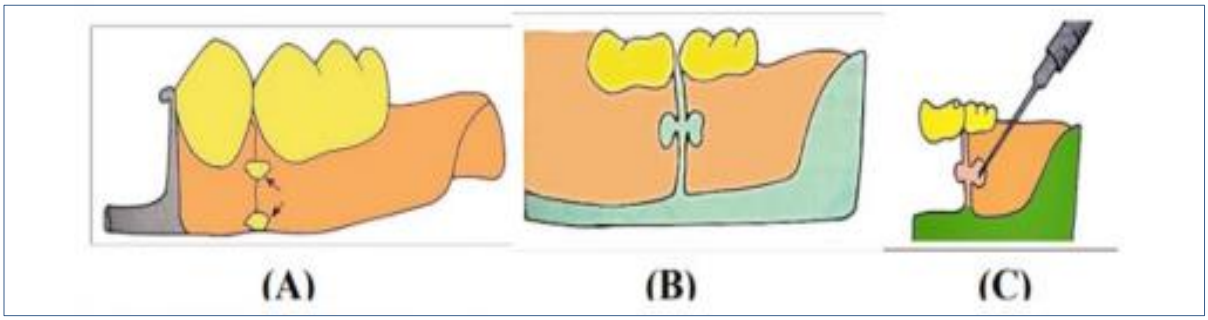

Figure (1.6) Denture base repair. (A) Broken parts of the denture base are approximated with sticky wax (B) the fractured zone is relined with dovetail grooves (C) adding the repair resin. (Stig et al., 2013)

1.9.1.2 Lost broken segments

If the broken segments are lost or cannot be re-positioned the following is done:

1. They are discarded in such cases, and the modeling plastic is added and contoured in the defective area as in **Figure (1.7)**
2. The impression is made without displacing soft tissues.
3. The repair is done as a ‘rebase’ procedure **(Stig et al., 2013).**

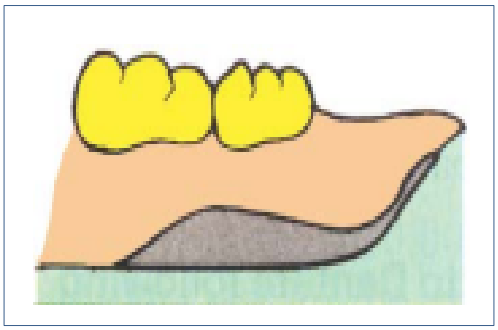

Figure (1.7) Molding of the border of denture base. Deficient borders of the denture should be border molded (Taylor, 2017).

1.9.2 Broken Clasp Arms

1.9.2.1 Reasons for the breakage of clasp arms

1. Breakage may result from repeated flexure into and out of too severe an undercut. If the periodontal support is greater than the fatigue limit of the clasp arm, failure of the metal occurs first otherwise, the abutment tooth is loosened and eventually is lost because of the persistent strain that is placed on it however, locating clasp arms only where an acceptable minimum of retention exists, as determined by an accurate survey of the master cast can prevent this type of breakage **(Carr et al., 2021).**

2. Breakage may occur as a result of structural failure of the clasp arm itself, a cast clasp arm that is not properly formed or is subject to careless finishing and polishing eventually will break at its weakest point this can be prevented by providing the appropriate taper to flexible retentive clasp arms and uniform bulk to all rigid non-retentive clasp arms **(Carr et al., 2021).**

3. Breakage may occur because of careless handling by the patient. Any clasp arm will become distorted or will break if subjected to excessive abuse by the patient, the most common cause of failure of a cast clasp arm is distortion caused by the accidental dropping of the removable partial denture **(Carr et al., 2021).**

1.9.2.2 Method of the repair of broken clasp arm

1. The remaining part of the original clasp arm is first to cut off flush with the point of origin of the clasp.
2. A hole is then drilled just below the adjacent denture tooth as in **Figure (1.8 B)**, from this hole a groove is cut in the resin base long enough to accommodate sufficient length of the wrought wire.
3. A piece of 18-gauge wrought wire is shaped and adapted to fit the groove as in **Figure (1.8 B).**
4. A right-angle bend is made at the end of the wire.
5. A straight portion is left emerging from the resin base at the point of origin of the new clasp arm.
6. The projecting wire is then cut off to the required length and adapted to the abutment tooth on the master cast to serve as a new retentive clasp arm as in **Figure (1.8 C)**, the wire is fixed to the base with chemically activated resin **(Niarchou et al., 2011).**

Figure (1.8) Fractured direct retainer on canine abutment. (A) Fractured arm, and the height of contour is shown in pencil with red line shown the position of the clasp arm. (B) Clasp adapted to the designated line on the canine and fitted into the resin. (C) finished and polished wire repair from the buccal. (D) Palatal view (Carr et al., 2021).

1.9.3 Occlusal Rest Repair

Breakage of an occlusal rest almost always occurs where it crosses the marginal ridge. Improperly prepared occlusal rest seats are the usual cause of such weakness. An occlusal rest that crosses a marginal ridge that was not lowered sufficiently during mouth preparations may be made too thin or maybe thinned by adjustment in the mouth to prevent occlusal interference. Failure of an occlusal rest rarely results from a structural defect in the metal and rarely if ever is caused by accidental distortion. Therefore, the blame for such failure must often be assumed by the dentist for not having provided sufficient space for the rest during mouth preparations **(Singh, 2013).**

1.9.3.1 Soldering repair technique of broken occlusal rests

1. In preparation for the repair, it may be necessary to alter the rest seat of the broken rest or to relieve occlusal interferences.
2. With the removable partial denture in its terminal position, an impression is made in irreversible hydrocolloid and then is removed, with the removable partial denture remaining in the impression.
3. The dental stone is poured into the impression and is allowed to set. The removable partial denture is removed from the cast, and platinum foil is adapted to the rest seat and the marginal ridge and overlaps the guiding plane.
4. The removable partial denture is returned to the cast and, with a fluoride flux, gold solder is electrically fused to the platinum foil and the minor connector in sufficient bulk to form an occlusal rest.
5. An alternative solder to use is an industrial brazing alloy, which is higher fusing but responds excellently to electric soldering and does not tarnish **(Singh, 2013).**

1.9.4 Repair Of Major And Minor Connecters

Major or minor connectors usually do not break because they have adequate bulk of metal. A major connector may weaken due to frequent adjustments to overcome adaptation or tissue impingement problems. Additionally major connectors which are not rigid and indicated in only some particular situations like Kennedy bar may weaken after sometime; and the weakened parts cannot tolerate intraoral stresses and may break as in **figure (1.9).**

Misuse of the patients may also be a reason of the distortion of the major or minor connectors. Usually clinicians choose the option to reconstruct the RPDs when the major connectors are broken **(Geckili et al., 2016).**

Figure (1.9): Fractured connector (Aditama et al., 2019).

1.9.4.1 Repairing procedures of major or minor connecter

1. Breakage of major connector happens rarely, except for the lingual bar major connector which breaks at its junction with retentive latticework. A new segment is cast and attached to the framework with solder the same can be done following breakage of the minor connector.
2. Major and minor connectors also need repair when the denture has been distorted and does not completely and passively seat on the abutment teeth.
3. The framework is sectioned with a carborundum disc and the sections are seated in the mouth. The sections should have an adequate fit or the entire framework should be remade
4. A plaster or resin index is used to record the relationship of the sectioned parts in the mouth. The sectioned denture with the index is sent to the laboratory where they are soldered and finished.

5. Following the loss of several teeth, a denture base minor connector may need to be added to the framework. An accurate repair cast with the existing partial denture is made along with an opposing cast for articulation. Loops of 18gauge wire can then be soldered to the framework for fabricating the minor connector. Alternately, sections of standard retentive mesh or latticework can also be soldered to the framework. An internal and external finishing line is mandatory **(Rangarajan et al., 2017).**

1.9.5 Replacement Of Additional Lost Natural Teeth

If for some reasons a tooth is to be extracted such as decay or periodontal disease, the addition of a denture tooth to the RPD to replace a natural tooth lost is usually a simple procedure when the partial denture base is made of resin, but when the base is made of metal the procedure is more complex and necessitates either casting a new component and adding it by soldering, or creating retentive elements for the attachment of a resin extension carrying Loss of an additional tooth.

Often adding of a tooth could be considered a real emergency if the tooth loss is for an anterior tooth. The tooth can be replaced as an addition after the natural tooth has been extracted and initial healing has taken place, and this is often the preferred way, as an immediate replacement followed by the extraction **(Brudvik et al., 1999).**

1.9.5.1 Adding an individual tooth

This procedure varies according to the design of the major connector. If there is a lingual plate, a retention loop for the added tooth can be directly

soldered to the framework. Later the denture tooth is trimmed and placed over this retention loop.

If there is no plate on the lingual side then a new retentive loop with a plate is cast and soldered to the existing framework. An internal finish line should be created for better adaptation of resin **(Renne et al., 2010).**

1.9.5.2 Adding multiple teeth

1. The base is redefined with modeling plastic in the area of the missing teeth.
2. Alginate over-impression is made over the partial denture.
3. A cast is poured.
4. An opposing cast with a centric occlusion record is articulated.
5. Denture base is prepared with resin.
6. A retentive clasp arm is made of wrought wire and attached to the resin or electro soldered to the framework near the added denture teeth **(Davda and Davda, 2014).**

1.9.6 Fractured Or Lost Artificial Teeth Repair

When the acrylic resin denture tooth is fractured, the procedure for repair and replacement of acrylic resin denture teeth is as follows:

1. The fractured tooth must be carefully cut out to create space in the denture base for a similarly sized new denture tooth. This should be accomplished at slow speed with an acrylic bur.
2. A new denture tooth is selected, adjusted to fit the repair site, and checked to ensure that there is adequate room for the auto polymerizing acrylic resin.

3. The denture tooth is luted in position with sticky wax, an index is made as shown in **Figure (1.10) and Figure (1.11)**, and new auto polymerizing acrylic resin is applied, processed, and finished.
4. Occasionally the anterior denture teeth are positioned against the residual ridge to eliminate a denture flange. In these instances, when an anterior denture tooth is fractured, an impression must be made with the RPD in place and the repair must be carried out to completion on a dental stone cast.
5. An alternate, temporary method to repair a fractured or lost denture tooth on an RPD is to add tooth-colored acrylic resin to the prepared defect site. The mass can be reshaped to simulate the denture tooth after the polymerization of the acrylic resin is completed as in **Figure (1.12).**
6. When denture teeth are repaired on an RPD, the occlusion of the RPD in centric and eccentric positions must be carefully checked and adjusted as necessary **(Fayyad and Nassouhy, 2017).**

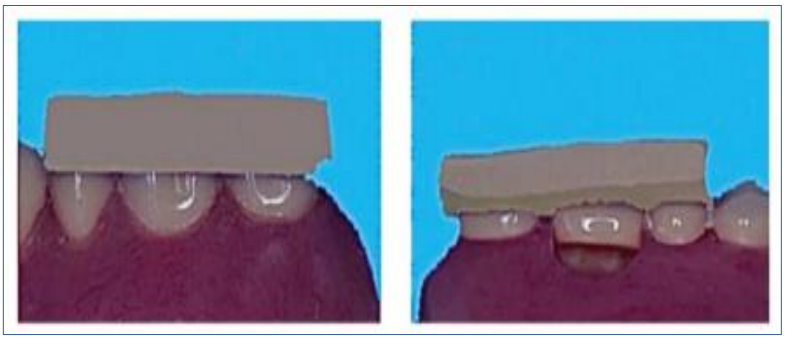

Figure (1.10) Making of stone index. With the denture tooth secured in the correct position, A dental stone index is made utilizing a thick hand mix of stone and water (Fayyad and Nassouhy, 2017).

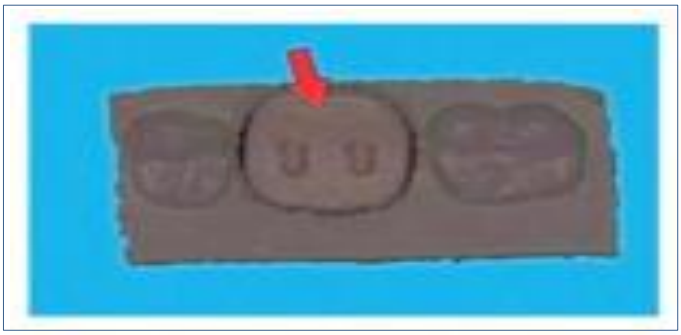

Figure (1.11) Removal of the stone index. The stone index is removed, the denture tooth is removed and cleaned and small retentive undercuts are provided (arrow) for mechanical retention as well as chemical bonding (Fayyad and Nassouhy, 2017)**.**

Figure (1.12) Adding of auto polymerizing acrylic resin (Fayyad and Nassouhy, 2017).

1.9.7 Constructing A Crown Under Existing RPD

1. If the abutment is grossly decayed, a crown should be inserted such that it synchronizes with the design of the existing RPD.
2. The tooth preparation is similar to a conventional crown preparation.
3. Additional reduction is done in the area of rest seat preparation.
4. Impression for the crown is made with the RPD in place.
5. The wax pattern is contoured such that it has the least interference with the existing RPD.
6. The crown is fabricated in the conventional manner.
7. Porcelain veneering of the crown can be done if needed **(Deepak et al., 2017).**

1.10 Preservation Of The Dentures

Maintenance and Patient Instructions Patient preparation and instruction are continuing, ongoing communications that are part of every appointment and procedure. However, the patient will retain more information for a longer period if it is written and repeated several times **(chang et al., 2019).**

It is important that the patient is instructed in proper placement and removal of the prosthesis so that undue strain is not placed on clasp arms, on other parts of the denture, or on contacted abutment teeth. The patient also should be advised that care must be given to the prosthesis when it is out of the mouth, and that any distortion may be irreparable. It should be made clear that there can be no guarantee against breakage or distortion from causes other than obvious structural defects **(şakar et al., 2016).**

1.11 Instructions For RPD Insertion And Maintenance

1.11.1 Placement Of The Prosthesis

Insert and seat the RPD using the fingers. Never instruct the patient to "bite" the prosthesis into place. This action could bend or break the prosthesis or cause harm to the remaining teeth. Make sure that the patient practices placement and removal of the prosthesis in front of a mirror **(Beumer et al., 2019)**.

1.11.2 Removal Of The Prosthesis

Instruct the patient to remove the prosthesis at night and store it in water. To avoid bending the prosthesis or damaging the dentition, instruct

the patient to remove the prosthesis along the same path used during insertion **(Beumer et al., 2019).**

1.11.3 Cleaning The Prosthesis

1. Clean the prosthesis and the natural dentition after every meal or snack.
2. Use care when cleaning the prosthesis. Avoid dropping the prosthesis and scrub it over a basin filled with water or a towel.
3. Hold the prosthesis carefully and avoid squeezing and bending flexible parts such as the retainers **(Beumer et al., 2019).**

1.11.4 Follow-Up Examinations

The patient is given an appointment 24 hours post-insertion. Areas causing irritation or discomfort should be relieved immediately. PIP is used to identify pressure areas on the denture-bearing surfaces, and disclosing wax is used to identify sections of the denture flanges that are overextended. If further difficulties are anticipated, the patient is given an appointment the following day. Otherwise, the next follow-up appointment should be scheduled 1 week later. This will ensure that the patient will transition smoothly through the accommodation stage with minimum difficulty **(Chang et al., 2019).**

Chapter Two

2.1 Conclusion

1- There are several types and causes of dentures fractures.

2- It is possible to repair an existing denture to extend its life and maintain the dentures.

3- The dentures could repair with several techniques depending on the type and site of fracture.

4- Clarifying the best materials used in repairing the denture.

5- Repair is a useful tool in dental practice to keep an existing denture serviceable and is often very popular with the patient.

6- Care should be taken to make sure all alternatives have been considered and discussed with the patient.

7- The patient attitude in preserving of their dentures play an important role in denture protection and maintenance.

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