PERIODONTAL PLASTIC AND ESTHETIC SURGERY

DR. PARAG HADGE

Introduction

- ***Mucogingival Surgery - Friedman*** et al 1950 – ‘surgical procedures designed to preserve gingiva, remove aberrant frena or muscle attachments and increase the depth of the vestibule’

- That was the era of the gingivectomy and as gingiva was excised, this often resulted in an alveolar mucosa margin.
- Simply removing the frenulum and deepening the vestibule did not provide the desired solution.
- Soon it became apparent that the lack of attached gingiva was the primary problem, not the frenulum or vestibular depth.

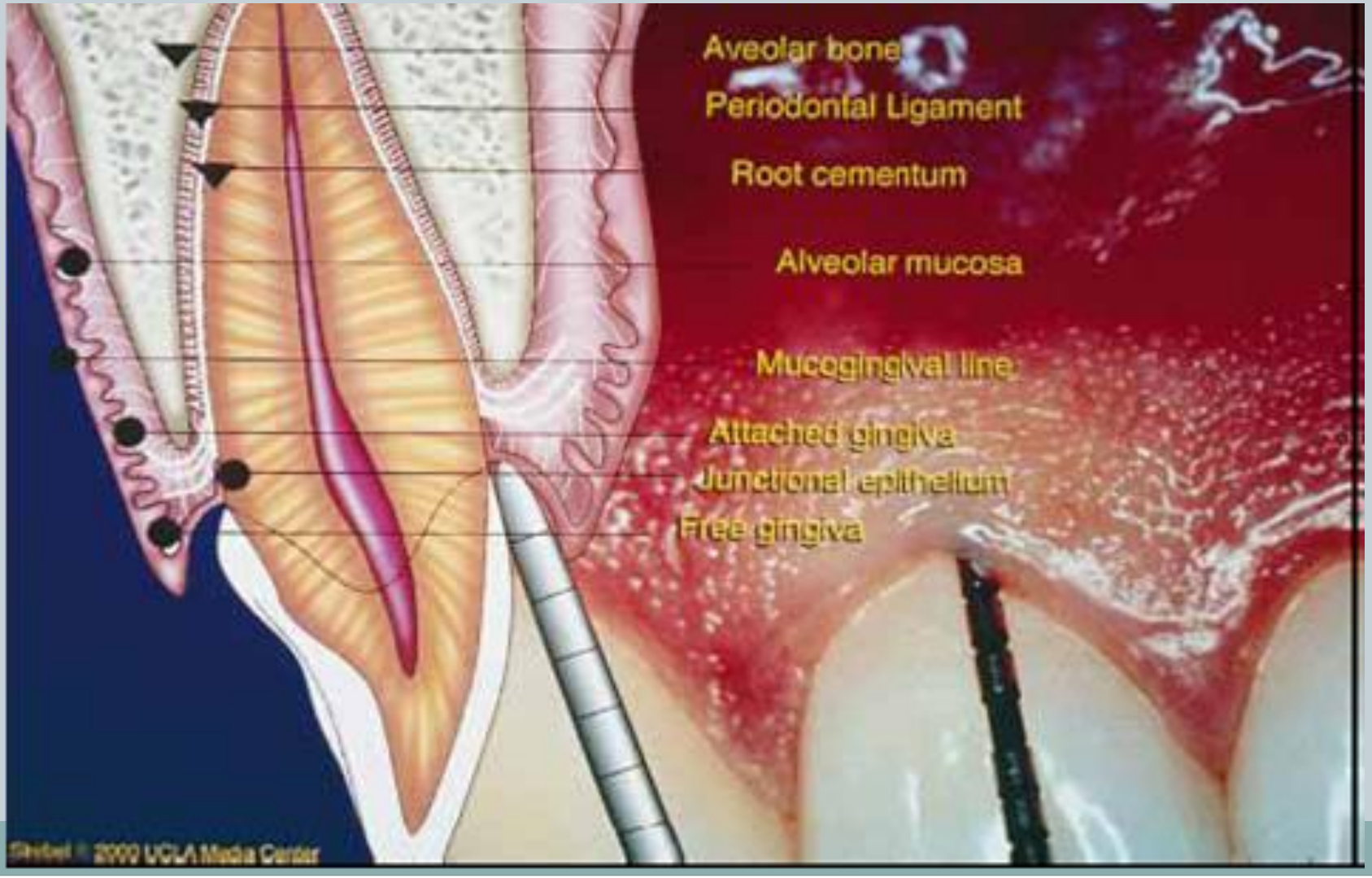
- The surgical technique, thus evolved, which either preserved or augmented, attached gingiva. These included soft tissues auto grafts.
- Lateral sliding flap introduced - ***Grupe*** and ***Warren*** in 1956
- Free soft tissue autograft - ***King*** and ***Pennel*** in1964
- Free autogenous gingival grafts - ***Sullivan HC*** and ***Atkins JH*** in 1968
- Free connective tissue grafts by- ***Edel A*** in 1974

- Since 1950s, with changing concepts and advancement of periodontal surgical techniques, 1996 World Workshop renamed mucogingival surgery as ***Periodontal Plastic Surgery***.
- This term was originally proposed by ***Dr. Preston Dallas Miller*** in 1993
- ***Periodontal Plastic Surgery*** includes *mucogingival surgery*, since it addresses the treatment of all deformities in the gingival or alveolar mucosa, but it also applies to modifications in the edentulous ridge size and the shape as well as surgical procedures for improvement of soft tissue esthetics.

- Periodontal Plastic Surgery is defined as ***surgical procedures performed to correct or eliminate anatomic, developmental, or traumatic deformities of the gingiva or alveolar mucosa***.

- Mucogingival surgery - functional result
- Periodontal plastic surgery - functional result and esthetic outcome
- Just as “pyorrhea” has become an outdated term, so has mucogingival surgery.
- Mucogingival defect - defects involving both the gingiva and alveolar mucosa.
- Thus it is appropriate to say that mucogingival defects are treated with periodontal plastic surgery.

Mucogingival Complex



Clinical Significance of Attached Gingiva

- The role played by the attached gingiva in the maintenance of gingival health is somewhat controversial

How much attached gingiva is enough?

- ***Lang & Loe*** - that a minimum width of 2 mm of gingiva needs to be present for gingival health to exist
- Areas with 1 mm or less of attached gingiva - clinical signs of inflammation

- With the proper oral hygiene and absence of bacterial plaque, gingival health in the form of no attachment loss and absence of inflammation can exist in areas where minimal or no attached gingiva is present
- However, it is commonly agreed that the areas with less than 2 mm of attached gingiva are at a higher risk for recession.
- Such areas should, therefore, be carefully evaluated longitudinally for the presence of inflammation, development of recession and therefore, treatment needs.

- Simple clinical test - Tension test
- Pulling on the cheeks or lips adjacent to the teeth being evaluated to examine the effects of this tension on the gingival tissues
- In areas of inadequate dimensions of attached gingiva, the tension test results in movement (need for the surgical intervention) and/or blanching of the gingival margin

Marginal Tissue Recession

- Recession (gingival recession) is defined as “location of the marginal tissue apical to the cemento-enamel junction.”
- Since the soft tissue margin may not always be composed of gingiva, the terms “soft tissue recession” and “marginal tissue recession” are the more accurate terms.

- If a tooth erupts in labioversion, it may have no keratinized tissue on the facial surface. In such case, there may be entirely alveolar mucosa. Then if recession occurs, then technically we have alveolar mucosal recession and not gingival recession.
- Therefore, the term marginal tissue recession, as coined by ***Maynard*** and ***Wilson*** (1979) becomes the more accurate term.

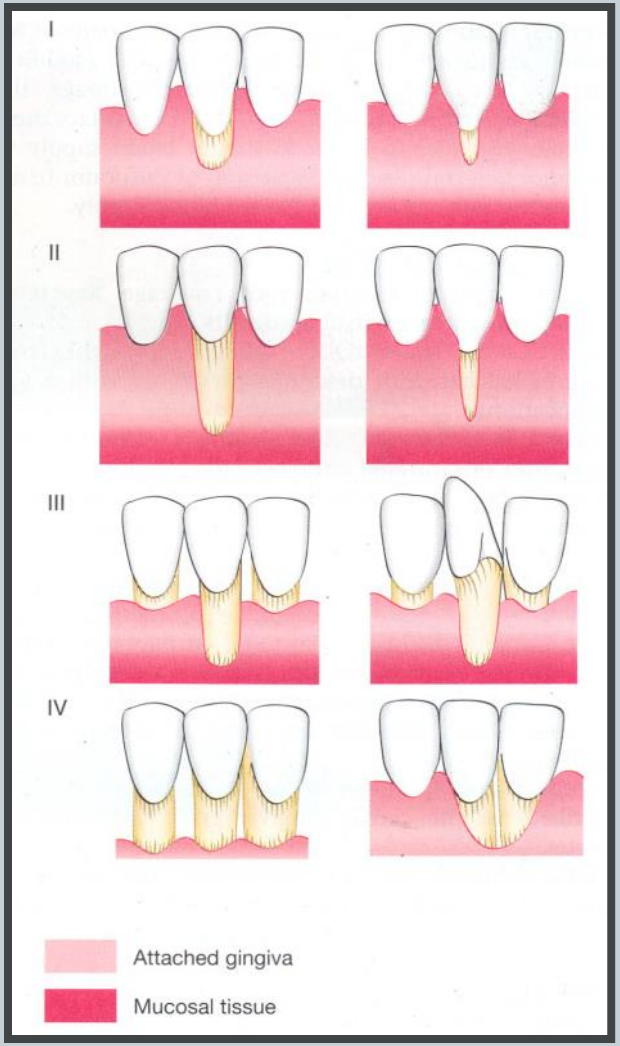
Classification of Recession

- ***Sullivan and Atkins*** in 1960. The basis of their gingival classification was the depth and the width of the defect. The four categories to describe defects were:

1. Shallow narrow
2. Shallow wide
3. Deep narrow
4. Deep wide

- The authors reported an inverse relationship between the size of the defect of the likelihood of root coverage.

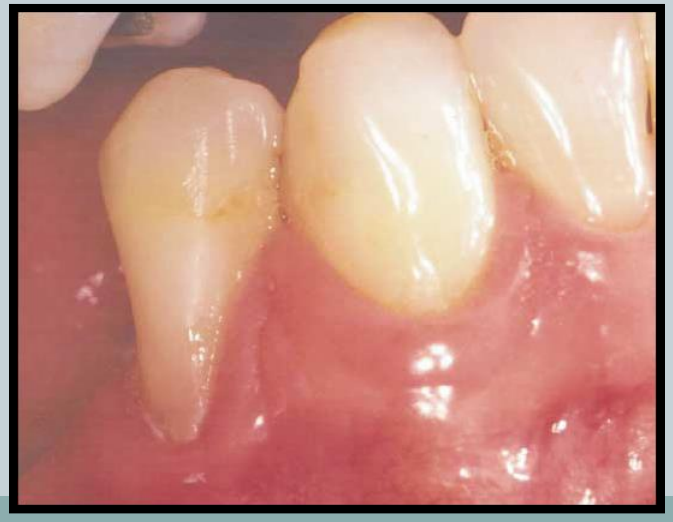
- Later, Miller in 1985 proposed a classification scheme for recession defects that is one currently the most commonly used by clinicians.
- He classified gingival recession according to the height of the interproximal tissues adjacent to the defect area



P. D. Miller's classification of denuded roots

- **Class I:** Marginal tissue recession that does not extend to the mucogingival junction. There is no periodontal loss (bone or soft tissue) in the interdental area and 100% root coverage can be anticipated.
- **Class II:** Marginal tissue recession that extends to or beyond the mucogingival junction. There is no periodontal loss (bone or soft tissue) in the interdental area and 100% root coverage can be anticipated.

- **Class III:** Marginal tissue recession that extends to or beyond the mucogingival junction. Bone or soft tissue loss in the interdental area is present or there is malpositioning of the teeth, which prevents the attempting of 100% root coverage. Partial root coverage can be anticipated.
- **Class IV:** Marginal tissue recession that extends to or beyond mucogingival junction. The bone or soft tissue loss in the interdental area and/or malpositioning of the teeth is so severe that root coverage cannot be anticipated.



Index of Recession (IR)

- Introduced by ***Smith***
- Recession is described by two digits separated by a dash (for example, F2-4), and the prefixed letter F or L denotes whether the recession is on the facial or lingual aspects of the tooth.
- If an asterisk were present, it would denote involvement of the mucogingival junction.
- The horizontal component is expressed as a whole number value (from the range 0-5) **Table.1**
- the second digit of the IR that gives the vertical extent of recession measured in millimeters (on a range from 0-9) **Table.2**

TABLE 1

THE HORIZONTAL EXTENT OF RECESSION.*

SCORE	CRITERIA
0	No clinical evidence of root exposure
1	No clinical exposure of root exposure plus a subjective awareness of dentinal hypersensitivity in response to a one-second air blast is reported, and/or there is clinically detectable exposure of the CEJ† for up to 10 percent of the estimated midmesial to middistal distance
2	Horizontal exposure of the CEJ more than 10 percent but not exceeding 25 percent of the estimated midmesial to middistal distance
3	Exposure of the CEJ more than 25 percent of the midmesial to middistal distance but not exceeding 50 percent
4	Exposure of the CEJ more than 50 percent of the midmesial to middistal distance but not exceeding 75 percent
5	Exposure of the CEJ more than 75 percent of the midmesial to middistal distance up to 100 percent

* Source: Smith.[1]
† CEJ: Cementoenamel junction.

TABLE 2

THE VERTICAL EXTENT OF RECESSION.*

SCORE	CRITERIA
0	No clinical evidence of root exposure
1	No clinical exposure of root exposure plus a subjective awareness of dentinal hypersensitivity is reported and/or there is clinically detectable exposure of the CEJ† not extending more than 1 millimeter vertically to the gingival margin
2 to 8	Root exposure 2 to 8 mm extending vertically from the CEJ to the base of the soft-tissue defect
9	Root exposure more than 8 mm from the CEJ to the base of the soft-tissue defect
*	An asterisk is present next to the second digit whenever the vertical component of the soft-tissue defect encroaches into the mucogingival junction or extends beyond it into alveolar mucosa; the absence of an asterisk implies either absence of mucogingival junction involvement at the indexed site or its noninvolvement in the soft-tissue defect

* Source: Smith.[1]
† CEJ: Cementoenamel junction.

- ***Nordland*** and ***Tarnow*** presented a classification system for loss of papillary height, as described in **Table 3**.

TABLE 3

CLASSIFICATION OF PAPILLARY HEIGHT.*

CLASSIFICATION	CRITERIA
Normal	Interdental papilla fills embrasure space to the apical extent of the interdental contact point/area
Class I	The tip of the interdental papilla lies between the interdental contact point and the most coronal extent of the interproximal CEJ† (space present but interproximal CEJ is not visible)
Class II	The tip of the interdental papilla lies at or apical to the interproximal CEJ but coronal to the apical extent of the facial CEJ (interproximal CEJ visible)
Class III	The tip of the interdental papilla lies level with or apical to the facial CEJ

* Source: Nordland and Tarnow.[39]
† CEJ: Cementoenamel junction.

- These two indexes are used primarily in cross-sectional and longitudinal epidemiologic studies to describe the prevalence, incidence, severity and etiology of gingival recession.
- Clinically, Miller's classification probably is the most widely used for describing gingival recession.

Causes for Marginal Tissue Recession

- Physiological due to aging.
- Progressive periodontal disease.
- Tooth brush trauma.
- Trauma from occlusion.
- Local factors like microbial dental plaque, calculus, etc.

- Orthodontic treatment.
- Buccally or labially placed teeth.
- Coronal frenal attachment with shallow vestibular depth.
- In presence of thin alveolar bone plate/its absence in dehiscences and fenestrations with malaligned teeth.
- Root prominence.
- Improperly contoured restorations.

Complications

- Altered aesthetics (long tooth syndrome).
- Cervical abrasion.
- Root sensitivity.
- Root caries.
- Caries leading to pulp involvement and periapical pathology.
- Food impactions.

Indications for Periodontal Plastic Surgical Procedures

- Gingival Augmentation
- Marginal Tissue Recession (Root Coverage)
- Augmentation of the edentulous ridge (Improve ridge contour)
- Aberrant/High frenulum
- The shallow vestibule (vestibular deepening)
- Excessive gingival display (crown lengthening)
- Teeth those are not likely to erupt (surgical exposure)
- Loss of interdental papilla which presents an esthetic and/or phonetic defect (papilla reconstruction)
- Esthetic defects around dental implants (bone and/or soft tissue augmentation)

Root Coverage Techniques

1. Pedicle Soft Tissue Grafts

a) Rotational Flaps

- Laterally Positioned flap
- Double Papilla flap.

b) Advanced flaps

- Coronally Positioned flap
- Semilunar flap.

2. Free Soft Tissue grafts

a) Non-Submerged Grafts

- Free gingival graft: One Stage (Direct Technique)
- Free gingival graft + Coronally Positioned flap: Two Stage (Indirect Technique)
- Free connective tissue graft

b) Submerged Grafts

- Connective tissue graft + Laterally positioned flap
- Connective tissue graft + Double Papilla flap
- Connective tissue graft + Coronally positioned flap (Sub epithelial connective tissue graft)
- Pouch and Tunnel technique
- Envelope technique

3. Additive Treatments

- Guided tissue membrane barriers
- Non resorbable membrane barriers
- Resorbable membrane barriers.
- Root Surface modification agents.
- Enamel matrix proteins
- Acellular Dermal Matrix Allograft (ADMA)
- Tissue Engineering Technology

Root coverage can be classified as

- Primary coverage which is achieved immediately after grafting.
- Secondary Coverage, when creeping attachment occurs ***(Goldman)***. Creeping attachment is the result of 'activation of the mesenchymal cells of the periodontal ligament with enough time and in the absence of mechanical and infectious inflammatory stimuli.'

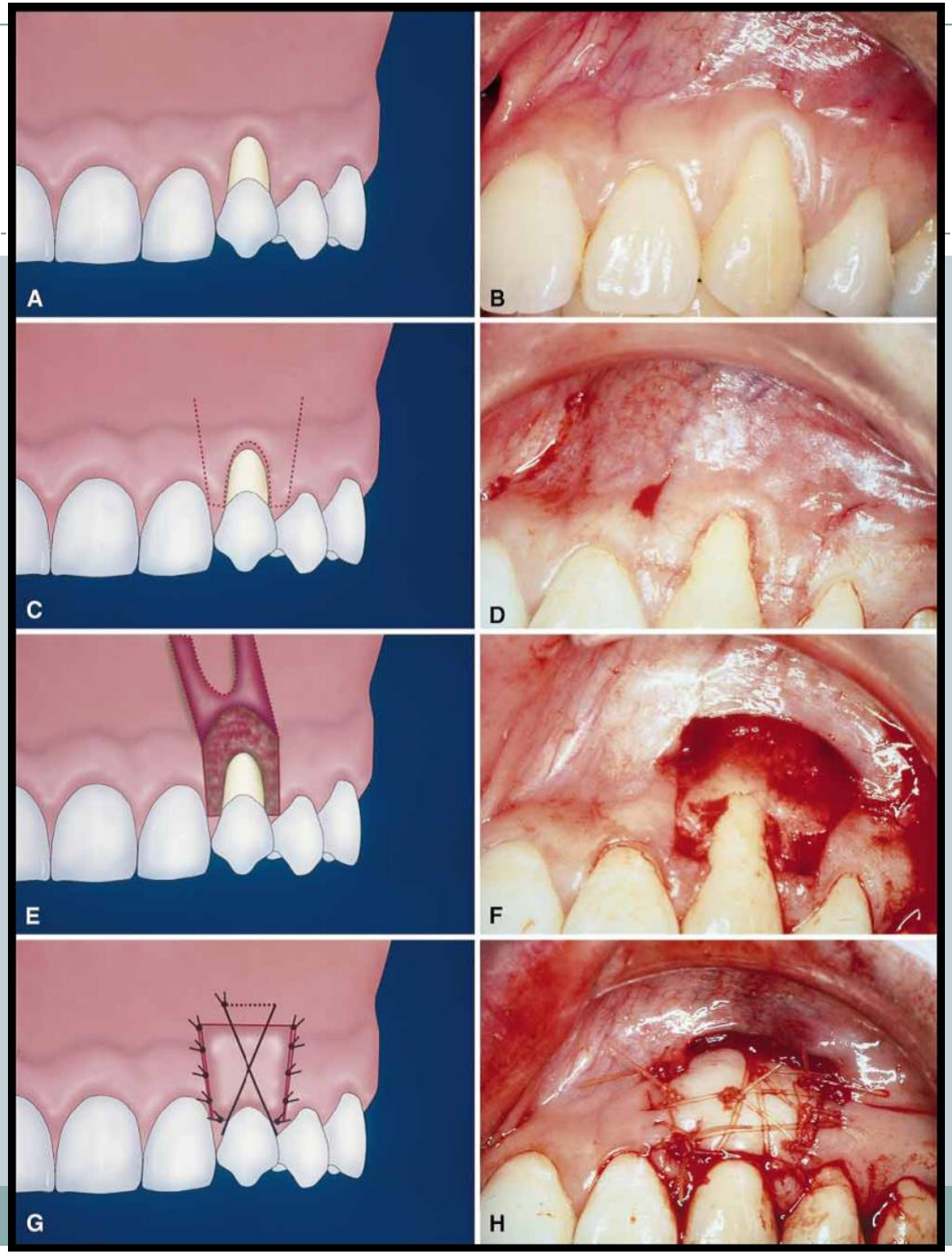
Free soft tissue graft for root coverage

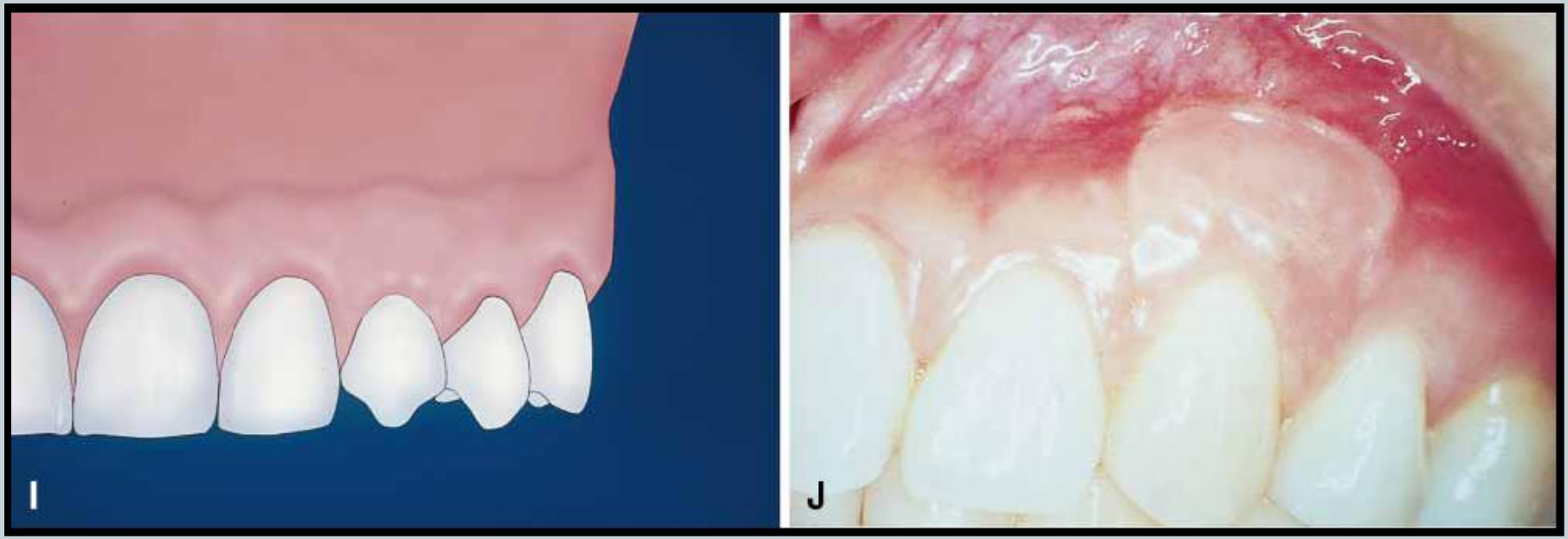
- First described by ***Sullivan*** and ***Atkins***.

Non Submerged Grafts

- The epithelialized soft tissue graft is commonly named ***'free gingival graft'***
- The terminology is misleading since the free gingiva is the unattached gingiva surrounding the teeth and this tissue is not used in grafting procedure.
- Additionally, the palatal tissue used for grafting is not actually gingiva, but technically masticatory mucosa.

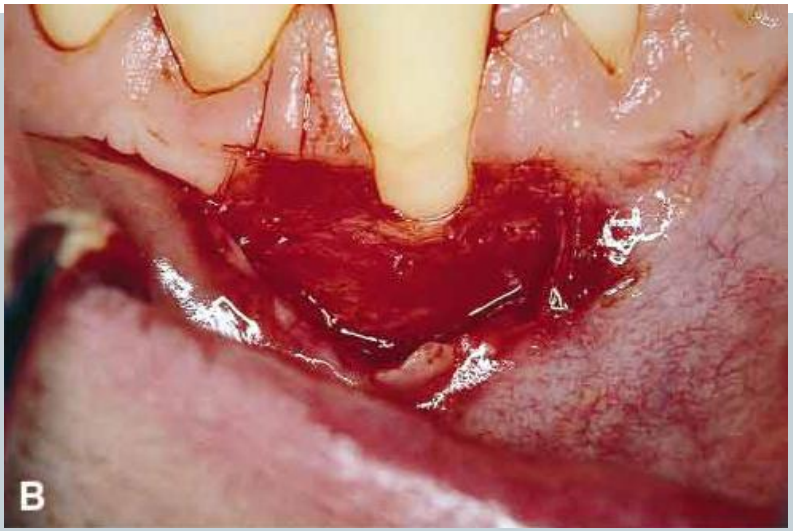
- Two basic surgical techniques
- ***Miller*** is a one-step procedure - direct approach
- ***Bernimoulin*** et al involves two surgical steps - indirect approach

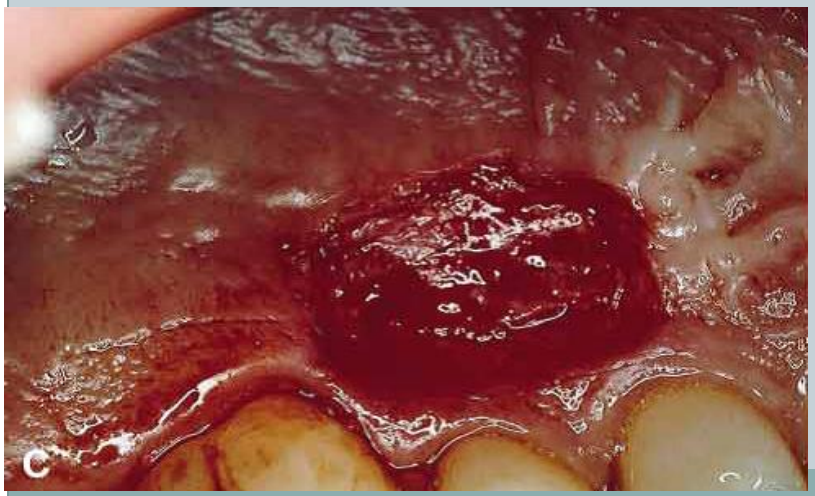

A
B
C
D
E
F
G
H


I
J

- A, B. Upper canine showing a Miller Class II gingival recession. Notice no loss of interproximal tissue.
- C, D. Following scaling and root planing, horizontal and vertical incisons are made. Vertical incisions are extended beyond the mucogingival junction.
- E, F. A split thickness flap is elevated and excised.
- G, H. Following harvesting from the palate, a thick (2-mm) free gingival graft is sutured in the recipient site with interrupted and circumferential periosteal sutures.
- I, J. Healing at 6 months postoperatively. Notice complete root coverage, increase in attached gingiva and excellent color match.

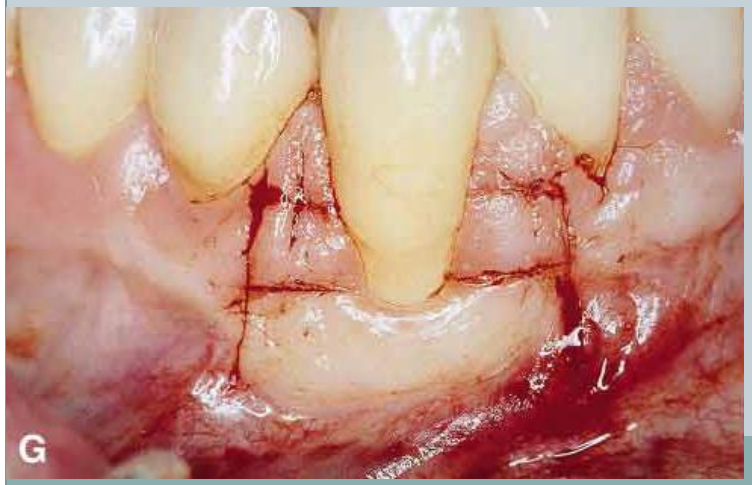
Indirect Technique



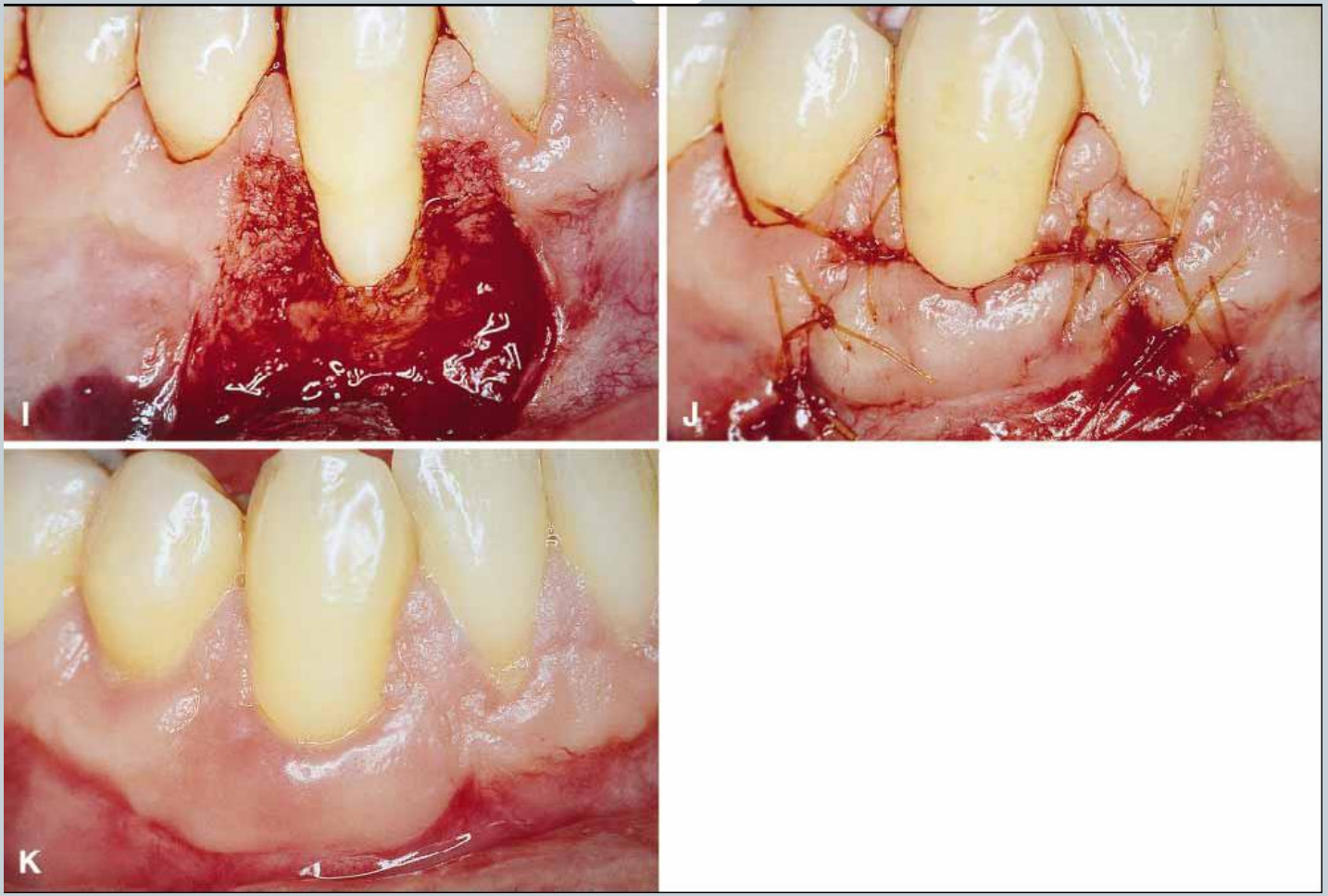



E


F


G


H


I
J
K

Root Preparation Relevance

- The primary importance for success in any root coverage procedures is proper preparation of denuded root, which would allow biological attachment of grafted tissue to it and helps to achieve a surface that is plaque and calculus free.
- Flattening of the root profile gives a smaller avascular surface for the graft and also results in close contact between the graft and the root surface.

- Chemical treatment of the root with citric acid or tetracycline HCl can remove the smear layer created during mechanical root preparation and may facilitate the formation of new connective tissue attachment by exposing collagen fibrils on the root surface.

Complete root coverage has been defined in clinical terms as

- Soft tissue margin must be at the CEJ
- There is no clinical attachment loss to the root.
- Sulcus depth is 2 mm or less.
- There is no bleeding on probing.

Wound Healing

- ***Initial (plasmic circulation) phase (0-3 days)***
- ***Revascularization phase (4-11 days)***
- ***Tissue maturation (organic union) phase (12-42 days)***

Thank You

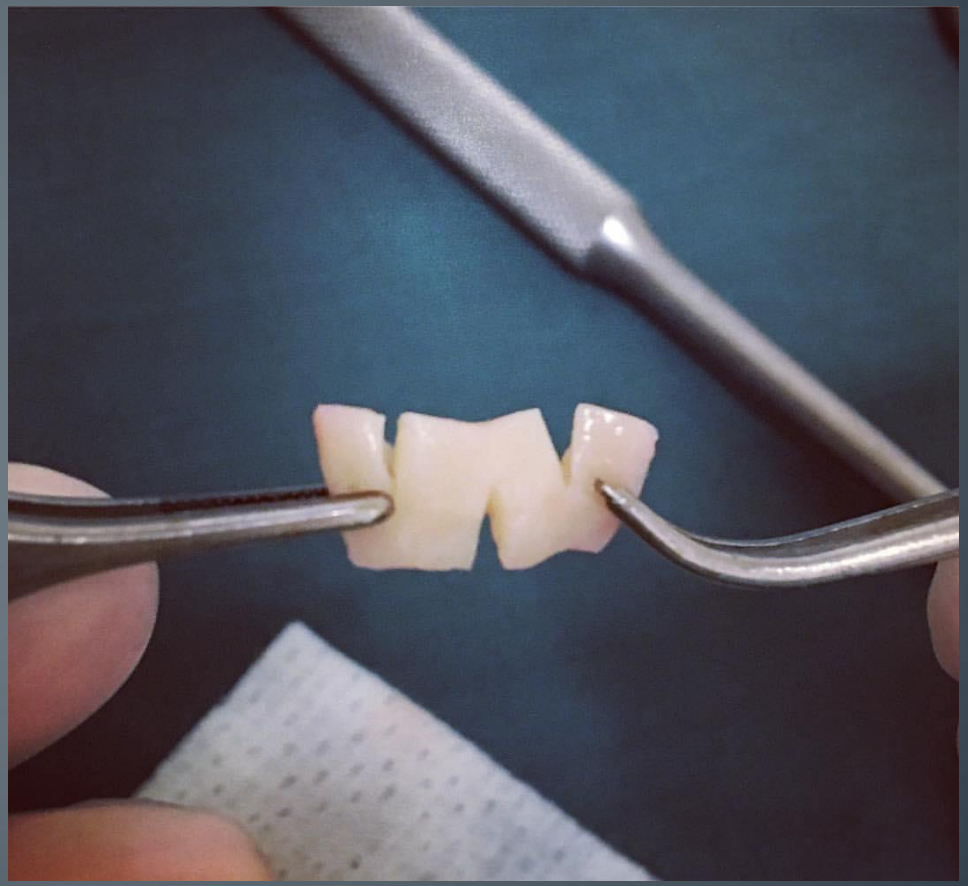
Periodontal Plastic & Esthetic Surgery

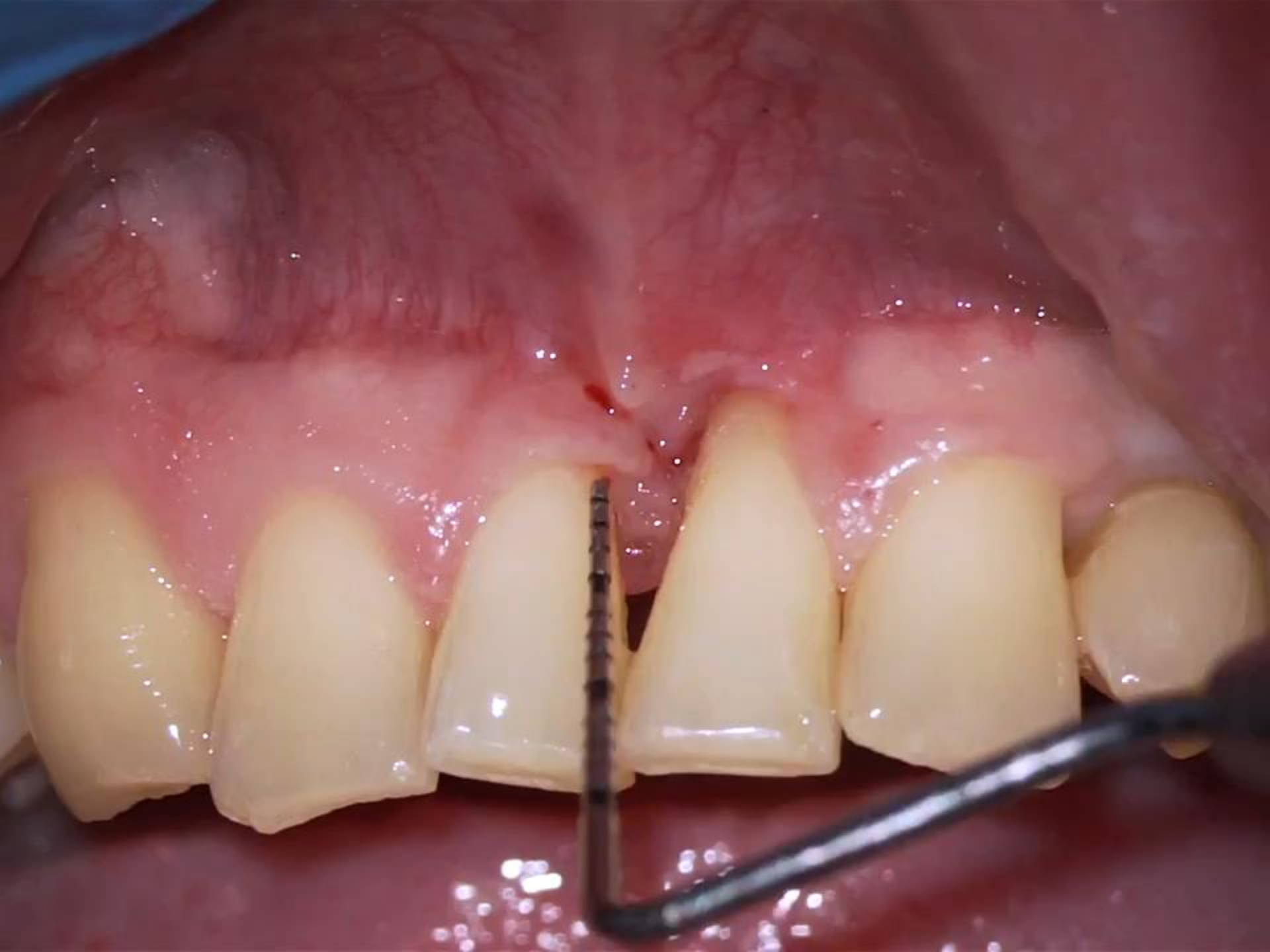
Cont

Dr. Parag Hadge

Variants of FGG

- *Accordion technique - **Rateitschak et al***
- *Strip technique - **Han TJ et al***
- *Combination technique*





Factors Associated with Incomplete Root Coverage

- Improper classification of Marginal Tissue Recession
- Inadequate root planing
- Failure to treat the planed root with Citric Acid
- Improper Preparation of Recipient Site
- Inadequate size of Interdental Papilla
- Improperly prepared Donor Tissue
- Inadequate Graft Size
- Inadequate Graft Thickness
- Dehydration of the Graft

- Inadequate adoption of Graft to Root and remaining periosteal bed and Failure to stabilize Graft
- Excessive Prolonged pressure & coaptation of sutured graft
- Reduction of Inflammation Prior to Grafting
- Trauma to Graft during initial healing
- Smoking

Connective Tissue Graft (CTG)

- Introduced by ***Edel*** in 1974

Advantages

- CTG receives a double blood supply from both the overlying pedicle flap and the underlying periosteum
- Color match – better in CTG compared to FGG
- Donor site – Healing by primary intention

Numerous procedures for harvesting a CTG have been described. All of which differ in

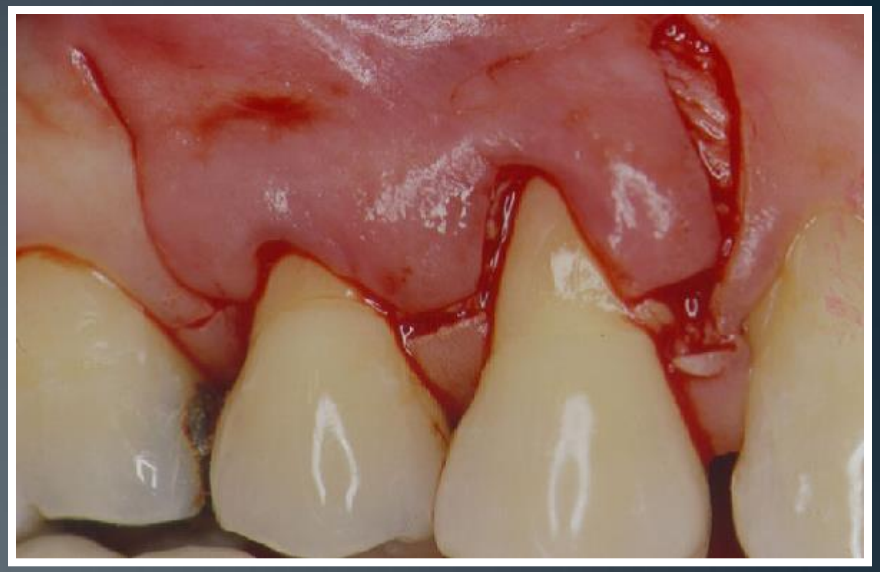
- No. of incisions,
- Flap design
- Technique of gaining access to the graft

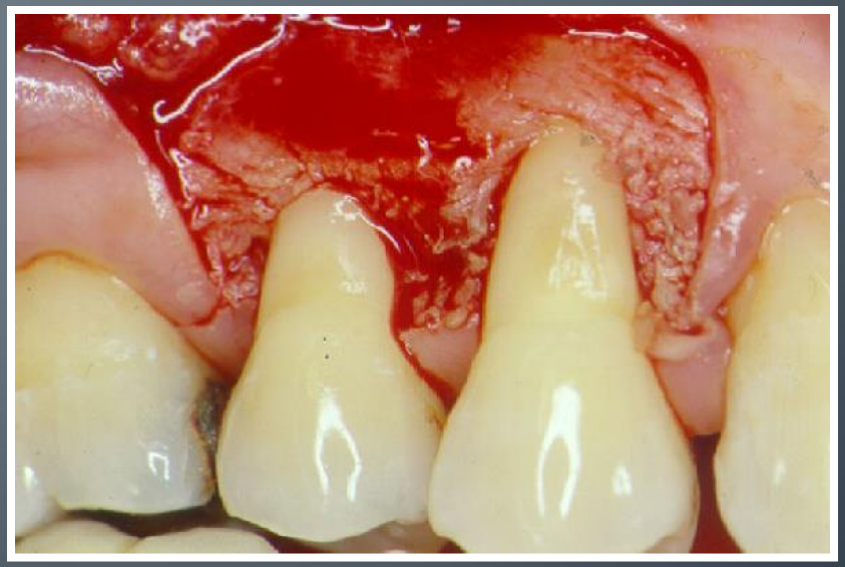
Subepithelial Connective Tissue Graft

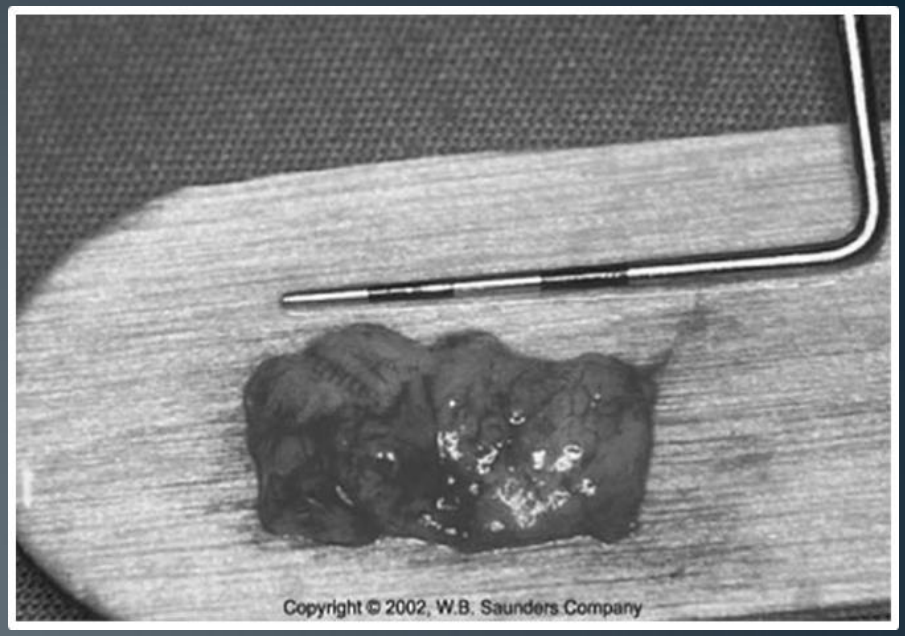
- Autogenous connective tissue can be obtained from the palate, maxillary tuberosity, or edentulous ridges.
- Palate being the most common donor site
- Thickest tissue is found from the ***mesial line angle of the palatal root of the first molar to the distal line angle of the canine***

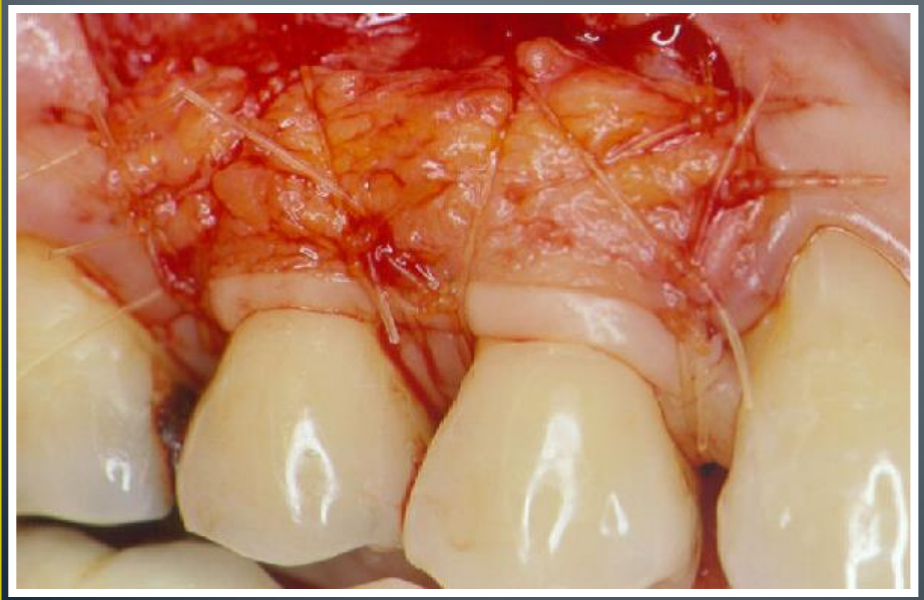
- Incision - 7 to 17 mm from the CEJ of the maxillary premolars depending on the height of the palatal vault
- Trap door technique - ***Edel***
- Parallel incision method - ***Langer*** and ***Langer***
- An incision at the base of the connective tissue between the parallel incisions frees the graft from the palatal bone
- This technique can be simplified by utilizing the ***Harris Double Blade Graft Knife*** - an instrument with 2 blades mounted 1.5 mm apart.

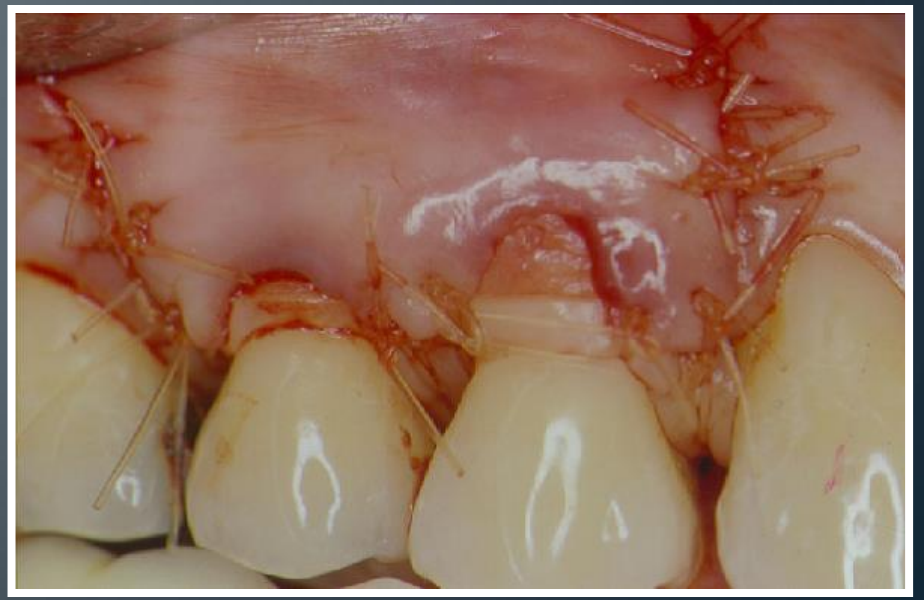
Harris knife used for CTG harvest

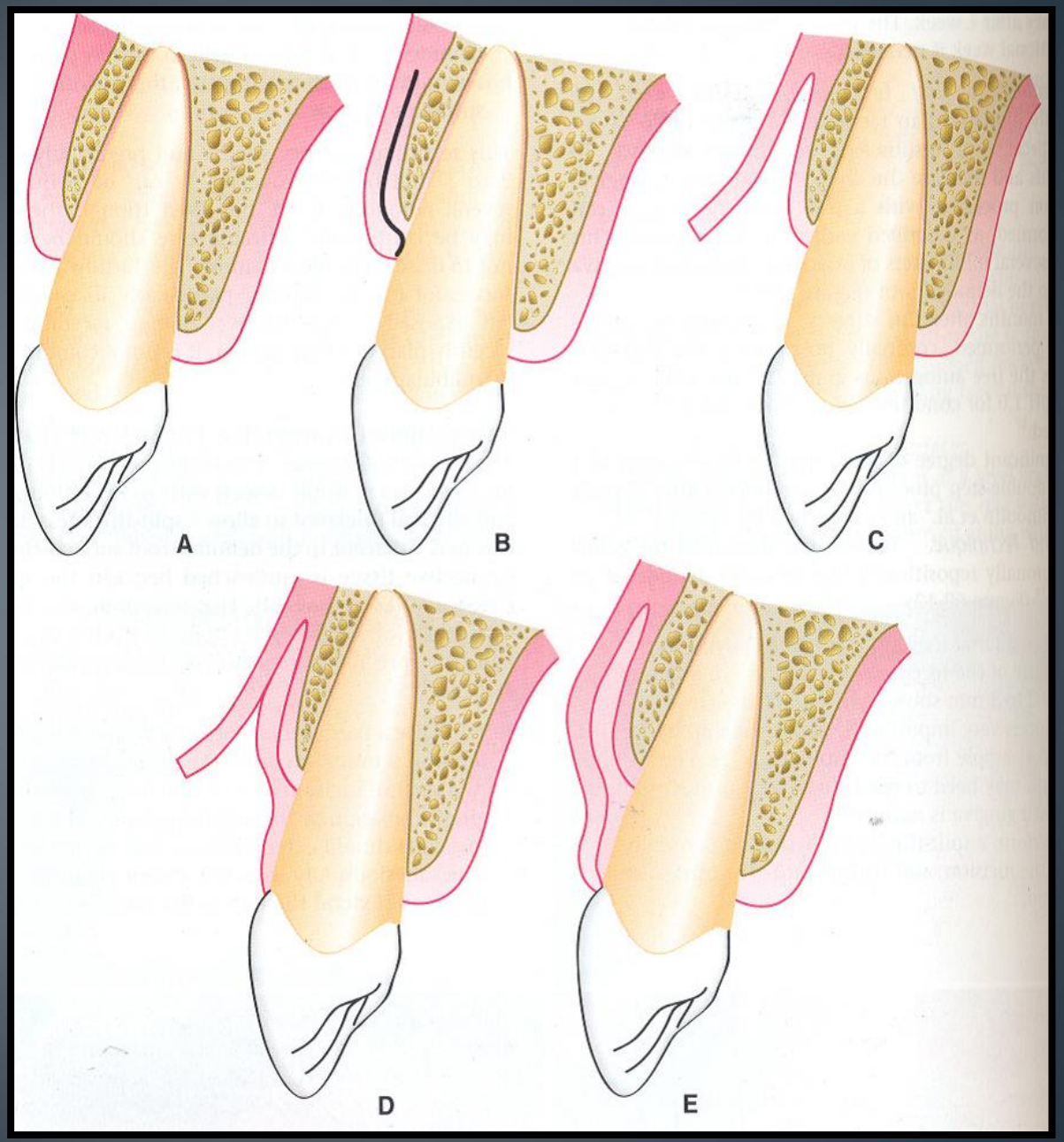




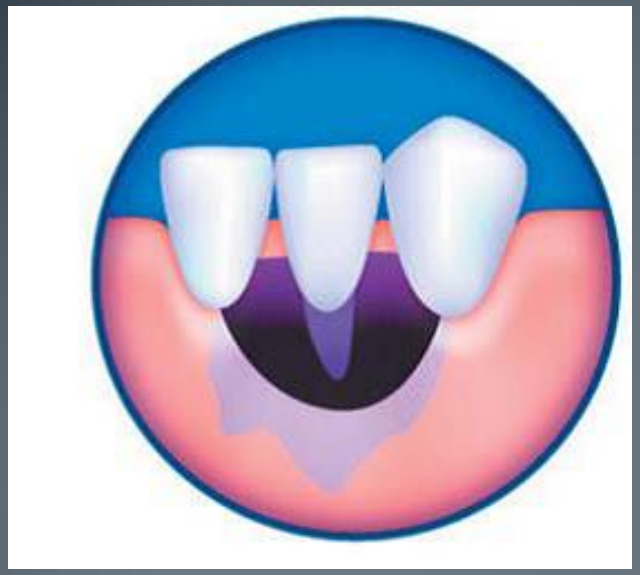

Copyright © 2002, W.B. Saunders Company

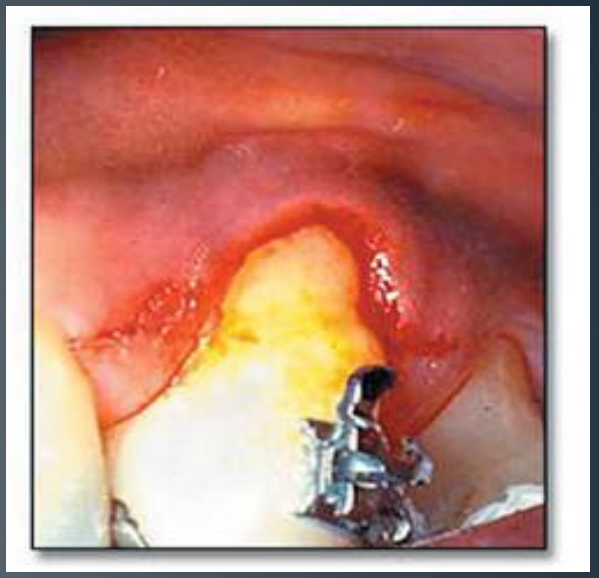




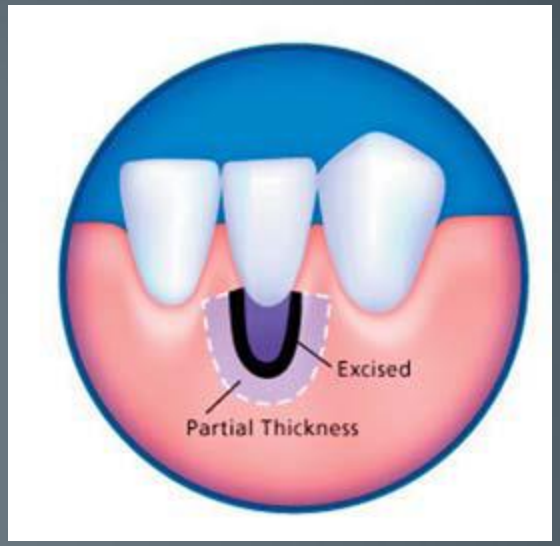

A
B
C
D
E

Bruno's modification

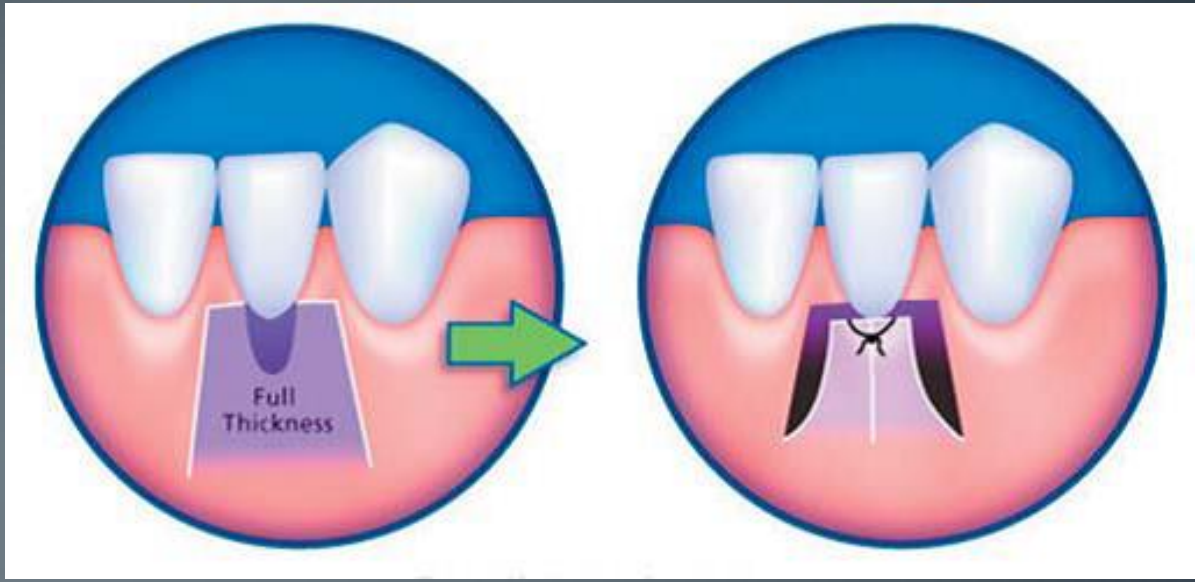




Raetzke's envelope flap design



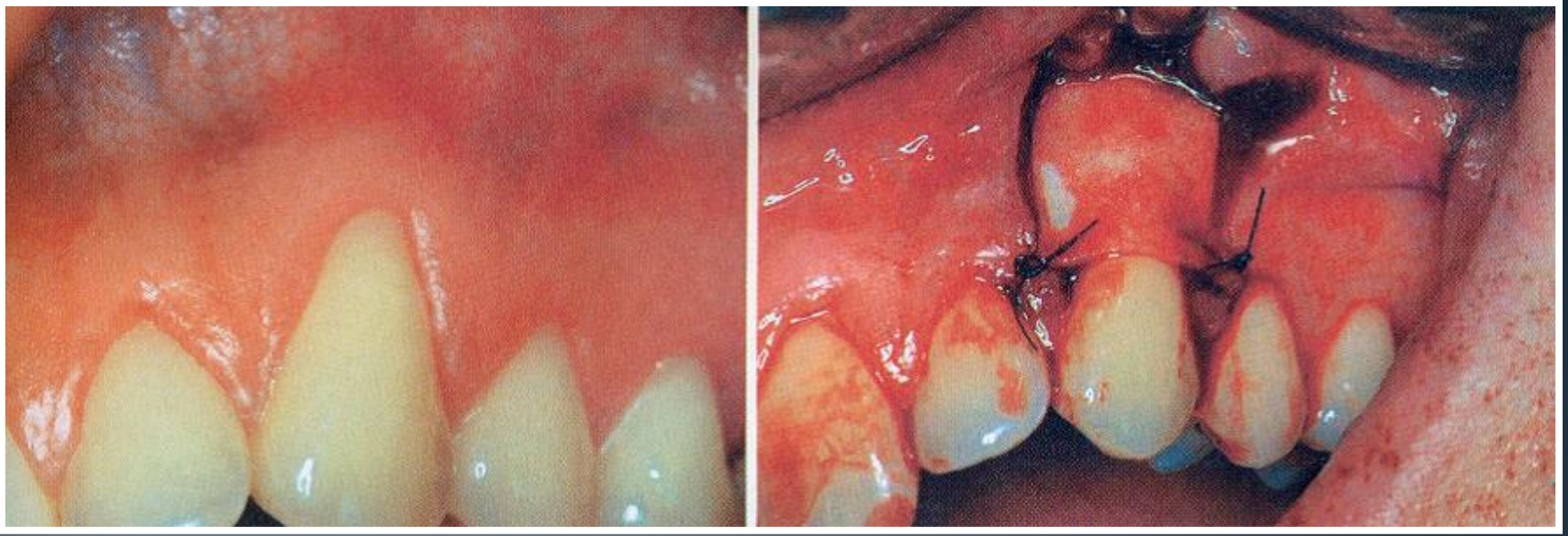
Nelson flap design

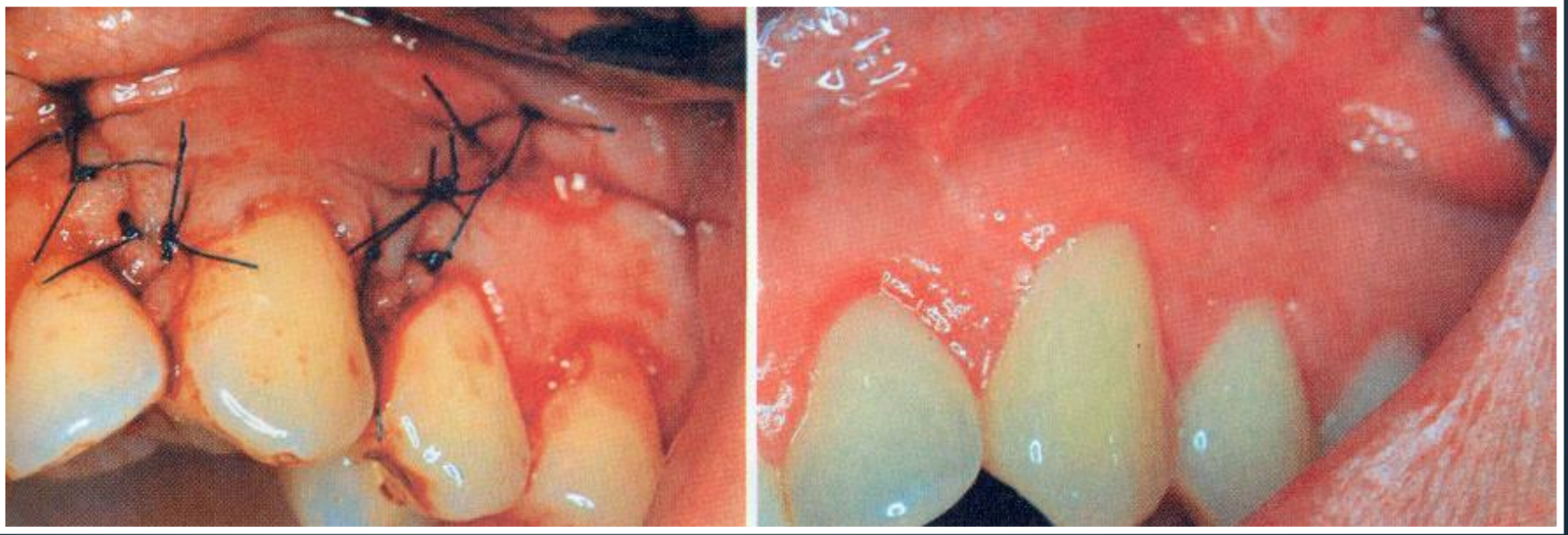


Tunnel flap design

Guided Tissue Regeneration in Marginal Tissue Recession

- A technique pioneered by ***Nyman et al*** which was later named as guided tissue regeneration (GTR) by ***Gottlow et al***
- GTR has been shown to promote new attachment formation
- Bioresorbable membranes made from collagen, polygalactic acid, polylactic acid, or copolymers preferred





Enamel Matrix Derivative (Emdogain) in Combination with SCTG

- A commercial enamel matrix derivative (Emdogain®, Biora AB, Malmö, Sweden) - FDA approved - It is a purified acidic extract of developing embryonal enamel derived from six-month-old piglets
- Contains proteins - ***amelogenin, enamelin***, and ***sheathlin*** (also called ameloblastin or amelin)
- Used for periodontal regeneration
- Coronal flap advancement combined with either EMD or CTG

Acellular Dermal Matrix Allograft (ADMA)/Alloderm and Root Coverage

- ADMA is used for dermal transplant
- Recently, an ***acellular dermal matrix allograft (ADMA)*** is introduced as a substitute for autogenous connective tissue grafts.
- This allograft is a special skin preparation from which the cell component (the target of rejection response) is removed - but the ultrastructural integrity of the acellular matrix is maintained
- ADMA is an ***acellular, non-immunogenic scaffold*** that heals by repopulation and revascularization

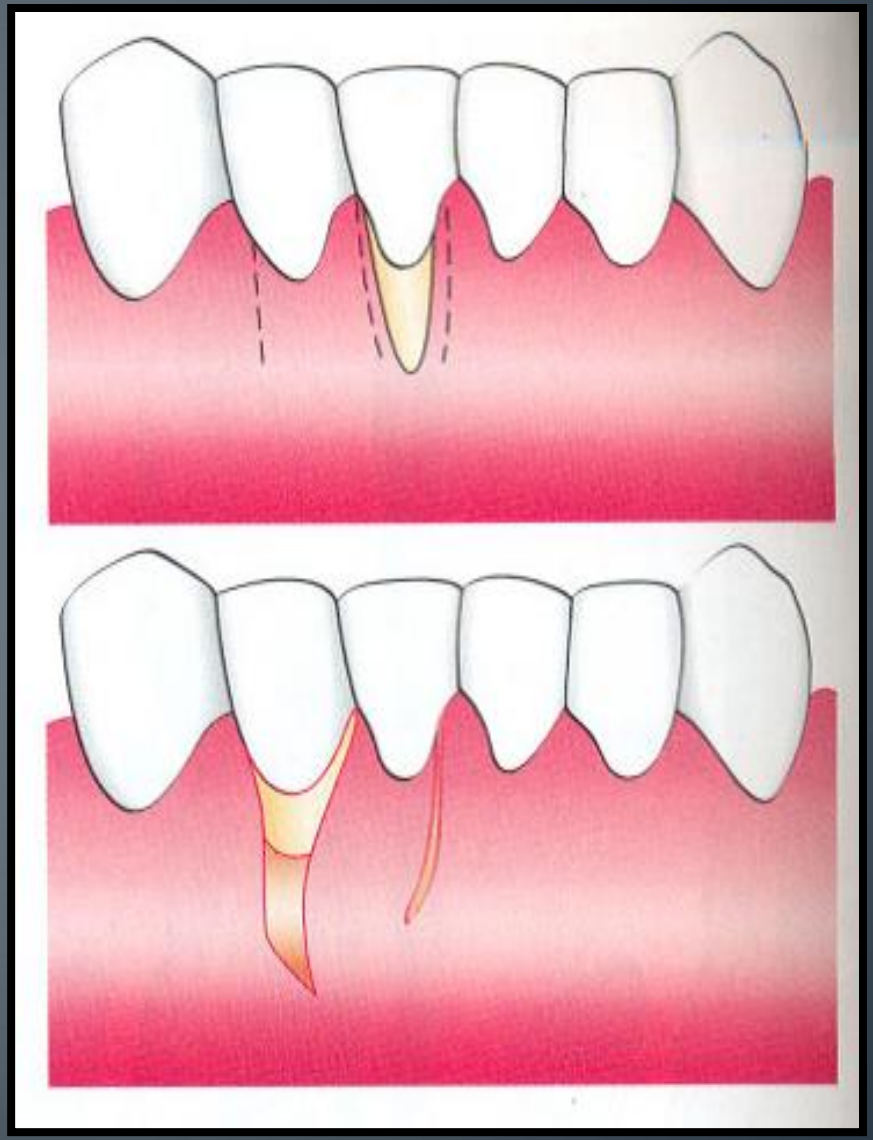
Pedicle Soft Tissue Grafts

- **Laterally Positioned Pedicle Graft**
- ***Grupe*** and ***Warren*** (1956)
- Gingiva on adjacent tooth is freed by means of a horizontal and two vertical incisions and then transferred to the recipient tooth.
- Requirements

(1) adequate donor tissue laterally;

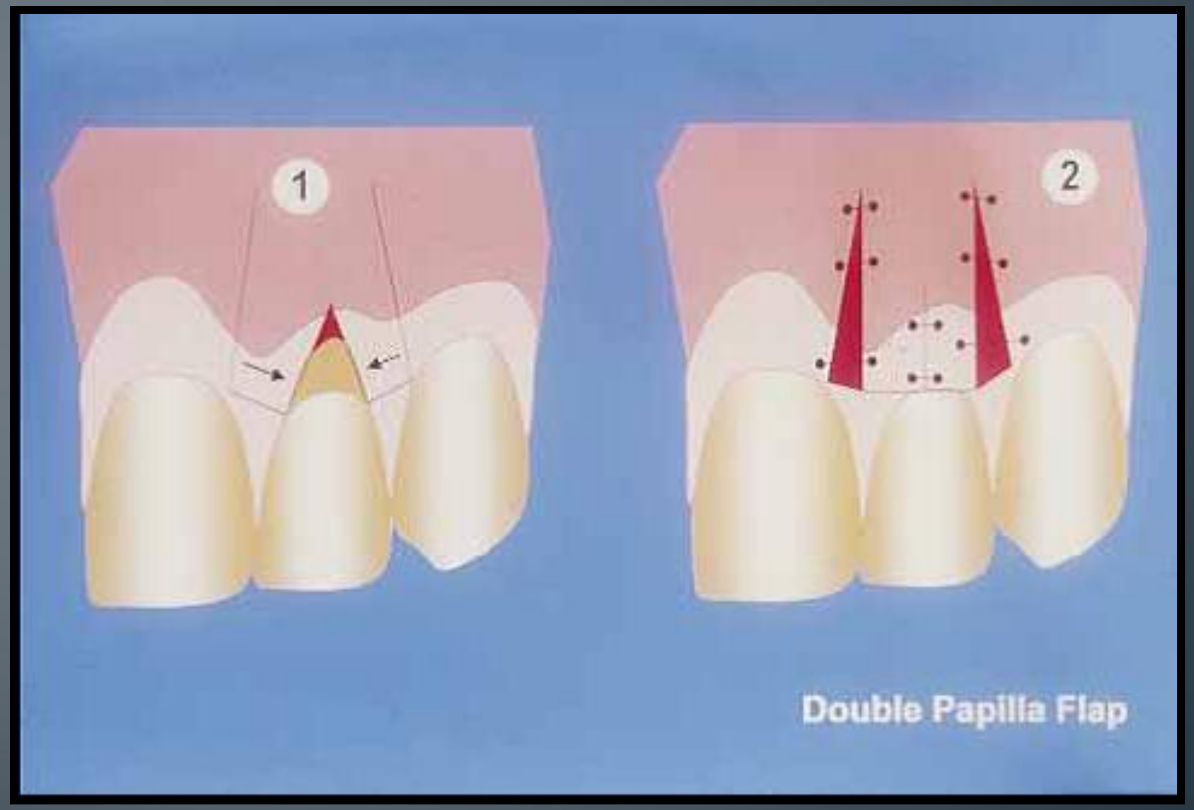
(2) normal to deep vestibule; and

(3) recession involving only one tooth.



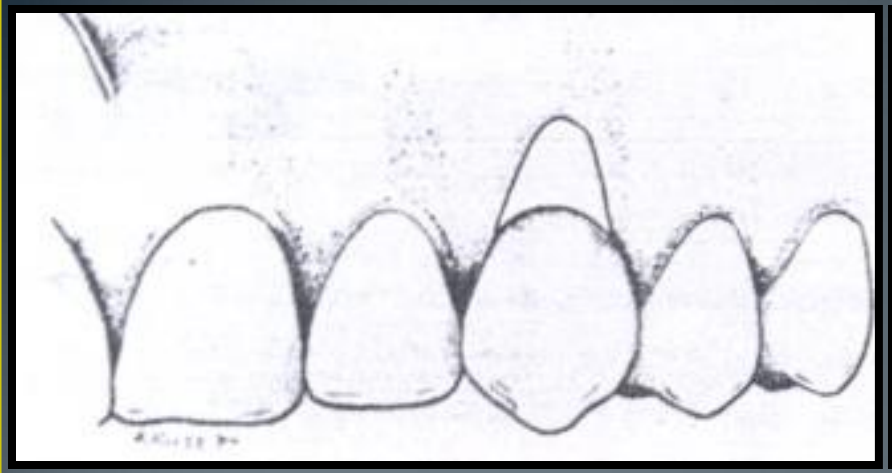
Double Papilla Flap

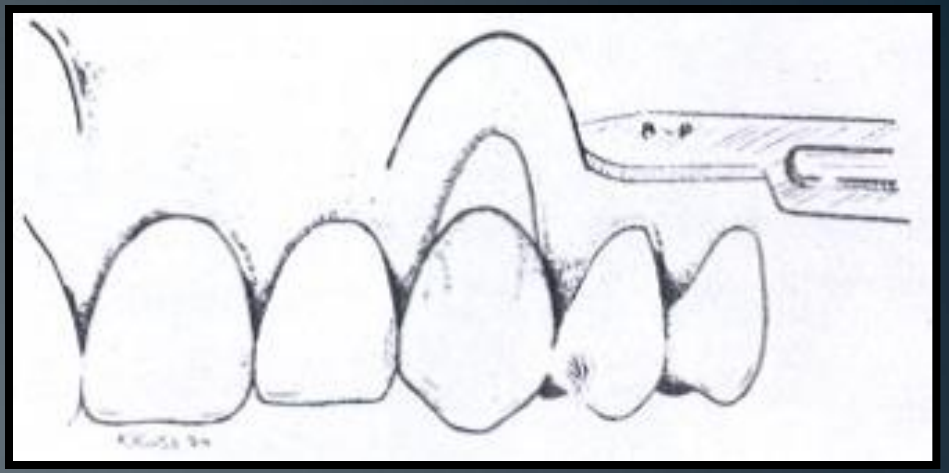
- ***Cohen*** and ***Ross*** 1968

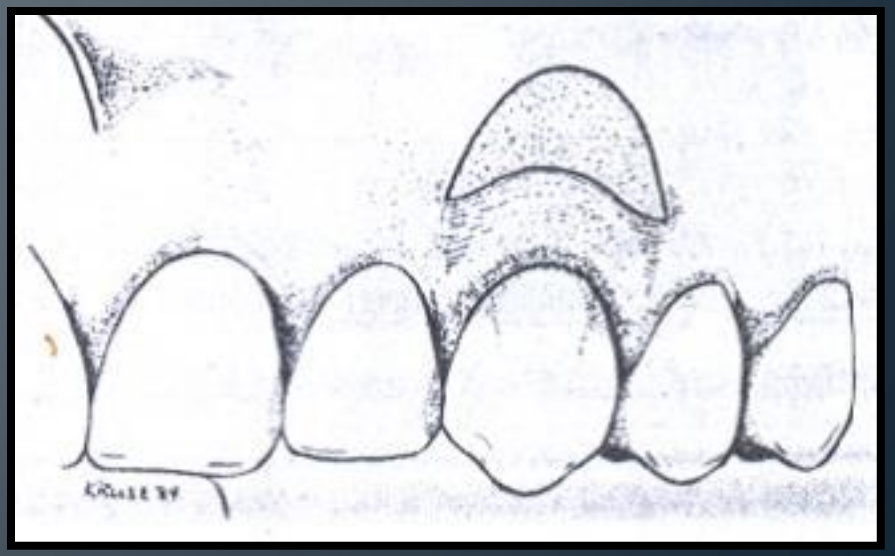


Coronally Advanced Flap

- Although described in the early part of 20th century (Harland 1907), it was popularized under the term ***"semilunar coronally repositioned flap" (Tarnow 1986).***







Coronally Positioned Flap Augmented by Connective Tissue

Vestibular Extension procedures

- Denudation / periosteal separation techniques
- Periosteal retention procedure
- Combination of these procedures
- Apically Displaced flap

Vestibuloplasty

- **Modified Edlan Mejchar Procedure**

Frenotomy/ Frenectomy

- A frenum is a mucous membrane fold containing muscle and connective tissue fibers.
- It attaches the lip and cheek to the alveolar mucosa, the gingiva, and the underlying periosteum.
- Frena may jeopardize gingival health when they are attached too closely to the gingival margin either because of interference with proper placement of a toothbrush or through opening of gingival crevice by muscle pull.

- The frenum is of little clinical significance if there is an adequate zone of attached gingiva coronal to the frenum.
- If there is an attached gingiva problem resulting in recession, gingival grafting is indicated, and the frenum may be removed during grafting
- The maxillary frenum, however, may present esthetic problems or compromise an orthodontic result (diastema).

Excessive Gingival Display

- Gummy smile - esthetic problem
- clinical and anatomical crown

Surgical Crown Lengthening

Indications

- Subgingival caries or fracture
- Inadequate clinical crown length for retention
- Unequal or unesthetic gingival heights

Contraindications

- Surgery would create an unesthetic outcome
- Deep caries or fracture would require excessive bone removal on contiguous teeth
- The tooth is a poor restorative risk




Interdental Papilla Management

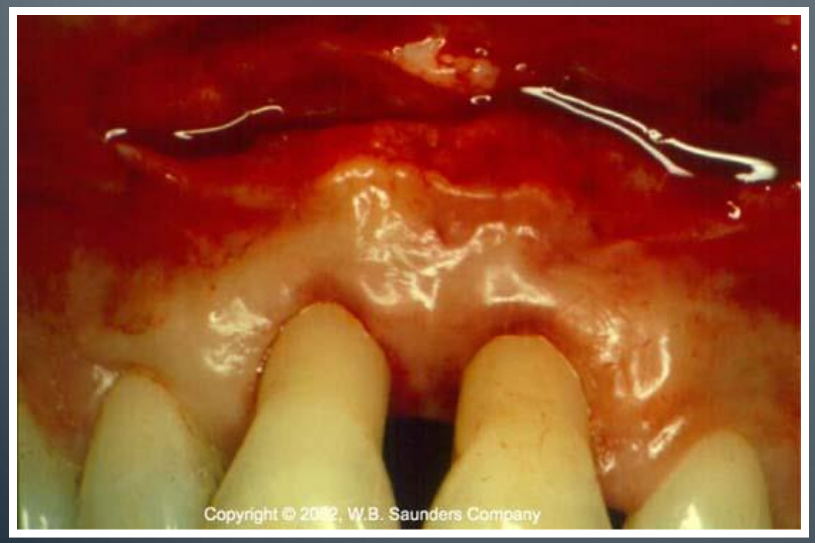
- **Restorative/Prosthetic Restorations**
- **Orthodontic Approach**
- **Nonsurgical Approaches**

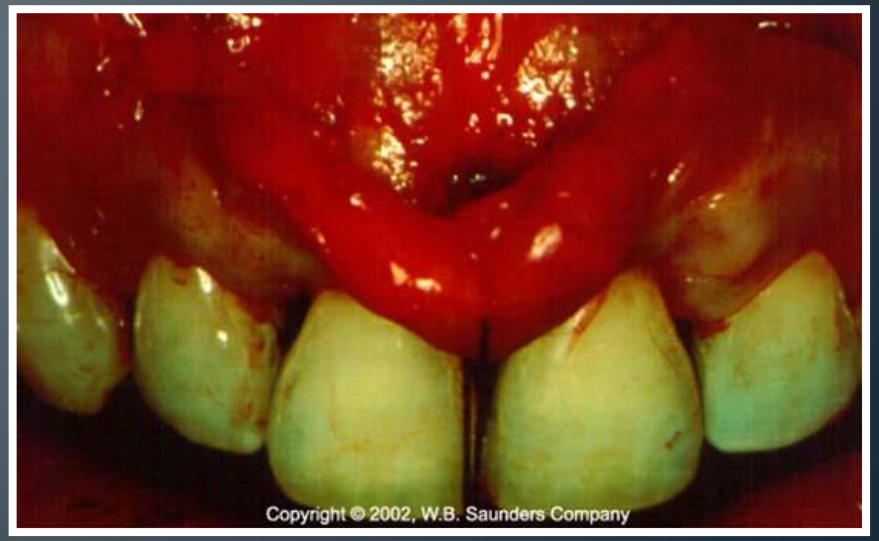
1. Correction of traumatic oral hygiene procedures
2. Repeated Curettage of the Papilla

Surgical Approaches

- **Papilla Recontouring**
- **Papilla Preservation -** ***Takei*** et al
- ***Modified papilla preservation technique (MPPF) - Cortellini*** et al
- ***Simplified papilla preservation flap (SPPF) - Cortellini*** et al

Papilla Reconstruction






Copyright © 2002, W.B. Saunders Company


Copyright © 2002, W.B. Saunders Company

Deficient Ridges


Thank You
digitalblasphemy.com