# PERIODONTAL FLAP

Flap: Part of gingiva or mucosa that is surgically separated from the underlying bone.
Flap retains blood supply from the donor area.

## Indications/Objectives of Flap Surgery

- Elimination or reduction of pocket depth
- Gain access to root debridement
- Regeneration of alveolar bone, periodontal ligament and cementum.
- Reshaping soft and hard tissues.

In the periodontal flap, the most important factor to be considered is the amount of attached gingiva.
Adequate width of attached gingiva is a must for optimal gingival health as it resists inflammation more efficiently and is more protective against the accumulation of plaque.

## Basic Requirements of Flap

- It should provide adequate exposure to the surgical area.
- The flap must have a **broad base** and a **good vascular supply**.
- When placed back after surgery, the flap should rest on healthy bone.

## Classification

**According to thickness**

- Full thickness /mucoperiosteal flap
- Partial thickness/mucosal flap/split-thickness flap

| | **Full thickness flap** | **Partial thickness flap** |
|---|---|---|
| Features | All soft tissues including the periosteum are elevated | Reflection of only the epithelium and a layer of underlying connective tissue |

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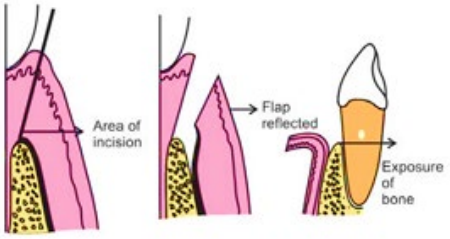
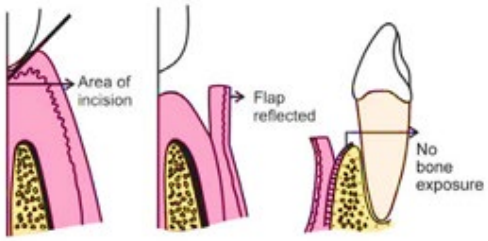
| |  |  |
| Indications | ▪ If osseous surgery is contemplated.<br>▪ Pockets that extend beyond the mucogingival junction<br>▪ Areas of minimal keratinized gingiva<br>▪ Enhance cleanability<br>▪ Facilitate restorative procedures<br>▪ Unesthetic or asymmetric gingival topography | For displacing flaps in the presence of dehiscence and fenestrations |
| Contraindications | ▪ Esthetic considerations<br>▪ Inadequate keratinized gingiva<br>▪ Teeth have a poor prognosis: excessive mobility, a poor crown-to-root ratio, and advanced attachment loss.<br>▪ Inadequate for larger defects. | |

## Advantages and Disadvantages of Full thickness flap

| Advantages | Disadvantages |
|---|---|
| Healing by primary intention | A moderate degree of difficulty |
| Better esthetics, pocket elimination | Should not be used in the presence of thin periodontium where dehiscences or fenestrations may exist. |
| Preservation of existing keratinized gingiva | Apical positioning may increase root exposure and sensitivity. |

| | |
|---|---|
| Access to roots for definitive scaling and root planning | cause cosmetic and phonetic problems especially anteriorly |
| Flaps can be positioned apically or coronally or unpositioned, relocation of the frenum | Cannot be combined with other procedures to increase the zone of keratinized gingiva without exposure of bone. |

**According to the Placement of the Flap after Surgery**

- Nondispalced flap
- Displaced flap

**According to the design of the Flap/management of papilla**

- **Conventional flap** – papilla is splitted into a facial and lingual/palatal half.
- **Papilla preservation flap** – entire papilla is included in one of the flaps.

## Incisions

**Horizontal Incisions**

- Internal bevel incision
- Crevicular incision
- Interdental incision

**Vertical incision**

- Oblique releasing incision

## Horizontal Incisions

**Internal Bevel Incision**

- The first incision, the **reverse bevel incision**
- It starts at a distance (**1 to 2 mm**) from the gingival margin and is aimed at the bone crest.
- It is the incision from which the flap is reflected to expose the underlying bone and root
- **Removes pocket lining**.
- Conserves the uninvolved outer surface of the gingiva.
- Produces sharp, thin flap margin for adaptation tooth bone junction.

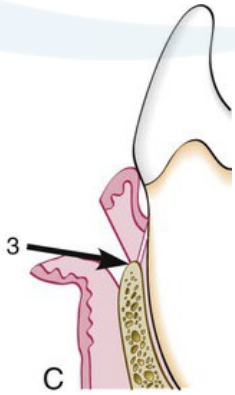
- **No.15 and No.11** surgical scalpels are used.


## Crevicular Incision

- The second incision
- From the base of the pocket to the crest of the bone
- **No.12 B** blade is used.


## Interdental Incision

- Third incision
- The **orban knife** is usually utilized for this incision.
- A curette or a large scaler (U15/30) can be used to remove the gingiva around the tooth.



**Envelop flap**: Flap with no vertical incision

## Vertical Incision

- Releasing incisions
- Done on one or both ends of the horizontal incision.
- Indications: the presence of isolated deep pockets.
- It is avoided in lingual or palatal areas, the centre of the interdental papilla.

## Papilla Preservation Flap

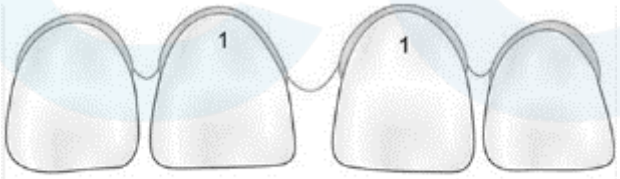
**Indications**

- Regenerative procedures – placing bone graft
- Aesthetic regions – maxillary anterior region

The maxillary anterior region with mild to moderate pockets – scaling and root planing.
For severe pockets in the maxillary anterior region – Papilla preservation flap is used.

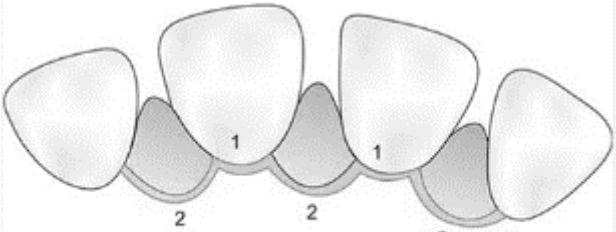
**Steps**

**Step1:** Crevicular incisions/Intersulcular incisions are made around each tooth



1. Intrasulcular incision
(Facial aspect)

**Step 2:** Semilunar incisions/scalloped incisions across the interdental papilla made on the lingual or palatal surface. Papilla is usually included facially.
These scalloped incisions should be **5 mm** away from the CEJ



1. Intrasulcular incision
2. Semilunar incision
(Palatal aspect)

**Step 3**: Papilla dissected by Orbans knife from the lingual or palatal aspect and elevated intact with facial flap.

Periodontal surgery in case of horizontal bone loss in the upper anterior region papilla preservation flap is indicated.

## Flap Techniques for Pocket Therapy

Three main flap techniques

- Modified Widman flap
- Undisplaced flap
- Apically displaced flap

### Modified Widman Flap

- Introduced by **Ramjford and Nissle in 1974**
- Offers the possibility of establishing intimate postoperative adaptation of healthy collagenous connective tissue to the tooth surface.
- Pocket reduction procedure

**Purpose**

- To expose root surfaces for instrumentation.
- For removal of pocket lining

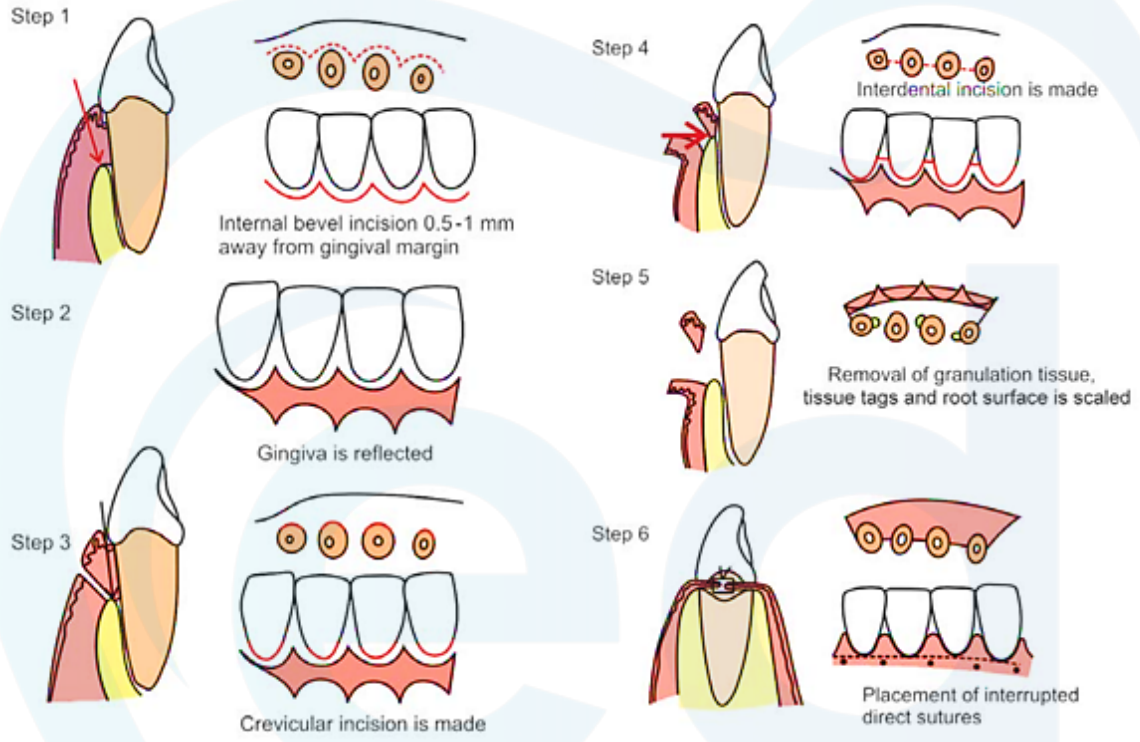
**Indications and Contraindications**

| Indications | Contraindications |
|---|---|
| The deep pocket depth and interdental defects of more than 5-7 mm | A narrow band of attached gingiva |
| When the minimal gingival recession is required | Insufficient attached gingiva |
| Can be combined with hemisection, root resection, wedge excisions, and osseous implantations. | Osseous surgical procedures |

**Steps**

- **Step 1:** internal bevel incision of **0.5 mm to 1 mm** away from the gingival margin directed to the alveolar crest.
- **Step 2**: Using the periosteal elevator gingiva is reflected
- **Step 3**: Crevicular incision is made and the flap is reflected

- **Step 4:** Third/interdental incision is made with Orbans knife and the gingival collar is removed.
- **Step 5**: Using curette tissue tags and granulation tissue is removed. Root surface scaled.
- **Step 6:** Flap approximation and **direct interrupted sutures** are placed.




## Advantages

- Less sensitivity, less mechanical trauma.
- Minimal bone removal, root planning with direct vision
- Healing with the primary intention
- Active pathological aspects of the pocket are eliminated, conservation of periodontal tissues
- Facilitates oral hygiene, post-operative discomfort is less
- Crestal bone resorption is minimal.

## Disadvantages

- Higher skills required
- The exact placement of interproximal flaps.

- Areas of interproximal bony craters show flat or concave architecture immediately after the removal of the surgical dressing.

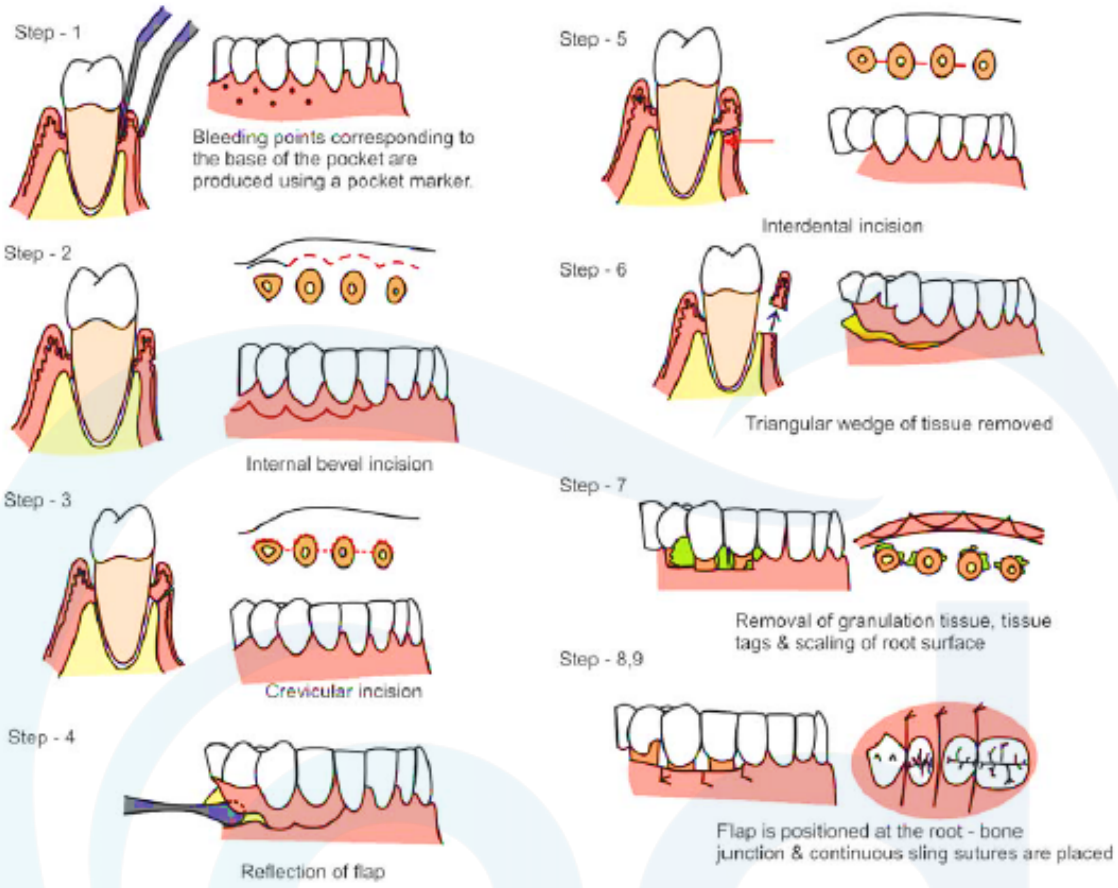
## Undisplaced Flap

The entire soft tissue pocket wall is removed with the initial incision.
**Internal bevel gingivectomy.**
**Purpose**

- Accessibility for instrumentation
- Removal of the pocket wall to eliminate or reduce the pocket.

**Steps**

- **Step 1**: Pocket measurement using a periodontal probe, Bleeding points are made on the gingiva. The final placement of the flap is determined by the first incision.
- **Step 2**: Internal bevel incision made. The incision is usually carried to a point apical to the alveolar crest depending on thickness. As the thickness of tissue increases the endpoint will be more apical.
- **Step 3:** Second or Crevicular incision from the bottom of the pocket to the bone.
- **Step 4**: Using periosteal elevator flap is reflected.
- **Step 5**: Using a knife interdental incision is made.
- **Step 6**: Using a curette triangular wedge of tissue is removed.
- **Step 7**: Debridement of the affected area, removing tissue tags and granulation tissue with sharp curettes. Scaling or root done.
- **Step 8**: Flap is placed back and sutured with continuous sling suture or interrupted suture.




- This flap technique procedure does not increase the width of the attached gingiva. Instead, it decreases the width.
- The undisplaced flap is essentially an **excisional procedure of the gingiva**.
- Undisplaced flap and gingivectomy are the two techniques that surgically remove the pocket wall.

**Variations in the design**

The incision should be scalloped to preserve as much as the interdental papilla.

## Apically Displaced Flap/Apically Repositioned Flap

- Used for both pocket eradication and/or widening the zone of attached gingiva
- **The pocket wall/lining is transformed into attached gingiva**.

- The pocket epithelium is the sulcular epithelium and when it is placed outside it has the potential to undergo keratinisation and it converts into attached gingiva.
- It increases the length of the clinical crown and is not indicated for palatal pockets.
- The width of the attached gingiva is increased by approximately **half the pretreatment pocket depth.**
- The best position for the apically displaced flap is at **2 mm** apical to the alveolar crest. It produces the most desirable gingival contour.
- Thick manageable true pockets with no recession are best treated with an apically displaced flap.

**Purpose**

- Improves accessibility.
- Pocket elimination by transforming the previously unattached keratinized pocket walls into attached tissues

**Steps**

- **Step 1**: Internal bevel incision Directed towards the crest of the bone from **1 mm** from the crest of the gingiva is made.
- **Step 2**: Crevicular incision is made and the flap is elevated. The interdental incision is made and a wedge of tissue with pocket wall is removed.
- **Step 3**: Vertical releasing incision made extending beyond mucogingival junction and the flap is elevated with a periosteal elevator.
- **Step 4:** granulation tissue is removed, root planing done
- **Step 5**: Flap is positioned apically and sutured.

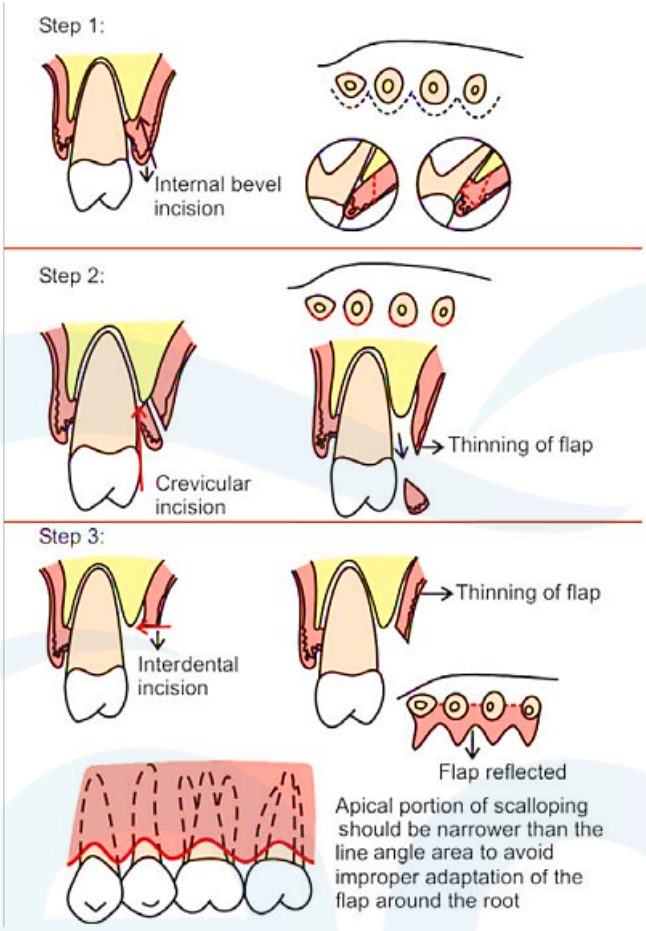
It is most difficult to perform an apically positioned flap procedure on the **facial surface of the third molars**.

## Comparison

| Parameters | Modified Widman Flap | Undisplaced Flap | Apically Displaced Flip |
|---|---|---|---|
| Nature of Procedure | Incisional procedure of the gingiva | Excisional procedure of the gingiva | Incisional procedure of the gingiva |
| Objectives | To facilitate root instrumentation | To reduce pocket wall | To eliminate the pockets |
| | To remove pocket lining | | To increase the width of the attached gingiva |
| Indications | Shallow to moderate pocket depth with base of the pockets located coronal to the mucogingival junction | Gingival enlargement | Moderate or deep pockets with base of the pocket apical to mucogingival junction<br>To lengthen crown |
| Vertical incision | Not Given | Not Given | Given |
| Bleeding Points | Not Marked | Marked | Not Marked |
| Ability to treat osseous irregularities and defects | No | No | Yes |
| Degree of difficulty | Low | Low | High |

## Palatal Flap

Displacement flaps and partial thickness flaps are not done on palatal tissues as they are attached, keratinized tissue and have no elastic properties.




## Variations in Technique

- When the tissue is thick, a **horizontal gingivectomy incision** is made followed by an internal bevel incision.
- Thinning of the flap should be done before reflection of the flap.
- As the palatal root tapers apically, The apical portion of the scalloping incision should be narrower than the line angle area.
- Rounded scallop will result in improper adaptation of the flap around the root.

## Distal Molar Surgery

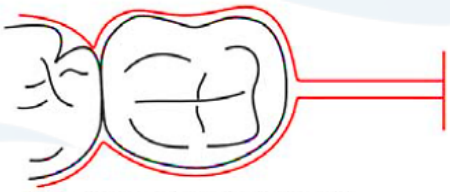
Treatment of periodontal pockets on the distal surface of terminal molars is complicated by the lack of sufficient attached gingiva and the presence of bulbous fibrous tissue over tuberosity and retromolar pad.

## Uses

- For maxillary molars
- For mandibular molars.

## Technique of maxillary molars

- **Two parallel incisions** at the distal surface of the terminal tooth are made.
- For deeper pockets, the distance between two parallel lines increases.
- **The transversal incision** is made and a long rectangular piece of tissue is removed.
- These incisions are made with a **No.12 blade**.
- The flap reflected and the bone surface curetted and the flap sutured.

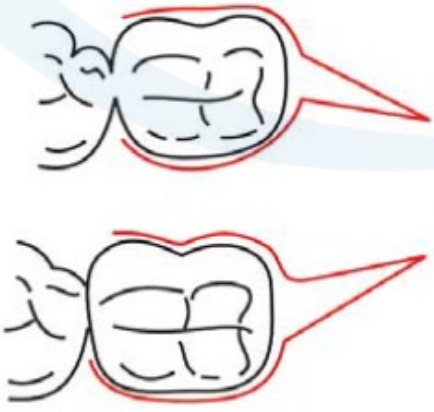


Typical incision design for distal surface of maxillary 2nd molar

Sutures placed

## Technique for mandibular molars

- **Two parallel incisions** at the **retromolar pad area** are made.
- After flap reflection and tissue removal, osseous surgery may be performed.



Incision design for distal surface of mandibular 2nd molar. Incisions following the areas of greatest attached gingiva may be distofacial or distolingual

Triangular wedge of tissue removed

Conditions

| Condition | Preferred flap |
|---|---|
| ▪ For accessibility in the anterior teeth segment<br>▪ For reconstructive osseous surgery | Papillary preservation flap |
| ▪ For accessibility in non-aesthetic zone | Modified Widman flap |
| ▪ For osseous defects closure by bone recontouring<br>▪ Decreased width/Absence of attached gingiva with thick pocket wall | Apically displaced flap |
| ▪ A long narrow gingival defect on a single tooth | Lateral displaced flap |

## Healing After Flap Surgery

- **Immediately after suturing (0 to 24 hours):** Formation of a blood clot, which consists of fibrin reticulum with PMNs, Erythrocytes, debris from injured cells, and capillaries.
- **1-3 days after flap surgery**: Space between flap and tooth/bone is thinner. epithelial cells migrate over the border of the flap.
- **One week after flap surgery**: epithelial attachment to the root is established by hemidesmosomes and basal lamina. Replacement of blood clots by granulation tissue which is derived from PDL, bone marrow and gingival connective tissue.
- After periodontal surgery, immediate recall is done after **1 week** for removal of the pack.
- **Two weeks after surgery**: collagen fibres begin to appear parallel to the tooth surface. The Union of the flap and the tooth clinically appears to be normal.
- **One month (4 weeks) after surgery**: well-defined epithelial attachment and full epithelized gingival crevice are present.
- After periodontal surgery, the sulcus can be safety probed after – **3 months**.

## Healing After Full-Thickness Flap

Additional steps like superficial bone necrosis, osteoclastic resorption and bone loss take place.

- **1-3 days**: superficial bone necrosis
- **4-6 days**: osteoclastic resorption