

# Soft tissue considerations in implant dentistry

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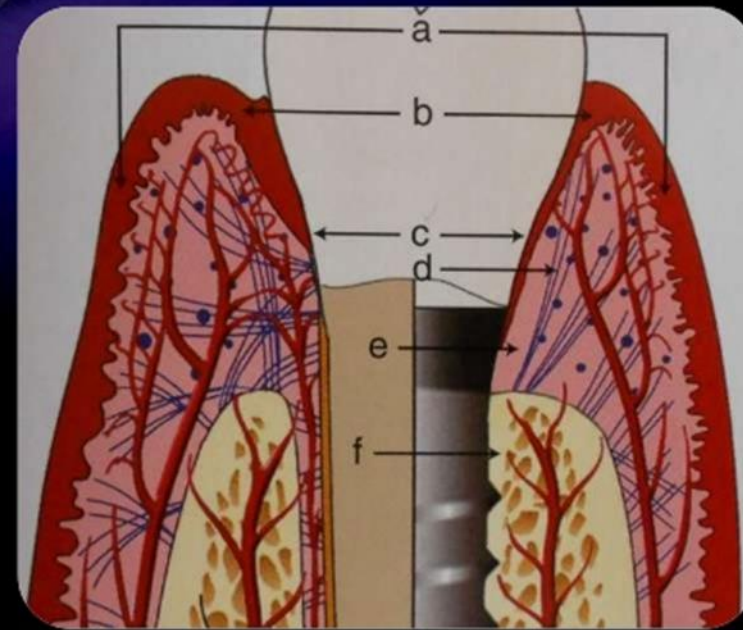
# Soft Tissue Considerations

- ▶ Gingival tissue and peri-implant mucosa
- ▶ The need for Keratinized Tissue
- ▶ Gingival Biotypes
- ▶ Aesthetic Predictability



# Peri-implant Mucosa

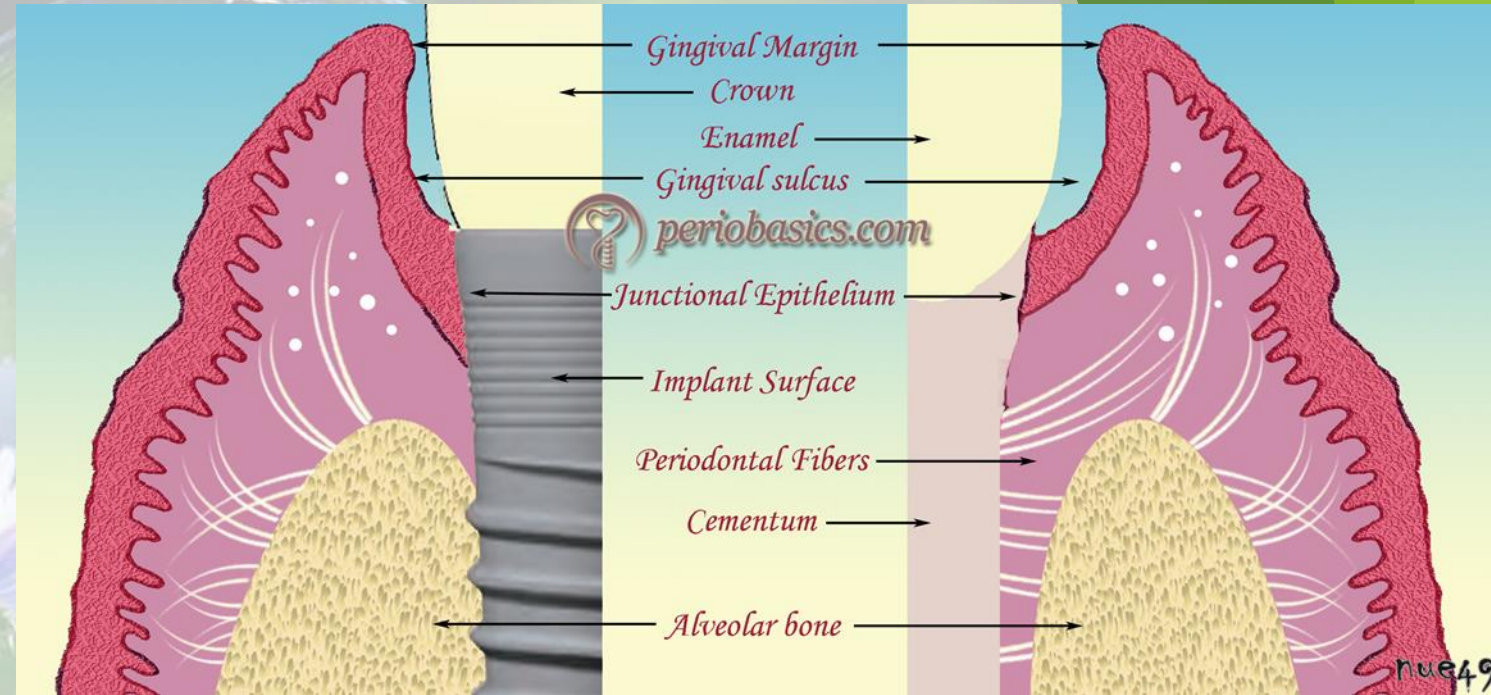
## Comparison of the interface





# Gingival tissue and peri-implant mucosa

- ▶ Sulcular Epithelium
- ▶ Junctional Epithelium
- ▶ Connective Tissue

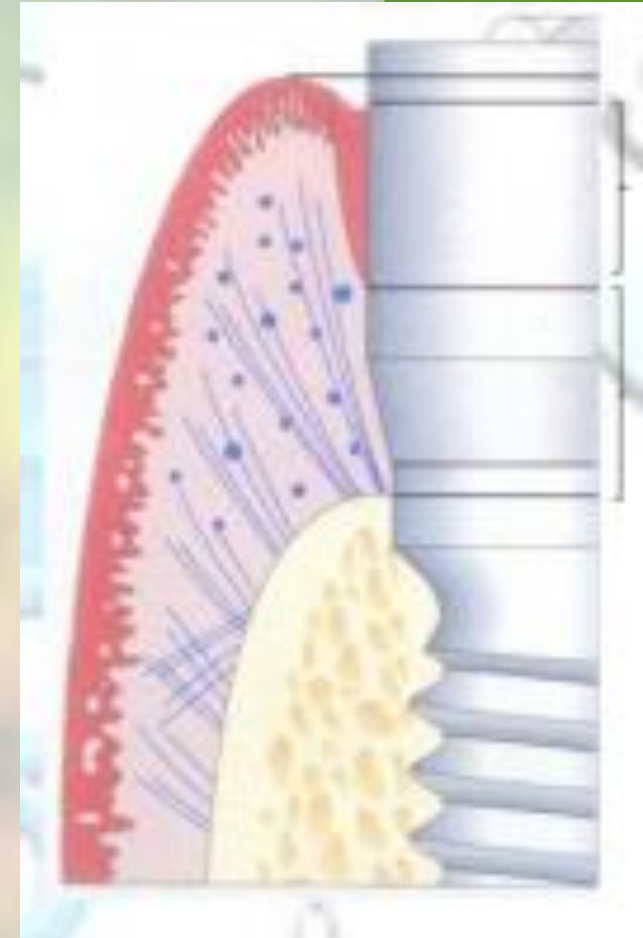


## A: Sulcular Epithelium:

- ▶ It is about 0.5-1mm

## B: Junctional Epithelium:

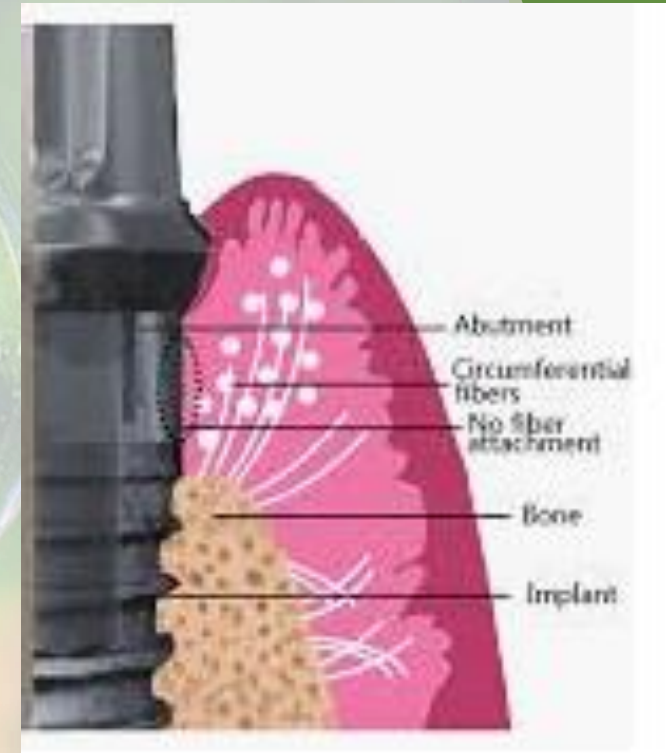
- ▶ It is about 2mm height
- ▶ 1mm longer in apico coronal direction when compared to natural teeth
- ▶ The attachment of epithelial cells to implant surface occurred by basal lamina and hemidesmosomes alike teeth.
- ▶ Peri-implant mucosal seal has an important role in preventing bacterial invasion





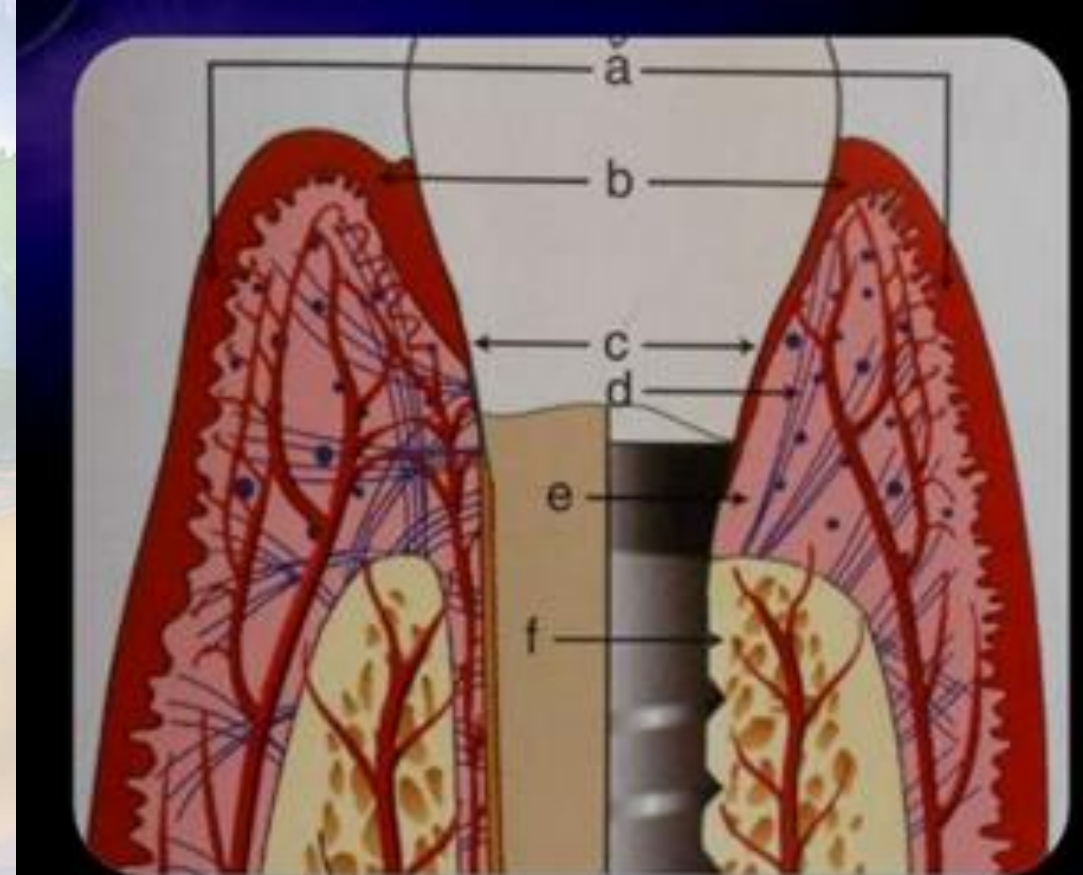
## C: Connective Tissue Attachment:

- ▶ Average length is 1.3 to 1.8 mm. (Burglundh)
- ▶ Parallel oriented fibers are found adjacent to implants
- ▶ Most of the fibers are circumferential and there is no fiber attachment



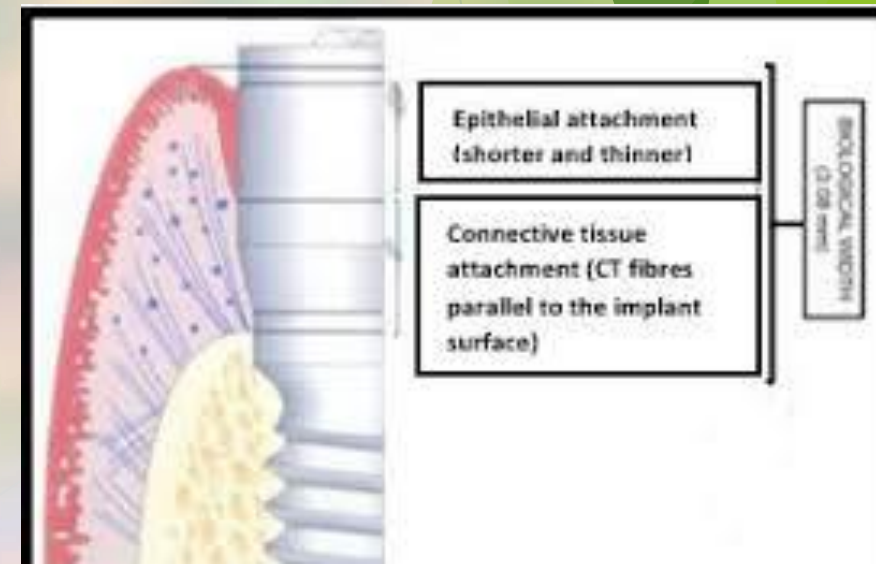
# Comparison of the interface

- ▶ The collagen fibers around implants are not perpendicular due to the lack of cementum and PDL
- ▶ The peri-implant Mucosa has **less** fibroblasts and blood vessel but **more** collagen fibers.
- ▶ The Junctional Epithelium around implant is longer than teeth



# Biological Width/Seal in peri-implant mucosa

- ▶ The mean biological width around implant is 3-4mm. (Burglundh et al)
- ▶ The Biological seal around dental implants acts as a protective barrier against bacterial infection, food debris entrapment. (Tsao et al)
- ▶ Peri-implant Mucosa ( in contrast to periodontal tissue) is poorly-organized to persist against progressive plaque- related lesions. ( Lindeh et al)





# Keratinized Tissue



## Masticatory Mucosa

- ▶ the lamina propria is firmly and directly attached to the periosteum of the bone
- ▶ The masticatory mucosa consists of dense, collagen-rich connective tissue lined by a keratinized epithelium

## Lining Mucosa

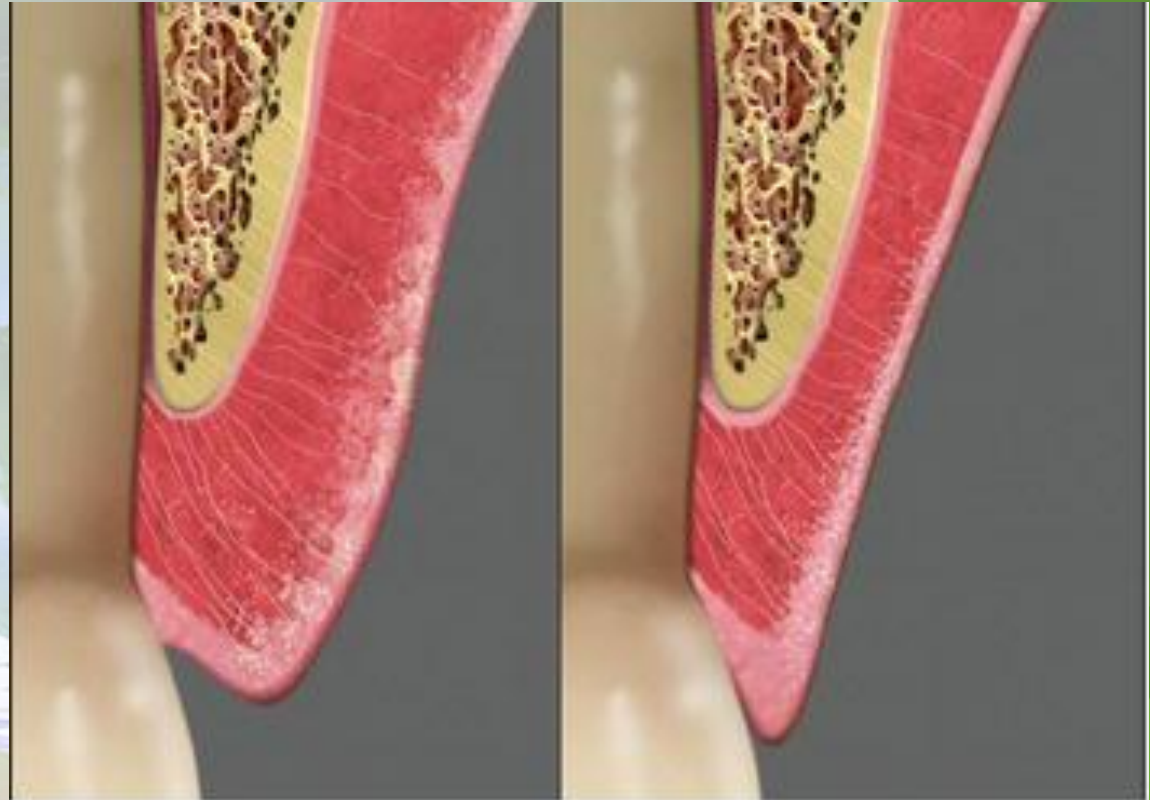
- ▶ The lining mucosa, on the other hand, has a structural composition that allows the soft tissue to adapt to muscle tension
- ▶ The lining mucosa is comparatively collagen-poor, but contains a large number of elastic fibers and is covered by non-keratinized epithelium.

# Keratinized Tissue importance

- ▶ The need for keratinized tissue to maintain implant mucosal health is controversial.
- ▶ The adequate keratinized tissue was defined 2 mm( Lang and Loe)
- ▶ Keratinized mucosa is not a pre-requisite for a successful implant result. (Wennstrom et al)
- ▶ No long-term effect of “inadequate” keratinized mucosa on development of soft-tissue recession was evident
- ▶ Keratinized tissue promotes resistance to mechanical trauma and facilitates home care maintenance.(Zarb et al)



# Gingival biotype



(d)

# Gingival biotype

## Thin Biotype

- ▶ Tissue thickness  $\leq 1.5 \text{ mm}$
- ▶ Highly scalloped architecture
- ▶ Narrow interdental papillae
- ▶ Associated with triangular teeth
- ▶ More prone to recession



## Thick biotype

- ▶ Tissue thickness  $\geq 2 \text{ mm}$
- ▶ Flat gingival architecture
- ▶ Wide interdental papillae
- ▶ Associated with square teeth
- ▶ More prone to pocket formation



# Gingival Thickness

- ▶ If the tissue thickness is less than **2 mm**, crestal bone loss may occur.( Linkevicius)
- ▶ The thick soft tissue is more resistant to mechanical and surgical insults, is less susceptible to gingival recession, and has more tissue volume for prosthetic manipulation.  
( Homelay Wang)
- ▶ A new method in which Subepithelial Connective Tissue Graft(SCTG) was placed in immediate implantation has shown good esthetic results without gingival recession.  
(Joseph Kan)



# Occlusion



# Occlusion

- ▶ Microbiology and occlusal overload are two most common etiologies for implant failure.
- ▶ Due to lack of PDL, implant cannot act as a shock absorber.
- ▶ Implant has less tactile sensibility and occlusal awareness. So, occlusal overload cannot be detected by implants.
- ▶ In teeth, the stress is distributed along the root to apical direction but in implants, stress is accumulated in the crest of the bone.

# Occlusal considerations

- ▶ Select a mutually protected occlusal scheme
- ▶ Reduce cantilever forces on implants
- ▶ Create even force distribution
- ▶ Increase number of implants
- ▶ Reduce shear and lateral forces on implants
- ▶ Maintain adequate crown space
- ▶ Narrow the size of the occlusal table



# Papillae considerations



# The interdental Papillae

- ▶ The interdental papillae is an important aspect of the esthetic appearance of a smile.
- ▶ The lack of papillae creates black triangle which is not esthetic.
- ▶ **Tarnow et al** evaluated the papillae fill relation to the distance between crestal bone and contact points:

$\leq 5\text{mm}$	→	100% papillae fill
6mm	→	50% papillae fill
$\geq 7\text{mm}$	→	25% papillae fill



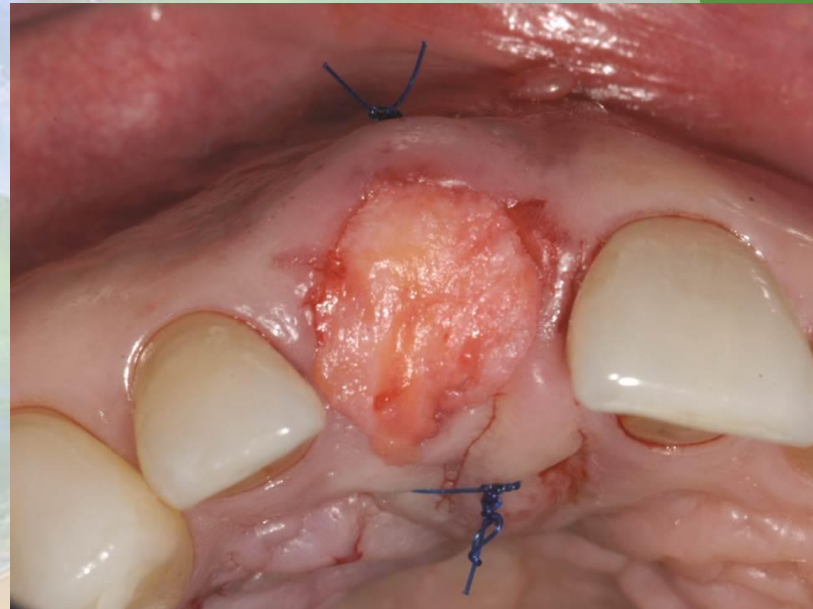
# The papillae around implant restoration

- ▶ Key determinants in complete papillae fill in single implant restoration and adjacent tooth are:
  1. connective tissue attachment of the adjacent tooth
  2. Contact Point
- ▶ The interimplant papillae height cannot be greater than 3mm,





# Soft tissue Augmentation Procedures



# When to operate soft tissue augmentation?

- ▶ At the time of extraction before implant surgery
- ▶ At implant placement
- ▶ At the time that implant is uncovered
- ▶ After the complete restoration has been placed

# Soft tissue augmentation procedures

- ▶ Pedicle and Rotated palatal grafts
- ▶ Connective Tissue Grafts
- ▶ Free Gingival Grafts
- ▶ Tunneling techniques





# Rotated Palatal Flap



# Rotated Palatal Flap



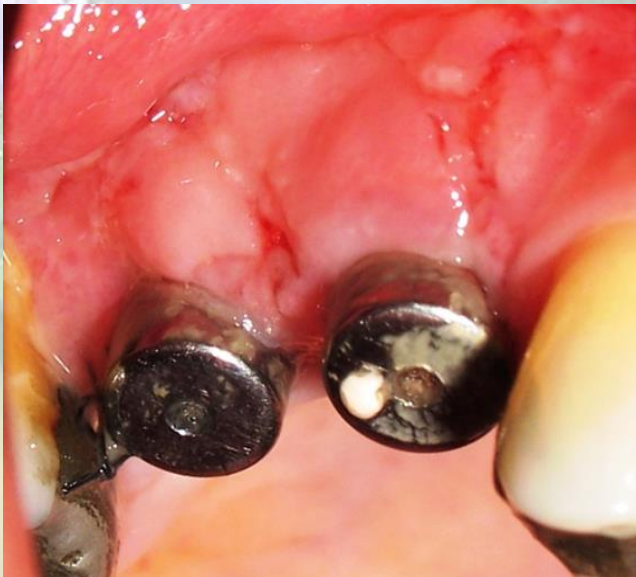
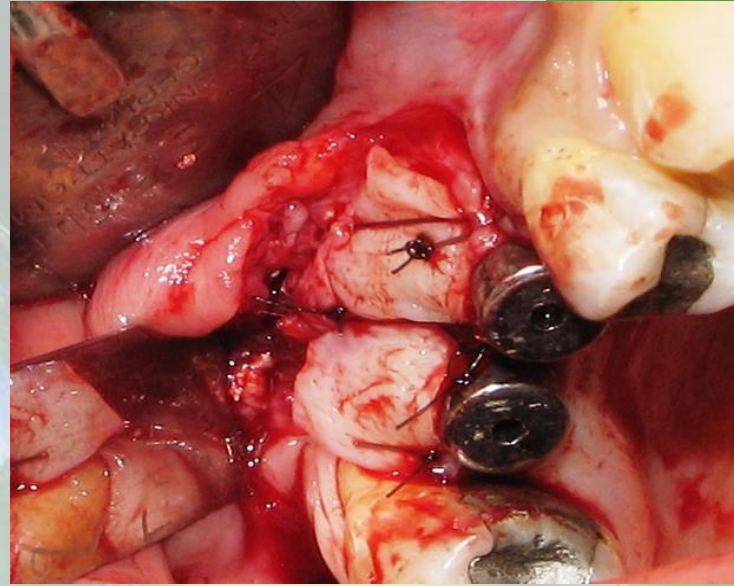
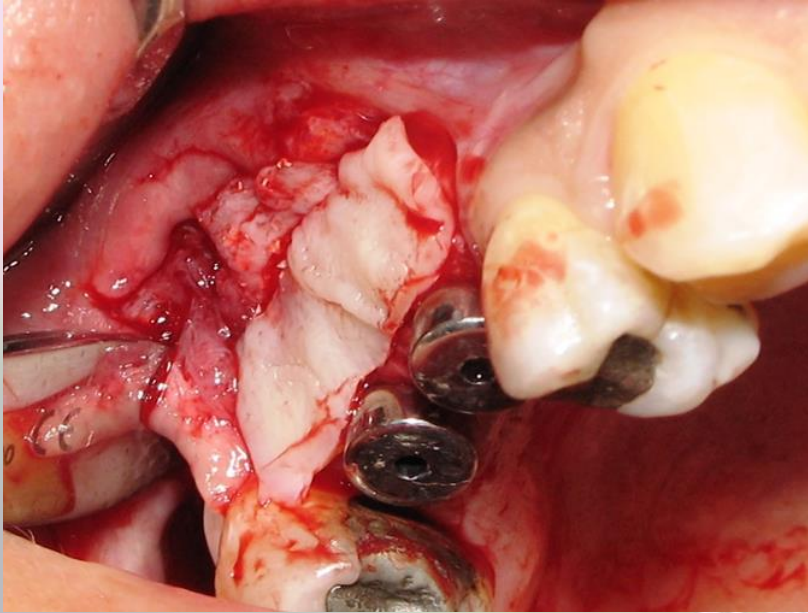


# Connective Tissue Graft

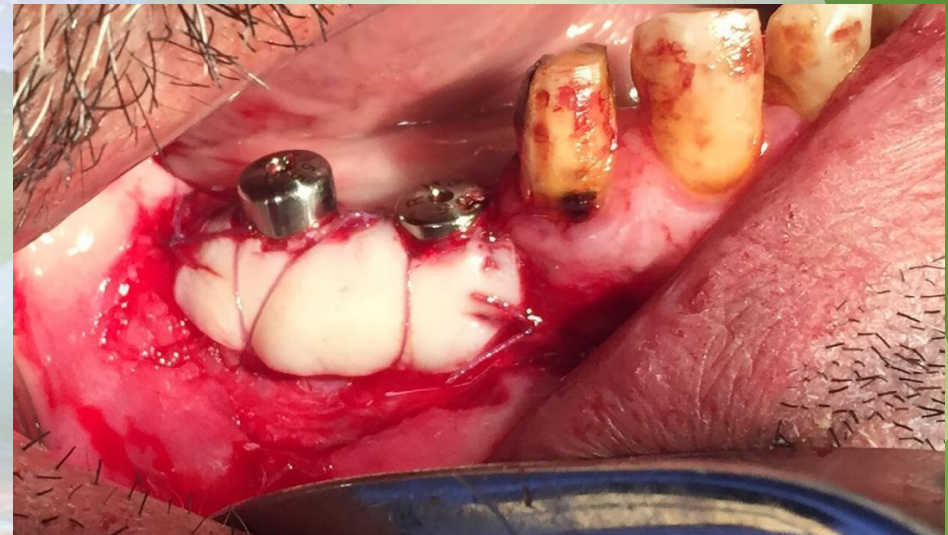




# Free Gingival Graft



# Free Gingival Graft





# Connective Tissue Graft+ Coronally Advanced Flap





# Periodontal considerations after implant insertion( implant maintenance)

- ▶ Plaque and Mucosal Assessment
- ▶ Bleeding on Probing (BOP)
- ▶ Peri-Implant Probing Depth
- ▶ Occlusal Evaluation
- ▶ Suppuration
- ▶ Radiographic Evaluation
- ▶ Evaluation of Implant Stability/Mobility

Table 1

Peri-implant plaque assessment index.

Score	Mombelli et al. [9] (mPI)
0	No detection of plaque
1	Plaque only recognized by running a probe across the smooth marginal surface of the implant
2	Plaque which can be seen by the naked eye
3	Abundance of soft matter

### Peri-implant marginal mucosal indices.

Score	Apse et al. [10]	Mombelli et al. [9] (mGI)
0	Normal mucosa	No bleeding when a periodontal probe is passed along the mucosal margin adjacent to the implant
1	Minimal inflammation along with color change and minor edema	Isolated bleeding spots visible
2	Moderate inflammation with redness, edema, and glazing	Blood which forms a confluent red line on mucosal margin
3	Severe inflammation with redness, edema, ulceration, and spontaneous bleeding without probing	Heavy or profuse bleeding



### Clinical implant mobility scale.

Scale	Description
0	Absence of clinical mobility with 500 g in any direction
1	Slight detectable horizontal movement
2	Moderate visible horizontal mobility up to 0.5 mm
3	Severe horizontal movement greater than 0.5 mm
4	Visible moderate to severe horizontal and any visible vertical movement

# Peri-implant mucositis

- ▶ The presence of inflammation
- ▶ Confined to the soft tissue
- ▶ No signs of loss of supporting bone following initial bone remodeling
- ▶ Reversible condition : early intervention and remove etiology

# Peri-implant mucositis

Clinical findings:

- ▶ Bleeding on probing / gingival redness
- ▶ Probing depth  $\geq 4$  mm
- ▶ No radiographic bone loss





# Peri-Implantitis

- ▶ An inflammatory process
- ▶ Soft tissue inflammation, Bleeding on probing
- ▶ Probing depth
- ▶ Suppuration
- ▶ Bone loss



# Peri-Implantitis

Progressive loss of supporting bone beyond biological bone remodeling:

- ▶ Mean crestal bone loss of 0.9-1.6 mm in first post-surgical year
- ▶ Then annual bone loss of 0.02-0.15 mm
- ▶ In case of no baseline radiograph, 2 mm vertical distance from expected marginal bone level

# Surgical approach

## Surgical approach:

- ▶ **Access surgery** : apically positioned flap, surface modification
- ▶ **Resective**
- ▶ **Regenerative** : guided tissue regeneration, bone grafting
- ▶ Surface decontamination



A glass sphere reflecting a blue sky with clouds, resting on a stem with purple flowers. The background is a soft-focus green field. The right side of the image features a green geometric pattern of overlapping triangles.

Thanks for your attention