GOOD MORNING

“MUCOGINGIVAL SURGERY”

Presented by:
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Introduction

- Mucogingival therapy is a general term used to describe non-surgical and surgical treatment procedures for correction of defects in morphology, position and/or amount of soft tissue and underlying bone support at teeth and implants.

- Mucogingival surgery,{Friedman ,1957}

  "surgical procedures designed to preserve gingiva, remove aberrant frenulum or muscle attachments, and increase the depth of the vestibule".

Glossary of Periodontal Terms (2001)

Mucogingival surgery :

"plastic surgical procedures designed to correct defects in the morphology, position and /or amount of gingivae surrounding the teeth".

PERIODONTAL PLASTIC SURGERY

- Miller (1993) proposed that the term <u>periodontal plastic surgery</u> is more appropriate, since mucogingival surgery has moved beyond the traditional treatment of problems associated with the amount of gingivae and recession type defects to also include correction of ridge form and soft tissue esthetics.
- Periodontal plastic surgery would accordingly be defined as "surgical procedures performed to prevent or correct anatomic, developmental, traumatic or disease induced defects of the gingiva, alveolar mucosa or bone" (Proceedings of the World Workshop in Periodontics 1996).

- Gingival augmentation
- Coverage of the denuded root surface
- Reconstruction of papillae
- Crown lengthening
- Ridge augmentation
- Esthetic surgical correction around implants
- Surgical exposure of unerupted teeth for orthodontics
- Gingival preservation at ectopic tooth eruption

OBJECTIVES

- TO create an adequate zone of attached keratinized gingiva.
- To eliminate pockets that extend beyond the mucogingival line.
- To eliminate muscle and frenulum pull
- To deepen the vestibule.
- To cover denuded root surfaces for esthetics or hypersensitivity.
- To overcome the anatomic factors of tooth position, thin alveolar housing, and large prominent roots, which promote dehiscence and/or fenestration formation with gingival recession.
- To minimize recession during orthodontic movement.
- To overcome the trauma of prosthetic or restorative dentistry requiring subgingival placement
- To stabilize and maintain a healthy mucogingival complex.
- To correct areas of progressive gingival recession
- To correct ridge deformities and undercuts.

- Gingival augmentation coronal to the recession (root coverage).

- Gingival augmentation apical to the area of recession.

Root Coverage Procedures

Glossary of Periodontal terms defines recession (gingival recession) as:

"Displacement of the soft tissue margin apical to the cementoenamel junction".

The soft tissue margin may not always be gingiva, hence

The term *marginal tissue recession* as coined by Maynard &Wilson (1979)is more accurate.

Gingival recession is characterized by the displacement of the gingival margin apically from the cementoenamel junction, or from the former location of the CEJ in which restorations have distorted the location or appearance of the CEJ, it may be localized or generalized. (Smith et al 1997)

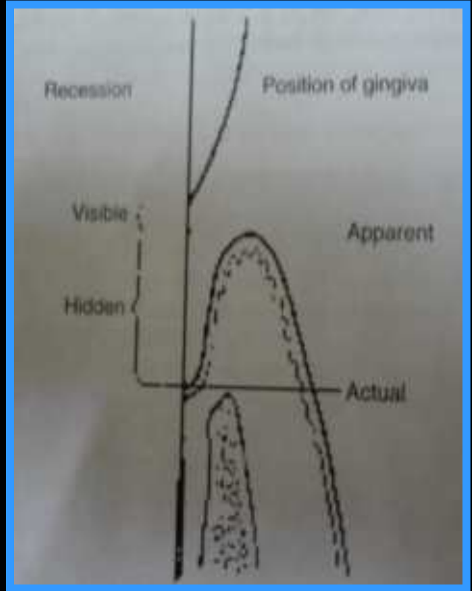
TYPES OF RECESSION

- *Actual position* is the level of the epithelial attachment on the tooth.
- *Apparent position* is the level of the crest of the gingival margin.

The severity of recession is determined by the actual position of the gingival, not its apparent position

TYPES:

- *Visible:* Clinically observable.
- *Hidden:* Covered by gingiva and can be measured only by inserting a probe to the level of epithelial attachment



CLASSIFICATIONS OF RECESSION

1. Ariaudo AA- 1966
2. Sullivan HC, & Atkins JH- 1968
3. Mlinik et al -1973
4. Bengue *et al*- 1983
5. Miller PD - 1985
6. Smith RG- 1997
7. Mahajan A -2010
8. Pandit N et al- 2012

Several classifications of denuded roots have been proposed.

***Sullivan and Atkins* (1968)**

- Type 1: Shallow-Narrow
- Type 2: Shallow-Wide
- Type 3: Deep-Narrow
- Type 4: Deep-Wide.

Mlinik et al (1973):

Provided quantitative approach to the classification:

1. Shallow – Narrow (< 3mm in both dimensions- horizontal and vertical)

2. Deep – Wide (>3mm in both dimensions- horizontal and vertical)

Bengui et al (1983)

Classified recession according to cover the prognosis-

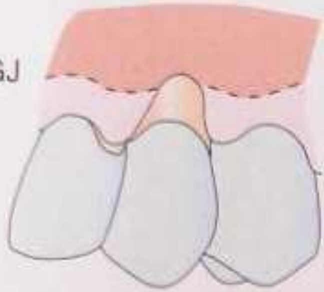
- U type- Poor prognosis
- V type- Fair prognosis
- I type- Good prognosis

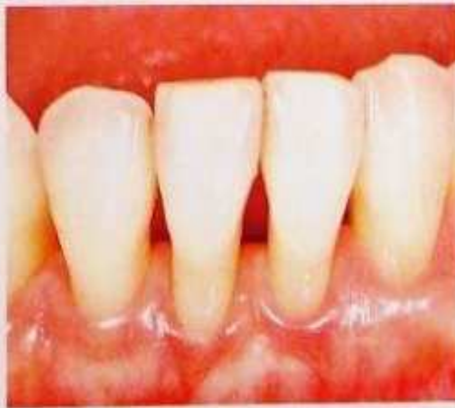
Miller(1985)

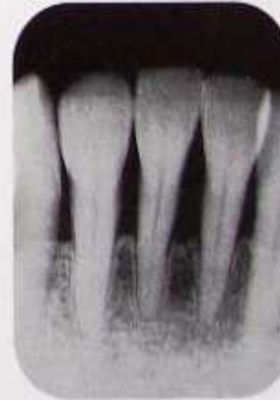
Class I -

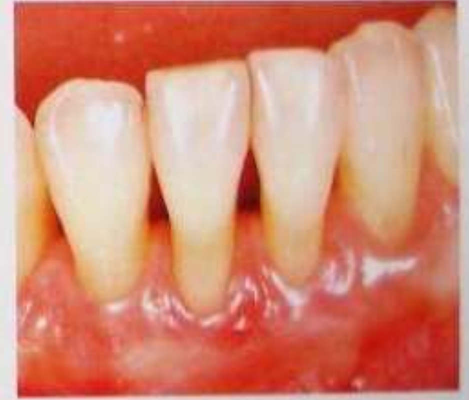
Class II -

Class III -

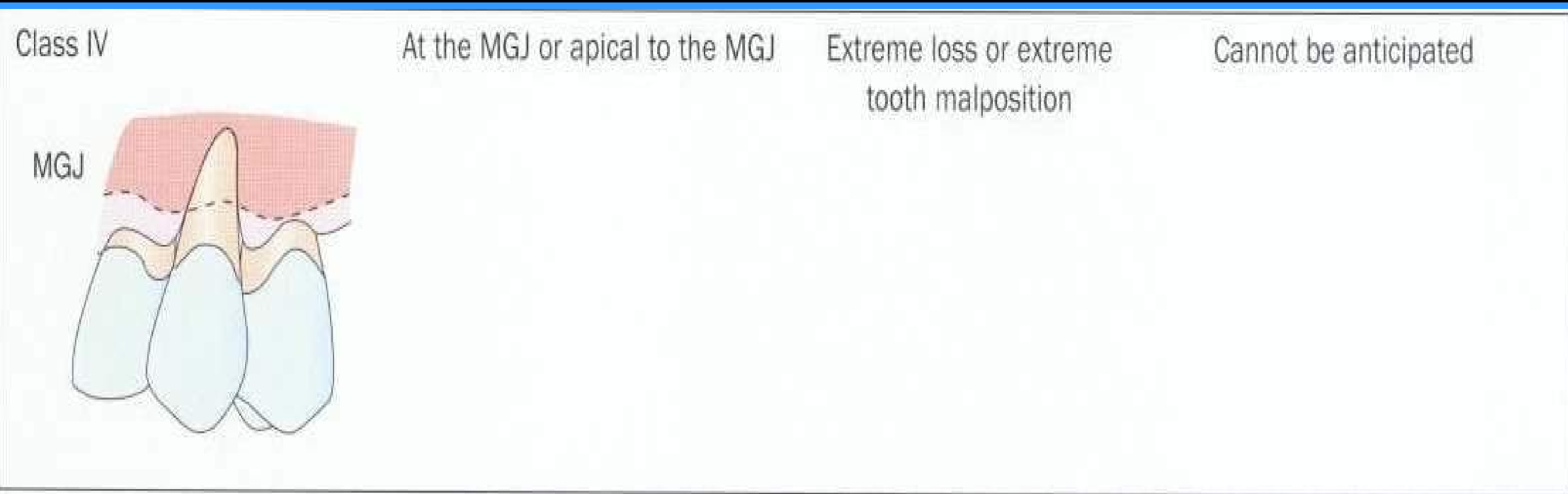








- # Class IV -



Drawbacks in Millers classification. (Pini-Pranto 2011)

- Miller's classification may be evaluated according to Murphy's (1997) statements.

- Usefulness: Miller's classification has been demonstrated useful and has been applied by the periodontal community mainly to distinguish recessions related to tooth brushing trauma (Classes I and II) from those caused by periodontal disease with inter-proximal attachment and bone loss (Classes III and IV).

- Exhaustiveness:
  - Miller's classification is not exhaustive because it does not consider all the cases of recession.
  - E.g.- a marginal tissue recession with inter-proximal bone loss that does not extend to the MGJ is not classified.
  - In fact, this recession cannot be included in class I because of inter-proximal bone loss and it cannot be categorized in class III because the gingival margin does not extend to the MGJ.

- Palatal recessions:
  - These are not mentioned in the classification system.
  - Because of the lack of the MGJ on the palatal side, it is impossible to classify these lesions.
  - On the other hand, even if palatal recessions do not involve aesthetic problems they may be associated with dental hypersensitivity that may require mucogingival treatment.

- Disjointness:
  - The difference between Classes III and IV is based on the position of the gingival margin of the two adjacent teeth. The author says ‘‘The probe is placed horizontally on an imaginary line connecting the tissue level on the mid-facial of the two teeth on either side of the tooth or teeth exhibiting recession’’.
  - Classes III and Class IV can be identified if there are adjacent teeth but in case of a missing adjacent tooth there is no reference point and it is impossible to include this case in the Class III or Class IV.
  - In addition,in the original article, the figure illustrating Class IV shows a recession associated with a missing adjacent tooth, thus generating further confusion in the classification system.

- Simplicity:
  - By definition, a clinical classification should be simple for practical application.
  - Miller's Classification appears simple but it is not so easy when it is considered carefully.
  - Many factors are involved such as MGJ, soft and hard inter-proximal tissues, gingival margins of the adjacent teeth, tooth malposition and tooth loss and a simultaneous evaluation of them all is difficult and generates confusion.
  - In fact, in some textbooks the classification is reported incompletely and somewhat differently from the author's thought
    (Takei et al. 2006; Wennstrom et al. 2008).
- As a tooth with recession always presents a certain amount of keratinized (free gingiva),the marginal tissue recession cannot extend to or beyond the mucogingival junction. Therefore, Class II never exist and class I & class II would represents as a single catergory.

Index of recession (IR)
(Smith RG 1997)

- Two digits- 1st digit denotes horizontal component

  - 2nd digit denotes vertical component.
- Asterisk- recession beyond Mucogingival junction.

- Example- F2-4

Table 2: Horizontal extent of recession expressed as whole number value

Score	Criteria
0	No clinical evidence of root exposure
1	No clinical exposure of root exposure but 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: a slit-like defect.
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

Table 2: Vertical extent of recession expressed in millimeters

Score	Criteria
0	No clinical evidence of root exposure
1	No clinical exposure of root exposure but 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 – 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 affixed 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 non-involvement in the soft-tissue defect

Mahajan A 2010

Mahajan's modification of Miller's classification[7]

Class I: Gingival tissue recession not extending to muco-gingival junction.

Class II: Gingival tissue recession extending to muco-gingival junction or beyond it.

Class III: Gingival tissue recession with bone or soft-tissue loss in interdental area up to cervical 1/3 of root surfaces and/or malpositioning of the teeth.

Class IV: Gingival tissue recession with severe bone or soft tissue loss in interdental area greater than cervical 1/3rd of root surface and/or severe malpositioning of teeth.

Prognosis according to Mahajan's modification

BEST - Class I and Class II with thick gingival profile

GOOD - Class I and Class II with thin gingival profile

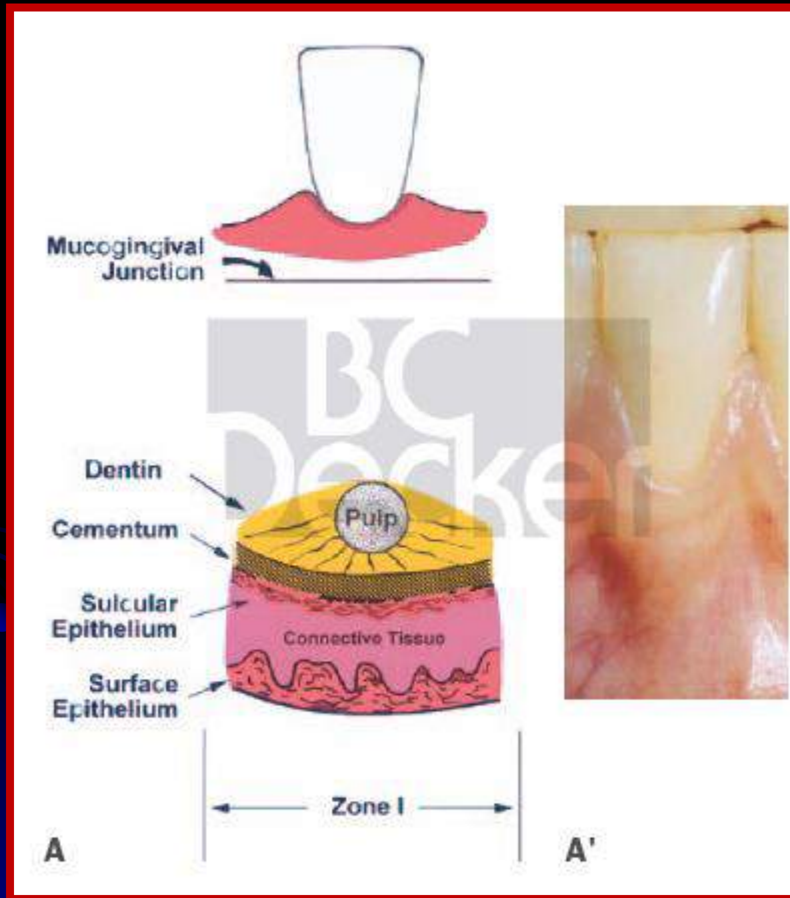
FAIR - Class III with thick gingival profile

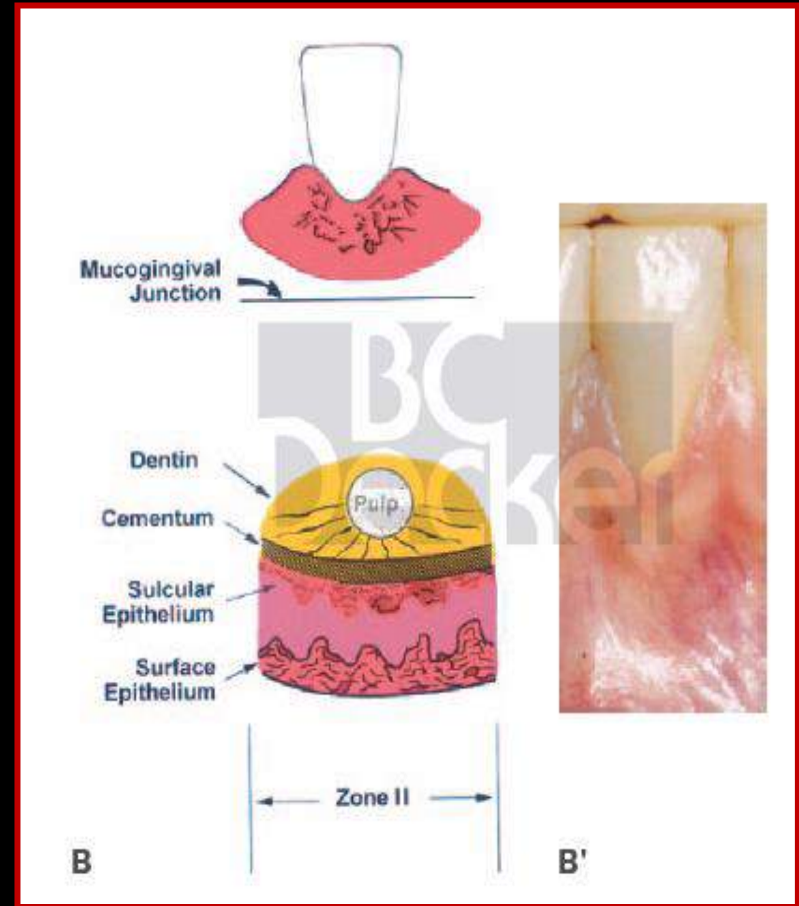
POOR - Class III and Class IV with thin gingival profile

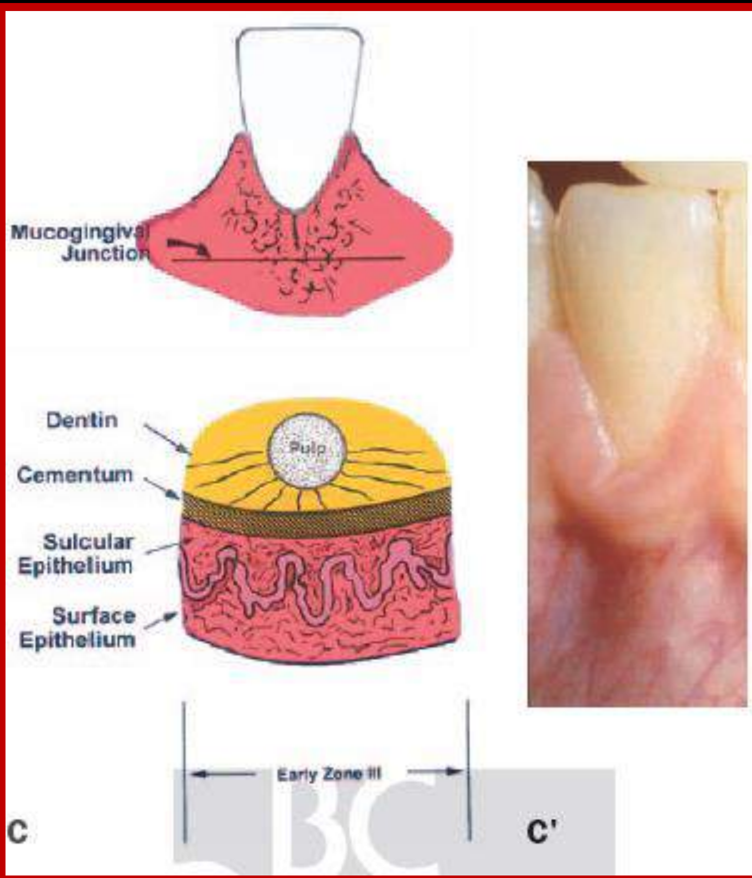
Malalignment Index (Pandit N. et al 2012)

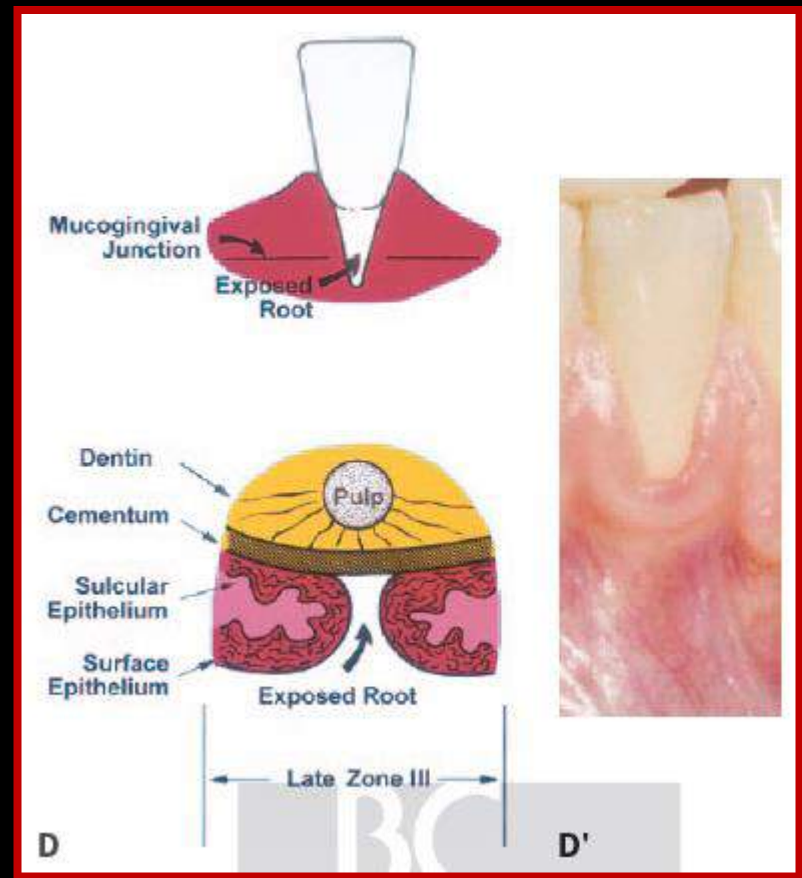
Score	Criteria
0	No malalignment (no proclination, no mesial, and no distal rotation); i.e., both mesial and distal halves of the tooth are touching the stainless steel wire.
1	Mild mesial rotation or distal rotation; i.e., mesial or distal half of the tooth is $\leq$1 mm away from the stainless steel wire.
2	Moderate mesial rotation or distal rotation; i.e., mesial or distal half of the tooth is 1 to 2 mm away from the stainless steel wire.
3	Severe mesial rotation or distal rotation; i.e., mesial or distal half of the tooth is $>$2 mm away from the stainless steel wire.
4	Mild proclination; i.e., both mesial and distal halves of the tooth are $\leq$1 mm away from the stainless steel wire.
5	Moderate proclination; i.e., both mesial and distal halves of the tooth are 1 to 2 mm away from the stainless steel wire.
6	Severe proclination; i.e., both mesial and distal halves of the tooth are $\geq$2 mm away from the stainless steel wire.

Etiology of recession
(Baker & seymour 1976)






Mucogingival
Junction
Dentin
Pulp
Cementum
Sulcular
Epithelium
Surface
Epithelium
Early Zone III
C
C'


Mucogingival
Junction
Exposed
Root
Dentin
Pulp
Cementum
Sulcular
Epithelium
Surface
Epithelium
Exposed Root
Late Zone III
D
D'

ETIOLOGIC FACTORS

- AGE
- DEVELOPMENT / ANATOMICAL FACTORS
- PATHOLOGICAL FACTORS
- LOCAL FACTORS
- DELETERIOUS HABITS
- OTHERS

CLINICAL SIGNIFICANCE

- Esthetic.
- Susceptible to caries.
- Abrasion or Erosion of the cementum.
- Hypersensitivity
- Hyperemia of the pulp.
- Interproximal recession causes oral hygiene problems and results in plaque accumulation.

Good
Morning

Periodontal Biotype

- The periodontium has been described as having two basic forms: thin and scalloped or thick and flat. (Oschenbein and Ross, 1973;Weisgold, 1977; Jensen and Weisgold, 1995).
- Olsson and Lindhe (1991) referred to these as *periodontal biotypes.*

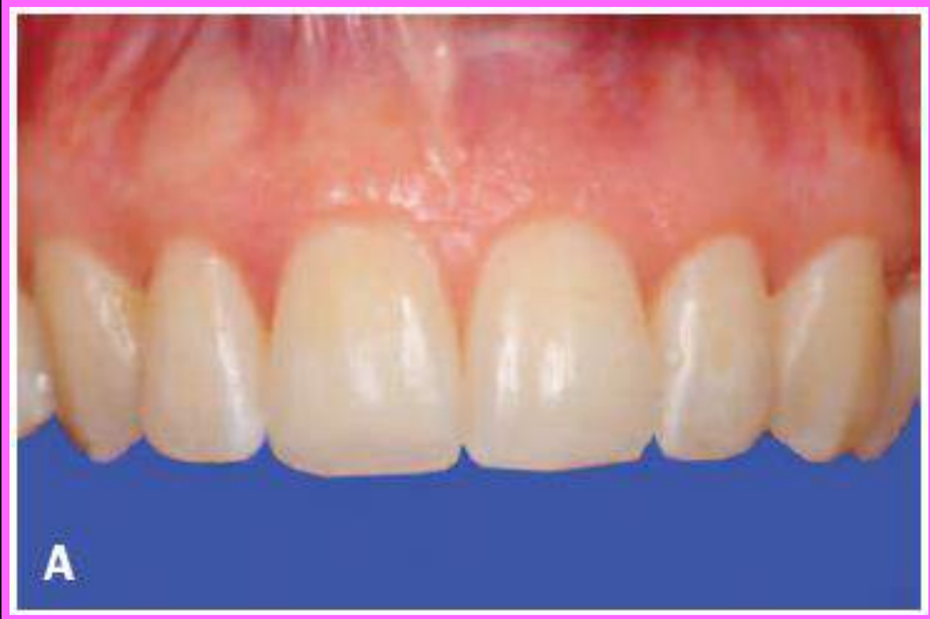
Dimensions of the buccal tissue

- Dimension of the alveolar process
- The form (anatomy) of the teeth
- Events that occur during tooth eruption
- Eventual inclination and position of the fully erupted teeth.

(Wheeler 1961;O'Connor & Biggs 1964; Weisgold 1977).

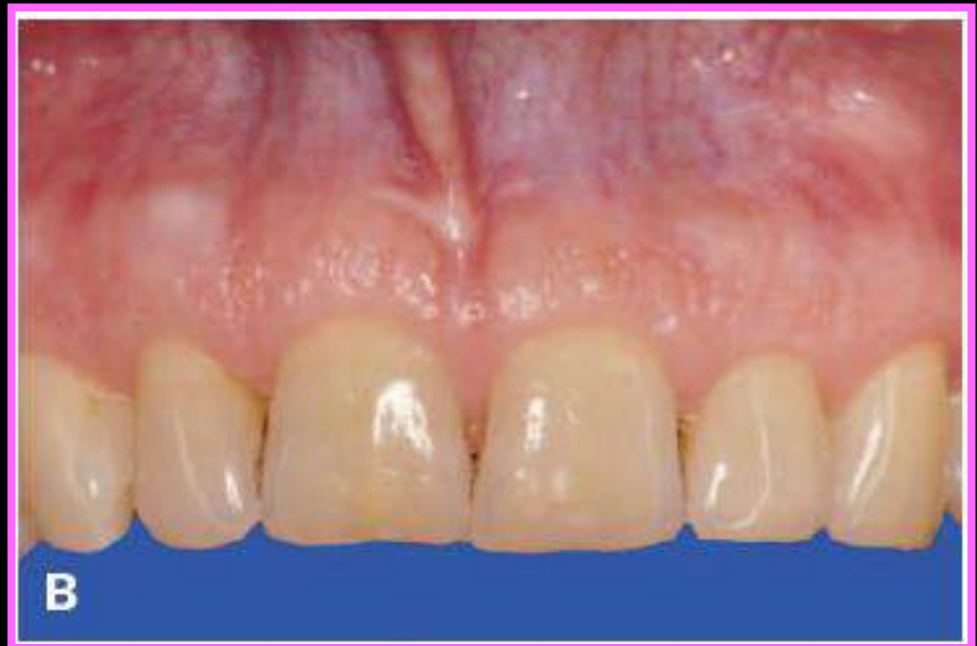
Thin and scalloped	Thick (dense) and flat
Delicate thin periodontium	Thick heavy periodontium
Highly scalloped gingival tissue	Flat gingival contour
Usually slight gingival recession	Gingival margins usually coronal to the cementoenamel junction
Highly scalloped osseous contours	Thick, flat osseous contour
Underlying dehiscences and/or fenestrations	No
Minimum zones of keratinized gingiva	Wide zone of keratinized gingiva
Small incisal contact areas	Broad apical contact areas
Insult results in recession	Insult results in pocket depth or redundant tissue
Triangular anatomic crowns	Square anatomic crowns
Subtle diminutive convexities in cervical third of the facial surface	Bulbous convexities in cervical third of the facial surface

(Olssonet et al 1991)



Thin & scallopeed

Thick & flat



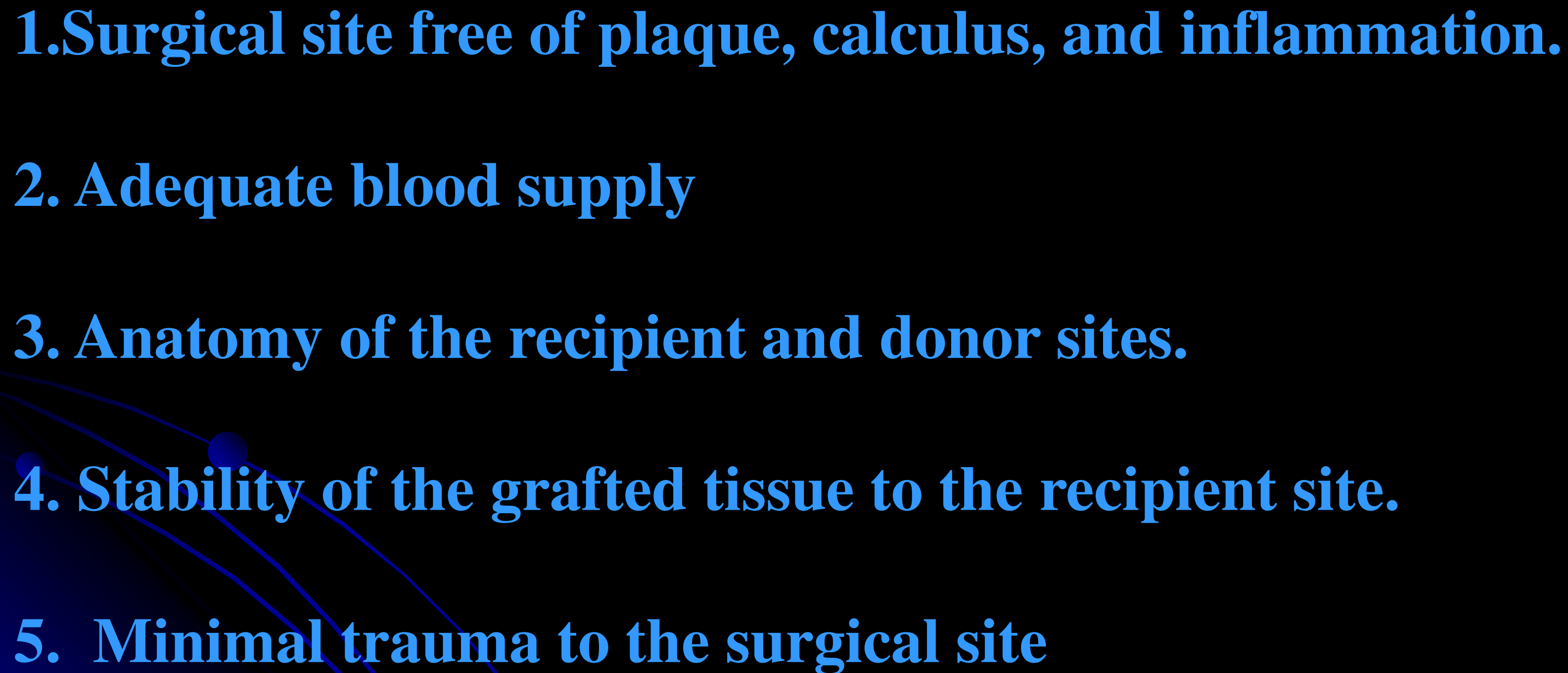
- Olsson & Lindhe (1991) reported that subjects with pronounced scalloped gingiva often exhibited more advanced soft tissue recession in the anterior maxilla than subjects with a flat gingiva.

- Coatoam *et al. 1981; Andlin-Sobocki & Brodin 1993.*

  Dimensions of the buccal gingiva may also be affected by the buccal–lingual position of the tooth within the alveolar process.

  Tooth position in buccal direction results in reduced dimensions of the buccal gingiva, while an increase is observed following a lingual tooth movement

CRITERIA FOR SELECTION OF TECHNIQUES



1. Surgical site free of plaque, calculus, and inflammation.
2. Adequate blood supply
3. Anatomy of the recipient and donor sites.
4. Stability of the grafted tissue to the recipient site.
5. Minimal trauma to the surgical site

TECHNIQUES

- Free gingival autograft
- Free connective tissue autograft
- Pedicle autografts

  Pedicle Rotational flap – flap rotated or displaced laterally.

  - Laterally positioned flap
  - Transpositional flap
  - Double papilla flap

  Advanced flap –flap placed without rotation or lateral migration

  - Coronally positioned flap
  - Semilunar coronally repositioned flap.

- Subepithelial connective tissue graft (Langer)
- Pouch and tunnel technique.
- Guided tissue regeneration.

Basic rationale:

To cover the exposed avascular root surface with a contiguous (in contrast to free) soft tissue autograft from an adjacent site.

FREE GINGIVAL AUTOGRAFT.

FREE GINGIVAL GRAFT:

This term is incorrect in 2 aspects

1. Firstly, the anatomic term *free gingival groove* differentiates the free gingiva from attached gingiva,this free gingiva is not used in grafting.

2. Secondly, gingiva is defined as the masticatory mucosa surrounding the teeth, palatal masticatory mucosa used in grafting is technically not gingiva since it does not surround the teeth.

So, the ideal term used should be *“Free palatal masticatory autograft”*

- Published reports on gingival grafting began appearing in the American literature in the 1960s:

- Bjorn (1963), King and Pennel (1964), *Cowan(1965)*, Nabers (1966B), and Haggerty(l966).

- Yet, it was not until Sullivan and Atkins (1968) published their classic trilogy of articles on indications, techniques, and wound healing that grafting became popular.

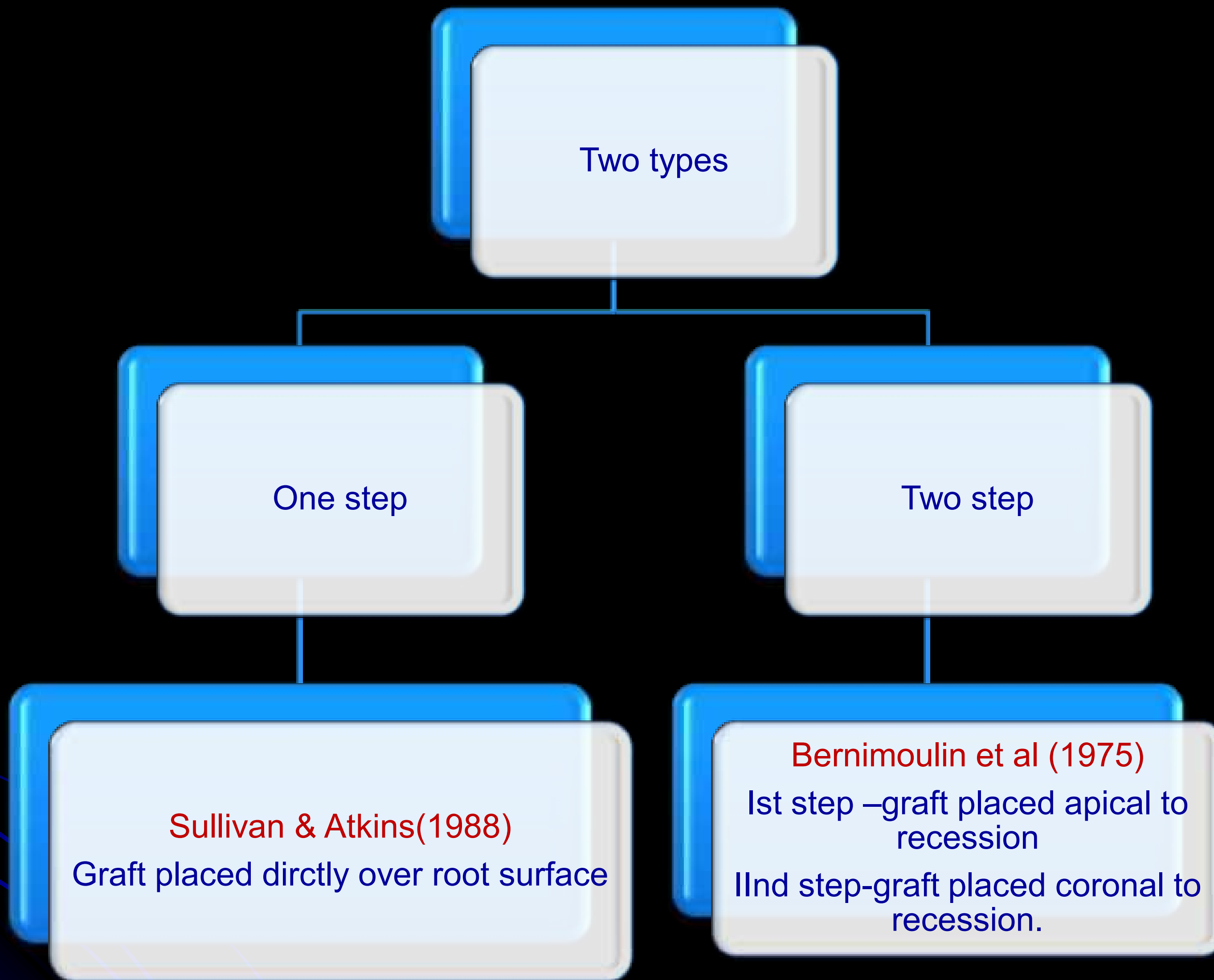
INDICATION

- All cases where root coverage is necessary except where a graft of sufficient thickness cannot be harvested.

CONTRAINDICATION

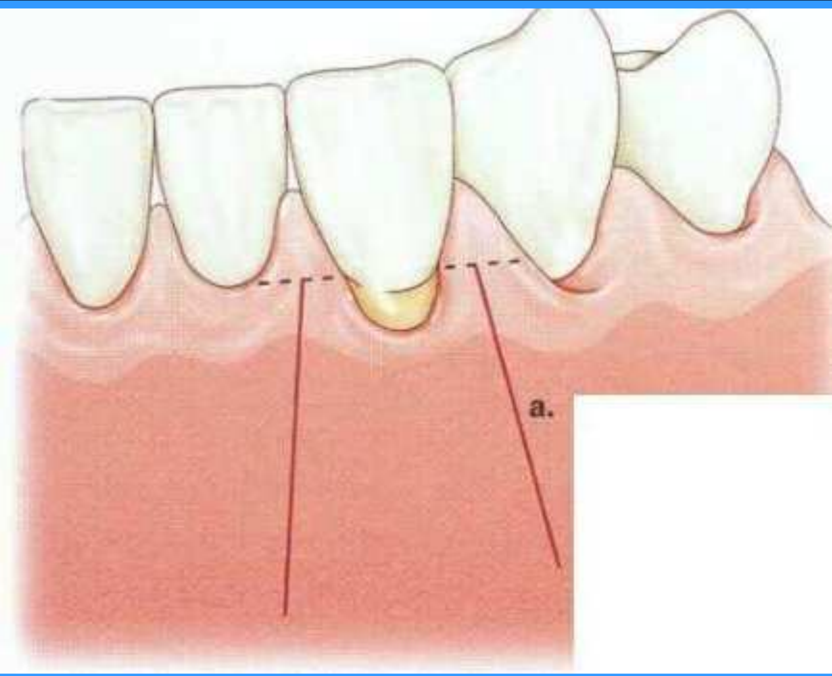
- Lack of thick donor tissue.
- Class III & class IV recession
- A root surface of excessive mesiodistal width with interproximal tissue that is too narrow to support the blood supply.

Thin graft technique	Thick graft technique
Like lateral pedicle graft	
One of earliest technique used for root coverage .	
Believe that thin FGG survive better on avascular root surface	Believe that thick graft was more likely to revascularize & survive on avascular root surface.
Thickness about 1mm	Graft thickness at least 2mm.
Work best on shallow narrow defect, but overall procedure was failure.	
Larger defect-concept was flawed & unreliable.	
Mean defect coverage ranged from 12% to 66%.	Defect coverage 39% to 100%
90% coverage achieved only in 16% of times. (Sullivan & Atkins 1968;Mlinek A et al 1973;Matter J 1980)	90% coverage in 84% of times (Miller PD Jr 1985,Laney JB et al 1992;Jahnke PV 1993)


Two types
One step
Two step
Sullivan & Atkins(1988)
Graft placed dirctly over root surface
Bernimoulin et al (1975)
Ist step –graft placed apical to recession
IInd step-graft placed coronal to recession.

CLASSIC TECHNIQUE (MILLER PD 1985)

Preparation of recipient site

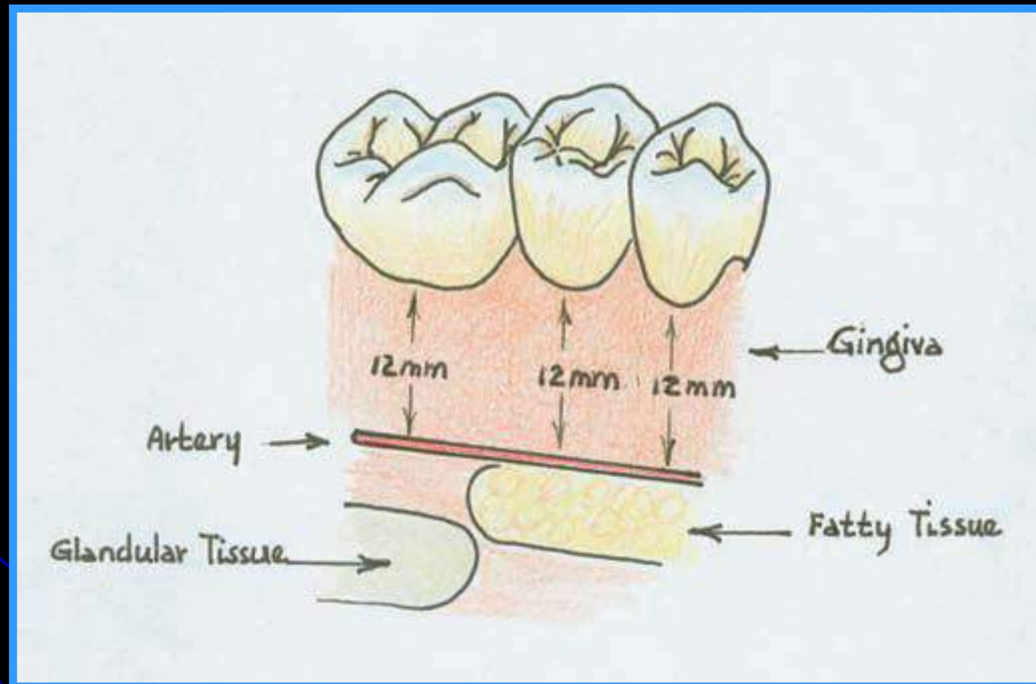


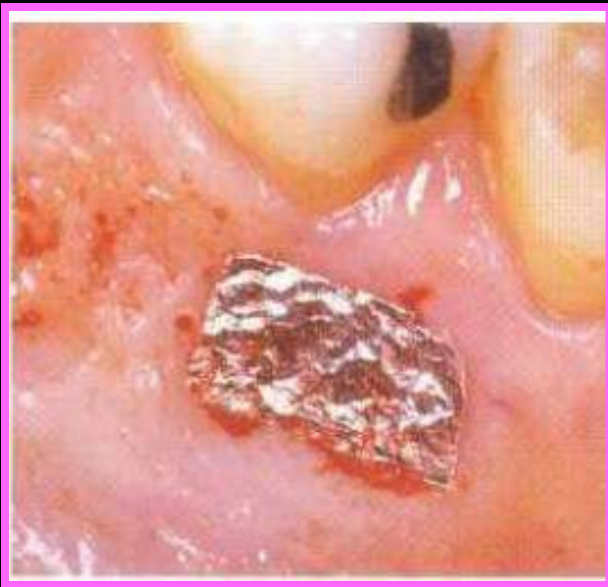
Horizontal & vertical incision incision outline

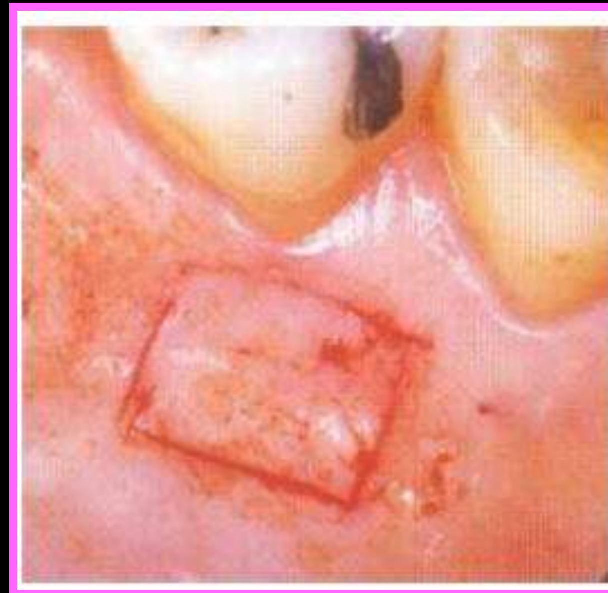
Horizontal incision #15 blade

Completely prepared recipient site.

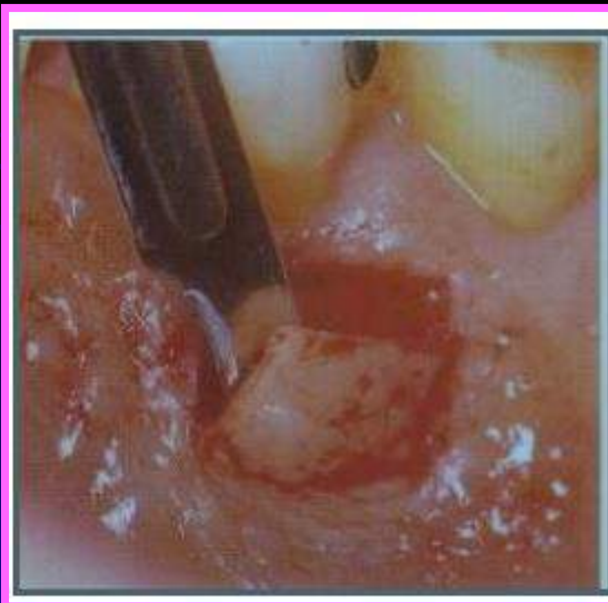
Anatomy of donor site

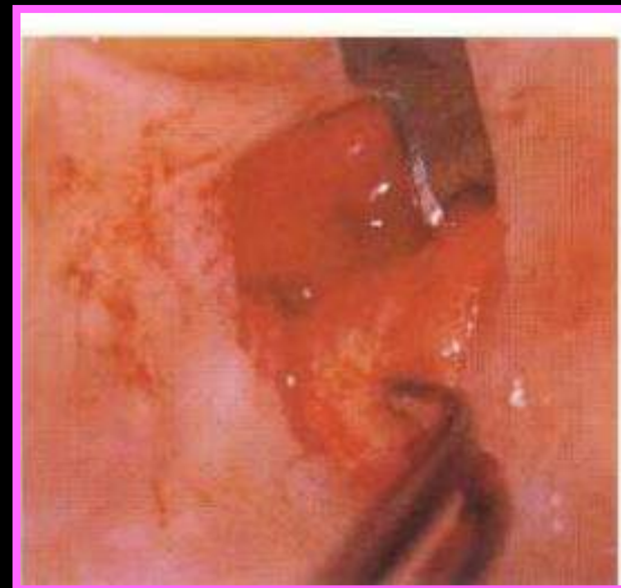






Graft from donor site



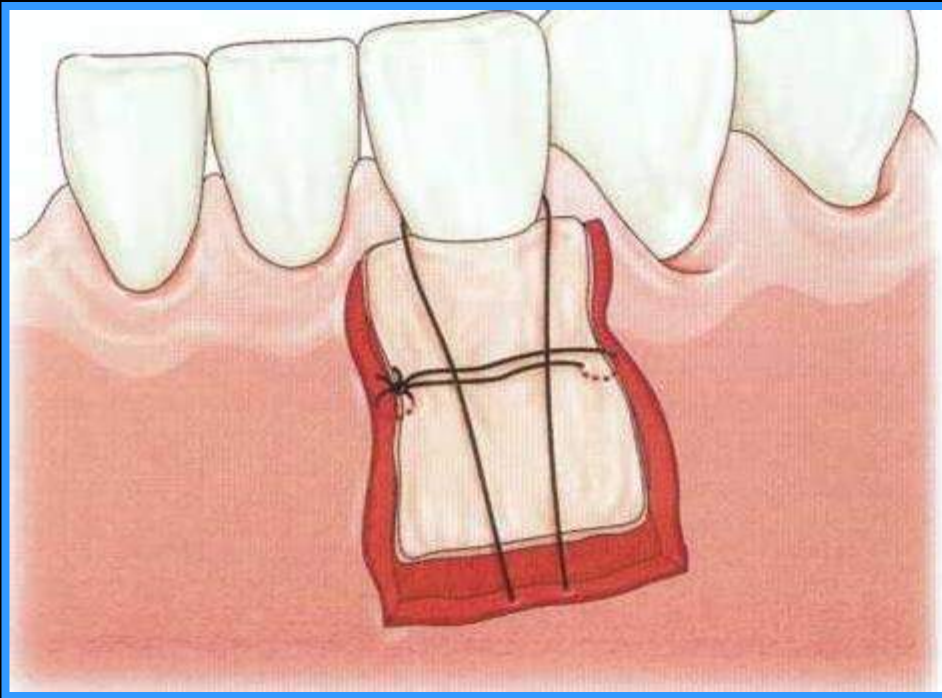


Thickness of graft

- Important for survival of graft
- Enough thick to permit ready diffusion of nutritive fluid from recipient bed.
- Too thin graft- necrosed & exposed the recipient site.
- Too thick – peripheral layer is jeoparadized,excessive tissue that separate it from new tissue.

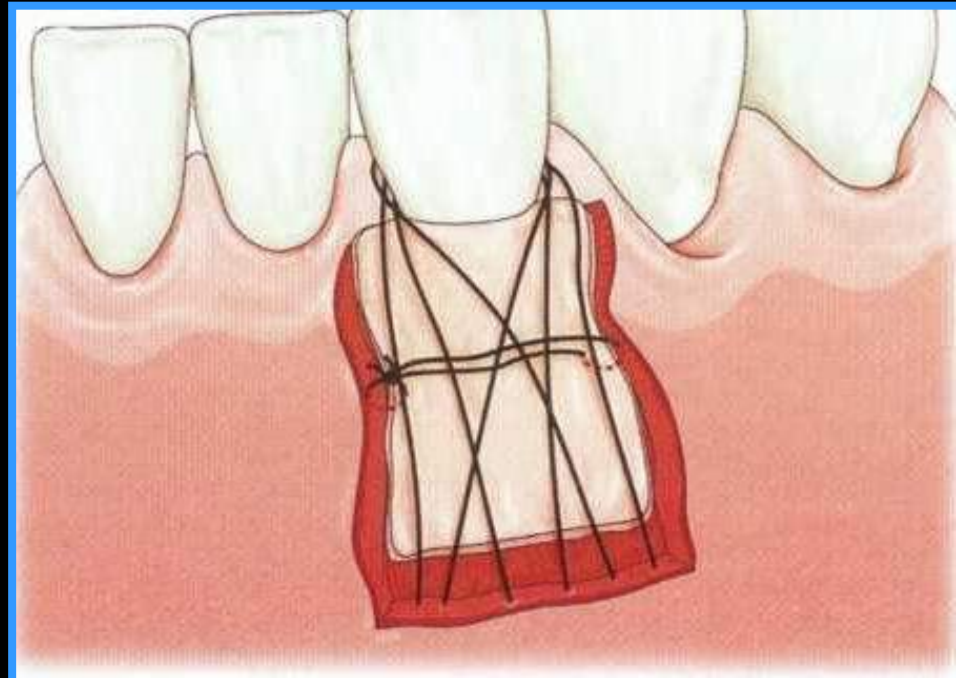
  - Deeper wound at donor site.
  - Possibilty of injuring major palatal artery.

- Ideal thickness :-
  - 1 to 1.5 mm (Marmann W et al 1981; Pemelbin et al 1969)
  - 2-3mm (Lindhe 5th edi)



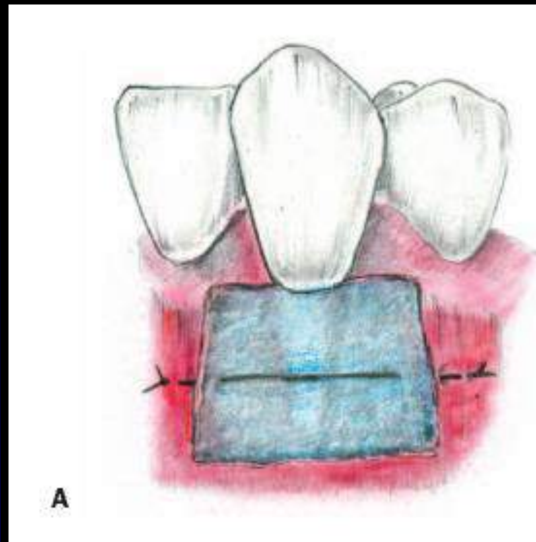
Horizontal suture which stretch the graft.
Circumferential suture

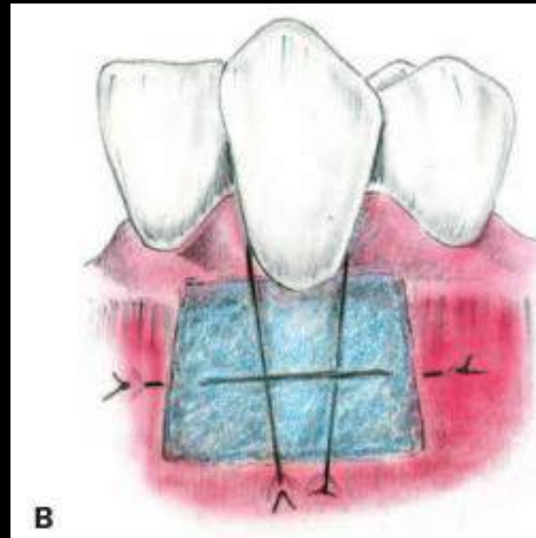
Interdental concavity suture

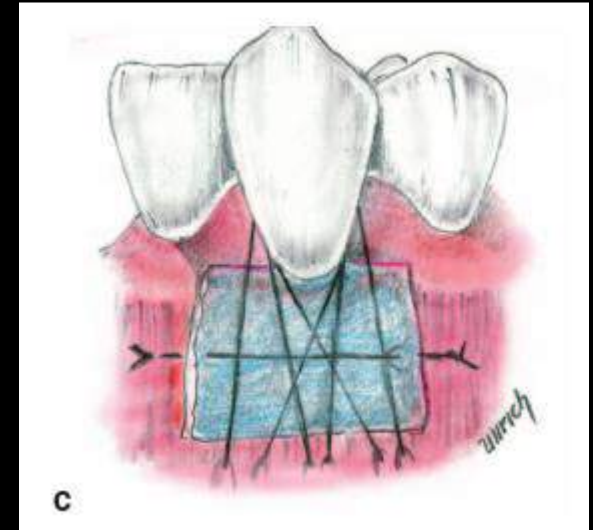


Suturing Modification for Root Coverage

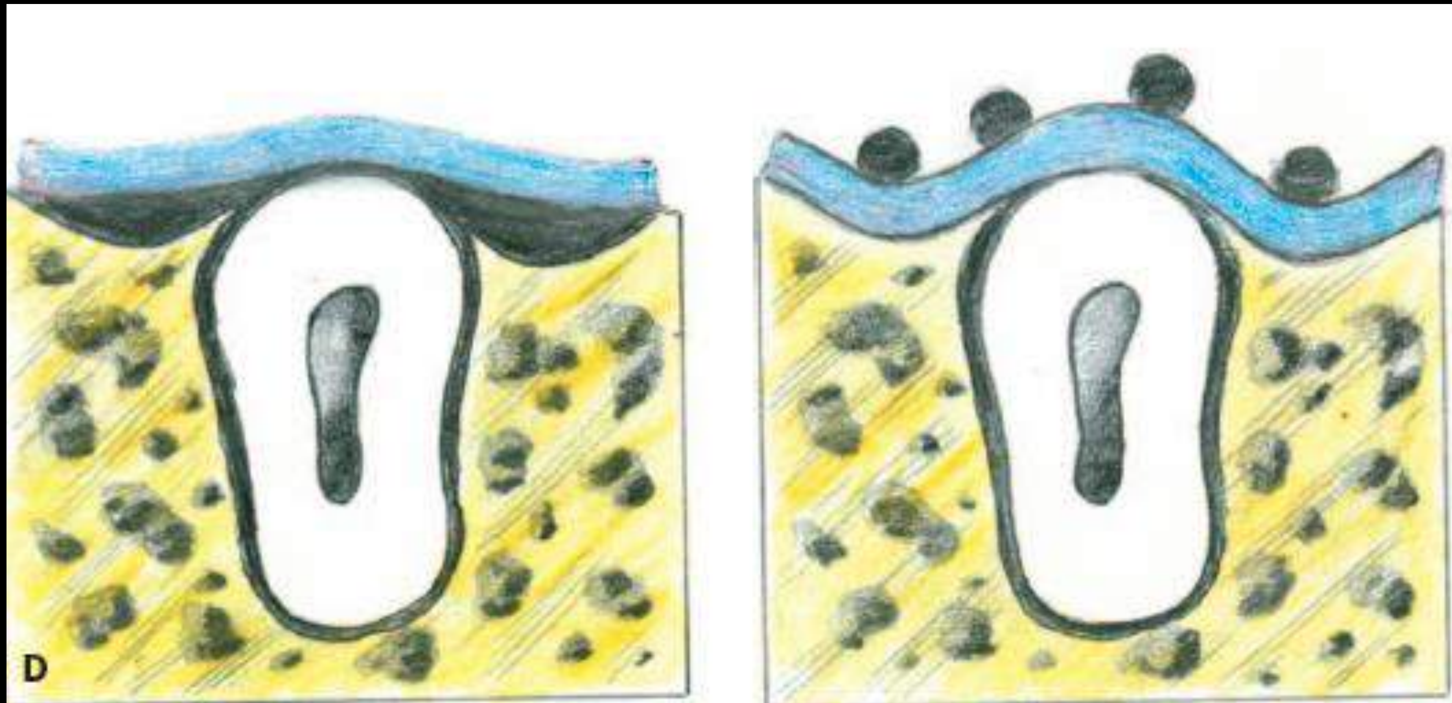
- Carvalho (1972) and Holbrook and Ochsenbein (1983)







Cross-sectional view



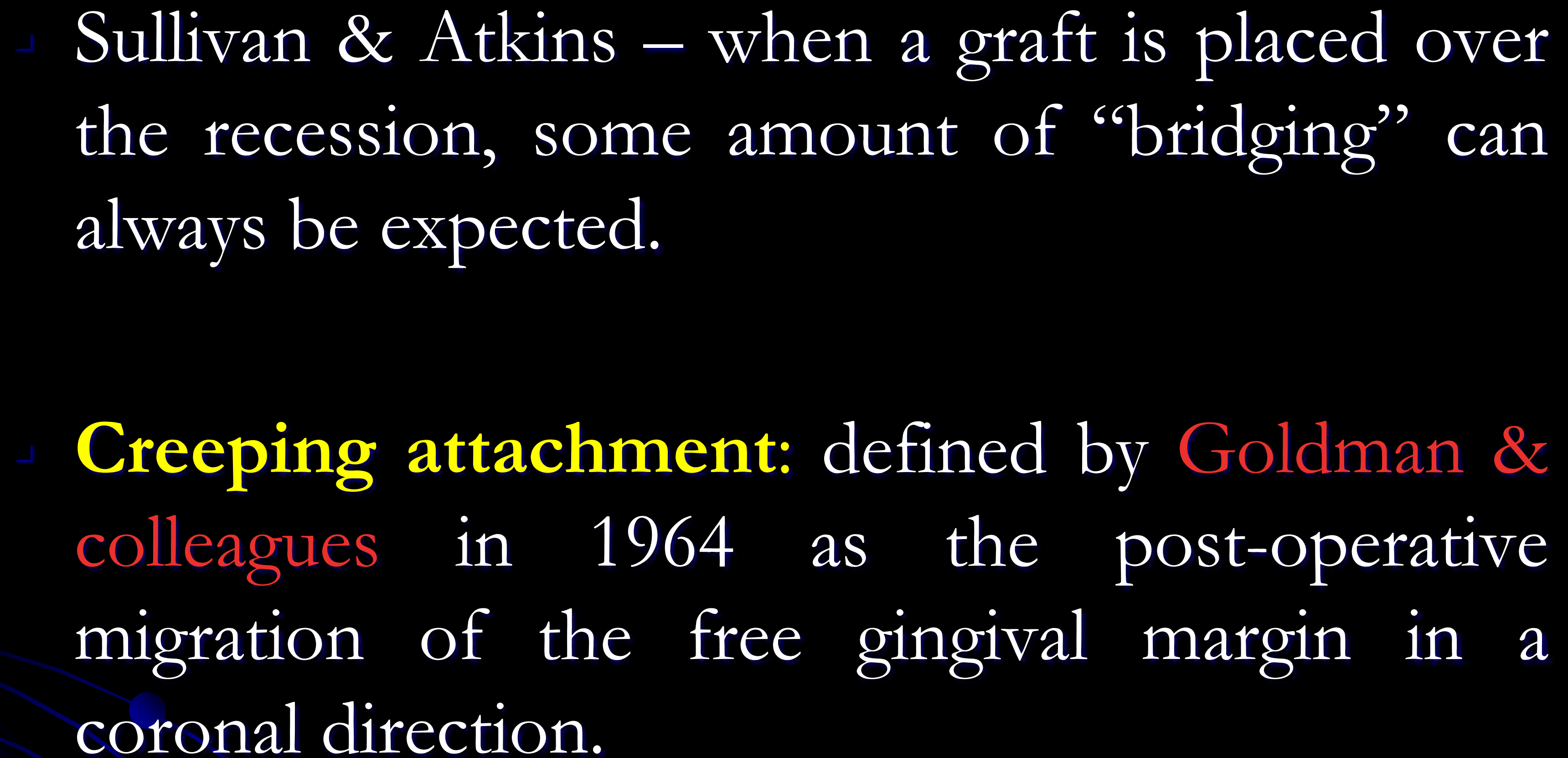
ADVANTAGE

- Multiple teeth can be treated.
- Can be performed when keratinized gingiva adjacent to the involved area is insufficient.

DISADVANTAGE

- Two operative sites.
- Compromised blood supply.
- Lack of predictability in attempting root coverage.
- Greater discomfort.
- Difficulty to achieve hemostasis in donor area.
- Scarring occurs with wound healing.

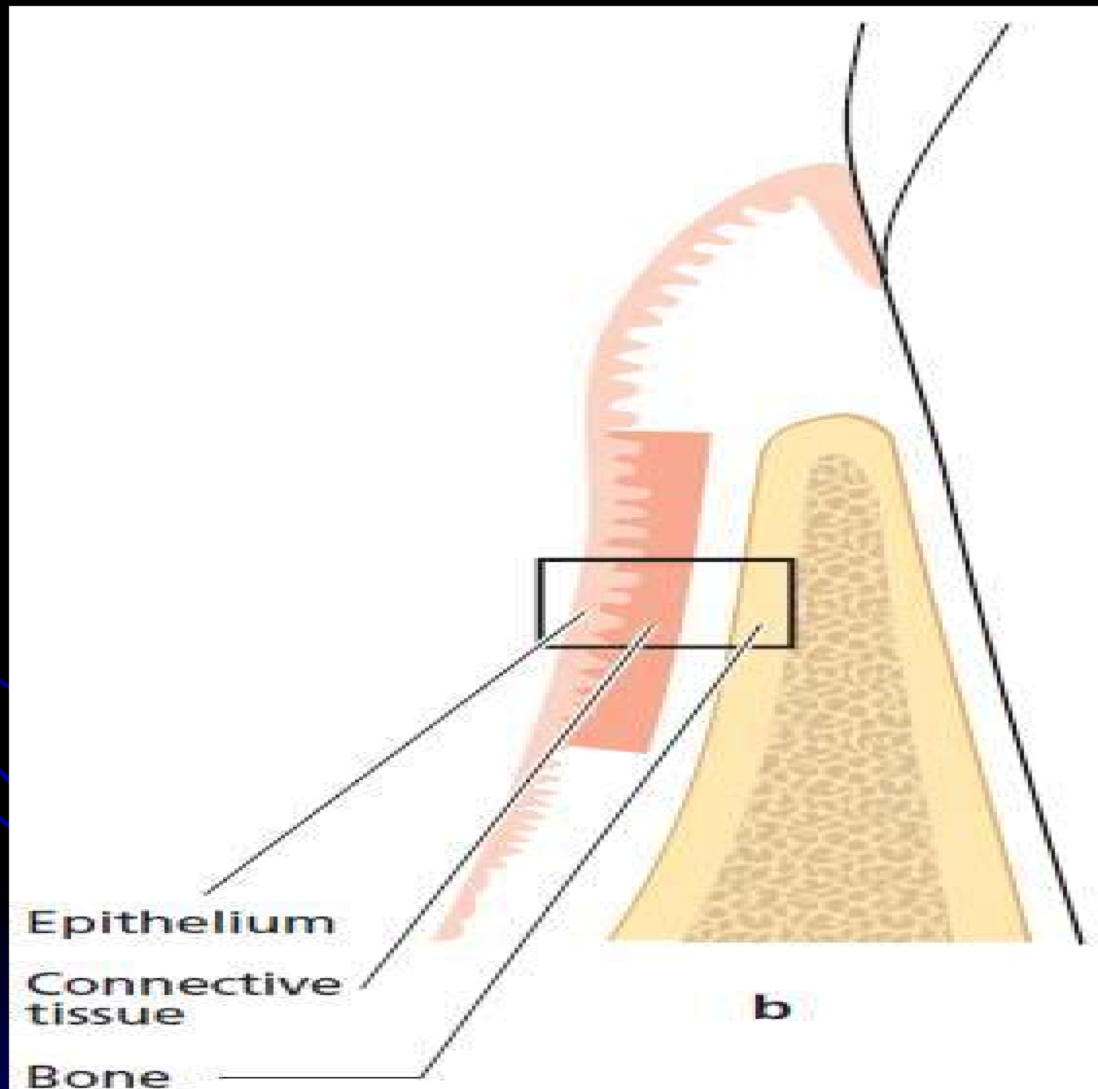
- The success of the FGG depends on the ability of the transplanted tissue to display keratinization.
- Re-establishment of an adequate blood supply in its new position.
- The first histological study of the healing of FGG reported, bridging or union of new capillaries with the original vessels of the graft was shown by *Gargiulo* in 1967.



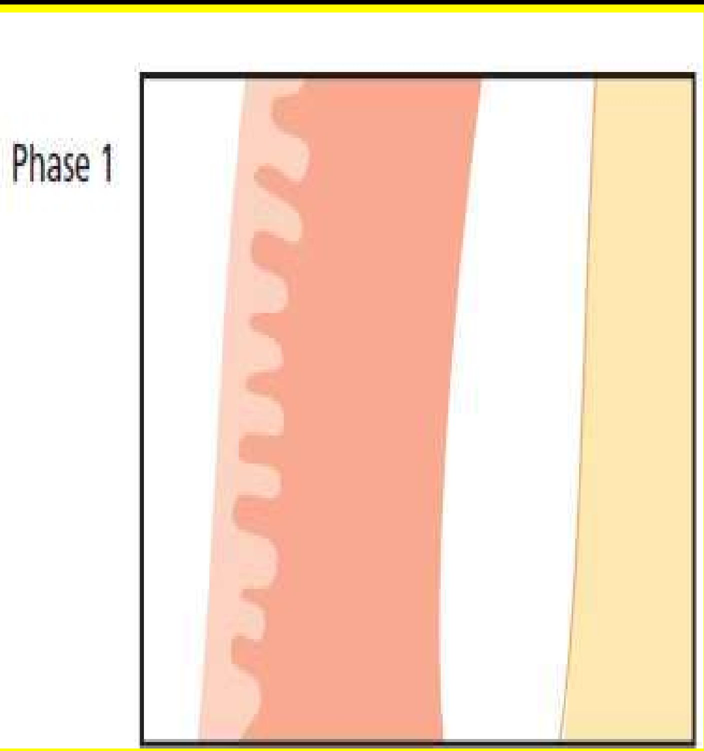
- Sullivan & Atkins – when a graft is placed over the recession, some amount of "bridging" can always be expected.

- **Creeping attachment:** defined by Goldman & colleagues in 1964 as the post-operative migration of the free gingival margin in a coronal direction.

Healing of free gingival graft



INITIAL –PLASMATIC PHASE



- 0-3 Days

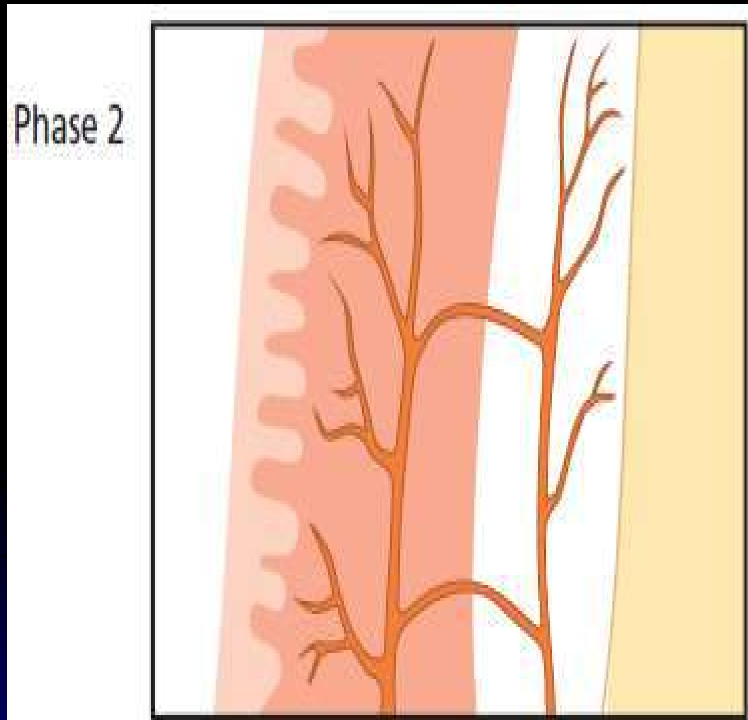
-There is marked inflammation in the first 48 hours.

-Thin layer of exudate between graft & rcipient bed.

-Survival of graft dependence upon "plasmatic circulation" from recipient bed.

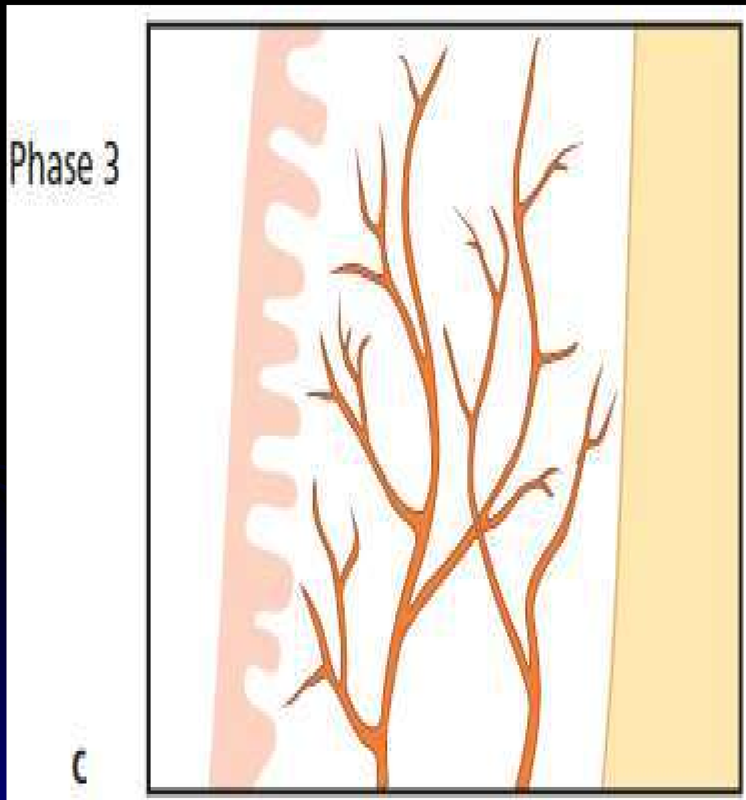
-Epithelium-degenerate & desquamated early in this stage.

RE-VASCULARIZATION PHASE



- 2 to 11 days
- After 4-5 days , blood vessels of the recipient site anaestomoses vessels of grafted tissue.
- Proliferation of blood vesseles forms dense metwork.
- At same time fibrous union between graft and underlying connective tissue bed.
- Adequate blood supply is achieved by the 8th day.
- central portion of graft vascularized last, 10th day.
- The graft re-epithelializes by proliferation from the epithelium
- 4th day thin layer of epithelium. 7th day rete peg may develop.

TISSUE MATURATION PHASE



-11 to 42 days

- number of blood vessels from transplanted tissue get reduced.

- after 14 day vascular system of graft appear normal

- epithelium mature & form keratin layer at this stage.

Functional integration of graft occurs on 17th day.

Gordan HP 1968 :

- Intermediate thickness graft (0.75mm) – heal by 10.5 weeks.
- Thicker graft (1.75mm) – 16 weeks or more.

Color changes

- At transplantation- graft I pale in color
- First 2 day – ischemic grayish
- After vascularization begins- pink color.

- Remya V et al (2008)- treated early Class III recession with the FGG, there was 40%-50% of root coverage with acceptable root coverage.

- Vijayendra R et al (2011) – evaluated two step procedure, FGG with CT graft for root coverage in Millers Class II recession.
  - There was 3mm increase in width of attached gingiva 35% root coverage.
  - It suggest that it is successful treatment in deep recession with shallow vestibule in mandibular anterior region.

CURRENT POSITION ON FREE GINGIVAL GRAFTS FOR ROOT COVERAGE (ACADEMY REPORT, J PERIODONTOL 2005 VOL 76)

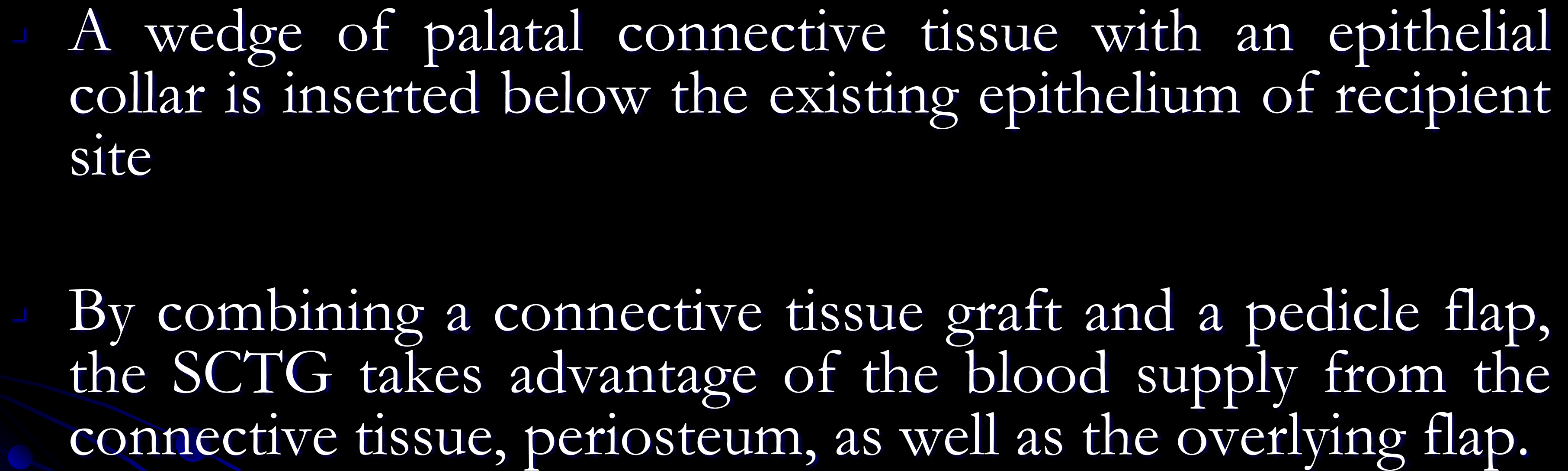
- Studies on thin free gingival grafts show a mean defect coverage of 12-66% (Matter et al 1980)
- Percent defect coverage was strongly and inversely correlated to recession depth
- Predictability data indicated that 90% or greater coverage was achieved only 16% of the time (Matter et al 1980).

FREE CONNECTIVE TISSUE AUTOGRAFT.

- Levine in 1991.
- Difference between this technique & free gingival graft autograft is donor tissue which is connective tissue graft in this technique.

Good morning

SUBEPITHELIAL CONNECTIVE TISSUE GRAFTS



- A wedge of palatal connective tissue with an epithelial collar is inserted below the existing epithelium of recipient site

- By combining a connective tissue graft and a pedicle flap, the SCTG takes advantage of the blood supply from the connective tissue, periosteum, as well as the overlying flap.

1974 – **Edel** introduced subepithelial connective tissue grafts for gingival augmentation procedures.

1982 – **Langer and Calagna** proposed - subepithelial connective grafts for ridge augmentation procedures.

1985 - **Langer and Langer** - introduced subepithelial connective grafts for root coverage procedures

LANGER AND LANGER TECHNIQUE - 1985

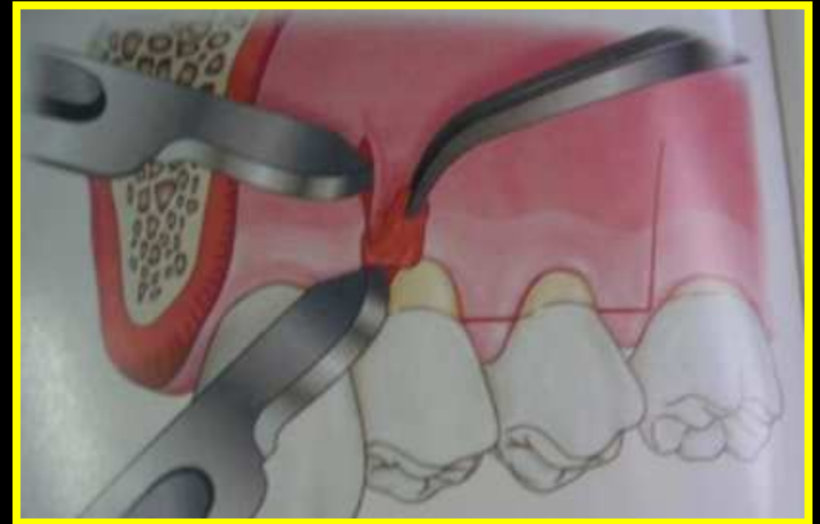
Indications

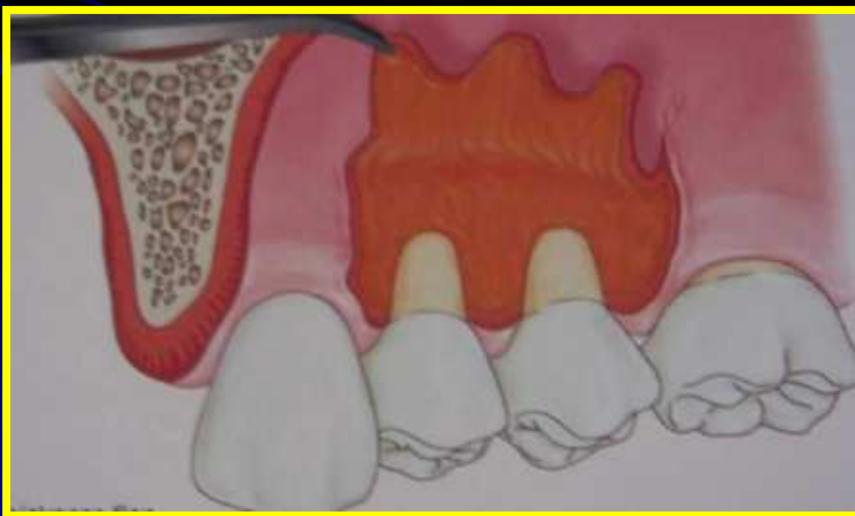
- Isolated wide and multiple defects
- Insufficient keratinized tissue for sliding flap procedure
- Multiple root exposures in combination with minimal attached gingiva

Contradictions

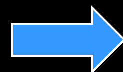
- Broad shallow palates
- Excessively glandular or fatty palatal submucosa

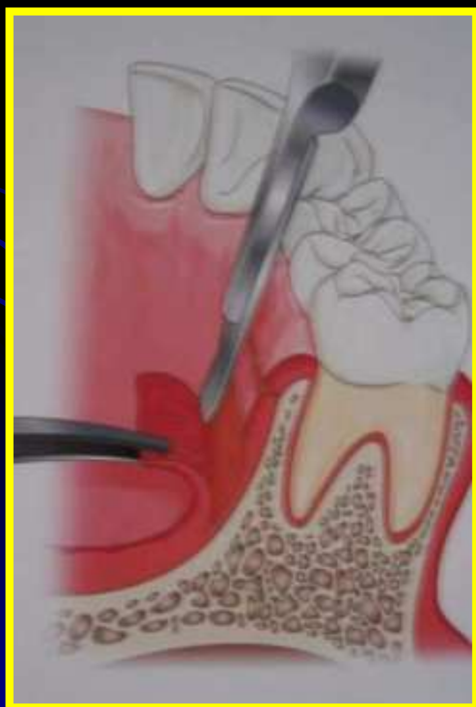
Flap design

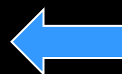


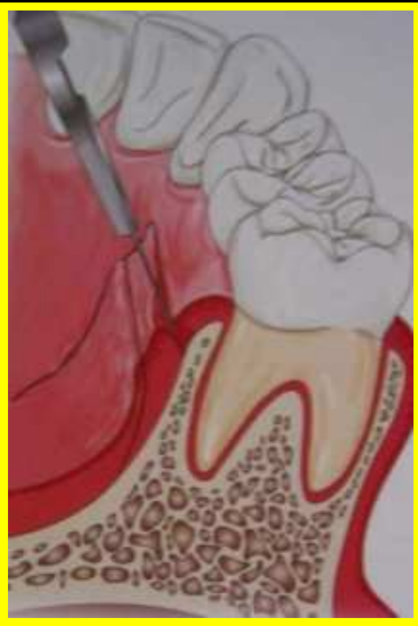
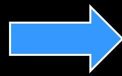
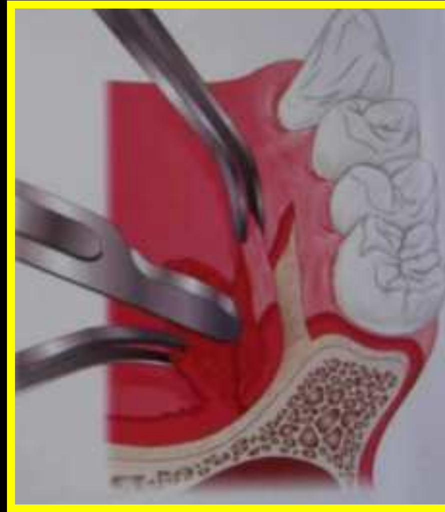
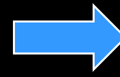


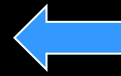
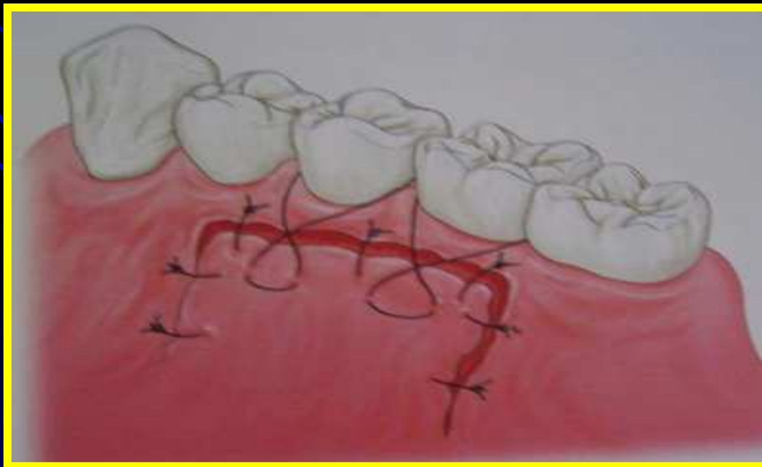
Harvesting graft

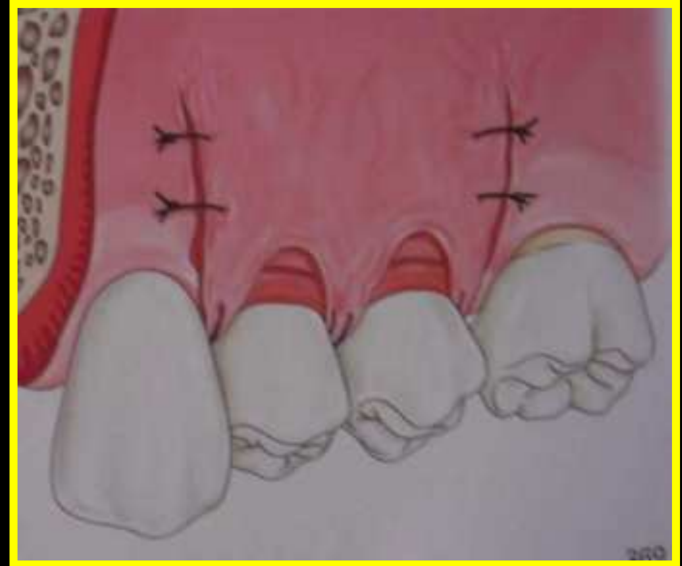








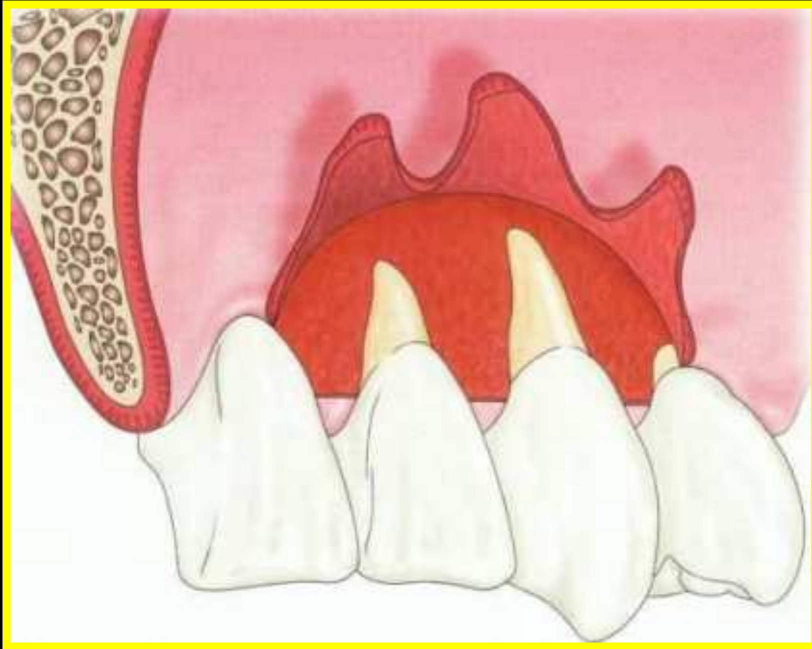
Modified Technique of Langer and Langer

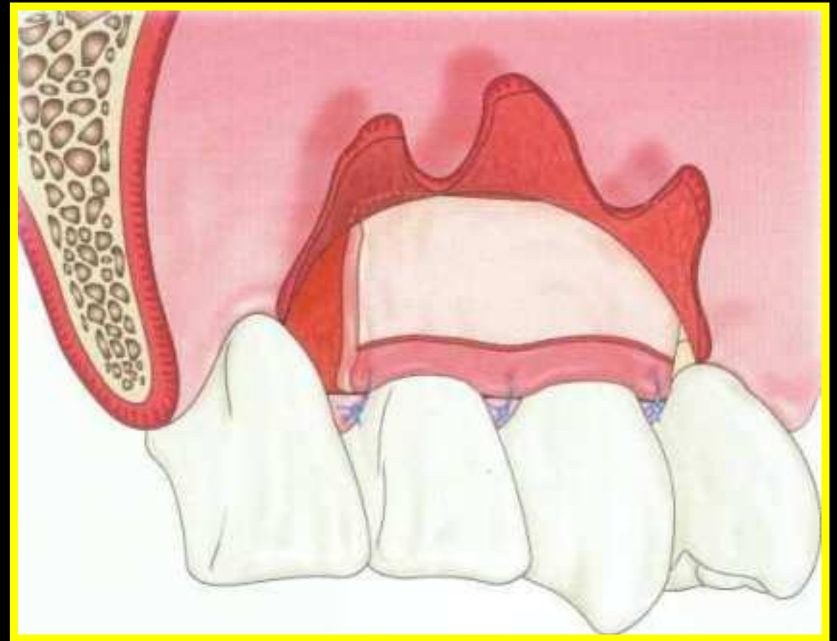
- Bruno (1994) modified the Langer and Langer technique

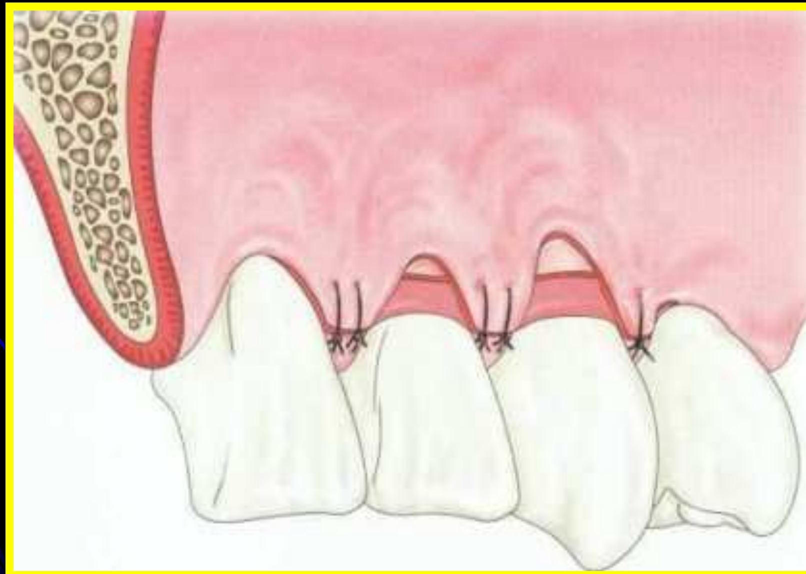
- Do not use a vertical incision when preparing a recipient site to
  - Ensure excellent blood supply to flap.
  - Alleviate postoperative discomfort.
  - Avoid scarring.

- Make a partial-thickness horizontal incision perpendicular to the interdental papilla of the recipient site.

- Close adaptation to donor tissue is obtained with a butt joint.







Advantages:

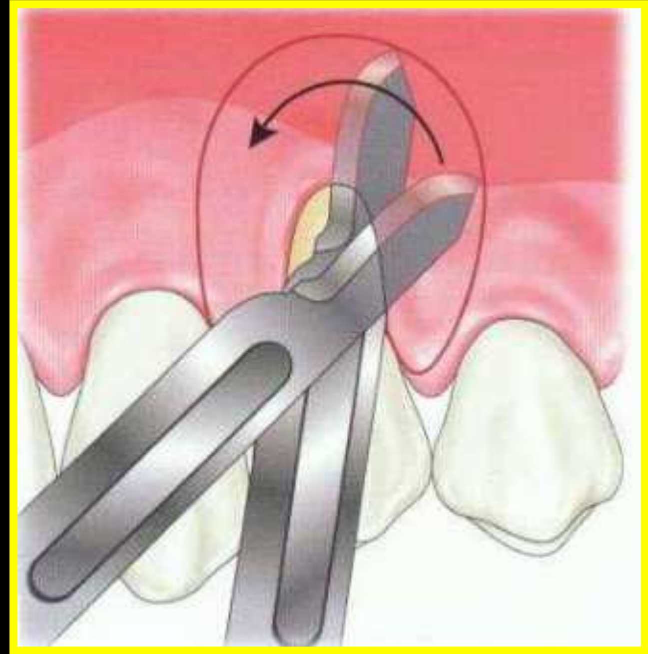
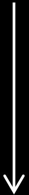
1. High predictabolity.
2. The graft received abundent blood supply from both the inside of the flap and periosteum-connective tissue.
3. Wound closed at palatal donor site after harvested of connective tissue graft. Therefore, hemostasi is easy and healing is rapid. There is also less discomfort and pain during healing.
4. The graft fits the surrounding tissue on the recepient site, therefore results are esthetically pleasing.
5. Applicable for gingival recession for multiple teeth.

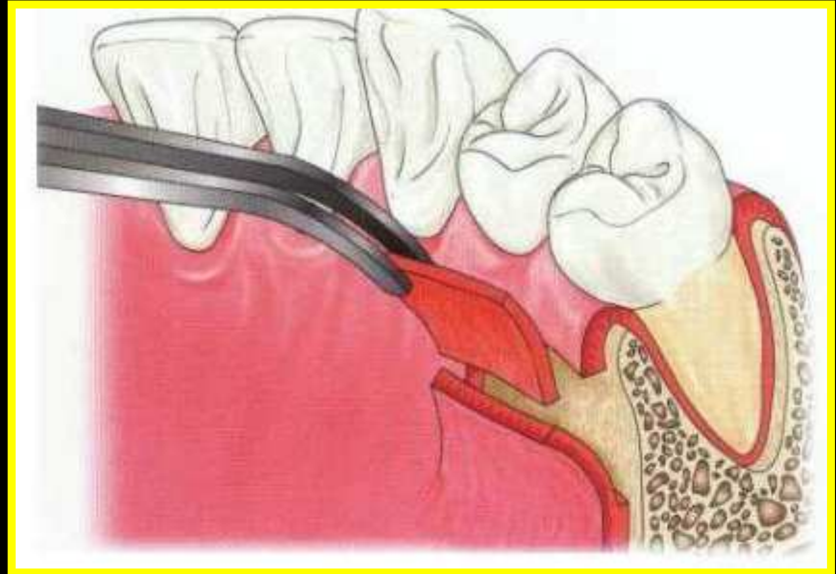
Disadvantages :

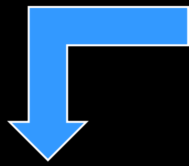
1. Technically demanding
2. Because thick graft is used, gingivoplasty may be necessary post-operatively to obtain better morphology.

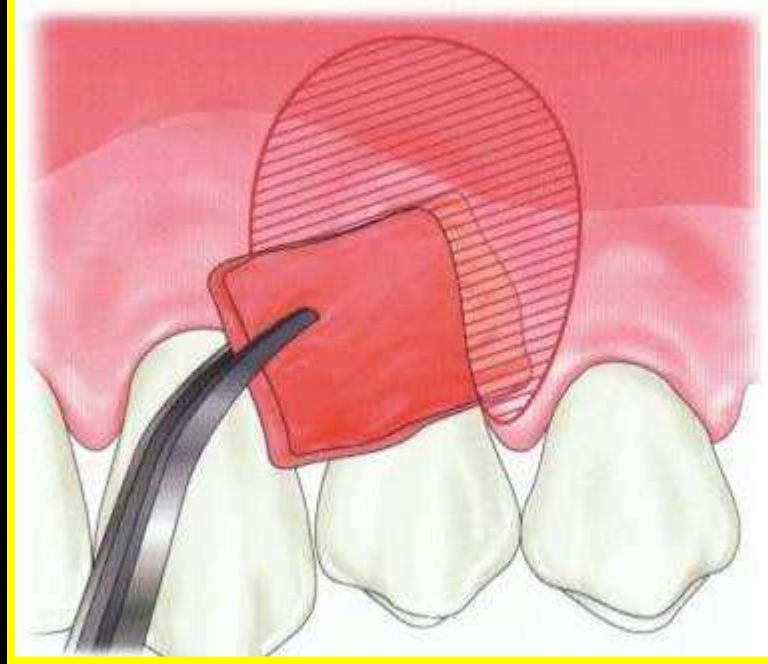
Envelope Flap

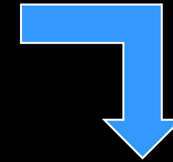
- Raetzke(1985) introduced a connective tissue graft using an envelope technique.
- No horizontal or vertical incision is made.
- Partial-thickness envelope flap is prepared on the soft tissue adjacent to the gingival recession area from the gingival sulcus.









Connective tissue graft

- Advantages :
  - Simplicity,
  - Minimal surgical invasiveness,
  - Good esthetics because the interdental papilla is preserved.

- Limitation:
  - It cannot be displaced coronally.
  - Not applicable in areas of extensive gingival recession because there is a limit to the size of the graft that can be placed.

Tunnel technique

- Zabalegui *et al.* 1999
- Multiple gingival recessions.

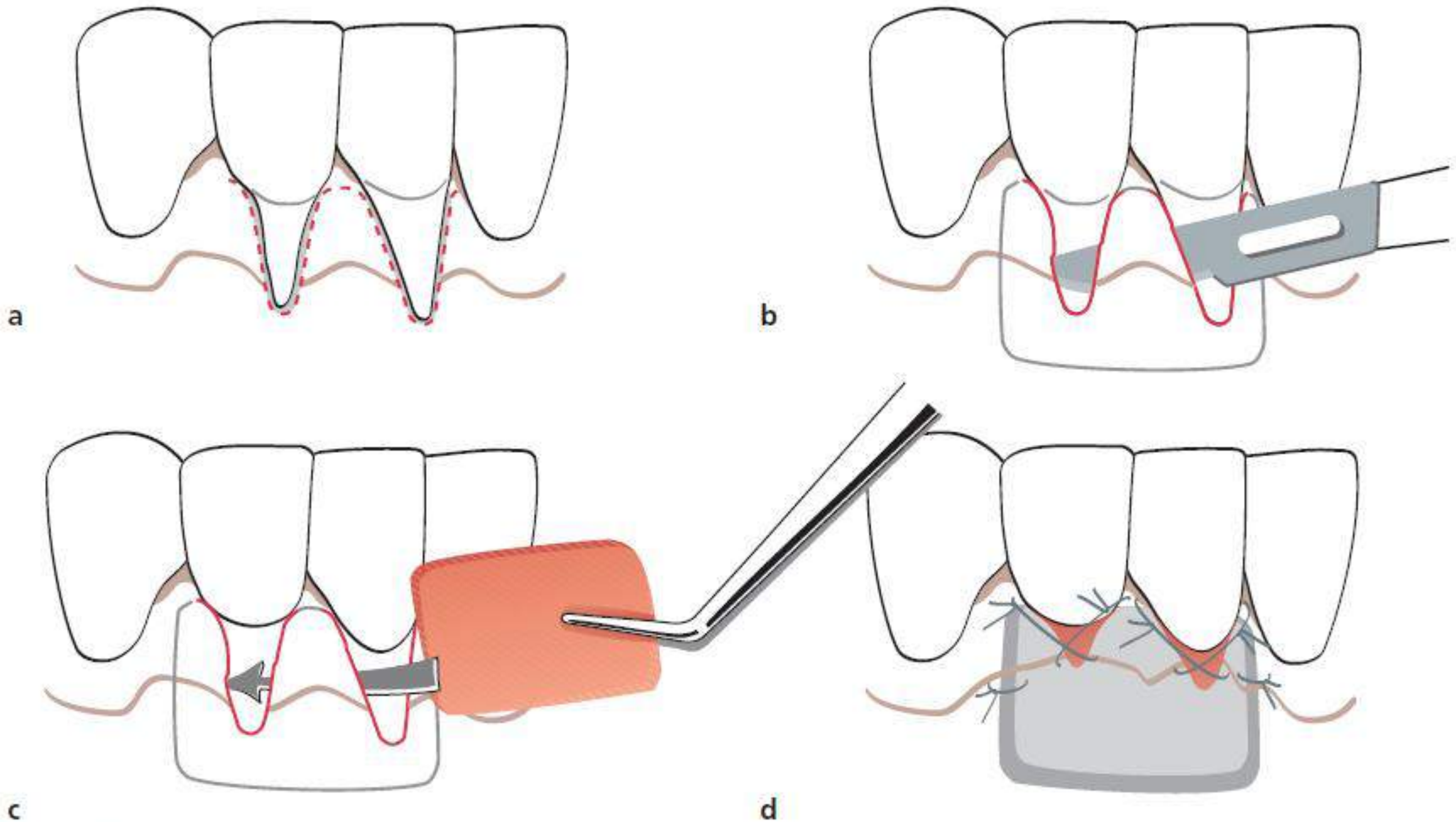


Fig. 44-49 Free connective tissue graft procedure – the "tunnel technique". Schematic drawings illustrating the surgical technique (see the text for explanation).

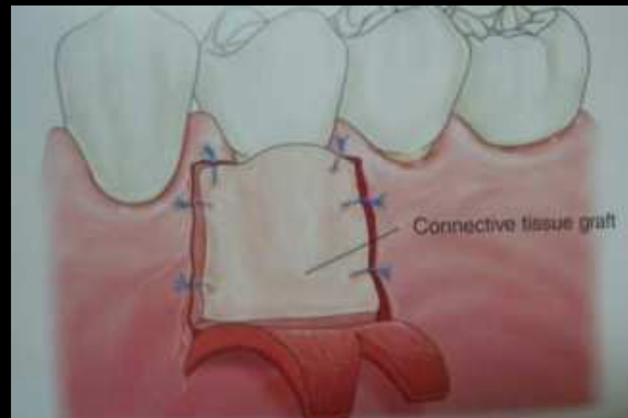
Good morning…..

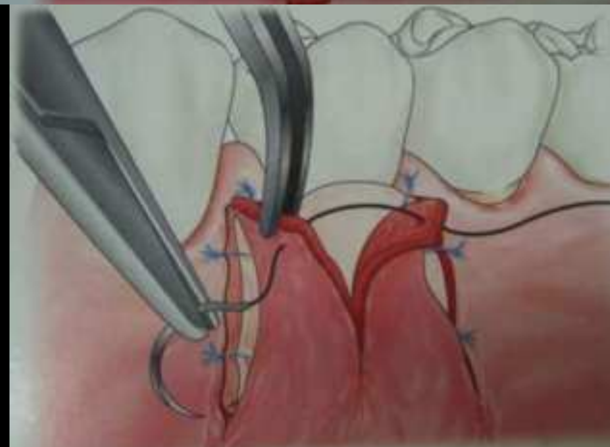
Subpedicle Connective Tissue Grafts

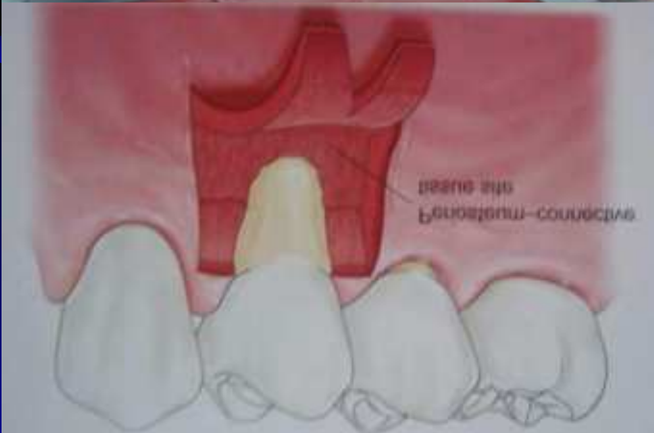
- Nelson and Borghetti (1987) and Louise (1991) described the fullthickness pedicle flap.
- Harris (1992) described the partial-thickness pedicle flap.
- Connective tissue grafts may be used with a pedicle flap (double papilla or laterally positioned flap)

- Advantage :
  - Pedicle cover the connective tissue graft,blood supply.
  - In addition to root coverage, the width of the keratinized gingiva can be increased.
  - Used in areas of gingival recession with narrow keratinized gingiva.

- Disadvantage:
  - More technically demanding.


Connective tissue graft




Periosteum–connective
tissue site

ADVANTAGES

Dual blood supply to graft

Minimal palatal trauma

Colour match is better

Treats multiple recession

Neither a shallow vestibule, nor an abberant frenal attachment contraindicates the use these grafts

DISADVANTAGES

Coronal portion of a de-epithelialized sub epithelial connective tissue graft when left exposed tends to thicken on re – epithelialization

Table 6-15 Causes of Failure of Connective Tissue Grafts[34]

1. Insufficient height of interdental bone and soft tissue.
2. Horizontal incision placed apical to the CEJ.
3. Reflection of all interdental papilla.
4. Flap penetration.
5. Inadequate root planing.
6. Insufficient blood supply from surrounding tissue due to inadequate recipient site preparation.
7. Connective tissue graft too small.
8. Connective tissue graft too thick.
9. Connective tissue graft inadequate for root coverage and coronal placement.
10. Insufficient coronal migration of flap covering the graft.

Langer L& Langer B. 1992

Literature

- Tozum TF et al (2005)- compare two different subepithelial connective tissue graft SCTG techniques - Langer and Langer and modified tunnel.
  - SCTG in combination with a tunnel procedure may result in an increased amount of root coverage and clinical attachment gain compared to the Langer and Langer technique.

- Nader Abolfazli et al (2009)-compare the 24 month results of coronally advanced flap + enamel matrix derivates (EMD+CAF) and CAF+ connective tissue graft (CTG+CAF) in the treatment of Miller Class I recession defects.
  - The CTG+CAF procedure seems to provide better long-term results than the EMD+CAF in obtaining root coverage, increasing the KTW and CAL gain.

- Zucchelli G et al (2010) review -Patient morbidity and root coverage outcome after subepithelial connective tissue and de-epithelialized grafts.
  - No differences were demonstrated in the post-operative pain and root coverage outcome in patients subjected to CAF with CTG or DGG.

- Chambrone L et al (2010) review:
  - Clear evidence that mainly CAF alone or associated with SCTG led to statistically significant gains in gingival recession and attachment level gain, with or without improvements in the width of keratinized tissue.

- Cortellini P et al (2012) -A partly epithelialized free gingival graft (PE-FGG) is described for the treatment of isolated and multiple gingival recessions in lower incisors to improve root coverage potential and mucogingival junction (MGJ) alignment.
  - The application of the M-FGG resulted in high percentage of recessions completely covered with excellent alignment of the MGJ and appreciable aesthetic outcomes.

- de Oliveira et al (2012) review - Effectiveness of surgical root coverage in the treatment of cervical dentin hypersensitivity
  - There is not enough scientific evidence to conclude that surgical root coverage procedures predictably reduce cervical dentin hypersensitivity. Well-conducted clinical trials are needed to establish scientific evidence that allows periodontists to indicate root coverage as treatment for cervical dentin hypersensitivity.

Hofmanner P et al (2012)-Systematic review

- Predictability of surgical techniques used for coverage of multiple adjacent gingival recessions.
- Indicate that in Miller Class I and II MAGRs, CAF or MCAF with or without CTG may lead to predictable CRC.
- The CRC obtained with MCAF were maintained over a period of 5 years
- The use of CTG appears to improve the long-term stability of the MCAF and the use of CTG in conjunction with CAF, MCAF, CPP, DPG, or the supraperiosteal tunnel technique appear to yield higher CRC or MRC than the use of bioabsorbable membranes, ADM, or PRF. Also, MCAT plus CTG appears to represent a valuable technique for the treatment of Miller Class III MAGRs.,

Method	Mean root coverage (%)	Complete root coverage (%)
MCAF	97.1 ± 5.1	88.6 ± 20.3
CAF with releasing incisions CAF without releasing incisions	92.64 ± 14.25 97.27 ± 8.08	77.7 89.3
CAF + bioabsorbable membrane	93.3 ± 13.1	NA
CAF + CTG	96.1	80
MCAF + CTG	96.7	93.1
CAF + CTG	96	71
MCAF MCAF + PRF	91.5 ± 11.4 80.7 ± 14.7	74.6 52.2
MCAF + CTG	91.2	50
Tunnel + CTG	97[*] 96.6[†] 99.1[*] 98.9[†]	78.6[*] 60[†] 79.2[*] 72.2[†]
Tunnel + ADM	60.5 ± 42.74	NA
Tunnel + CTG	85	50
MCAT + CTG MCAT+ CTG + EMD	83 ± 26 82 ± 25	38 38
PPG	90.95	NA

PEDICLE AUTOGRAFT

Pedicle gingival grafts are classified according to the direction of flap migration.

- Rotational flap – flap rotated or displaced laterally
  - Laterally positioned flap
  - Transpositional flap
  - Double papilla flap

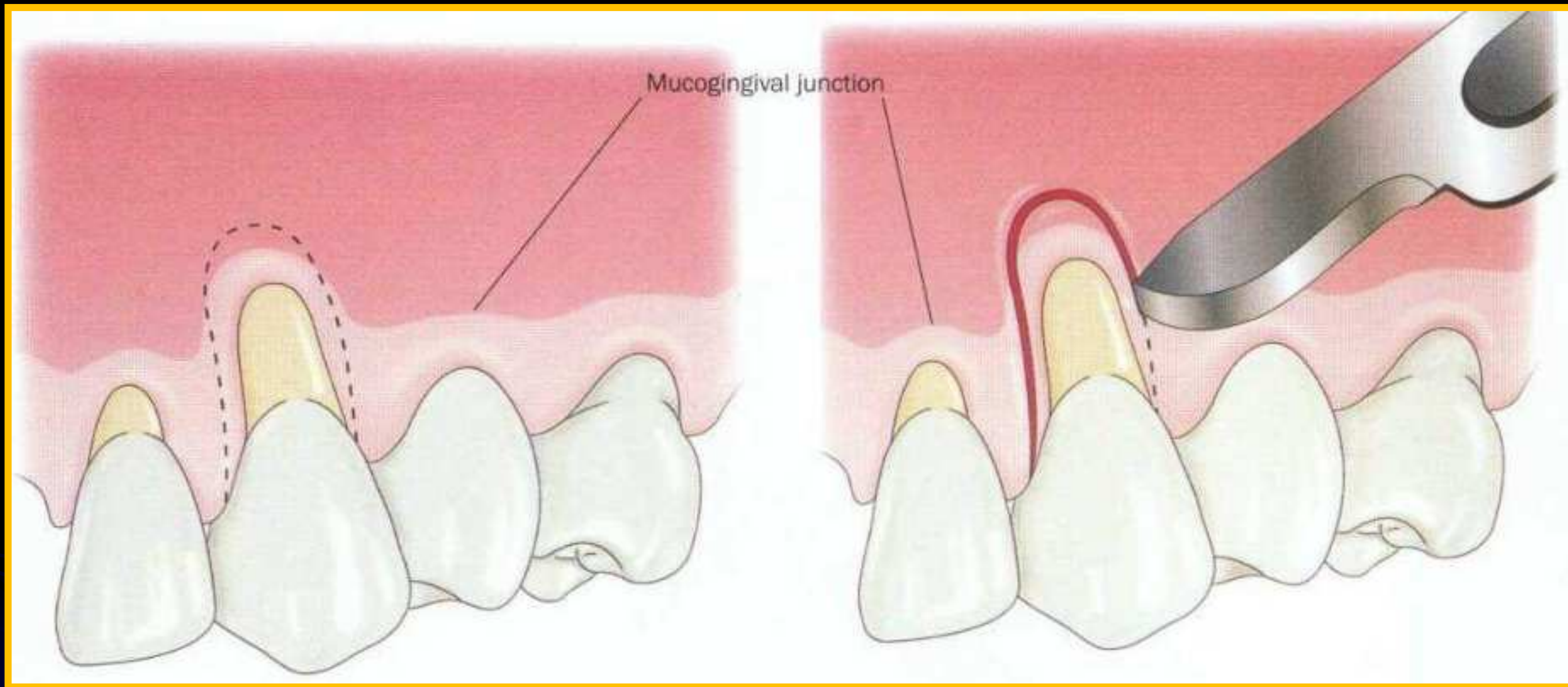
- Advanced flap –flap placed without rotation or lateral migration
  - Coronally positioned flap
  - Semilunar coronally repositioned flap.

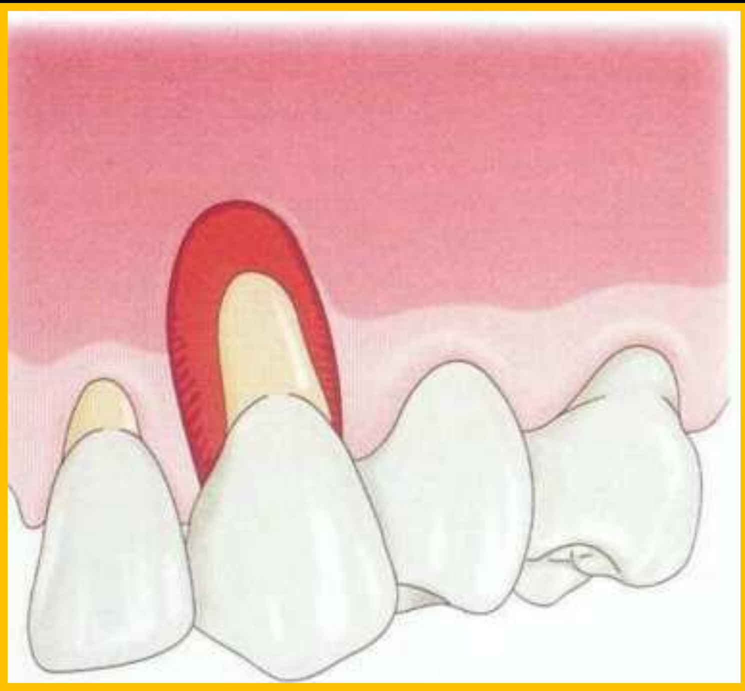
Advantages

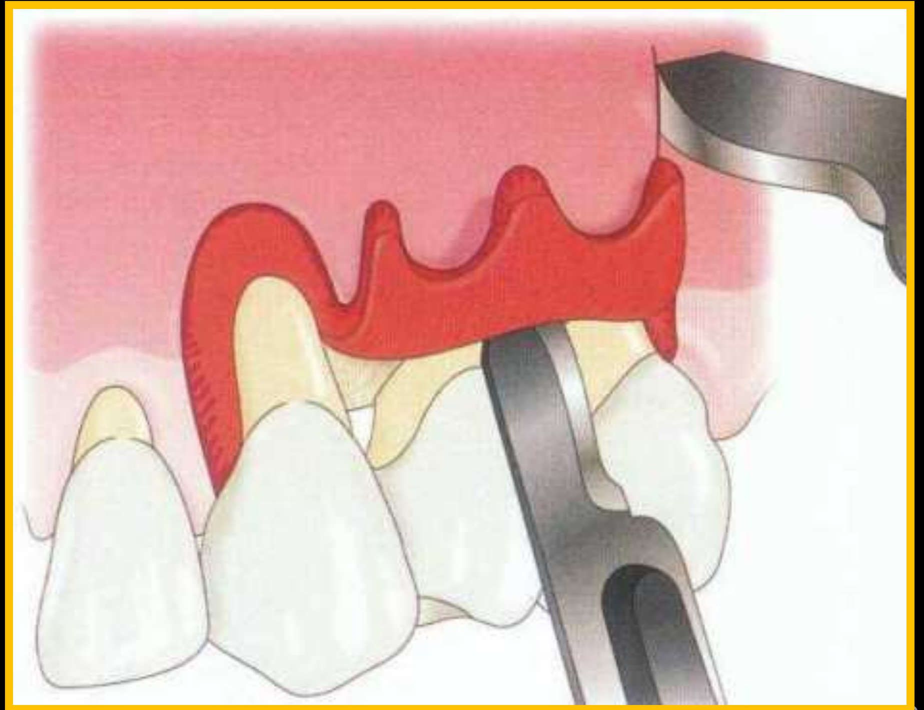
Disadvantages

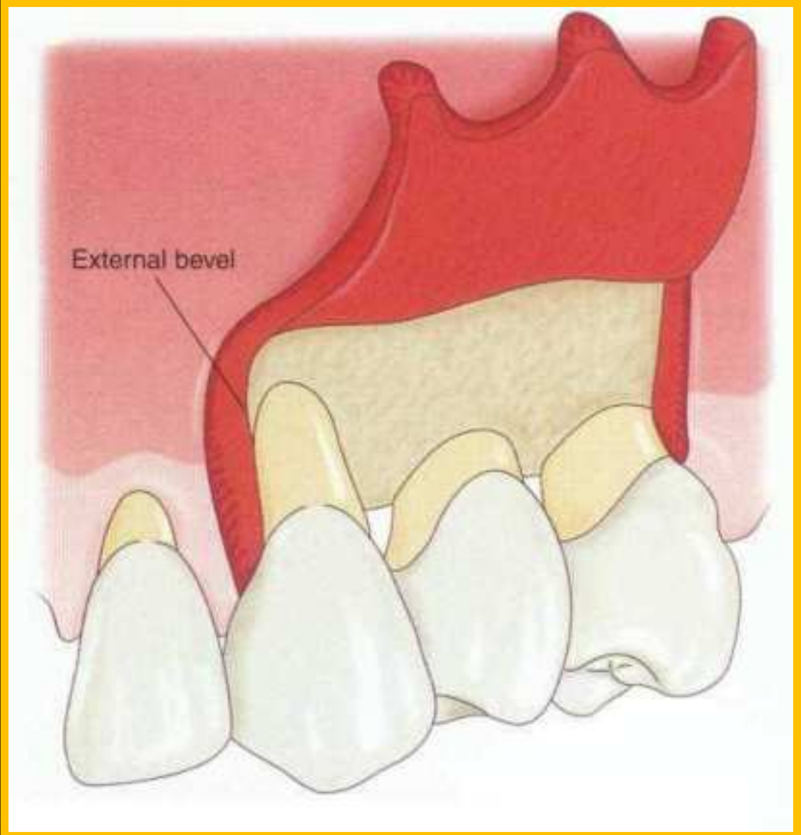
LATERALLY POSITIONED FLAPS

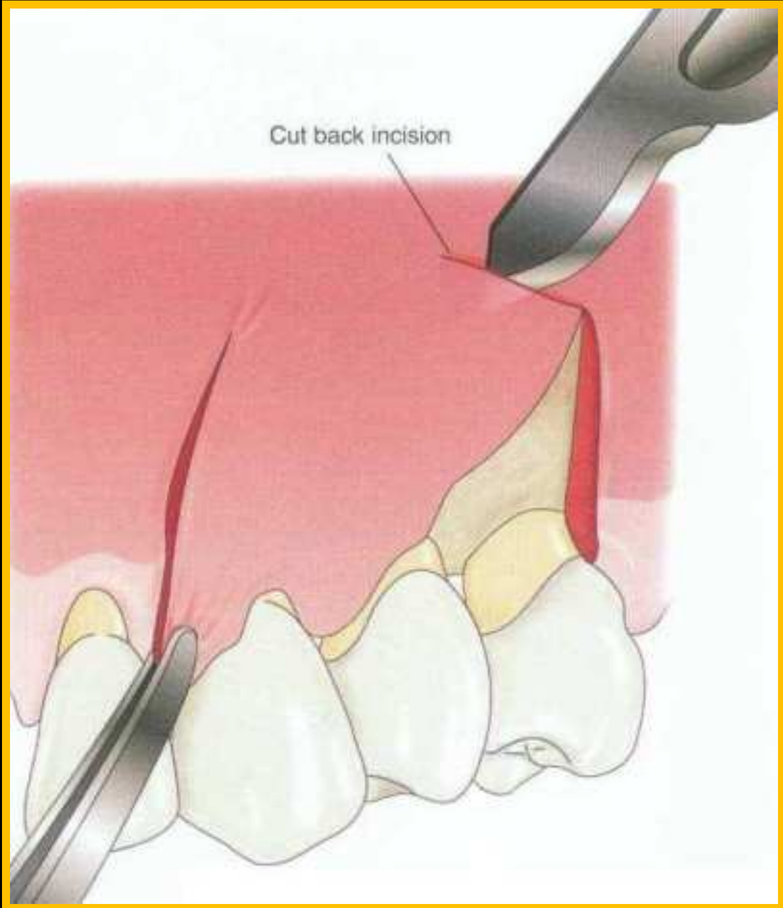
Grupe and Warren (1956)

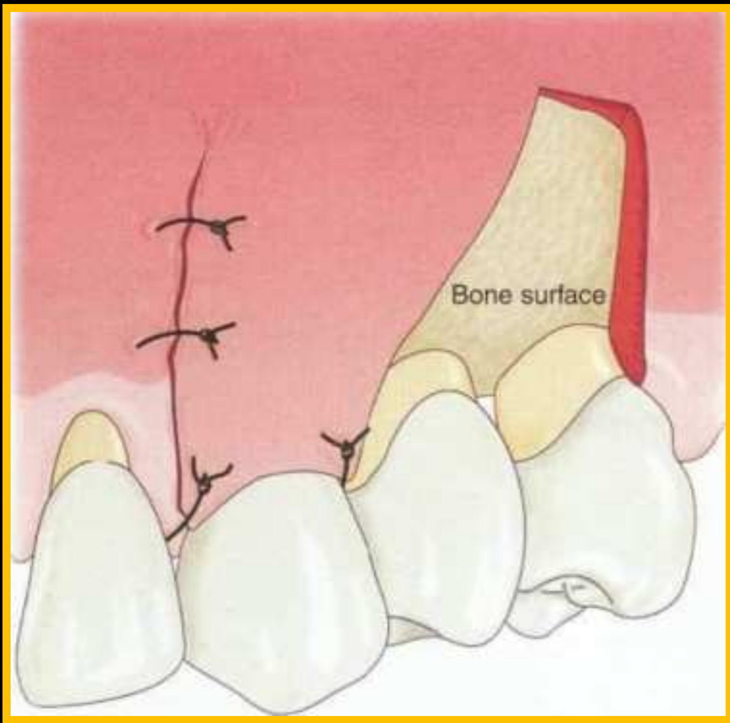

Mucogingival junction

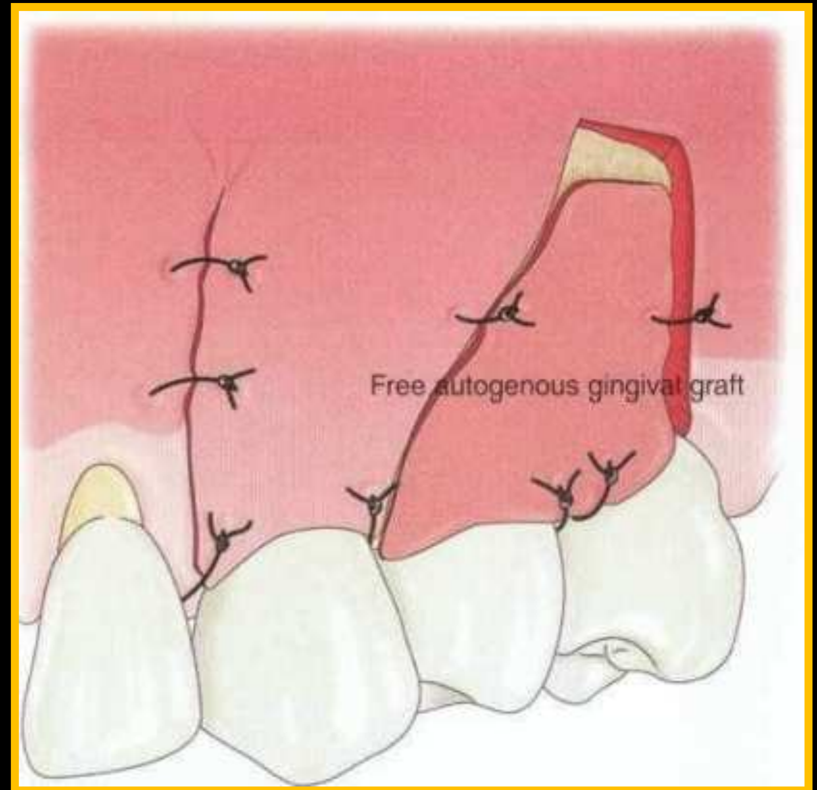





External bevel


Cut back incision


Bone surface


Free autogenous gingival graft

Indications

- Sufficient width, length, and thickness of keratinized tissue exist adjacent to the area of gingival recession.
- Coverage of the exposed root is limited to one to two teeth.
- This method is most suitable for root coverage in gingival recession with narrow mesiodistal dimension (e.g. Mandibular anterior area).

Contraindications

- Insufficient width and thickness of keratinized tissue in the adjacent donor site.
- Extremely thin bone in the donor site or an osseous defect such as a dehiscence or fenestration.
- Gingival recession area extremely protrusive.
- Deep periodontal pocket and remarkable loss of interdental alveolar bone in the adjacent area.
- Narrow oral vestibule.
- Multiple teeth involved.

- Modified methods of Grupe and Warren
  - Staffileno (1964) advocated the use of a partial-thickness flap to avoid recession on the donor site.
  - Grupe (1966) reported a modified technique to preserve the marginal gingiva by making a submarginal incision on the donor site

- Pfeifer and Heller (1971)
  - Reattachment on the exposed root surface is more likely to occur with full-thickness laterally positioned flaps than with partial-thickness flaps.
  - Full-thickness flaps are appropriate for root coverage, and partial-thickness laterally positioned flaps are suitable for increasing the width of the attached gingiva.

- Espinel and Caffesse (1981) compared these two procedures and found minimal gingival recession on the donor site with the free autogenous graft was used, there was no reduction of the width of keratinized gingival on the donor site.

  Therefore, laterally positioned flaps with free autogenous gingival grafts on the donor site is the clinical method most favored currently.

- Studies on clinical root coverage by the laterally positioned flap report about a 70% success rate.

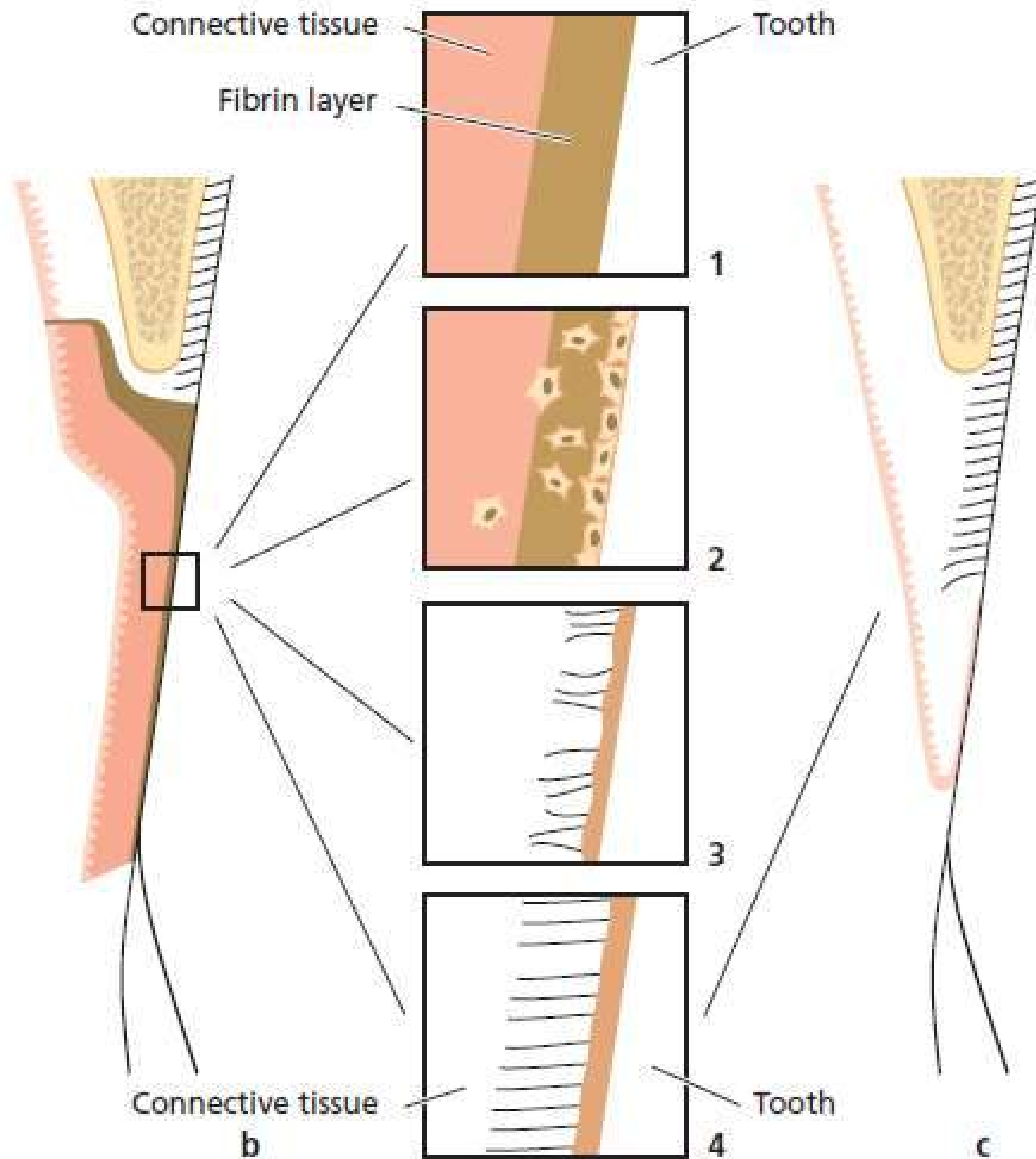
- Santana RB et al (2010)- compare the efficacy of single-stage LPF and CAF techniques in the treatment of localized maxillary GR defects.
    - The results obtained by CAF in the treatment of Miller Class I maxillary GR are clinically similar to the LPF albeit with more limited gains in WKT.

HEALING OF PEDICLE SOFT TISSUE GRAFTS

Wilderman & Wentz (1965).

Four stages as follows:

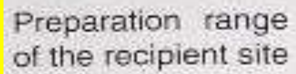
- The adaptation stage (from 0 to 4 days)
- The proliferation stage (4-21 days)
- The attachment stage (from 27 to 28 days)
- The maturation stage


Connective tissue
Tooth
Fibrin layer
1
2
3
4
Connective tissue
Tooth
b
c

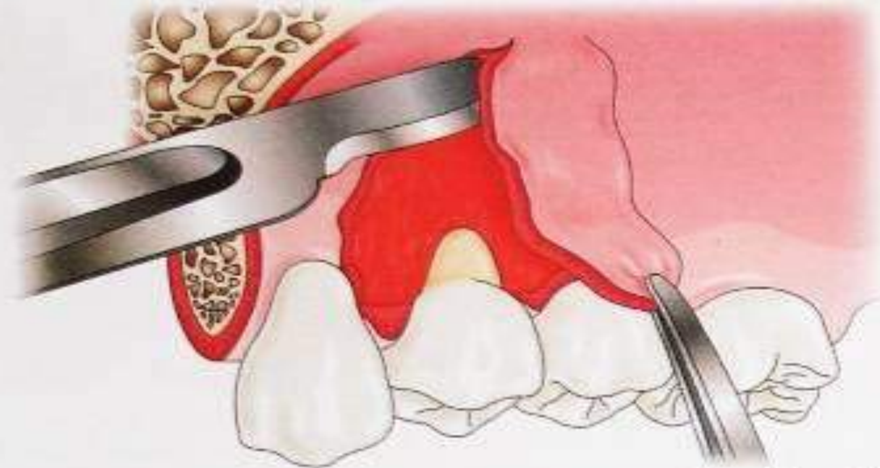
Good Morning

TRANSPOSITIONAL FLAPS

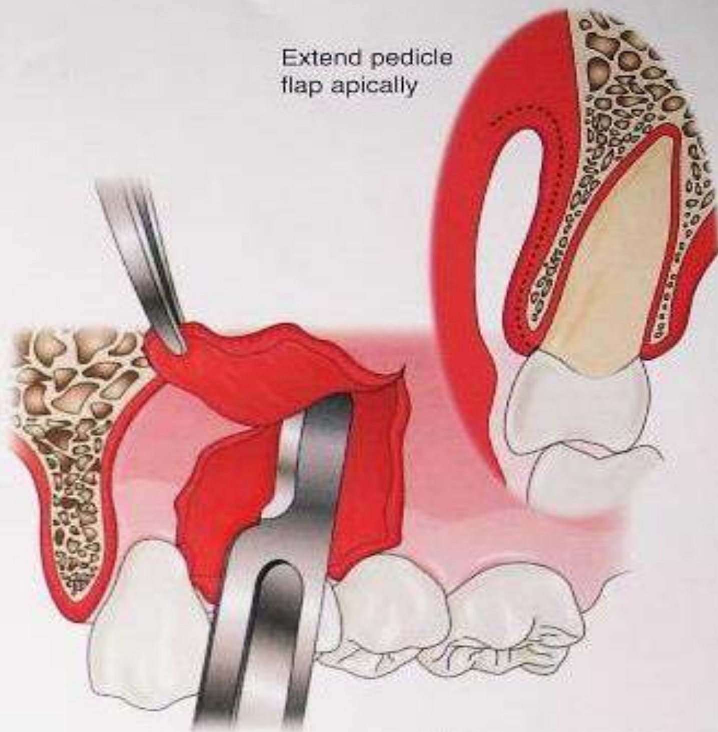
- Bahat et al (1990) described the transpositional flap.



a. Make two vertical incisions including sufficient interdental papilla.

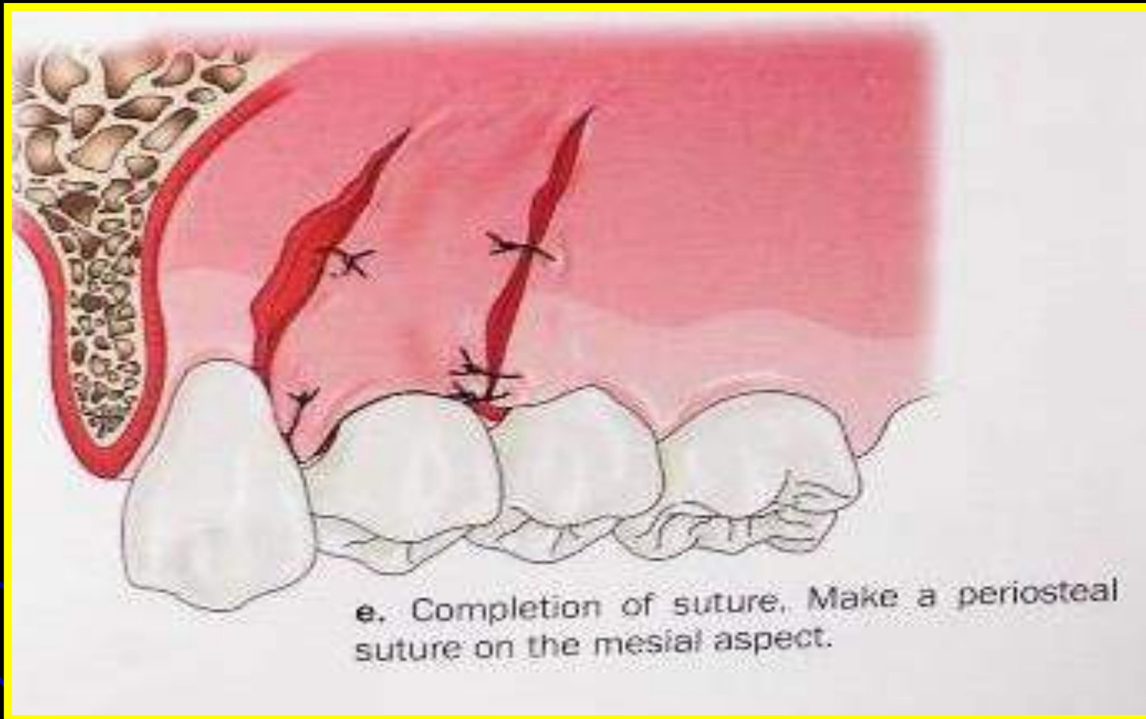


b. Prepare the pedicle flap using a partial-thickness incision. Resect the ep ithelium of the mesial interdental papilla and prepare the recipient site.



d. Using partial thickness, extend the pedicl flap preparation apically beyond the MGJ s that it may be displaced to the exposed roo surface.

c. Suture the pedicle flap on the mesial interdental papilla area of the recipient site.


e. Completion of suture. Make a periosteal
suture on the mesial aspect.

Advantages

- Predictability in areas of narrow root exposure.
- Possible to avoid gingival recession at the donor site.

Disadvantages

- Sufficient length and width of the interdental papilla adjacent to the gingival recession area necessary.
- Not suitable for multiple tooth root coverage.

DOUBLE PAPILLA FLAPS

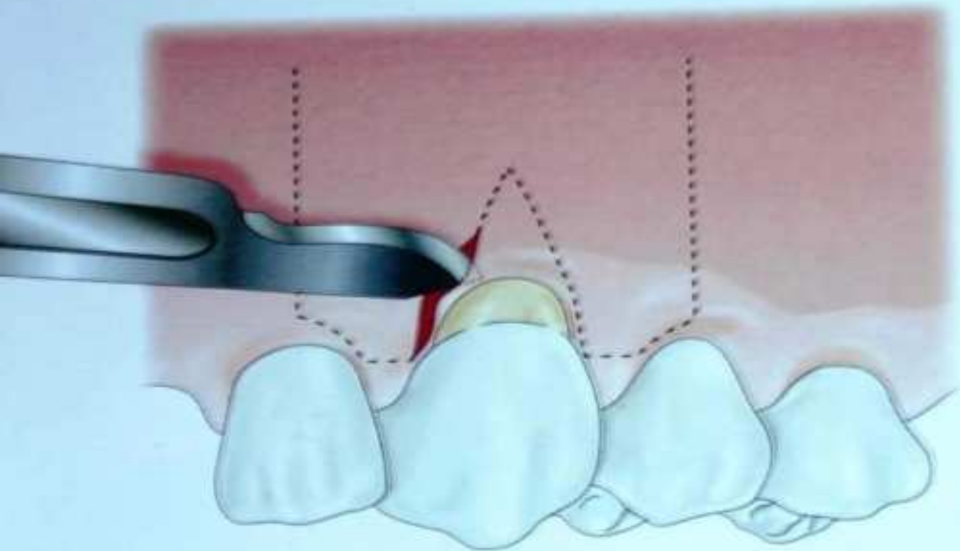
Cohen and Ross (1968) introduced the method in which bilateral interdental papilla is used as donor tissue for localized root coverage.

- In this technique, there is less chance of flap necrosis and suture is easy because interdental papilla is thicker and wider than labial gingiva on the root surface.
- Double papilla flaps are useful in cases where there is no gingiva on sites adjacent to areas of gingival recession or where there are periodontal pockets on the labial surfaces of the adjacent tooth.
- Laterally positioned flap surgery is not indicated in these cases

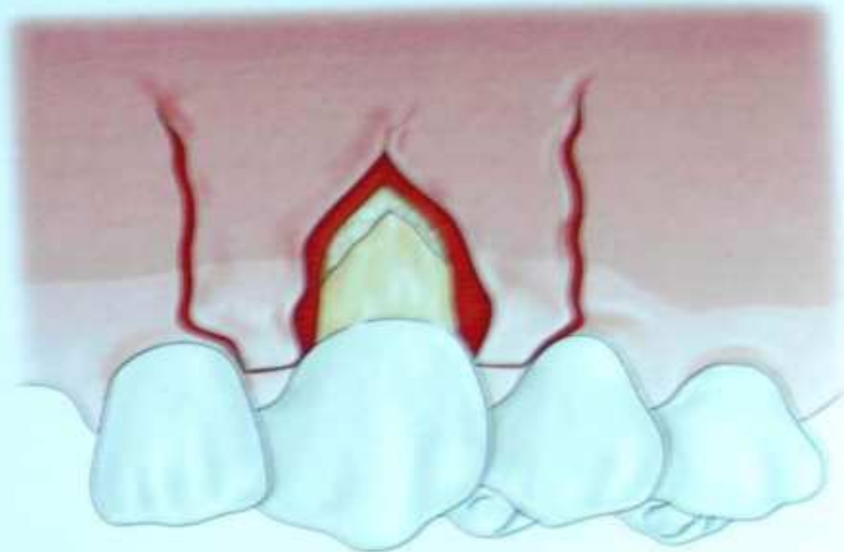
Indication

- Sufficient width and length of the interdental papilla on both sides of the area gingival recession.

Fig 6-10 Root coverage using double papilla flaps.



a. Make a V-shaped incision with a bevel on the mesial interdental papilla surface.

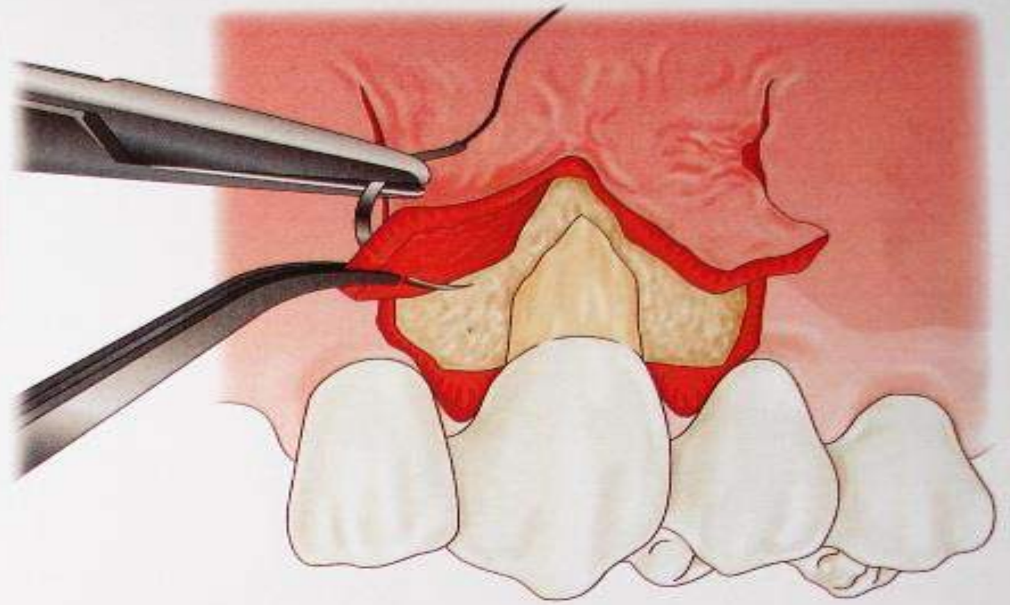


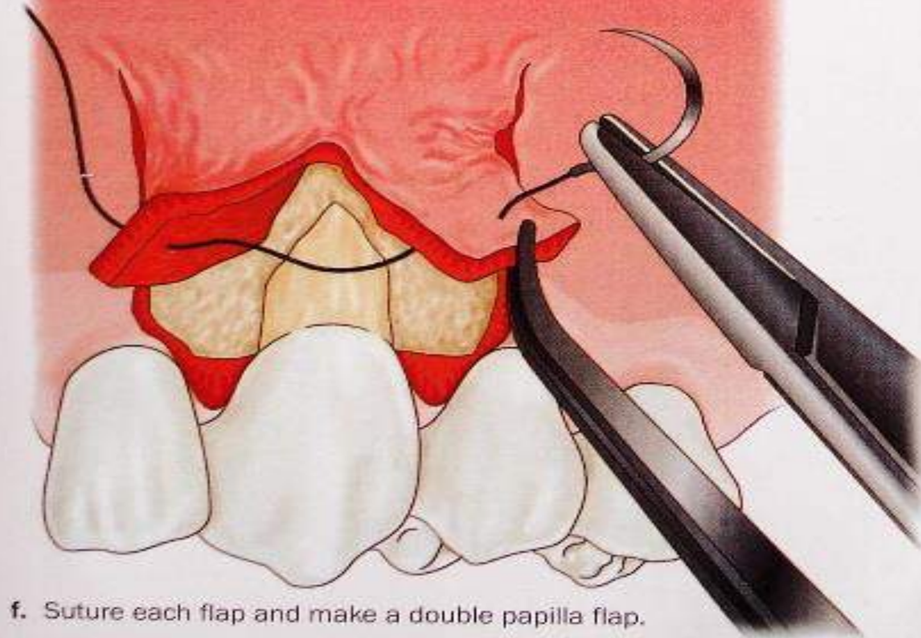
b. Remove the V-shaped tissue. The flap design includes a hori-zontal incision to the mesiodistal interdental papilla on the coron[illegible] side and two vertical incisions.

c. Prepare a full-thickness pedicle flap including sufficient interdental papilla on the mesial and distal sides.

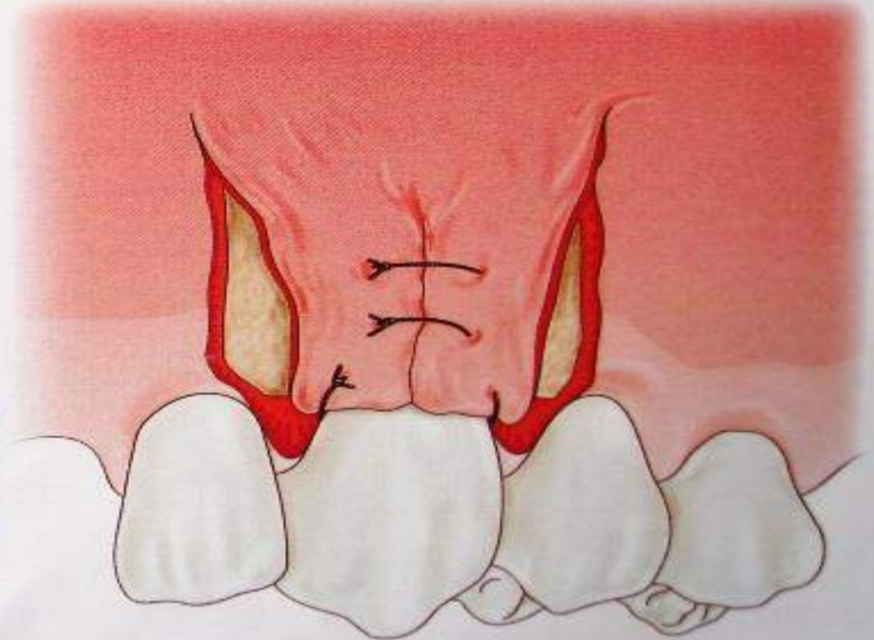
d. Make a partial-thickness flap on the apical part of the flap for easy flap migration.

e. Reflect flaps.





f. Suture each flap and make a double papilla flap.



g. Cover the exposed root with the double papilla flap. Stabilize the flap coronal to the CEJ with a sling suture.

Advantages

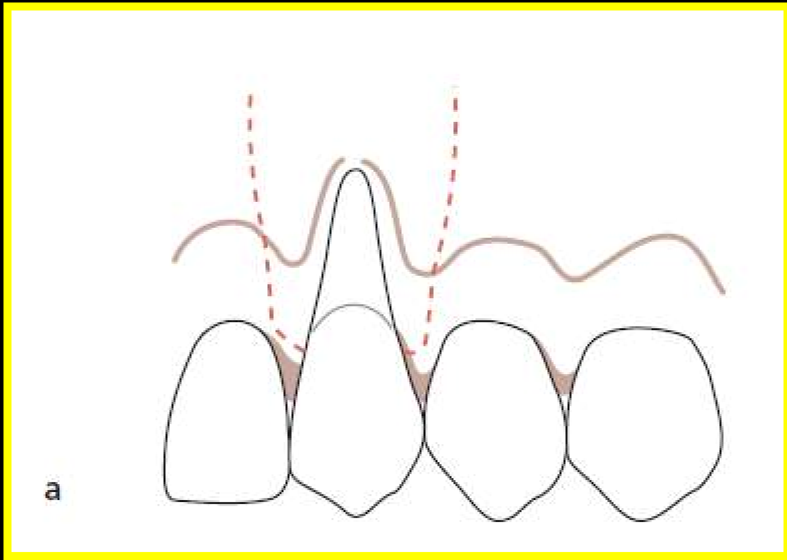
- The amount of donor tissue is small because interdental papilla adjacent to the gingival recession area is displaced. Therefore, less tension to the pedicle flap.
- Interdental bone is exposed if a full-thickness pedicle flap including interdental papilla is used, there is little damage to the alveolar bone because interdental alveolar bone is thick.

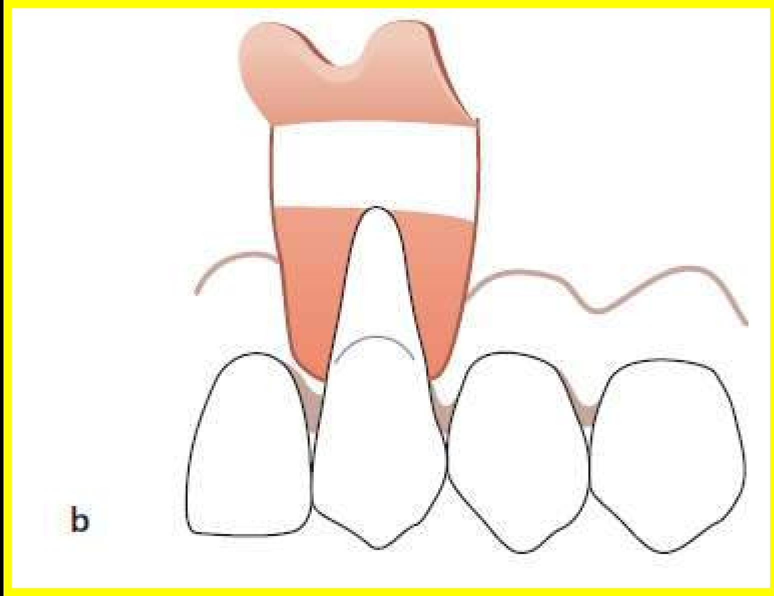
Disadvantages :

- Technically demanding.
- Limited application. The technique is generally used for multiple interdental papilla grafting.

Coronally Displaced Flap.

The purpose of the coronally displaced flap operation is to create a split-thickness flap in the area apical to the denuded root and position it coronally to cover the root. Two techniques are available for this purpose.


a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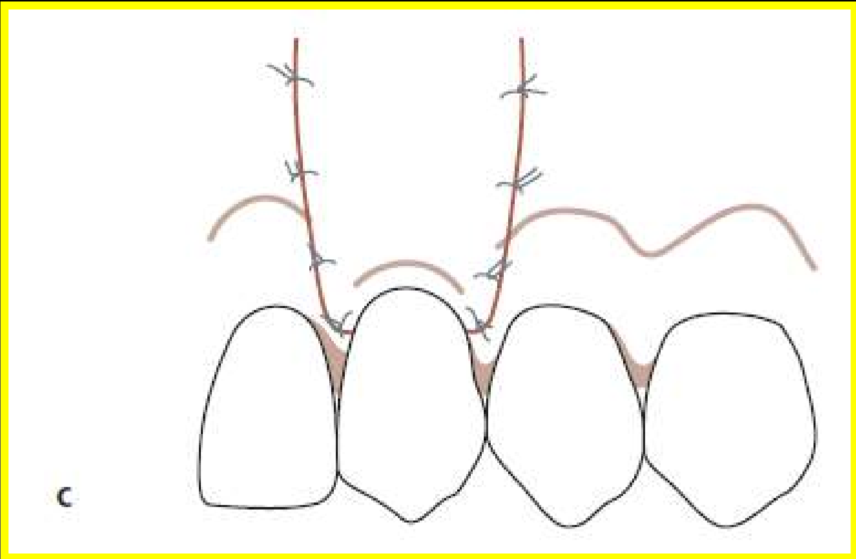
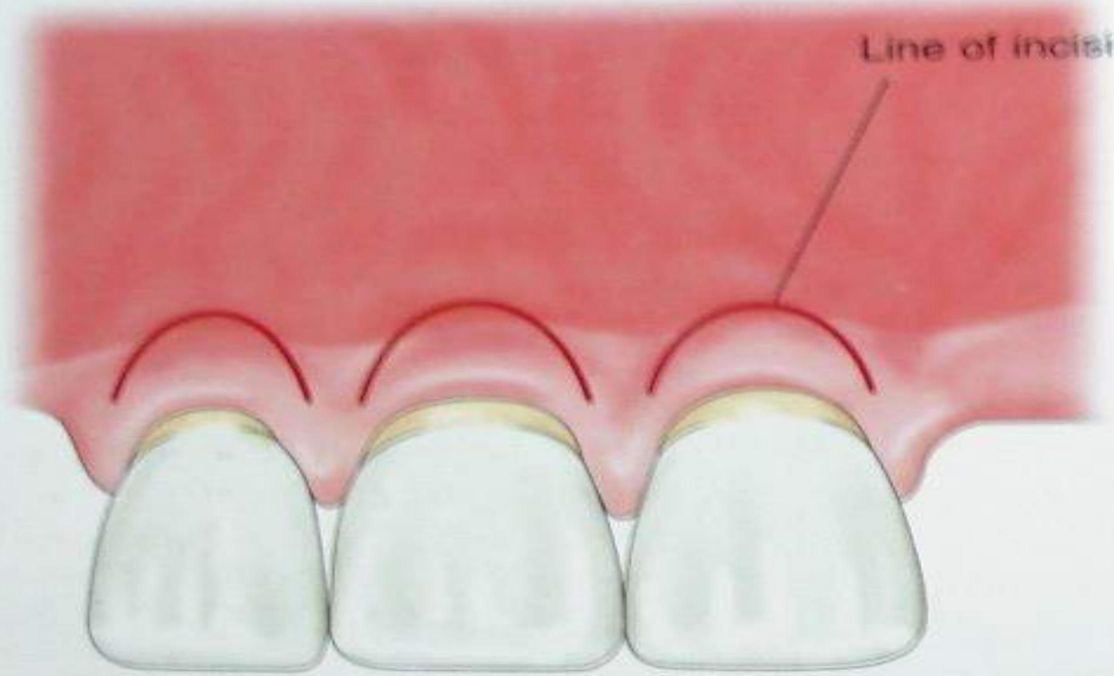
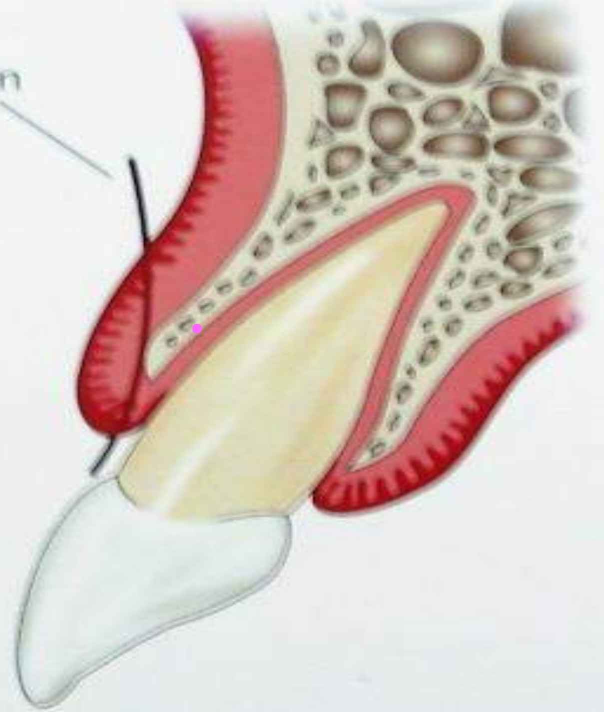

c

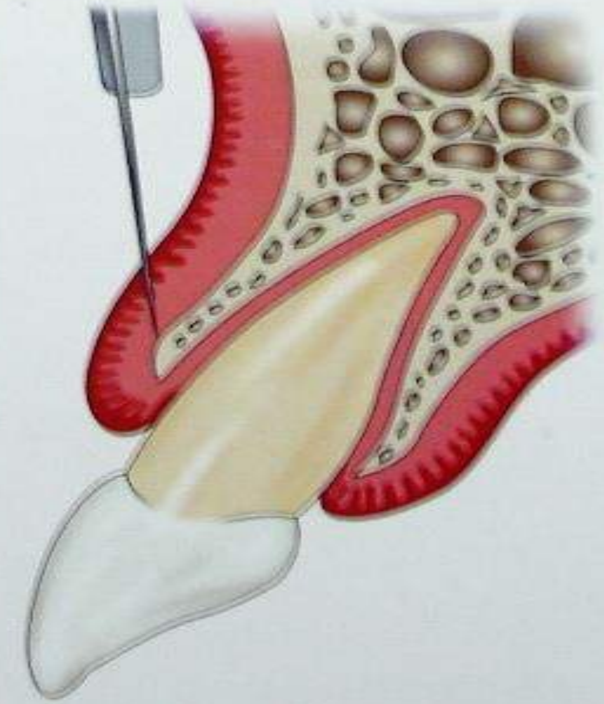
Semilunar coronally positioned flap to cover denuded root (Tarnow – 1986)

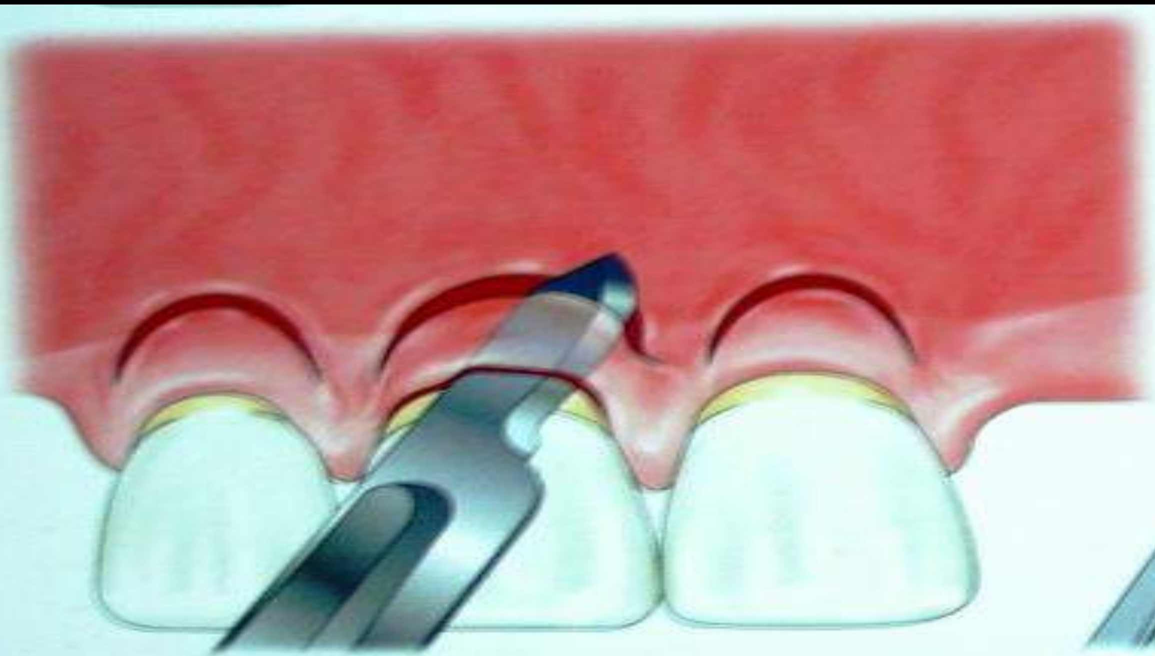
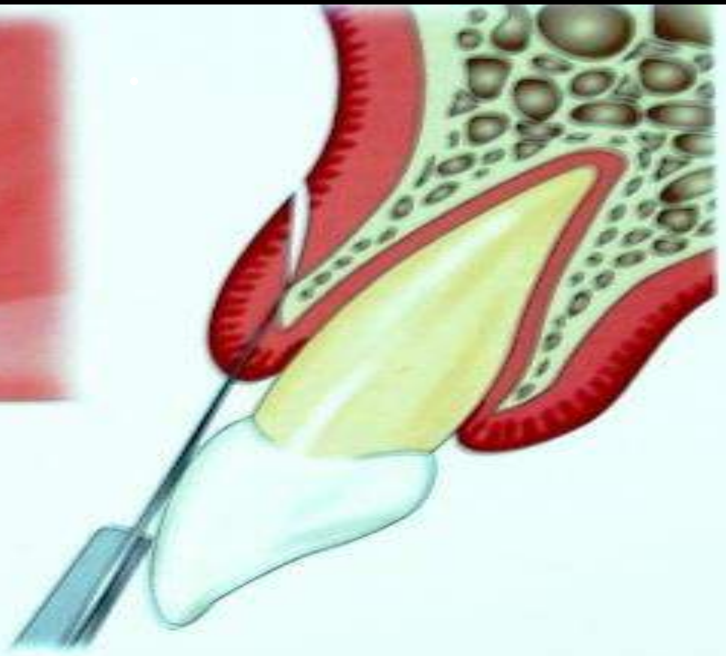
Indication :

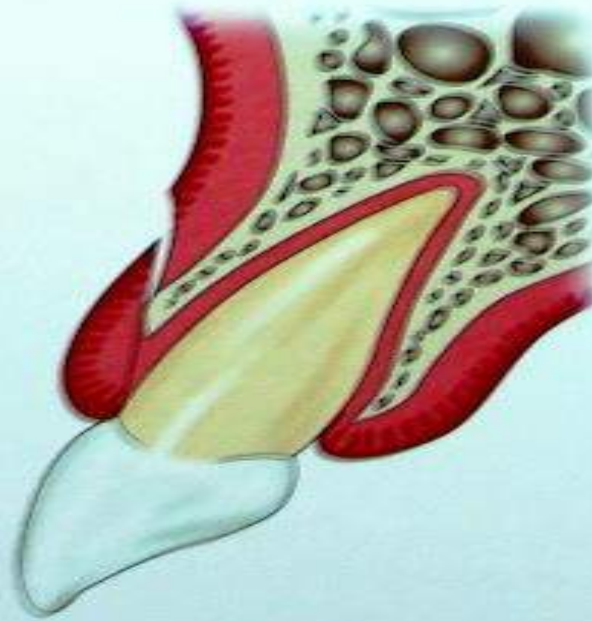
- Maxillary anterior teeth and premolar with 2-3mm of recession.
- As a complementary procedure for small areas of gingival recession remaining after other procedures for root coverage




Line of incision





Advantages :

- No tension on coronal migration of semilunar flap.
- No narrowing of the oral vestibule
- Good esthetic because height of the interdental papilla is preserved.
- Simple and require minimal surgical time
- Minimal post-operative discomfort.
- Applicab;e for minimal gingival recession at multiple teeth.

Diadvantages:

- Not applicable in cases of extreme gingival recession.
- Thick keratinized gingiva necessary for adequate thickness of the partial thickness flap apical to the recession.
- In dehiscence or fenestration exist apical to the gigival recession area, free autogenous grafting is required.

PINHOLE SURGICAL TECHNIQUE
(CHAO JC. 2012)

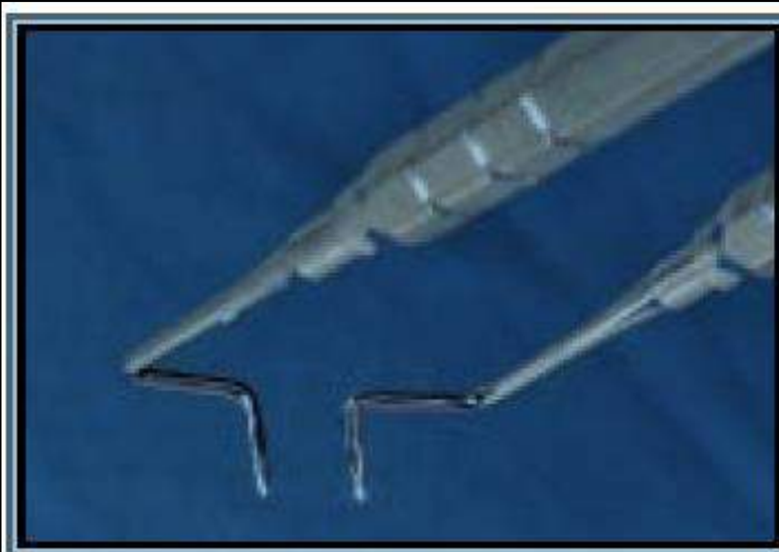


Fig 1 *Trans-Mucosal Papilla Elevators.*

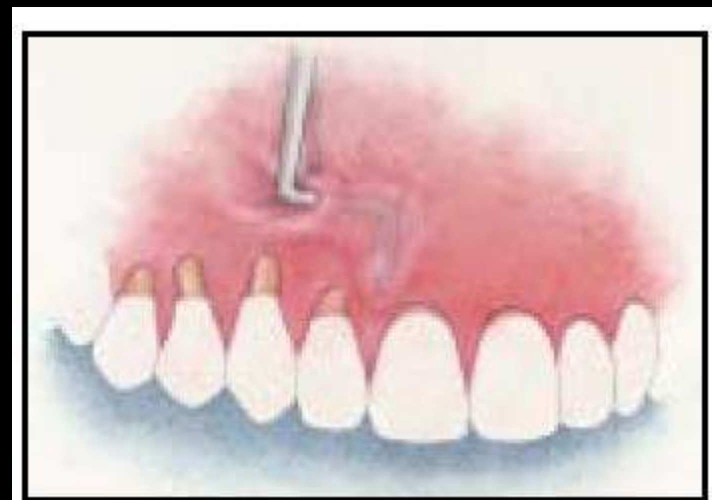


Fig 2 *Full-thickness flap elevation.*

Fig 3 *Elevation of the papillae on each side of the affected tooth.*

Fig 4 (left) *PST graft pliers.*

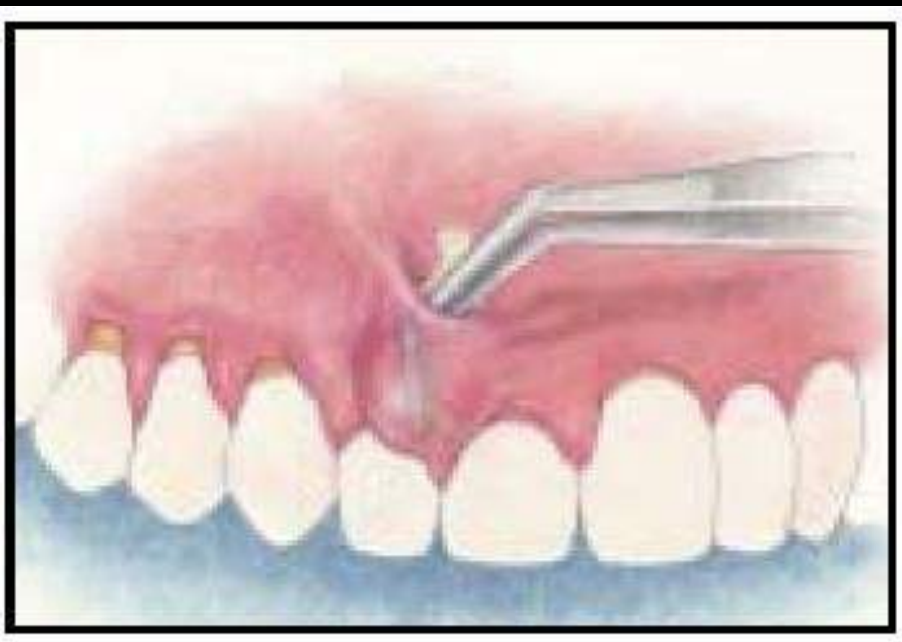


Fig 5 (right) *Placement of the BM graft material.*

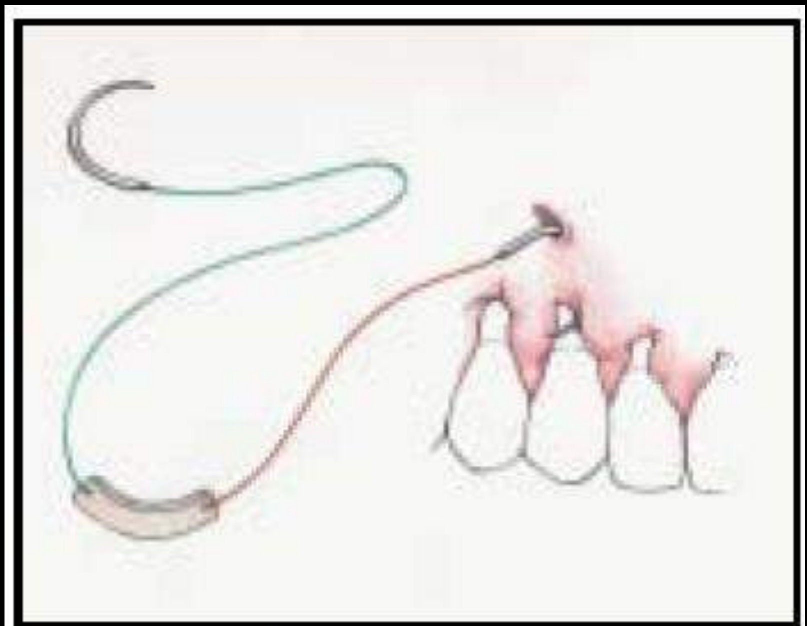


Fig 6a *Needle is threaded through the entry incision to emerge under the facial marginal gingiva of the recipient root.*

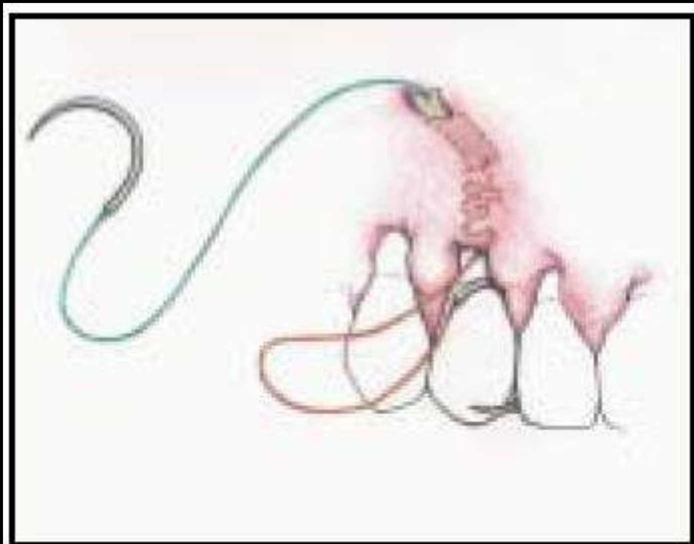


Fig 6b *Needle is threaded under the mesial contact.*

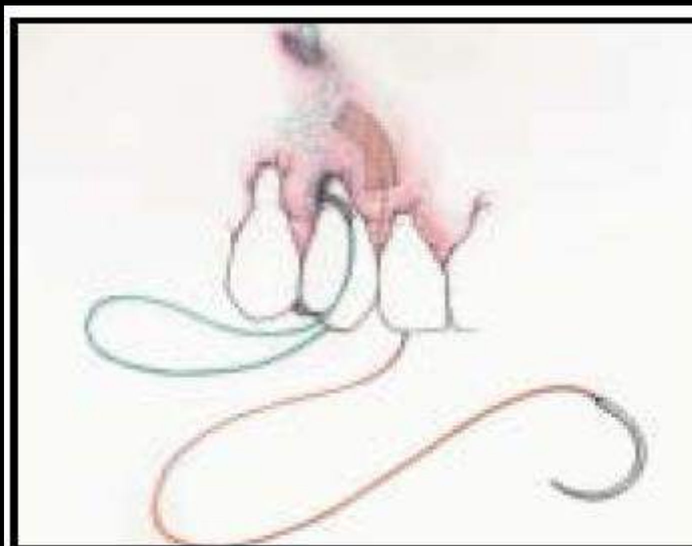


Fig 6c *A needle at the other end of the graft has been passed under the flap and under the distal contact to appear at the oral aspect. Tugging on one end and then the other from the facial aspect allowed the ends of the graft to slip through the entry incision.*

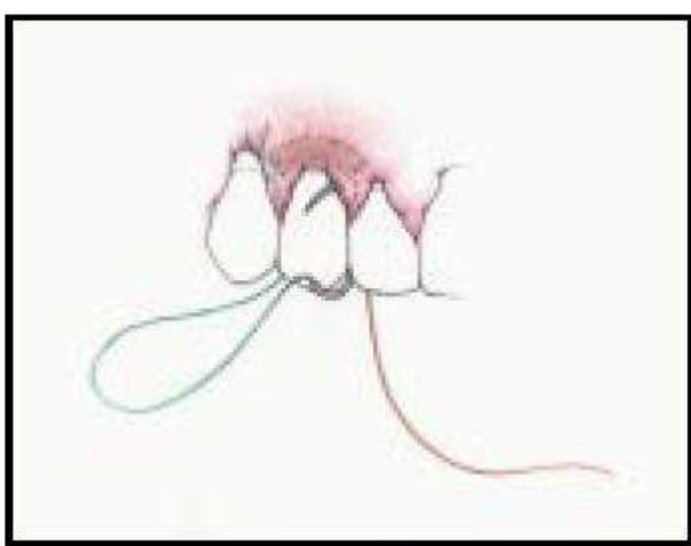


Fig 6d *The distal needle is passed under the mesial contact to appear at the facial aspect.*

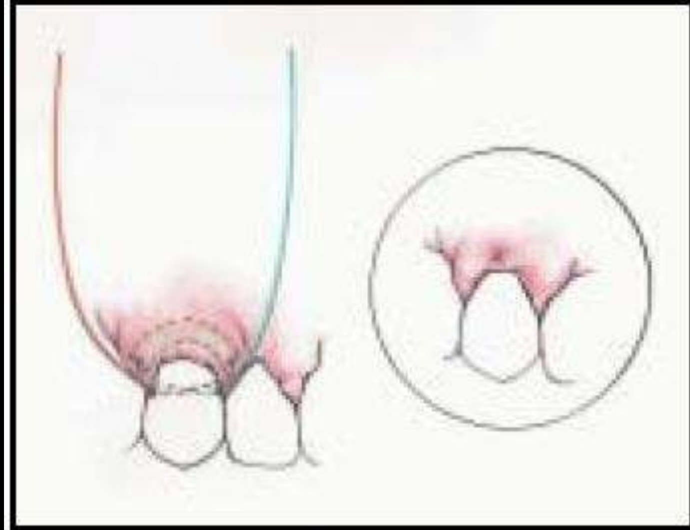


Fig 6e *Tugging both sutures from the facial aspect simultaneously advances the entire graft strip coronally. Sutures are tied and the knot is tugged under the flap.*

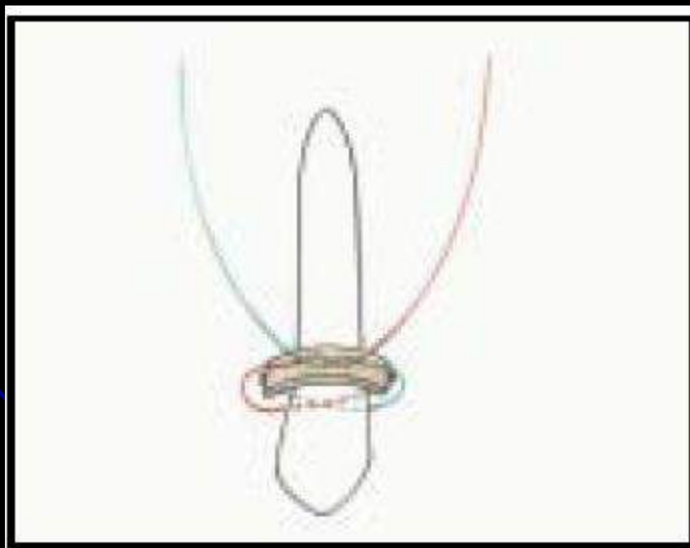


Fig 6f *The suturing technique from the facial perspective.*

CONCLUSION

There are numerous techniques designed to obtain root coverage. Some are more predictable than others and provide a more esthetically pleasing result. No single technique is best suited for every situation and every clinician. Each situation presents circumstances that favour one technique or other.

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Thank you