

CHAPTER 13

UNDERCUTS

DEFINITION

An UNDERCUT is the portion of the surface of an object that is below the height of contour in relation to the path of placement.¹

An undercut is the part of a tooth or cast surface cervical to the survey line (height of contour) AT THE SELECTED PATH OF PLACEMENT of the denture (TILT OF THE CAST). If the tilt of the cast is changed (changing the path of placement of the denture) the depth of the undercut will change (Fig. 13-1).

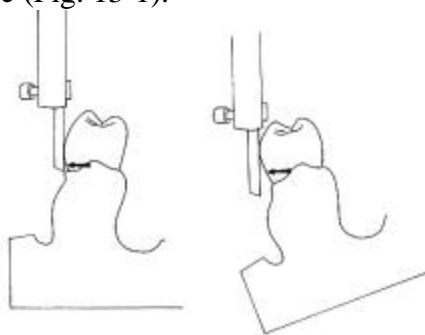


Fig. 13-1. Changing the tilt of the cast changes the depth of the undercuts

TYPES OF UNDERCUTS

Undercuts may be desirable or undesirable.

DESIRABLE UNDERCUTS are those which are engaged by retentive clasp arms of clasps to provide retention for the RPD. They are located on the facial or lingual surfaces of abutment teeth (Fig. 13-2). The desirable undercut engaged by a retentive clasp arm to provide retention is termed the UNDERCUT.

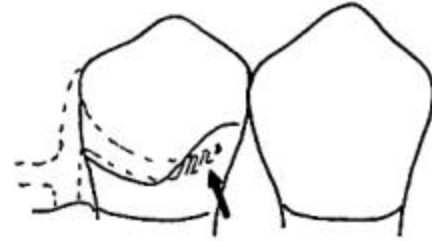


Fig. 13-2. The (desirable) undercut on an abutment tooth

UNDESIRABLE UNDERCUTS are all undercuts in the area of the RPD framework except those used for retention (desirable undercuts). Undesirable undercuts are located on abutment tooth surfaces (Fig. 13-3), non-abutment teeth contacted by rigid portions of the framework, and the soft/hard tissues involved in the design of the RPD framework (Fig. 13-4).



Fig. 13-3. Undesirable undercuts on an abutment tooth

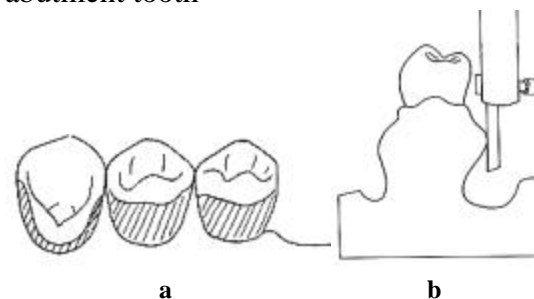


Fig. 13-4. Undesirable undercuts, a) on non-abutment teeth contacted by rigid portions of the framework, b) on soft/hard tissues involved in the design of the RPD.

SIGNIFICANCE OF DESIRABLE UNDERCUTS

The location of the potential retentive undercut is related to the survey line and influences the selection of the

retentive clasp arm as discussed in Chapter 12.

The depth of the potential retentive undercut also influences the selection of the retentive clasp arm, since each retentive clasp arm has an "ideal" depth for the desired quantity of retention (Fig. 13-5).

	CANINE OR PREMOLAR	MOLAR
CAST CIRCUMFERENTIAL	0.010"	0.015"
CAST BAR	0.015"	0.020"
WROUGHT CIRCUMFERENTIAL		
18 GAUGE	0.010"	0.015"
19 GAUGE	0.015"	0.020"
20 GAUGE	0.020"	0.025"
WROUGHT BAR		
18 GAUGE	0.015"	0.015"
19 GAUGE	0.020"	0.020"
20 GAUGE	0.025"	0.025"

Fig. 13-5.■ Suggested undercuts for "ideal" chromium alloy retentive clasp arms. Undercuts should be 0.005 inch greater for gold alloys.

SIGNIFICANCE OF UNDESIRABLE UNDERCUTS

If possible, undesirable undercuts are eliminated. Undesirable undercuts on teeth may frequently be reduced, and sometimes eliminated, by recontouring the tooth by removing tooth structure or placing a crown (Fig. 13-6). Undesirable undercuts caused by a bony or soft tissue prominence may frequently be reduced or eliminated by surgery (Fig. 13-7).

Undesirable undercuts which can not be eliminated must be either (1) avoided in the design of the RPD framework (Fig. 13-8), or blocked out and relieved in the construction of the framework (Fig. 13-9).

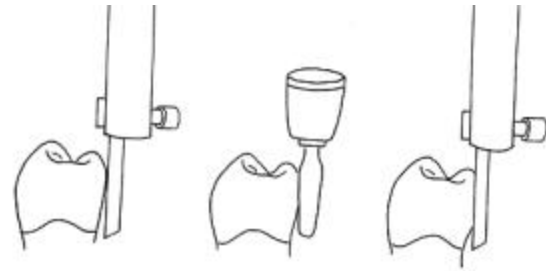


Fig. 13-6.■ Recontouring a tooth surface to reduce, or eliminate, undesirable undercuts



Fig. 13-7.■ Surgically reducing, or eliminating, undesirable soft/hard tissue undercuts

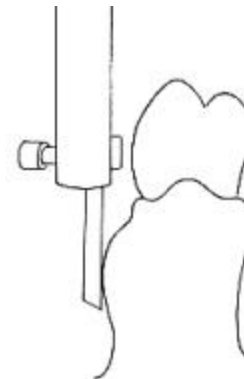


Fig. 13-8.■ Avoiding an undesirable soft/hard tissue undercut. A circumferential clasp will be used rather than a bar clasp which would have the approach arm overlying an undesirable undercut.

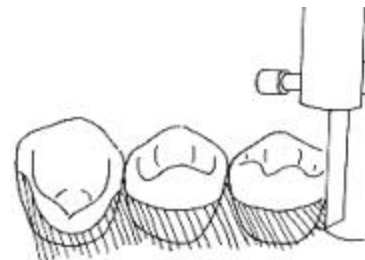


Fig. 13-9.■ Blocking out an undesirable undercut on the master cast

MEASURING THE DEPTH OF UNDERCUTS ON TEETH

Undercuts on teeth on a cast are measured with undercut gauges in a dental surveyor using the following technic:

1. Orient the cast in the cast holder at the tilt indicating the path of placement for the denture. This is the tilt at which the analyzing rod is parallel to the average long axes of the abutment teeth, and the facial survey lines are at the same occlusal/ incisal-cervical height on the teeth on both sides of the arch.
2. Place an undercut gauge in the chuck in the spindle of the surveyor.
3. Slide the cast holder on the platform so that the tooth surface contacts the shaft of the undercut gauge (Fig. 13-10).
4. Maintain the contact of the shaft of the undercut gauge with the tooth surface and raise the spindle until the lip or head of the undercut gauge contacts the tooth surface (Fig. 13-11).
5. The lip of the undercut gauge measures the horizontal DEPTH of the undercut.

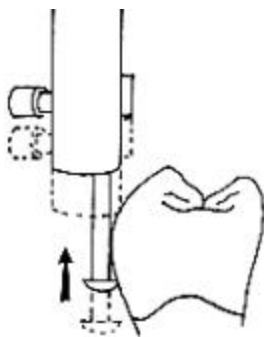


Fig. 13-10. ■ Measuring the depth of an undercut with an undercut gauge

Current undercut gauges are designed to measure 0.010 inch (0.25 mm), 0.020 inch (0.50 mm) and 0.030 inch (0.75 mm) depths (Fig. 13-11). Intermediate distances are considered to be $\frac{1}{2}$ way on the tooth surface between the level indicated by the available undercut gauges, i.e. a 0.015 inch (0.375 mm) undercut is $\frac{1}{2}$ way between the levels indicated by the 0.010 and 0.020 inch undercut gauges (Fig. 13-12).

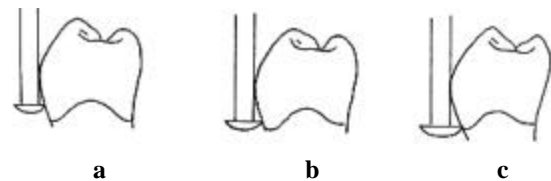


Fig. 13-11. ■ Undercut gauges, a) 0.010 inch (0.25 mm), b) 0.020 inch (0.50 mm), c) 0.30 inch (0.75 mm)

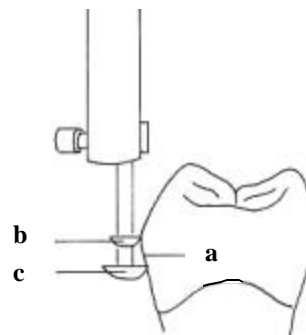


Fig. 13-12. ■ A 0.015 inch undercut (a) is $\frac{1}{2}$ way between the 0.010 inch (b) and 0.020 inch (c) undercut marks

FALSE DESIRABLE UNDERCUTS

Desirable undercuts must be present at the path of placement of the RPD.² Tilting the cast away from the path of placement of the RPD may create undercuts, but these are FALSE UNDERCUTS because they do not provide retention (resistance to movement of the prosthesis away from the tissues along the path of placement and removal of the denture) since they are not present along the path of placement and removal of the denture (Fig. 13-13).

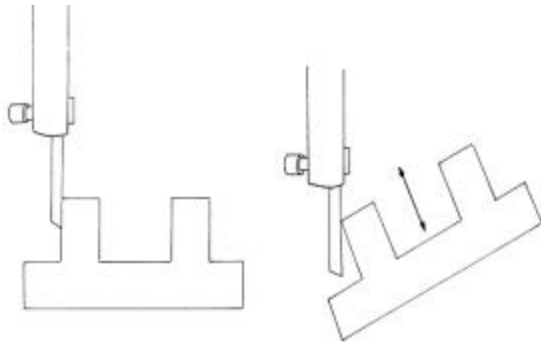


Fig. 13-13.■ False undercuts, a) cast with no undercuts, b) tilting the cast produces false undercuts since the undercuts are not perpendicular to the path of placement and removal of the denture (arrow) which is determined by the guiding plane surfaces of the teeth

REFERENCES

1. The glossary of prosthodontic terms. 6th ed. St. Louis, C V Mosby, 1994.
2. Sowter J B. Dental laboratory technology, prosthodontic techniques. Chapel Hill, University of North Carolina, 1968: 151.