Other classification of flaps is:

A) The original Widman flap:

In 1918 Leonard Widman published one of the first detailed descriptions of the use of a mucoperiosteal flap design aimed at removing the pocket epithelium and the inflamed connective tissue, thereby facilitating optimal cleaning of the root surfaces.

The advantages in comparison to the gingivectomy procedure:

1. Less discomfort for the patient, since healing occurred by primary intention.

2. It was possible to re-establish a proper contour of the alveolar bone in sites with angular bony defects.

Technique:

Sectional releasing incisions were first made to) demarcate the area scheduled for surgery (Figure 18). These incisions were made from the mid-buccal gingival margins of the two peripheral teeth of the treatment area and were continued several millimeters out into the alveolar mucosa. The two releasing incisions were connected by a gingival incision (submarginal internal bevel), which followed the outline of the gingival margin and separated the pocket epithelium and the inflamed connective tissue from the non- inflamed gingiva. Similar releasing and gingival incisions, if needed, were made on the lingual aspect of the teeth.

mucoperiosteal flap was elevated to expose at least 2-3 mm of the marginal alveolar bone. The collar of inflamed tissue around the neck of the teeth was removed and the exposed root surfaces were carefully scaled. Bone recontouring Was recommended in order to achieve an ideal anatomic form of the underlying bone

Following careful debridement of the teeth in the surgical area, the buccal and lingual flaps were laid back over the alveolar bone and secured in this position with interproximal sutures. Widman pointed out the importance of placing the soft tissue margin at the level of the alveolar bone crest, so that no pockets would remain. The procedure resulted in the exposure of root surfaces. Often the interproximal areas were left without soft tissue coverage of the alveolar bone.

B)The Neumann flap:

Neumann (1920) suggested the use of a flap procedure, which in some respects was different from that originally described by Widman.

Technique:

Intracrevicular incision was made through the base of the gingival pockets and the entire gingiva (and part of the alveolar mucosa) was elevated in a mucoperiosteal flap. Sectional releasing incisions were made to demarcate the area of surgery.

The inside of the flap was curetted to remove the pocket epithelium and the granulation tissue. The root surfaces were subsequently carefully "cleaned". The flaps were then trimmed to allow both an optimal adaptation to the teeth and a proper coverage of the alveolar bone on both the buccal/lingual (palatal) and the interproximal sites.

C.) The modified flap operation:

1931 Kirkland described a surgical procedure to be used in the treatment of "periodontal pus pockets". The procedure was called the modified flap operation, and is basically an access flap for proper root debridement.

Technique:

In this procedure incisions were made intracrevicularly through the bottom of the pocket (Figure 22) on both the labial and the lingual aspects of the interdental area. The incisions were extended in a mesial and distal direction.

The gingiva was retracted labially and lingually to expose the diseased root surfaces which were carefully debride. Angular bony defects were curetted.

Following the elimination of the pocket epithelium and granulation tissue from the inner surface of the flaps, these were replaced to their original position and secured with interproximal sutures Thus, no attempt was made to reduce the pre-operative depth of the pockets.

In contrast to the original Widman flap as well as the Neumann flap, the modified flap operation dịd nọt include (1) extensive sacrifice of non-inflamed tissues and (2) apical displacement of the gingival margin.

It could be useful in the anterior regions of the dentition for esthetic reasons, since the root surfaces were not markedly exposed. Another advantage was the potential for bone regeneration in intrabony defects

D) The apically repositioned flap:

New surgical techniques for the removal of soft and, when indicated, hard tissue periodontal pockets. The importance of maintaining an adequate zone of attached gingiva after surgery was emphasized. One of the first authors to describe a technique for the preservation of the gingiva following surgery was Nabers (1954).

In 1962 Friedman proposed the term apically repositioned flap to describe more appropriately the surgical technique introduced by Nabers. Friedman emphasized the fact that, the entire complex of the gingiva and alveolar mucosa rather than the gingiva alone was displaced in an apical direction. This surgical technique was used on buccal surfaces in upper and lower jaws and on lingual surfaces in the lower jaw, while an excisional technique had to be used on the palatal aspect of maxillary teeth where the lack of alveolar mucosa made it impossible to reposition the flap in an apical direction.

Advantages pf the apically repositioned flap procedure:

1. Minimum pocket depth post-operatively

2. If optimal soft tissue coverage of the alveolar bone is obtained, the post- surgical bone loss is minimal.

3. The post-operative position of the gingival margin may be controlled and the entire mucogingival complex may be maintained.

Disadvantages of the apically repositioned flap procedure:

1. May cause esthetic problems due to root exposure.

2. May cause hypersensitivity.

3. May increase the risk of root caries.

Contraindications of the apically repositioned flap procedure:

1.Periodontal pockets in severe periodontal disease

2. Periodontal pockets in areas where esthetics is critical

3. Deep intrabony defects

4. Patient at high risk for caries

5. Severe hypersensitivity

6. Tooth with marked mobility and severe attachment loss

7. Tooth with extremely unfavorable clinical crown/root ratio

Technique:

According to Friedman (1962) the technique should be performed in the following way: A reverse (internal) bevel incision is made using a scalpel with a Bard-Parker blade (No. 12B or No. 15). How far from the buccal/lingual gingival margin the incision should be made is dependent on the pocket depth as well as the thickness and the width of the gingiva if pre-operatively the gingiva is thin and only a narrow zone of keratinized tissue is present, the incision should be made close to the tooth. The beveling incision should be given a scalloped outline, (to ensure maximal interproximal coverage of the alveolar bone repositioned. Vertical releasing incisions extending out into the alveolar mucosa (i.e. past the mucogingival junction) are made at each of the end points of the reverse incision, thereby making apical repositioning of the flap possible.

A full-thickness flap is raised by means of a mucoperiosteal elevator. The flap has to be elevated beyond the mucogingival line in order to be able later to reposition the soft tissue apically. The marginal collar of tissue, including pocket epithelium and granulation tissue, is removed with curettes, and the exposed root surfaces are carefully scaled and planed.

. The alveolar bone crest is recontoured with the objective of recapturing the normal form of the alveolar process but at a more apical level. The osseous surgery is performed using burs and/or bone chisels.

The buccal/lingual flap is repositioned to the level of the newly recontoured alveolar bone crest and secured in this position. A periodontal dressing should therefore be applied to protect the exposed bone and to retain the soft tissue at the level of the bone crest.

To handle periodontal pockets on the palatal aspect of the maxillary teeth,Friedman described a modification of " apically repositioned flap" , which he termed the beveled flap .In order to prepare the tissue at the gingival margin to follow the outline of the alveolar bone crest properly, aconventional mucoperiosteal flap is first resected.

The tooth surfaces are debrided and osseous recontouring is performed.

The palatal flap is subsequently replaced and the gingival margin is prepared and adjusted to alveolar bone crest by a secondary scalloped and beveled incision.

The flap is secured in this position with interproximal suture

E) The modified Widman flap:

Ramfjord and Nissle (1974) described the modified Widman flap technique that 1s also recognized as the open flap curettage technique. It should be noted that, while the original Widman flap technique included

both apical displacement of the flaps and osseous recontouring (elimination of bony defects) to obtain proper pocket elimination, the modified Widman flap technique is not intended to meet these objectives.

The main advantages:

1. The possibility of obtaining a close adaptation of the soft tissues to the root surfaces.

2. The minimum of trauma to which the alveolar bone and the soft connective tissues are exposed.

3. Less exposure of the root surfaces, this from an esthetic point of view is an advantage in the treatment of anterior segments of the dentition.

Technique:

The initial incision which may be performed with a Bard-Parker knife (No.11), should be parallel to the long axis of the tooth and placed approximately 1 mm from the buccal gingival margin in order to properly separate the pocket epithelium from the flap lf pockets on the buccal aspects of the teeth are less than 2 mm deep or if esthetic considerations are important, an intracrevicular incision may be made. Furthermore, the scalloped incision should be extended as far as possible in between the teeth, to allow maximum amounts of the interdental gingiva to be included in the flap. A similar incision technique is used on the palatal aspect. Often, however, the scalloped outline of the initial incision may be accentuated by placing the knife at a distance of 1-2 mm from the mid-palatal surface of the teeth. By extending the incision as far as possible in between the teeth, sufficient amounts of tissue can be included in the palatal flap to allow for proper coverage of the interproximal bone when the flap is sutured. Vertical releasing incisions are not usually required.

Buccal and palatal full-thickness flaps are carefully elevated with a mucoperiosteal elevator. The flap elevation should be limited and allow only a few millimeters of the alveolar bone crest to become exposed. To facilitate the gentle separation of the collar of pocket epithelium and granulation tissue from the root Surfaces, an intracrevicular incision is made around the teeth (second incision) to the alveolar crest.

A third incision made in a horizontal direction and in a position close to the surface of the alveolar bone crest separates the soft tissue collar of the root surfaces from the bone.

The pocket epithelium and the granulation tissues are removed by means of currettes. The exposed roots are carefully scaled and planed, except for a narrow area close to alveolar bone crest in which remnants of attachment fibers may be preserved. Angular bony defects are carefully curetted.

The flaps are complete coverage of the interproximal bone. If adaptation cannot be achieved by soft tissue recontouring, some bone may be removed from the outer aspects of the alveolar process in order to facilitate the all-important flap adaptation.The flaps are sutured together with individual interproximal sutures. Surgical dressing placed over the area to close adaptation of the flaps to the alveolar bone and root surfaces. The dressing, as well as the sutures, is removed after 1 week.

F. The papilla preservation flap:

In order to preserve the interdental soft tissues for maximum soft tissue coverage following surgical intervention involving treatment of proximal osseous defect, takei et al. (1985) proposed a surgical approach called papilla preservation technique. Later,Cortellini et al. (1995b,1999) described modifications of flap design to be used in combination with regenerative procedures.For esthetic reasons,the papilla preservation technique is often utilized in the surgical treatment of anterior tooth regions.

Technique:

It is initiated by an intra-sulcular incision at the facial and proximal aspects of the teeth without making incisions through the interdental papillae.

Subsequently, an intra-sulcular incision is made along the lingual/palatal aspect of the teeth with a semilunar incision made across each interdental area. The semilunar incision should dip apically at least 5mm from the line angles of teeth, which will allow the interdental tissue to be dissected from the lingual/palatal aspect so that it can be elevated intact with the facial flap. In situations where an osseous defect has a wide extension into the lingual/palatal area,the semilunar incision may be placed on the facial aspect of the interdental area to have the papillae included with the lingual/palatal flap.

A curette or interproximal knife is used to free the interdental papilla carefully from the underlying hard tissue. The detached interdental tissue is pushed through the embrasure with a blunt instrument.

A full- thickness flap is reflected with a periosteal elevator on facial and lingual/ palatal surfaces. The exposed root surfaces are thoroughly scaled and root planed and bone defects carefully curetted.

While holding the reflected flap, the margins of the flap and the interdental tissue are scraped to remove pocket epithelium and excessive granulation tissue. In anterior area, the trimming of granulation tissue should be limited in order to maintain the maximum thickness of tissue.

The flap is repositioned and sutured using cross mattress sutures.

Alternatively, direct suture of the semilunar incisions can be done as the only means of flap closure. Dressing placed to protect the surgical area. The dressing and sutures are removed after 1 week.

G-Pedicle flap for root coverage:

1-Coronally Repositioned flap.

2-Laterally repositioned flap.