

Prosth sheet no. : 15

Written by : Dania Said Jibreel

Surveying:

Highlighting the high of contours of the soft and hard tissues structures according to specific path of insertion and to detect parallel surfaces on proximal/ axial surfaces of teeth.

Dental surveyors :

1st one introduced in 1918.

There are different types of dental surveyors :

- Ney (as in our 3rd year labs)
- Jelenko
- Williams (similar to ones in our clinics)

There are more advanced dental surveyors and more expensive types, you don't really need to buy them, they all do the same thing.

Ideally the clinician, rather than the dental technician, surveys the study cast in preparation for designing an RPD.

Components of Dental Surveyor

1. Base
2. Vertical arm
3. Analyzing rod
4. Horizontal arm
5. Mandrel (piece of metal which you can attach another piece to it)
6. Adjustable table Accessories:
 - Analyzing rod
 - Carbon or graphite marker
 - Wax trimmer
 - Undercut gauges:
 - 0.25 mm or 0.01 inch
 - 0.50 mm or 0.02 inch
 - 0.75 mm or 0.03 inch

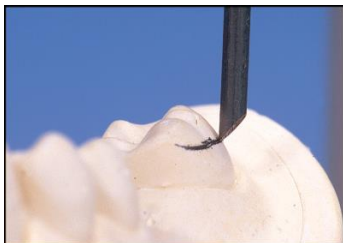
#1 Analyzing rods :

This metal rod is placed against the teeth and ridges during the initial analysis of the cast to highlight the high of contours, to identify undercut areas and to determine the parallelism of proximal surfaces of teeth without marking the cast and we use it to decide later on the 2nd tilt.

#2 Graphite marker

The graphite marker is moved around the tooth and along the alveolar ridge to identify and **mark** the position of (high of contour) maximum convexity = survey line, separating non-undercut from undercut areas, so anything below the line is undercut area.

Its beveled; the tip of the marker should be level with the gingival margin close as much as possible to tooth, allowing the side of the marker to produce the survey line , in order not to have false undercuts.



A false survey line will be produced if the tip of the marker is incorrectly positioned (not touching the soft tissue).

In this example there is no an undercut area on the tooth although an incorrect surveying technique has indicated one.

If this false line is used in designing an RPD, errors will arise in the positioning of components, especially clasps.

There is a sleeve to hold the marker and give support so you don't fracture the marker.

So we can have:

1. Hard tissue undercut "teeth".
2. Soft tissue undercut.
3. True and false undercuts.

Undercuts aren't just in the axial surfaces but also they can be in buccal and palatal/lingual surfaces of the teeth.

#3 Undercut gauge

Gauges are provided to measure the extent of horizontal (depth) undercut and are available in the following sizes: 0.25 mm, 0.50 mm and 0.75 mm.

By adjusting the vertical position of the gauge until the shank and head contact the cast simultaneously (at same time), the point at which a specific extent of horizontal undercut occurs can be identified and marked.

This procedure allows correct positioning of retentive clasp arms on the tooth surface .

According to the depth of undercut, you can choice type of clasp.

Co-Cr clasps more rigid and less flexible than wrought wire clasp so shallower undercut engaged with co-cr clasps.

Gold wrought clasp in 0.5 mm undercut will give me equal retention to co-cr clasp in 0.25 mm undercut.

Other, more sophisticated, types of undercut gauge are available such as dial gauges and electronic gauges. These attachments fulfill the same function as the simpler type of gauge but more expensive.

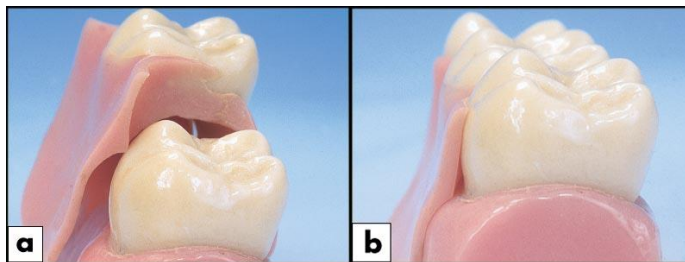
#4 wax trimmer:

To block out unwanted undercut areas that won't be engaged with clasps on, the excess of wax is removed with the trimmer.

it acts as graphite marker, it moves around high of contour touching the gingiva, so it removes exactly the excess no more or less

If we don't do that, the clasp can't get out from the cast. And if you try to put it inside patient's mouth, it won't enter because teeth are stronger than co-cr.

Only the tip of retentive arm clasp which engaged in the undercut area.



(a) This RPD cannot be inserted in the mouth because failure to eliminate unwanted undercut on the cast has resulted in acrylic resin being processed into the area.

(b) This denture has been processed on a correctly prepared cast and, as a result, there is no interference with insertion.

After we finished wax trimming the next step is duplication of the cast to produce another cast where the wax now is rigid and part of the cast.

Main objectives of Surveying:

-overview:

"Engaging undercuts with clasp arms and to prevent other rigid parts of RPD to engage any undercut area."

-More specifically:

1. To mark the most bulbous parts of the teeth
2. To identify undercut areas
3. To help in designing and locating the exact position of the clasp.
4. To block out the unwanted undercuts
5. To measure the depth of undercuts, therefore, the dentist will decide which type of metal could be used regarding the clasps.
6. To identify the proximal tooth surfaces that may serve as guiding planes to have one path of insertion.
7. To identify soft tissue undercuts that would act as interference.

Before discussing the functions of a surveyor in more details it is necessary to explain the following terms:

♣ **Guide surfaces.**

♣ **Path of insertion.**

♣ **Path of common displacement.**

♣ **Guide surfaces/planes**

Two parallel surfaces opposing each other usually they are the proximal surfaces. This can be used to limit the path of insertion(one path).

What oppose it in RPD?

The Guiding **plates**.

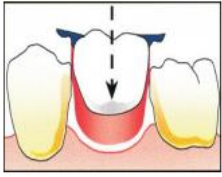
♣ **Path of insertion.**

Path of insertion: the way that the patient will insert the RPD inside his mouth.

Path of withdrawal: the way that the patient will remove the RPD from his mouth.

(If we have more than one path of insertion we will have more paths of withdrawal. the way it goes in, they way it goes out)

Single path



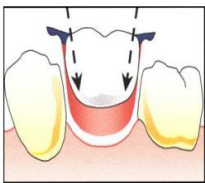
This denture has one path of insertion because there are two parallel guiding planes.

so as soon as the denture touches one of the teeth it will be guided by planes into its position so we will have one path of insertion.

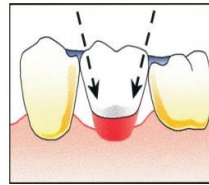
Why is it important to have one path of insertion?

- To have better retention and stability
- To control the path (later on we will talk about it)

Multiple paths :



- When teeth are divergent

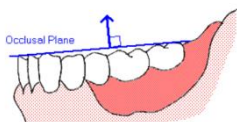


- when we have contact points.

In these cases we prepare the sides of the teeth to get parallel guiding planes.

♣ **Path of common displacement.**

The path along where a RPD is most likely to be displaced during function (sticky food). The path is perpendicular to the occlusal plane.



Occlusal plane:

plane connected the cusps tips and incisal edges.

Why we called it COMMON ?

- Because its common to everyone(fixed criteria) the way the patient eats; mouth is open and sticky food is between and this dislodge the denture in that direction so we can't control it, unlike the path of insertion/withdrwal by tilting the cast we can control it.

Magnitude of displacing forces varies according to the type of the consumed sticky foodstuff. The sticker the food the more powerful force on RPD.

Displacing forces will dislodge the denture if their magnitude becomes greater than the retention force obtained by retentive elements = clasps tips.

We increase the retention in these cases (we will talk about it later on)

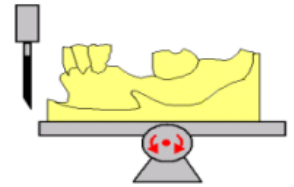
Surveying The Diagnostic Cast

1st : Cast should be oriented onto the table of the surveyor at **zero tilt**.

Zero tilt: is the tilt of the cast when the occlusal plane assumes parallelism with the horizontal plane, and perpendicular to vertical surveyor arm.

Why we start at zero tilt ?

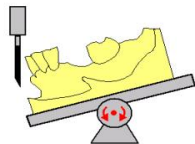
- Because zero tilt is the closer position to the patient's mouth when he is eating, which is the common path of displacement (out of control)



if we did the denture at this zero tilt we will have path of insertion as same as path of dislodgment.

So we need to do **2nd tilt** to change the path of insertion (controllable), and we will be able to engage undercuts that we couldn't do before.(we gain retention)

We shouldn't engage any undercuts except for the clasps tips.



In this specific case by this 2nd tilt its more esthetic because we avoid putting a clasp on canine, so engaging the guiding surfaces.

Again, the steps of surveying :

1st : visual assessment of the cast. (looking for undercuts, depths, directions, interferences,...etc)

2nd : initial surveying which is done at zero tilt (our reference/ start point) to know the common path of displacement.(soft and hard tissues)

3rd : analyze the cast and decide if we need 2nd tilt or not and what type of tilts we need (anterior or posterior) (specific criteria)

4th: Final surveying

3 types of tilts:

***Anterior tilt:** Heels down

***Posterior tilt:** Heels up

***Lateral tilt**

Anterior and posterior tilts are the most common used, lateral tilt is very rare except in some cases need lateral tilt.

What are the criteria to choice the 2nd tilt ?

- appearance
- retention
- interference
- Parallelism of guiding planes.

Appearance :

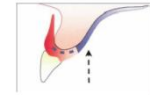
1st picture is at zero tilt, where the proximal/mesial areas are undercuts according to the path of insertion.



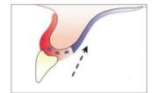
2nd picture is at posterior tilt which is more esthetic because we hide the black triangular; we open up the



undercuts area so the denture can engage it



Another example just to show you how we open up the undercuts so denture can be engaged on proximal surfaces of anterior teeth.



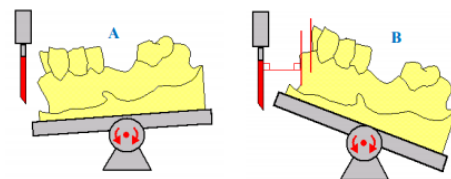
We only care about this when proximal surfaces on the mesial of anterior tooth (mesial undercut). So if 1st PM is missed, proximal surface is distal to the canine so it won't show too much, depending on the case of course.

Interference

*In this case we have interference with soft tissue on the maxillary ridge.

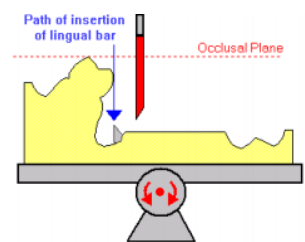
Problems of having denture like this at zero tilt:

- Appearance, too bulky
- Food trap and loss of retention



So we have to avoid it by a 2nd tilt which in this case posterior tilt ; to engage the undercuts and better esthetics.

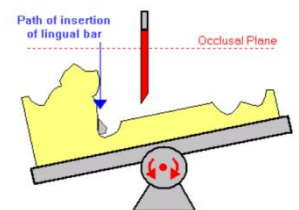
*Another interference which is common to see, lower premolars are tilted lingually so at zero tilt the major connector will be far away and this will interfere with the tongue .



In this case we do lateral tilt (one of the few cases to use lateral tilt)

So: Better engagement of major connector, more comfortable to the tongue and better appearance

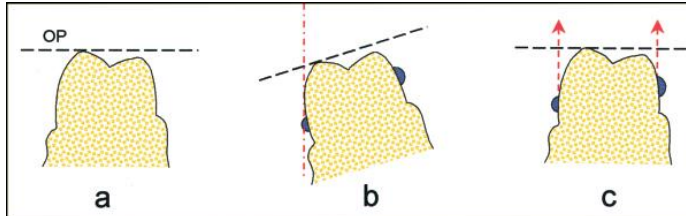
But sometimes we have this inference in both sides , what you do ?



We have to do preparation on teeth; you may just need to restore in one side then do tilt to the other side to be less aggressive.

Retention

To obtain retention, undercuts must be present on teeth relative to the zero tilt. It is a misconception to believe that changing the tilt of the cast will produce retentive undercuts if none exist when the cast is horizontal. path of displacement as we said its fixed and out of control.



- A) No undercuts on the tooth at zero tilt.
- B) False undercut created by tilting the cast laterally but it isn't exist in patient's mouth, you can't create an undercut.
- C) Clasp arms placed in this false undercut do not provide any resistance to movement along the path of displacement.

So you shouldn't engage the undercuts appeared on the 2nd tilt because they are false undercuts. You just engage undercuts of 1st survey line (zero tilt)

Next lecture the Dr will explain further the retention ☺

Best of luck