Lec.14    INDIRECT RETAINERS

An indirect retainer consists of a minor connector and a rest, and helps to stabilize the distal extension RPD, indirectly (compared to direct retention with clasps), when the patient eats sticky foods.

To provide acceptable support, the indirect retainers are placed in properly prepared rest seats with positive contact on the tooth, and also placed on a tooth that can provide the required support.

Indirect retainers should be placed as far as possible from the fulcrum line to prevent movement of the denture bases away from the tissues.

A fulcrum line is an imaginary line around which an RPD will tend to rotate. Fulcrum lines may be in the horizontal, frontal or vertical plane. Indirect retainers provide resistance to rotational movement of a distal extension RPD away from the denture bearing tissues around the retentive fulcrum line (Figure 2).

The retentive fulcrum line is an imaginary line connecting the retentive clasp tips of the abutment teeth adjacent to the distal extension. The indirect retainer is located on the opposite side of the retentive fulcrum line from the mucosa supported base.

Most frequently, indirect retainers are placed on canines or the mesial fossa of first premolars. Incisors are usually not strong enough to provide the support necessary for indirect retention; however, occasionally they provide the only option. The effectiveness and function of indirect retainers are controlled by several factors:

a-The rests must remain in their seats for indirect retention to be effective.

b-The further the indirect retainer is from the fulcrum line, the more effective it will be.

c-The amount of indirect retention is directly proportional to the length of the distal extension base.
The components of the supporting and connection parts of the RPD must be rigid. The minor connectors supporting the indirect retainers cannot be flexible.

An indirect retainer requires a positive rest seat. An inclined plane, such as a lingual plate major connector NOT an effective indirect retainer, since it lacks a positive seat and can allow movement to and away from the tissues. Occasionally, the lingual plate major connector is your only choice to provide some indirect retention (theoretically), when there is only six or fewer remaining anterior teeth.

Indirect retainers provide additional support and distribute the forces of occlusion over a larger number of abutment teeth for the RPD. Additional stabilization of the RPD against horizontal forces can be provided by indirect retainers.

The indirect retainers help prevent the major connector from being displaced toward the tissue and impinging on the underlying tissues during occlusal forces.

They are the third point of reference for the RPD framework, and aid in the evaluation of the seating of the framework.

Indirect retainers help in accurately positioning a framework during a reline or rebase procedure, and during the altered cast technique, when the direct retainers and indirect retainers are in their proper position on the abutment teeth.

There are basically two main fulcrum lines to be considered in indirect retention. The retentive fulcrum line passes through the tips of the retentive clasps and is the point which the RPD rotates around when the denture base moves away from the tissues. The stabilizing fulcrum line is the area which the RPD rotates around when the denture is displaced during occlusal forces (Figure 1).

Technically the indirect retainer should be placed perpendicular as far away from the retentive fulcrum line as possible. For simplicity, and because
clinically it probably does not make any difference, Figures 3 will illustrate stabilizing fulcrum lines for various Kennedy classifications, the ideal location of the indirect retainer and the actual clinical placement of the retainer.

LOCATION OF STABILIZING FULCRUM LINES

KENNEDY CLASS I - the fulcrum line passes through the rest areas on the most posterior abutment on either side of the arch.

KENNEDY CLASS II - the fulcrum line passes diagonally through the most posterior occlusal rests.

KENNEDY CLASS III - the fulcrum line is non-existent.

A tooth supported RPD is totally supported by occlusal rests and has no rotation because of no soft tissue movement.

KENNEDY CLASS IV - the fulcrum line passes through the two most anterior rests adjacent to the edentulous space.

An indirect retainer on the incisal of the mandibular canine helps to prevent rotation of the denture base away from the tissue. This is especially important when eating sticky foods. The indirect retainer should be located as far away from the rotational fulcrum line as possible.
Fulcrum lines found in various types of partially edentulous arches, around which denture may rotate when bases are subjected to forces directed toward or away from residual ridge. Arrows indicate most advantageous position of indirect retainers.

**A and B, in class I arch**, fulcrum line passes through the most posterior abutments, provided some rigid component of framework is occlusal to abutment's heights of contour. **C in class II arch**, fulcrum line is diagonal, passing through abutment on distal extension side and the most posterior abutment on opposite side.

**D, if abutment tooth** anterior to modification space lies far enough removed from fulcrum line, it may be used effectively for support of indirect retainer.

**E and F, in class IV arch** fulcrum lines passes through two abutments adjacent to single edentulous space.

**G, in class III arch** with posterior tooth on right side which has a poor prognosis and will eventually be lost, fulcrum line is considered the same as though posterior tooth were not present. Thus its future loss may not necessitate altering original design of the removable partial denture framework.

**H, in class III arch** with nonsupporting anterior teeth, adjacent edentulous area is considered to be tissue-supported end, with diagonal fulcrum line passing through two principal abutments as in class II arch.
Indirect Retainers

Definition: The component of a removable partial denture that assists the direct retainers in preventing displacement of the distal extension denture bases by functioning through lever action on the opposite side of the fulcrum line when the denture base moves away from the tissues in pure rotation around the fulcrum line.

An investigation of the effectiveness of indirect retainers.

Methods: Tested the following combinations:
1) D rest 2nd PM/canine rest,
2) D rest 2nd PM/M rest 1st PM,
3) D rest 2nd PM/no indirect retainer,
4) M rest 2nd PM/no indirect retainer,
5) M rest 2nd PM/M rest 1st PM,
6) M rest 2nd PM/canine rest. Applied dislodging forces with Instron machine unilaterally, bilaterally, anteriorly and posteriorly. A wrought-wire clasp was substituted for the bar clasp on both 2nd premolars. Also rested with and without guide planes. Attached rests to framework with autopolymerizing acrylic resin.

Conclusions: The type of clasp arm used has a much greater influence on the amount of denture base displacement than does the presence or location of an
Usefulness of an indirect retainer in preventing occlusal displacement of a denture base appears to be very limited. It is probably more effective in distributing forces to teeth other than the direct abutments than in preventing denture base lifting. Guiding planes are important in preventing denture base lifting. Mesial rest placement decreases the distance from the fulcrum line to the indirect retainer, but this does not seem to increase denture base dislodgement.

In this example the mesial rest on the right maxillary premolar acts as an indirect retainer. The forces of gravity tend to displace the obturator portion of the prosthesis, down and out of the defect. The indirect retainers resist this displacement.

The musculature of the lip tends to lift the prosthesis away from the tissue bearing surfaces in the anterior region. The indirect retainers resist this rotation. Indirect retention provided by: The rests on the 2nd molars act as indirect retainers. The longer the rests the more effective the indirect retention. Axis of rotation (fulcrum line).