

DIPLOMA OF PRIMARY CARE DENTISTRY

-RCSI-

PART – 1

CLINICAL SKILLS

PART 1: RESTORATIVE DENTISTRY

PROSTHODONTICS

A. PROSTHODONTICS:

⇒ Treatment planning for patients with missing teeth:

Solutions for missing teeth will vary depending on the number, their location and function, and the patient's wishes. A minimally invasive approach is preferable where possible.

For those with insufficient teeth for satisfactory function and aesthetics, fixed or removable prosthodontic solutions will be needed.

➤ Indications for the replacement of missing teeth:

- Increase masticatory efficiency.
- Improve speech.
- Preserve or improve health of the oral cavity by preventing unwanted tooth movements (vertical/rotational/tipping/driftng).
- Improve distribution of occlusal loads.
- Space maintenance.
- Restore aesthetics.
- Prepare patient for complete dentures.

➤ Options for the replacement of missing teeth:

1. No replacement:

First consider whether benefits of replacing missing teeth (improved mastication, speech, occlusal stability, and aesthetics) outweigh disadvantages (increase oral stagnation, tooth preparation, cost). If not, then replacement is contraindicated.

2. Bridges:

Conventional bridges can have good appearance, but are destructive of tooth tissue, moderately expensive, and require lengthy clinical time.

3. Removable partial dentures:

These can be minimally invasive as only minor (or no) tooth preparation is required but they increase plaque accumulation/changes in composition.

Can be a good option when there are multiple edentulous areas or as a training/interim appliance prior to F/F.

Can be used to replace missing soft tissue and aesthetics can be very good but patients often dislike removable prostheses.

4. Complete immediate dentures:

These are indicated for patients who have already mastered wearing a partial denture and whose remaining teeth have a poor prognosis.

5. Complete dentures:

These require patient compliance as well as good clinical and technical management for success. They can replace hard and soft tissue, but patients tend to dislike them and successful denture control can be difficult for patients to master.

⇒ **In the older**, partially dentate patient it is important to assess whether the patient is likely to retain some functional teeth for the remainder of their lifespan.

6. Orthodontic space closure:

This is an option that is seldom used but may be appropriate, particularly in the imbricated dentition.

✚ Treatment planning:

- If replacement is indicated: consider fixed or removable prosthesis.

⇒ Factors affecting this decision:

General	Local
Patient's motivation/condition	OH and periodontal health
Age	Number of missing teeth
Health	Position of missing teeth
Occupation	Occlusion
Cost	Condition of potential abutments
	Length of span
	Degree of resorption

- Removable prostheses are indicated if general or local factors are less than ideal.
- Always consider implants or shortened dental arch therapy.
- Modify design if necessary and commence prosthetic treatment.

Bridges:

⇒ Types of bridges:

1. **Fixed–fixed:**

The pontic is anchored to the retainers with rigid connectors at either end of the edentulous span. Both abutments provide retention and support. Both preparations must have at least one common path of insertion to allow the prosthesis to be fully seated.

2. **Fixed–movable:**

The pontic is anchored rigidly to the major retainer at one end of the span and via a movable joint to the minor retainer at the other end. The major abutment provides retention and support while the minor abutment provides support only. This design allows some independent movement of the minor abutment and has the advantage that the preparations need not be parallel.



3. **Direct cantilever:**

Pontic is anchored at one end of the edentulous span only.

4. **Spring cantilever:**

A tooth-retained, mucosal-supported bridge. Usually, an upper incisor is replaced from the premolars or a molar. It is useful where there is an anterior diastema or if the posterior teeth are heavily restored; however, they are often poorly tolerated. These are rarely used now.

5. **Minimal or no preparation resin-bonded bridges:**

Retained by resin composite. May be adhered by glass ionomer adhesives when considered for temporary purposes.

6. **Compound/hybrid Combination of more than one of the types listed.**

⇒ Types of retainers:

- Full coverage crown.
- Three-quarter crown.
- Onlay.
- Inlay.

All of these restorations are listed in order from most retentive to least retentive.

⇒ Selection of abutment teeth:

General factors must be taken into account: caries status and existing restorations. Also, two other considerations specifically relate to bridgework—retention and support.

A. Assessment of retention:

- Retention offered by a potential abutment tooth depends on clinical crown height and the available surface area.
- It is important to assess the amount of enamel present for retention for resinbonded bridges.
- Obviously, larger teeth offer more retention and should be chosen in preference to smaller ones.

B. Assessment of support: Three factors are important:

1. Crown–root ratio
2. Root configuration.
3. Periodontal surface area.

⇒ Taper and parallelism:

- For most designs, abutments should be prepared with a common path of insertion.
- Opposing walls of abutments should have a 6° taper or a total degree of convergence of 12°.
- Checking parallelism: direct vision, with one eye; survey mirror with parallel lines inscribed.

⇒ Types of pontic:

1. Modified ridge lap:

This type of pontic should make (minimal) contact with the buccal aspect of the ridge. Gives good aesthetics and is the most popular type.

2. Bullet:

Makes point contact with the tip of the ridge. Can be used for posterior bridgework.

3. Ovate:

Aims to address the issue of emergence profile in the maxillary anterior region. Has greater mucosal contact and applies light pressure to the underlying mucosa. Needs a smooth, convex surface to allow flossing. The patient must have excellent OH.

4. The 'modified ovate pontic':

It lies slightly more labial to the ovate pontic, so tends to be used more in aesthetic areas.

5. Hygienic:

Does not contact saddle, therefore supposedly easy to clean but can still be challenging and may lead to food packing if insufficient clearance. **Unesthetic**, therefore limited to molar replacement.

6. Saddle (ridge lap):

Extends over ridge buccally and lingually, therefore difficult to clean. Should not be used.

⇒ **Most common reasons for bridge failure:**

- Loss of retention.
- Mechanical failure, e.g. # of casting.
- Problems with abutment teeth, e.g. 2° caries, periodontal disease, loss of vitality.

⇒ **Management of failures:**

- Depending upon type and extent of problem:
 - Keep under review.
 - Adjust or repair in situ.
 - Replace.

▽ **Resin-bonded bridges:**

This type of bridge is almost exclusively used for cantilever adhesive bridgework, i.e. one abutment and one pontic.



○ **Advantages:**

- Less expensive than conventional bridge or cobalt chromium partial denture or implant in the shorter term.
- Minimal or no tooth preparation required.
- No LA required as preparation is in enamel.
- Potential for rebond if debond occurs.

○ **Disadvantages:**

- Tendency to debond especially if planning and preparation and placement technique is poor.
- Metal may show through abutments.
- Creation of a natural emergence profile can be challenging especially in very resorbed ridges. Use of an ovate pontic can be helpful.

○ **Indications:**

- Short span-single tooth edentulous space.
- Sound abutment teeth (or only minimal restoration) and sufficient crown height to ensure sufficient surface area for acid etch bonding.
- Favourable occlusion.

○ **Problems:**

- Dentine exposed during preparation: use a dentine adhesive system.
- Debonds.
- Caries occurring under debonded wings.

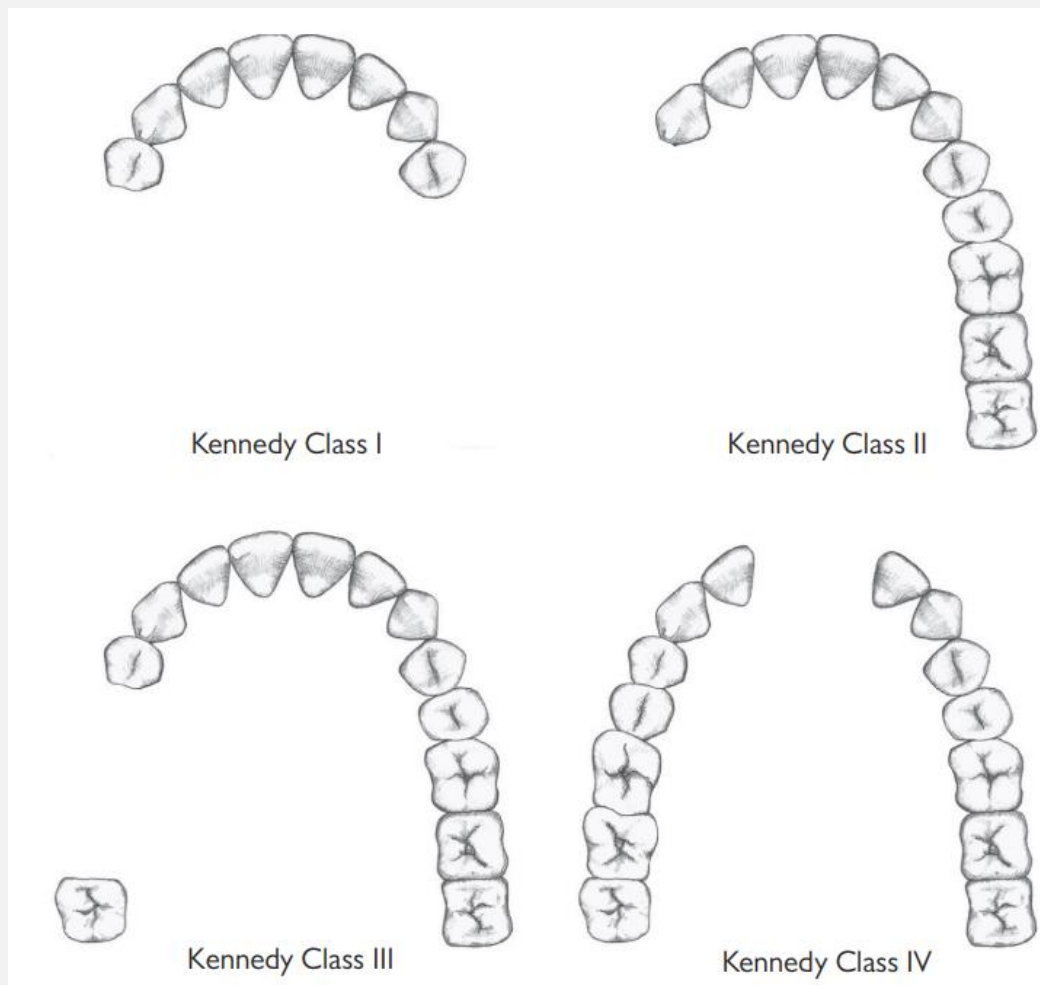
+ Removable partial dentures:

- Classification:

• Kennedy Describes the pattern of tooth loss:

- Bilateral free-end saddles.
- Unilateral free-end saddle.
- Unilateral bounded saddle.
- Single, anterior bilateral bounded saddle: must cross the midline.

⇒ Any additional saddles are referred to as modifications (except Class IV), e.g. Class I modification 1 has bilateral free-end saddles and an anterior saddle.



⇒ Craddock Describes the denture type:

- Tooth-borne.
- Mucosa-borne.
- Mucosa- and tooth-borne.

⇒ Acrylic versus metal dentures:

- Approximately 75% of the dentures provided in the UK have an acrylic connector and base. Although metal bases are generally preferred because the greater strength of metal permits a more hygienic design, an acrylic base is indicated for:
 - Temporary replacement, e.g. following trauma or in children.
 - Where there is inadequate support from the remaining teeth for a tooth-borne denture.
 - When additions to the denture are likely in the near future. However, where financial constraints C/I a metal base.

⇒ Removable partial dentures—components:

1. Saddles:

These can be made entirely of acrylic or have a sub-framework of metal overlaid by acrylic.

2. Rests:

These are an extension of the denture onto a tooth to provide support &/or prevent over-eruption. Occlusal rests are used on posterior teeth (usually over either the mesial or distal marginal ridge and fossa) and cingulum rests on anterior teeth.

Rests may be wrought or cast; the latter is preferred for strength and fit.

3. Clasps:

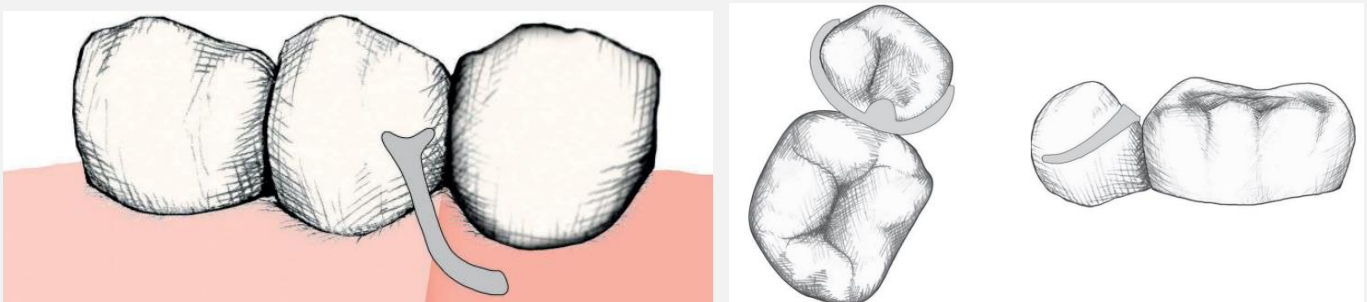
These provide direct retention by engaging the undercut portion of a tooth.

The action of a clasp must be resisted either by a non-retentive clasp arm above the maximum bulbosity of the tooth or by a reciprocal connector.

Clasps can be classified by their construction and material or by their position:

- Occlusally approaching.
- Gingivally approaching.

A minimum length of 14mm is generally advocated for cobalt– chrome clasps to prevent rapid distortion.



⇒ **Connectors:**

In addition to joining parts of the denture together, the connector can also contribute to support and retention, its types:

- **Lingual bar:** should only be used if there is >7mm between floor of mouth and gingival margin to give 3mm clearance from gingivae. Does not contribute to indirect retention. Usually cast. C/I if incisors are retroclined. If insufficient space can use sublingual bar.
- **Sublingual bar:** lies horizontally in anterior lingual sulcus, but opinions differ as to patient tolerance. More rigid than lingual bar.
- **Lingual plate:** is well tolerated and provides good support, bracing, and indirect retention if used in conjunction with rests but covers gingival margins. Can be made of cast metal or acrylic.
- **Continuous clasp:** is really a bar which runs along the cingulum of the lower anterior teeth and is usually used in conjunction with a lingual bar. Poorly tolerated.
- **Dental bar:** is similar to continuous clasp, but of i cross-sectional area and without lingual bar. Useful for teeth with long clinical crowns. Provides support and indirect retention. May not be well tolerated.
- **Buccal/labial bar:** is indicated when the lower incisors are retroclined.

⇒ **Some design problems:**

A. The lower bilateral free-end saddle (Class I) :

- This presents a particular problem because of a lack of tooth support and retention distally, small saddle area compared to force applied, and distal leverage on abutment tooth in function (which increase with resorption).
- Possible solutions include:
 - Maximize indirect retention by placing rests and clasps on mesial aspect of the abutment tooth and using lingual plate design.
 - Using a muco-compressive impression of saddle area to d displacement in function—the altered cast technique.
 - Use fewer, smaller teeth and maximize base extension.
 - RPI system for distal abutment teeth—mesial Rest, distal guiding Plate, and mid-buccal I bar.

B. Class IV Can sometimes avoid unsightly clasps anteriorly by the use of:

- A flange engaging a labial alveolar undercut.
- Avoiding distal facing clasps. A mesial-facing clasp will engage more as the anterior saddle tries to drop/rotate out.
- A rotational path of insertion utilizing rigid minor connectors that are rotated into proximal undercuts anteriorly.
- Interproximal undercuts, which may allow minimal display of clasps— 'hidden clasps'.



Immediate complete dentures:

When the remaining teeth have a poor prognosis, the transition from the partly dentate to edentulous state must be managed carefully.

⇒ Types of immediate complete denture:

- Flanged: either full or part (extended 1mm beyond maximum bulbosity of ridge).
- Open face: no flange, artificial teeth sit over (or just into) the socket of the natural predecessor.

Flanged dentures are preferable as they afford better retention and make subsequent rebasing easier. However, where a deep labial undercut exists into which it would be impossible to extend a flange, the choice is either surgical reduction or an open-face denture. Most patients choose the latter.

⇒ Clinical procedures:

- 1° impressions
- 2° impressions in alginate or silicone.
- Recording occlusion.
- Try-in.
- Extraction of remaining teeth as atraumatically as possible.
- Finish.

⇒ Complete dentures—principles:

- Retention:

The resistance of a denture to displacement. It is dependent upon (i) peripheral seal, (ii) contact area between denture and tissues, (iii) close fit, and (iv) viscosity/volume of saliva. Neuromuscular control has more to do with stability than retention.

- Stability:

The ability of a denture to resist displacing forces during function. Influenced by forces acting on polished and occlusal surfaces, as well as the form of the supporting tissues.

- Neutral zone:

The area where the muscular displacing forces are in balance.

⇒ Common denture faults:

- Lack of freeway space (FWS).
- Failure to reproduce closely enough the features of previous successful dentures.
- Occlusal errors.
- Incorrect adaptation and extension

⇒ Complete dentures—impressions:

Classically, two sets of impressions are recorded of the edentulous mouth.

The purpose of the first is to record sufficient information for a special tray to be made in which to record the second or master impression.

1. Preliminary impressions:

- These are recorded using an (edentulous) stock tray and alginate, elastomer (both preferable for undercut or flabby ridges), or impression compound.
- A line should be marked on the impression to indicate to the technician the desired extension of the special tray.
- In the upper, the posterior limit should be the hamular notches and the vibrating line, and in the lower the retromolar pads.
- Special trays: these can be made in self-cure or light-cure acrylic.
- The space left for the impression depends upon the material to be used: ZOE = 0.5mm; elastomer = 0.5–1.5mm (depending on viscosity); alginate = 3mm.
- For trays with >1mm space use greenstick stops clinically to aid positioning.

2. Master impressions:

- These aim to record the maximum denture-bearing area, and to develop an effective border seal, the functional width and depth of the sulcus.
- The special tray should be modified by reducing any over-extension and the peripheries adapted by the addition of greenstick tracing compound.
- Nonperforated trays ensure that a peripheral seal with the upper tray can be demonstrated before taking the impression.
- However, a perforated tray reduces the compression of tissue leading to a more mucostatic impression.
- Gently manipulate the patient's soft tissues and ask them to slightly protrude their tongue to imitate functional movements.

⇒ Muco-compressive versus muco-static:

- A muco-compressive impression technique is sometimes advocated to give a wider distribution of loading during function and to compensate for the differing compressibility of the denture-bearing area, thus preventing # due to flexion. ZOE or composition is used.
- However, dentures made by this method are less well retained at rest, which is the greater proportion of time. Alginate is said to be more muco-static.

⇒ Special techniques:

1. Neutral zone impression technique:

This is used for recording the neutral zone in patients with limited natural retention.

2. Functional impression:

Tissue conditioner is placed inside the patient's existing denture. After several days of wear a functional impression is produced.

⇒ Common impression problems and faults:

- A feather edge indicates under-extension: this can be corrected by the addition of greenstick to the tray and repeating.
- Tray border shows through impression material: reduce tray in the area of over-extension and repeat the impression.
- Air blows: if small, can be filled in with a little soft wax. If large, retake the impression, or if using silicones or ZOE the impression may be added to.
- Tray not centred: often partially due to using too much material so that it is difficult to see what is where.
- Patient with dry mouth: ZOE is C/I; use elastomer instead.
- Areas where tray shows through in otherwise good impression: can be overcome by prescribing a tin-foil relief when dentures are being processed.

⇒ Type of articulator to be used for setting up the teeth:

Most textbooks advocate semi-adjustable or average value articulators for F/F dentures. However, most dentures are made on simple hinge articulators to the satisfaction of the majority of patients, probably because they are able to adapt to the occlusion that results. An average value type is the preferred method. It will give some degree of balanced articulation which can then be refined in the mouth and will help avoid the introduction of occlusal interferences.

⇒ Common pitfalls:

- Inaccuracies caused by poorly fitting bases.
- Rims contacting prematurely posteriorly and flipping-up anteriorly, or vice versa.
- Failure to provide adequate FWS: this is less likely to occur if the rest position is recorded with only one denture or rim in position.
- Attempting to correct too much when replacing old worn dentures and exceeding the adaptive capacity of the patient.

⇒ Fitting of Complete Denture:

- **Check occlusion:**

- The vertical dimension of the dentures is maintained by contact between the upper palatal and lower buccal cusps, therefore adjustment of these should be avoided if possible.
- Get patient to occlude and check contact with articulating paper. If contact uneven, or heavy contacts seen, adjust the fossae.
- For cusped teeth only, place articulating paper between occlusal surfaces and ask patient to make small lateral movements and adjust buccal upper and lower lingual ('BULL' rule) cusps only to remove any interferences.
- Remove any interferences to protrusive movements.
- Balancing contacts are desirable, but not essential unless they can be established easily by minor adjustments to working side contacts.

⇒ Advice to the patient:

Verbal and written instructions should be given.

- Most patients take some time to adapt to their new dentures.
- During this time a softer diet is advisable.
- If pain is experienced, the patient should try to continue wearing their dentures and return for adjustment as soon as possible so that affected areas can easily be seen. If this is not possible, they should stop wearing the dentures until 24h prior to the next visit.
- Although patients should be encouraged not to wear their dentures at night, adaptation may be speeded up if they are worn full-time for the first 1–2 weeks.
- When the dentures are not being worn they should be stored in water to prevent them drying out and warping. Plastic denture boxes are cheap, and safer than a glass of water at the bedside.

- Cleaning dentures:
 - ✓ When new dentures are fitted, the importance of regular, thorough cleaning, especially of fitting surfaces, with soap, water, and a brush to prevent the build-up of plaque, stain, and calculus should be emphasized.

 - ✓ Unfortunately, few patients are sufficiently diligent, due in part to being conditioned by advertising, to expect to use a denture cleaner. Advise patients to clean their dentures over a basin of water to act as a safety net.

Table 7.5 Cleaning dentures—formulations

Formulation	Active ingredients	Problems
Powder	Abrasives, e.g. calcium carbonate	Abrasion
Paste	Abrasives + eugenol	Abrasion + crazing
(Dentu-creme [®])	Abrasive + phenol oil	Abrasion + sensitivity
Hypochlorite (Dentural [®])	Sodium hypochlorite	Can corrode metal
Effervescent (Steradent [®])	Dissolves to give alkaline peroxide solution	Doubts about effectiveness
Dilute acids (Denclen [®])	3–5% hydrochloric acid or 5–10% phosphoric acid	Can corrode metal
Enzymatic	Proteolytic enzymes	Not widely available

⇒ Hypochlorite solutions are effective for acrylic dentures when used overnight, but if used with hot water are liable to cause bleaching, therefore warn patient.

⇒ The peroxide cleaners are popular but are ineffective if used for only 15–30min as the manufacturers advise.

Table 7.6 Cleaning dentures—peroxide cleaners

	Avoid	Use
Visco-gel [®]	Acids, alkaline peroxide	Hypochlorite
Molloplast [®]	Acids, alkaline peroxide	Hypochlorite
Coe-Comfort [™]	Hypochlorite, alkaline peroxide	Soap + water
Metal denture	Hypochlorite	Alkaline peroxide
Any denture	Household bleach	

⇒ **Denture problems and complaints:**

- The most common complaints are of pain and/or looseness, which can be due to denture errors or patient factors.
- Unless the cause is immediately obvious, e.g. a flaw on the fitting surface, a systematic examination of the fitting and the polished and occlusal surfaces (including the jaw relationship) should be carried out.

1. Pain:

- This can be due to a variety of causes, including roughness of the fitting surface, errors in the occlusion, lack of FWS, a bruxing habit, a retained root, or other pathology.
- Forward or lateral displacement of a denture due to a premature contact can lead to inflammation of the ridge on the lingual or lateral aspect, respectively.
- With continued resorption, bony ridges become prominent and the mental foramina is exposed, which can lead to localized areas of specific pain.
 - ✓ Pain from an individual tooth:
 - Excessive load and/or traumatic occlusion.
 - Leverage due to unstable denture.
 - Clasp arm too tight.

2. Looseness: This more commonly affects the lower than the upper denture.

Table 7.7 Denture faults—looseness

Denture faults	Patient factors
Incorrect peripheral extension	Inadequate volume of saliva
Teeth not in neutral zone	Poor ridge form
Unbalanced articulation	↓ adaptive skills, e.g. elderly patient
Polished surfaces unsatisfactory	

3. Burning mouth:

- This can be due to:
 - a. Local causes like OVD or sensitivity to acrylic monomer, or be unrelated to the denture (e.g. irritant mouth washes, candidiasis).
 - b. Systemic causes: the menopause, deficiency states, cancerophobia, or xerostomia.

4. Cheek biting:

Check first that teeth are in the neutral zone.

5. Speech:

Table 7.8 Denture faults—speech

Patient's complaint	Possible cause
Difficulty with f, v	Incisors too far palatally
Difficulty with d, s, t	Alteration of palatal contour Incorrect overjet and overbite
An s becomes th	Incisors too far palatally Palate too thick
Whistling	Palate vault too high behind incisors
Clicking teeth	OVD Inadequate FWS Lack of retention

6. Recurrent fracture:

Apart from carelessness, this is usually caused by occlusal faults or fatigue of the acrylic due to continual stressing by small forces.

Flexing of the denture can occur with flabby ridges, palatal tori, and following resorption. Notching of a denture, e.g. relief for a prominent fraenum, can also predispose to #.

Treatment depends upon the aetiology, but in some cases provision of a metal plate or a cast-metal strengthener may be necessary.

⇒ **Candida and dentures:**

- Denture stomatitis:

- Also known as denture sore mouth, a misnomer because the condition is usually symptomless.
- Classically, seen as redness of the palate under a denture, with petechial and whitish areas.

➤ **Management:**

- ✓ Patients should be encouraged to remove their dentures at night.
- ✓ They should cleanse denture thoroughly, e.g. brushing fitting surface and soaking in hypochlorite cleanser.
- ✓ New dentures may be required if these measures fail despite good compliance. The denture can act as a reservoir for Candida.
- ✓ Reduce sugar intake.
- ✓ Miconazole gel can be added to the fitting surface of the denture before insertion.
- ✓ If suspect systemic factors exacerbating condition, refer to GMP.
- ✓ Coexisting papillary hyperplasia of palate may need surgical reduction.
- ✓ Systemic fluconazole may be used in some cases.

Overdentures:

- An overdenture (OD) derives support from one or more abutment teeth or implants by completely enclosing them beneath its fitting surface.
- It can be a partial or complete denture.

⇒ Advantages:

- Alveolar bone preservation around the retained tooth.
- Improved retention, stability, and support.
- Preservation of proprioception via PDL.
- Better crown-to-root ratio, which d damaging lateral forces.
- Increase masticatory force.
- Additional retention possible using attachments.
- Psychological benefits of maintaining natural teeth.

⇒ Disadvantages:

- RCT probably required.
- To avoid excessive bulk in region of retained tooth (which may compromise aesthetics), denture base may need to be thinned, which increase likelihood of #.
- Increase maintenance for both patient and dentist.
- Roots may be prone to caries.

⇒ Indications:

- Motivated patient with good OH.
- Because of d retention and stability and increase rate of mandibular resorption, ODs are particularly useful for full denture or free-end saddle.
- CLP.
- Hypodontia.
- Severe tooth wear.

⇒ Problems:

- The most important are:
 - Caries of abutment teeth, therefore need good oral and denture hygiene and topical fluoride, e.g. toothpaste, applied to the fitting surface of the denture. Patients should be encouraged to remove their denture at night.
 - Periodontal breakdown.