STARTER VOLUME (2nd Edition)

INDEX

TABLE OF CONTENT

Lithium disilicate restorations are fabricated using one of the following two processes:

Fig. 1.47: IPS e.max CAD block.

a. CAD/CAM MILLING

This involves chairside designing and fabrication of prosthesis where a block of LiDiSi is subjected to subtractive milling. This is then stained and glazed to achieve the final restoration.

b. HEAT PRESSING

This method is similar to the lost wax technique. It involves the fabrication of a wax pattern, which is invested and burnt-out. This leaves a mould into which the molten lithium disilicate is pressed. The restoration is then retrieved, finished, stained and glazed prior to its insertion.

Fig. 1.48: Cental incisor fabricated using the heat pressing technique.

LiDiSi restorations can be used in one of the following three designs (Fig. 1.46) based on the clinical requirement:

✦ MONOLITHIC

These are homogeneous LiDiSi restorations and depend on surface staining for an aesthetic outcome. Owing to it's monolithic nature, they enjoy the best mechanical properties and are usually used for restoration of posterior teeth.

✦ LAYERED

In this type, a LiDiSi coping is first heat pressed and then layered with compatible porcelain. Although, layering helps achieve lifelike aesthetics, it does reduce the overall strength of the prosthesis. Thus, layered LiDiSi prostheses are usually restricted for use in high demand aesthetic cases with stable occlusion.

✦ CUT-BACK

In this type, the monolithic restoration is cutback at the incisal edge and layered with compatible porcelain (to achieve aesthetics). Thus, cut-back prostheses have advantages of both, the monolithic and the layered design.

IPS e.max from Ivoclar Vivadent is the most widely used LiDiSi material globally. It is available in various translucencies and opacities:

- ★ HT (High translucency).
- ★ MT (Medium translucency).
- ★ LT (Low translucency).
- ★ MO (Medium opacity).
- ★ HO (High opacity).
- ★ Impulse: Exhibits increased opalescence.
- ★ Multi: Has a natural gradation of shade (from enamel to dentin).

Opacity of the ingot is chosen on the basis of the color of the prepared tooth, the thickness of the restoration and the desired optical properties.

CASE 10: COSMETIC REHABILITATION USING LiDiSi RESTORATIONS

Fig. 1.49: Pre-treatment view. Anterior teeth are planned for a combination of partial and full coverage restorations as part of a full mouth rehabilitation. Crown lengthening was planned on 21 and 22.

Fig. 1.50, 1.51: Maxillary and mandibular wax patterns ready for heat pressing.

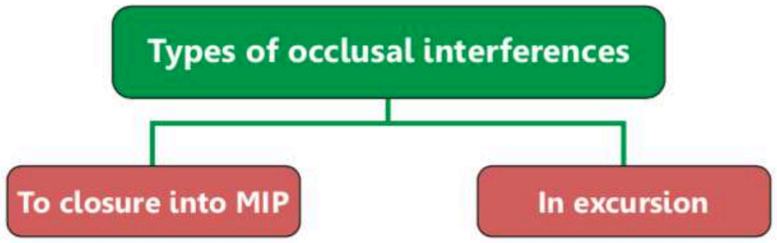
INTERFERENCE IN OCCLUSION

Mandibular movements are supposed to be free of any dental obstacle. An interference is any tooth contact that disrupts the mandibular movement (by getting in the way), thereby not allowing the occlusion to function normally.

The proprioceptive feedback is extremely sensitive, accurate and reactive to noxious stimuli.

Having said this, there are significant differences in the adaptive response by different patients to occulsal abnormality. Some are unable to tolerate seemingly trivial occlusal interferences, whereas others are able to cope with significant malocclusions without any obvious symptoms.

An interference is of two primary types :



a. INTERFERENCE TO CLOSURE INTO MIP

Upon closure into Centric Relation (CR), any contact on an inclined surface causes the mandible to deviate from its desired path of closure, resulting in a 'hit and slide' occlusion. Such an interference incline is termed as a 'deflective contact'

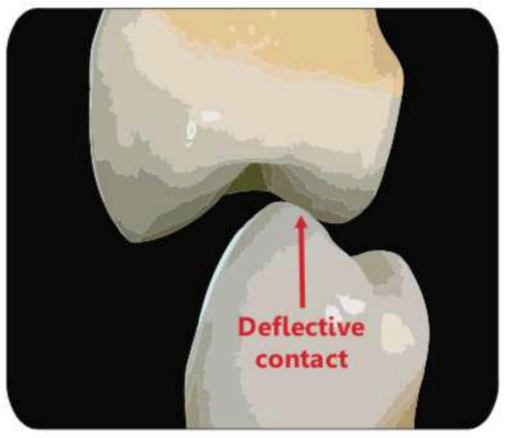


Fig. 2.21: In the presence of a deflective contact, the mandibular cusp contacts a cuspal incline.

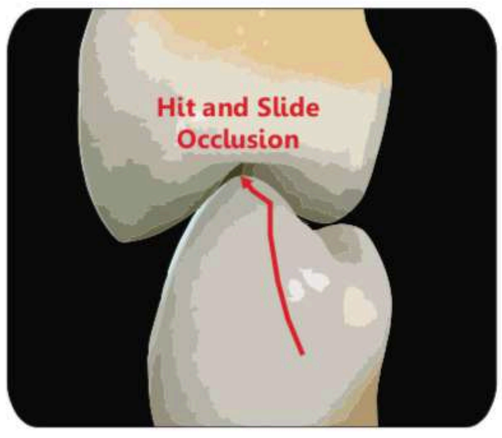


Fig. 2.22: From this point of contact, the mandible slides into MIP.

In most clinical situations, indirect prostheses (or direct fillings) are designed to conform to the pre-existing occlusal scheme. In other words, the restorations are designed such that they duplicate the shape of the natural tooth being replaced. In order to ensure this, one must reduce a sufficient amount of tooth to accommodate for the prosthesis.

Failure to do so results in an over-contoured prosthesis, which increases the risk of introducing deflective contacts, as explained in Fig 2.23-2.27.

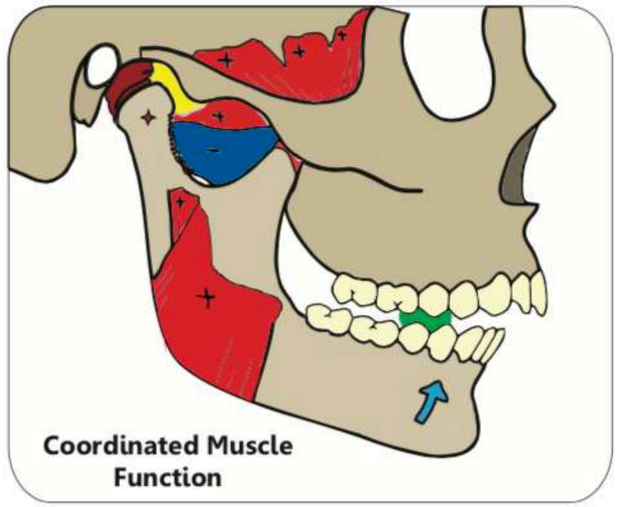


Fig. 2.23: Pre-treatment condition. Note, upon closure the elevator muscles are active (+), while the depressor muscle (inferior lateral pterygoid) is relaxed (-). Such a patient is said to have 'Coordinated Muscle Function'.

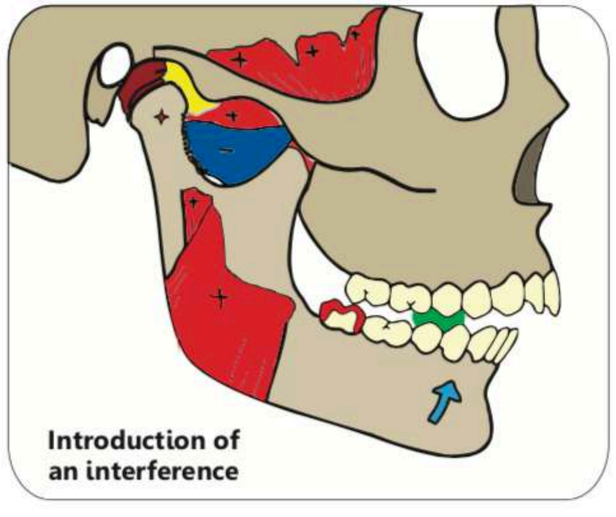
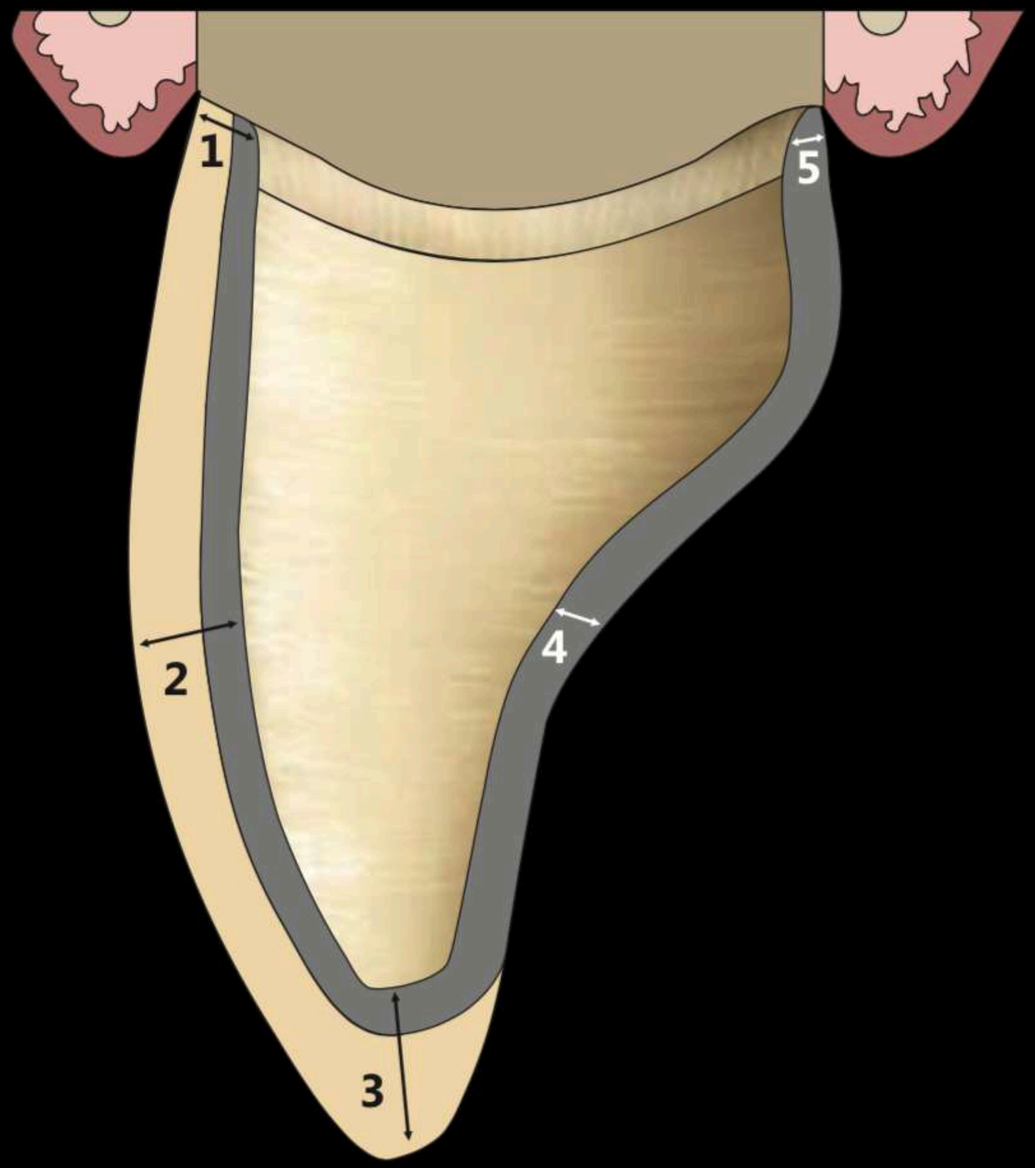


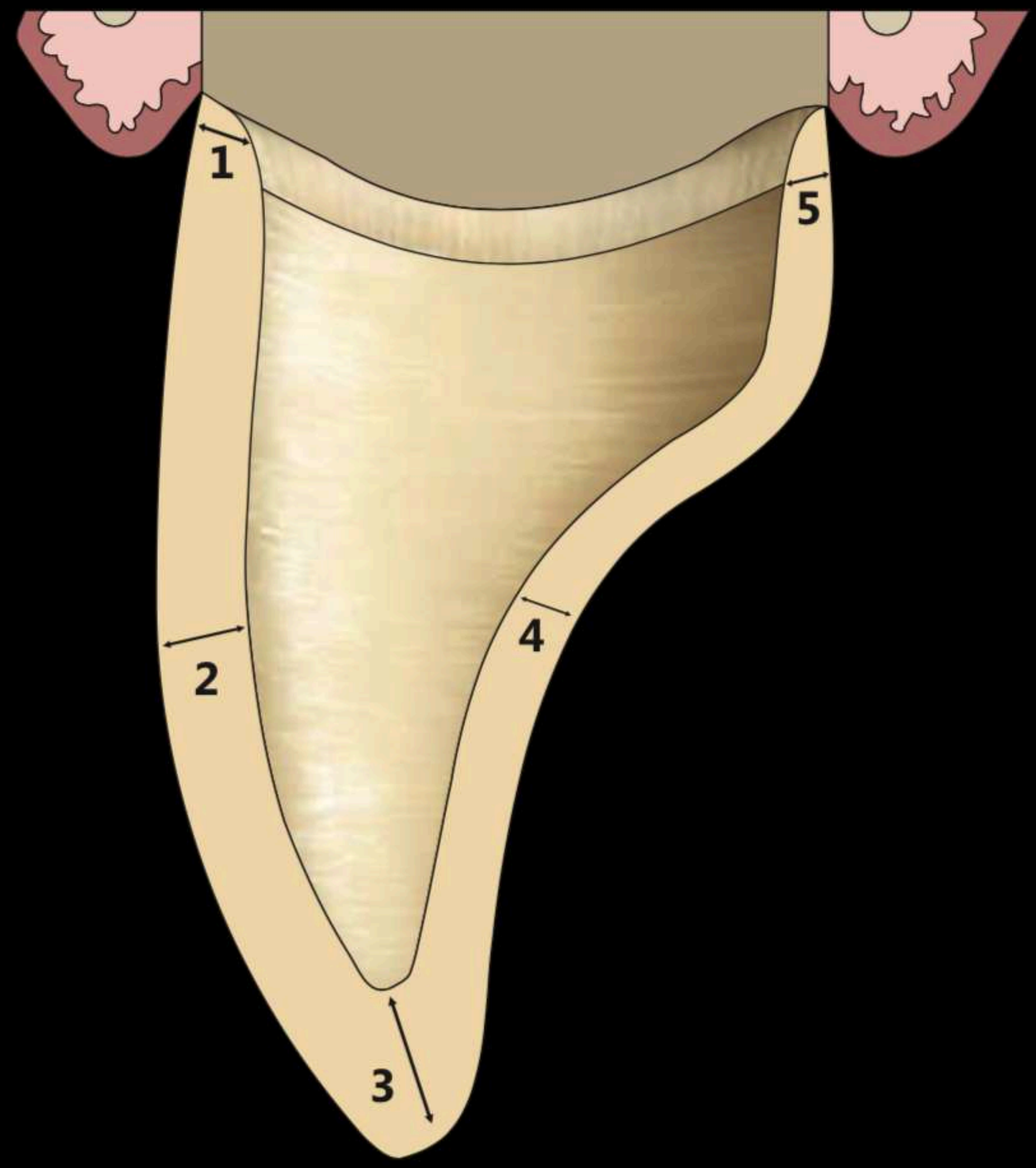
Fig. 2.24: Prosthetic crown on mandibular second molar. Often posterior crowns seat 'high' upon placement. Such a prosthesis needs to be adjusted in order to ensure that it 'fits' into the pre-existng balance of the stomatognathic system. However, if left to 'settle' by itself, the body would have to respond with a cascade of adaptive changes.

Fig. 4.2: **AVERAGE REDUCTION REQUIRED FOR A PFM FACING CROWN: ANTERIOR TOOTH**



1.	Labial margin	1.0-1.2 mm
2.	Labial surface	>1.5 mm
3.	Incisal edge	about 2.0 mm
4.	Palatal/lingual surface	0.5 mm
5.	Palatal/lingual margin	0.5 mm

Fig. 4.3: **AVERAGE REDUCTION REQUIRED FOR A METAL FREE (LiDiSi/PFZ) CROWN: ANTERIOR TOOTH**



1.	Labial margin	0.8-1.0 mm
2.	Labial surface	1.2-1.5 mm
3.	Incisal edge	about 2.0 mm
4.	Palatal/lingual surface	0.5-0.8 mm
5.	Palatal/lingual margin	0.5-0.8 mm

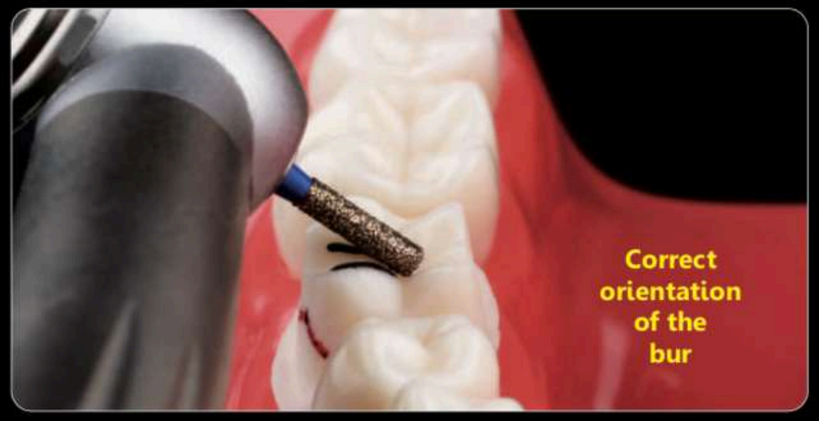


Fig. 4.98: The occlusal reduction bur should be oriented along the pre-existing incline of the tooth.

Fig. 4.99: In case the bur orientation flattens out, the occlusal reduction begins to resemble a table-top with greater reduction over the cusp tips and barely any reduction along the central groove. This often culminates into metal exposure or porcelain fracture along this under-reduced area.

Fig. 4.100: As the functional cusp requires 2 mm reduction, the OR 1.6 bur is used to create a depth orientation groove extending from the cusp tip to the base/central developmental groove. This bur needs to be sunken full depth.

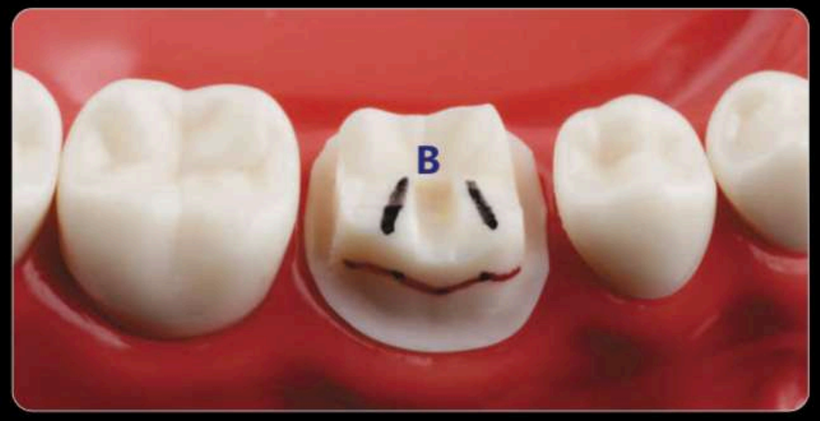


Fig. 4.101: This creates a groove that is 1.6 mm in depth. For descriptive purposes, we shall label this groove as "B".

Fig. 4.102: The same step is repeated on the mesiobuccal and distobuccal cusp ridges. For descriptive purposes, we shall label the mesial groove as "A" and distal groove as "C".

Fig. 4.103: All three grooves as seen from the buccal view.

Fig. 5.83: First, putty is mixed and loaded into the tray. The pre-cut sheet is then placed on top of it and the assembly is seated into the patient's mouth. Portion of the sheet that extends beyond the tray should be folded to prevent tissue irritation while seating. Variotime from Heraeus Kulzer was used for this documentation.

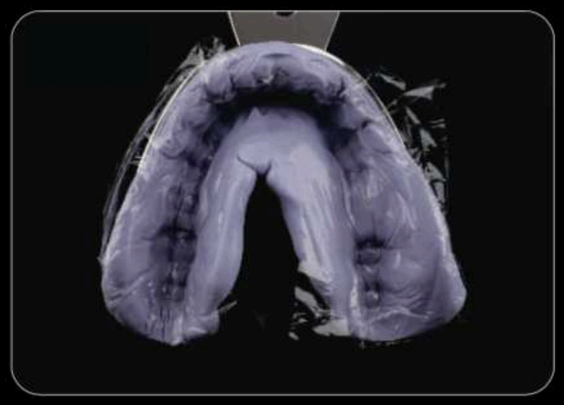


Fig. 5.84: The set putty material records the prepared teeth with the foil interposed between them.

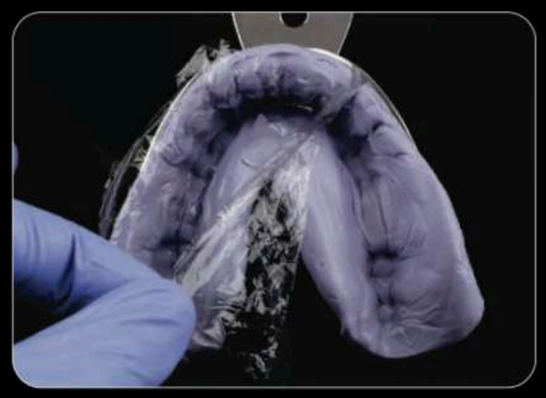


Fig. 5.85: The foil spacer is then peeled off, creating a custom tray in putty.

Fig. 5.86: Following intra-oral isolation, the space created in the impression is then filled with light body and the tray is re-inserted into the patient's mouth slowly. Excessive pressure should not be applied as this can displace the light body, causing putty-tooth contact. This would defeat the very purpose of recording a two-step impression.

Fig. 5.87: The final impression shows all hard and soft tissues recorded in detail by the light body material.

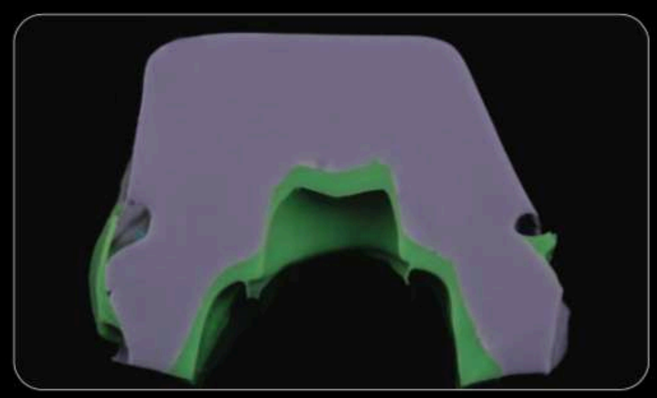


Fig. 5.88: Cross section of the two-step impression shows how details are recorded by the light body material, while the putty/heavy body comprises bulk of the impression.

Fig. 6.4: **Scenario 2:** The two distal most teeth are prepared.

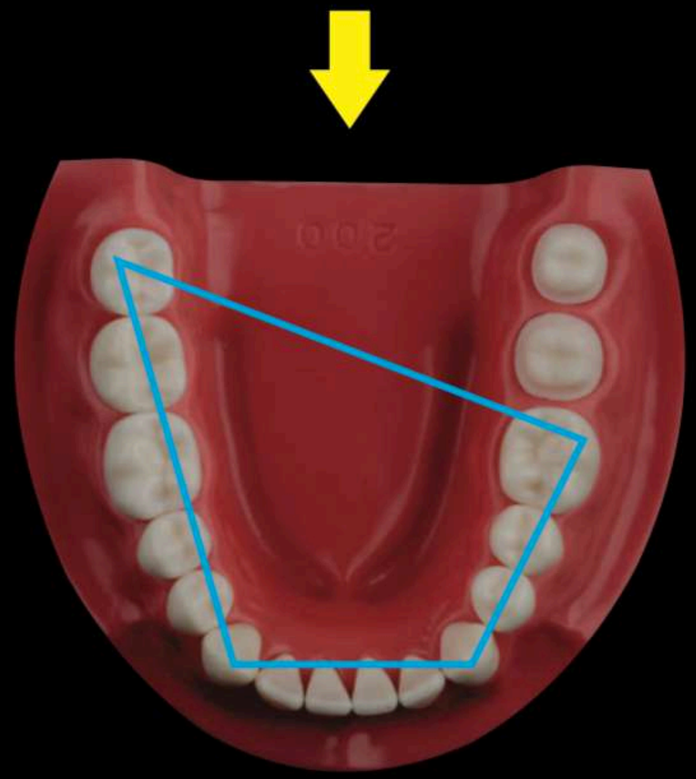


Fig. 6.5: In this situation, there is no occlusal contact posterior to the distal most prepared tooth. Hence, the desired stability during mounting of the cast is deficient and such a case would benefit from bite registration.

Fig. 6.6: **Scenario 3:** In this situation, all three molars in one quadrant have been prepared. Here, the stability on the prepared side is grossly deficient making it difficult for the technician to judge the amount of clearance provided; thereby significantly increasing the possibility of erroneous mounting. Such cases would definitely need a bite registration.

Fig. 6.7: **Scenario 4:** In this situation, teeth have been prepared to receive a bridge. However, there is a tooth distal to the posterior abutment providing a stable occlusal stop. Thus, the four points of contact for accurate mounting are present and such cases would not need bite registration.

DUAL-CURE RESIN CEMENTS

This cement group is polymerized via light activation and also by chemical interaction within their components. Typically, once the resin has been photo-activated, the cement immediately adjacent to the light gets cured while also initiating a self-cure reaction in the remaining cement that has not been illuminated.

Advantage

- ▲ Ensures curing even in areas that cannot be light cured.

Drawbacks

- ▼ Weaker bond strength than light cure cements.
- ▼ Lack of color stability and can darken over time.

Indications

- ▶ Where light access to the cement is questionable:
  - ✦ Thick glass ceramic restorations.
  - ✦ Opaque core based restorations, like PFM, PFZ.
  - ✦ Difficult to access areas, like post space.

CHEMICAL-CURE RESIN CEMENTS

These cements are not reactive to light and polymerize by a chemical reaction only when the separate components are physically mixed together.

Advantages

- ▲ Not dependant on light for their activation.

Drawbacks

- ▼ Do not offer much selection in terms of shade and translucency.
- ▼ Have very low early bond strength and require hours to reach full maturity. Thus, immediate post bonding care is essential.
- ▼ Lower bond strength as compared to the light-cure and dual-cure resin cements.

Indication

- ▶ Areas where light-curing is not possible.

Table 10.1: Cementation options for various prosthetic materials.

	GIC	RMGIC	Total Etch	Self Adhesive	Self Adhesive with Selective Etch
Full Metal/ PFM Prostheses	✔	✔✔	✔	✔✔	✔✔
Monolithic Zirconia/ PFZ Prostheses	✔	✔✔	✔	✔✔	✔✔
LiDiSi Prostheses	✘	✔	✔✔	✔	✔✔✔
Prostheses with poor retention form	✘	✘	✔✔✔	✔	✔✔✔
Posterior Partial Bonded Restorations	✘	✘	✔✔	✔	✔✔✔
PLVs	✘	✘	✔✔✔	✘	✔✔
Metal Posts	✔	✔	✔	✔✔	✔✔✔
Fiber Posts	✘	✘	✔	✔✔	✔✔✔

SURFACE TREATMENT OF PROSTHETIC MATERIALS PRIOR TO CEMENTATION/BONDING

Surface treatment of prosthesis can play a vital role in improving the longevity at the tooth-cement interface. Treatment is subjective to the material being used:

METAL BASED PROSTHESES

Sandblasting helps increase the micro-irregularities and the surface area of the fitting surface of the prostheses, thereby increasing their frictional resistance to dislodging forces.

Prostheses are usually sandblasted in the laboratory. However, sandblasting can also be performed chair-side, with an air polisher using fine grit aluminum oxide particles.

RETRIEVAL USING THE CHRISTENSEN CROWN REMOVER

Fig. 11.24: An imaginary line can be drawn along which the prosthesis is to be sectioned.

Fig. 11.25, 11.26: A diamond bur is first used to cut through the porcelain, until the metal coping is exposed. The cut is initially made on the labial surface only.

Fig. 11.27: By altering the orientation of the bur, the cut is then extended through the incisal edge.

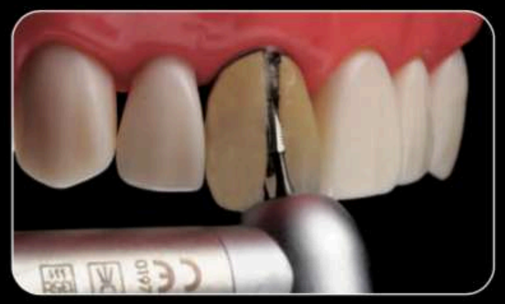


Fig. 11.28: A carbide bur is then used to slice through the metal coping, taking care not to overtly hurt the abutment tooth.

Fig. 11.29: The metal coping is cut until the underlying tooth is visible on the labial and incisal surfaces.

Fig. 11.30: Christensen Crown Remover is then placed into the slit and rotated. The straight design is used for anterior teeth.

Fig. 11.31: As the two slit edges get pushed apart, the instrument exerts a tensile force on the luting cement (causing it to give way).

Fig. 11.32, 11.33: Although such a technique destroys the prosthesis rendering it useless, the abutment tooth is subjected to hardly any trauma.

SECTIONAL VIEWS

Sectional images form the most important part of our protocol and are also the most routinely used. Both dental arches are divided into an anterior quadrant and a left and right posterior quadrant. These images are usually made with the help of sectional mirrors at a magnification ratio of 1:1.5-1:2, with the focus point in the center.

Here, it is extremely vital to be perpendicular to the occlusal surface (of the image on the mirror) and to ensure that not a lot of the buccal or palatal surface is seen in the posterior segment images.

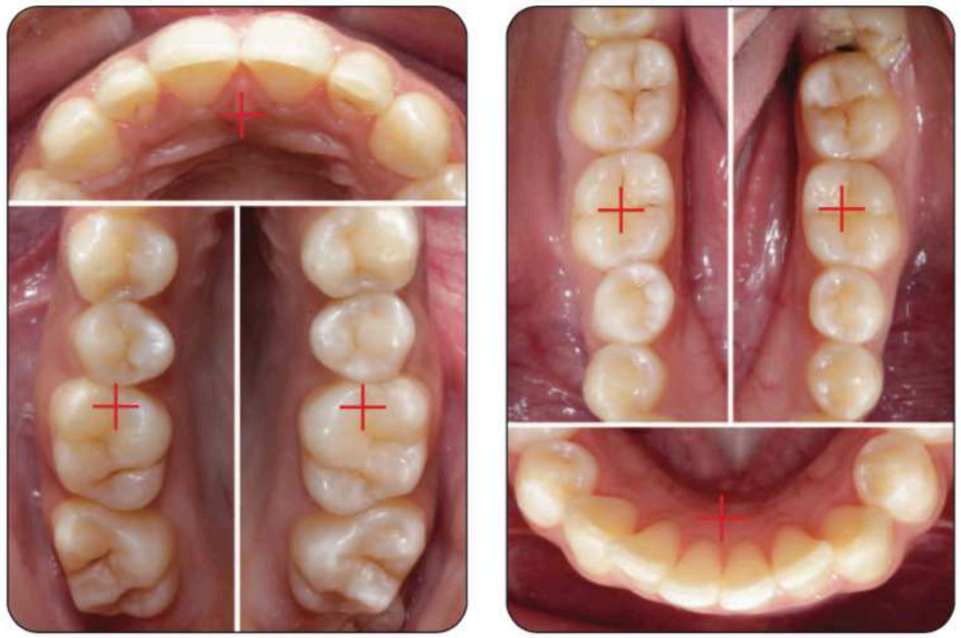


Fig. 19.49-19.50: Sectional/quadrant images. Left: Maxillary; Right: Mandibular.

Fig. 19.51: Image to record the overjet and over bite.

Image is taken from a lower angle, almost parallel to the mandible. It is taken at a magnification ratio of 1:1.5, with the focus point in the center. Because this is a mirror image it has to be flipped.

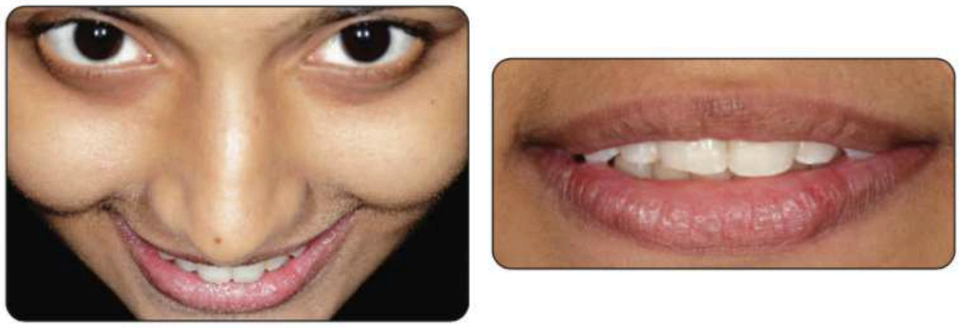


Fig. 19.52-19.53: Images showing the relation of teeth with respect to the vermillion border of the lower lip.

Conclusion

Dental photography is important to uplift one's dental practice. Ideal equipment for documentation is an entry level DSLR, a 100 mm macro lens and a twin flash. It is advisable to avoid use of mobile phones for dental documentation.

Developing a habit of using cameras in their manual mode is vital to achieve consistent results with respect to composition and exposure of the images. Following specific imaging protocols in daily practice helps save time and effort spent in recording the views. If practiced on a routine basis, documentation becomes easy and is a great source of inspiration to help us become better health care providers.

This text provides the basic understanding of all essential settings, equipment and intra-oral appliances and in doing so it attempts to set a constant, so that dental images can be taken accurately and quickly.

Fig. 19.54: Glam shot.

2 B. USE OF MAGNIFICATION

Magnification can improve visualization, postural habits, as well as productivity. Properly selected and adjusted magnification devices can help prevent the clinician from gradually tilting their head and leaning forward.

Dental loupes are the most frequently used form of magnification. As with all microscopes, the higher the magnification the shorter is the depth of field and narrower is the field of vision. Thus, choosing which type of loupes to use is a personal decision based on the procedural requirements and comfort level of the clinician.

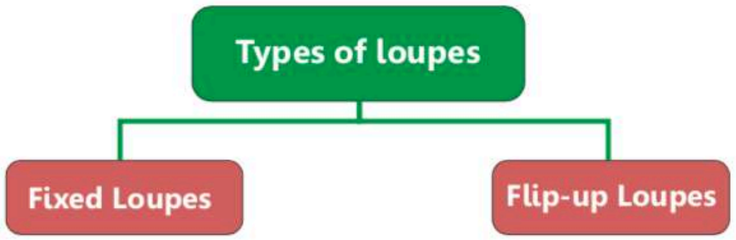
An accommodation period may be required when first using loupes and some eye fatigue or headache may be experienced initially. When first adopting loupes, wearing them for just two to three hours per day and progressively extending the wearing time over a couple of weeks helps with the adjustment process.

Large frames, while less elegant than small oval frames are superior as they sit low on the cheek. This enables lower scope placement relative to the pupils and better head position.

Working distance is quantified as the distance between the front of the clinician's eye and the patient's maxillary central incisor.

The difference in working distance ranges from less than 14 inches to greater than 20 inches. Too short a working distance can lead to hunching and too long a working distance can result in stretching. Thus, it is prudent to select loupes that meet your personal working distance (which is subjective to your height).

There are two primary designs for magnification loupes, depending on the mode of attachment of the magnification telescope.



THROUGH THE LENS TYPE	FLIP-UP TYPE
The optical magnification barrels are built on to the carrier lens itself (thus the name).	The optical magnification barrels are mounted on a hinge mechanism that flips in front of the carrier lens.
	
As the distance between the eyes and the optical barrels is less, these provide wider field of view in the same magnification	The presence of an additional hinge increases the distance between the eyes and the magnification barrels, thereby narrowing the field of view.
These types of loupes are lighter in weight and hence can be used for a relatively longer period of time.	These loupes are comparatively heavier because of the hinge and barrels that protrude further. This also creates an uneven balance, requiring the body to compensate for it by pressurizing the neck muscles, especially when looking down. Such a system often requires a cord to be tied around the head in order to stabilize the framework.
The barrels cannot be moved and thus when communicating with the patient, the loupe may have to be removed or the clinician may have to look over the lens (which could be inconvenient).	The barrels can be flipped out of site when not working or when wearing gloves, changing burs, talking to the patient, etc. This makes it convenient for use.
They are individually customized according to the clinician's working distance, angle of declination and inter-pupillary distance (at the most ergonomic position suitable to the user). Hence is user specific.	They allow adjustable angle of declination and adjustable inter-pupillary distance, making it convenient for multiple users.
Angle of declination is customized and fixed to the user's requirement and cannot be increased if desired (which is a disadvantage for this system).	The angle of declination is adjustable on the basis of the clinicians focal distance.
It also serves as an advantage, as the user does not have to adjust the telescope each time to reach his/her best ergonomic position.	This can be a disadvantage, as the flip-up mechanism can be knocked out of position and needs readjustment.

Continued onto next page

6. Uncomfortable or strange feeling: This may occur because of the differences between natural teeth and the artificial replacements. Most patients usually become accustomed to this feeling in time.

7. Gingival recession: Periodontal (gum) disease can occur at any age, with or without these restorations. Generally, crown or bridge work does not cause or prevent any gum disease. Dark lines at the gumline may appear in crowns or fixed bridges lined with metal, especially if the gum recedes after placement.

8. Esthetics or appearance: You will be given the opportunity to observe the appearance of the crowns or bridges in your mouth prior to final fixation.

9. It is the patient's responsibility to seek attention from the dentist, should any undue or unexpected problems occur. The patient must diligently follow any and all instructions, including the scheduling and attending of all appointments. Failure to keep the cementation appointment can result in ultimate failure of the crown/bridge which fails to fit properly and an additional fee may be required to correct the situation.

INFORMED CONSENT:

I have been given the opportunity to ask questions regarding the nature and purpose of the crown and/or bridge treatment and have received answers to my satisfaction. I voluntarily assume any and all possible risks, including the risk of substantial harm, if any, which may be associated with any phase of this treatment in hopes of obtaining the desired results, which may or may not be achieved. No guarantees or promises have been made to me concerning the results. The fee for this service have been explained to me and is satisfactory.

By signing this form, I am freely giving my consent to allow and authorize Dr. _____ and his/her associates to render the treatment pertaining to crown and bridge prosthetics considered necessary and/or advisable for my dental conditions, including the prescribing and administering of any medications and/or anesthetic deemed necessary for my treatment.

Date: _____

Patient's name: _____

Signature of patient
or legal guardian.

Readers are urged to get this consent form printed on their own case paper sheets and have your patients sign it prior to starting any irreversible tooth reduction in their mouth.