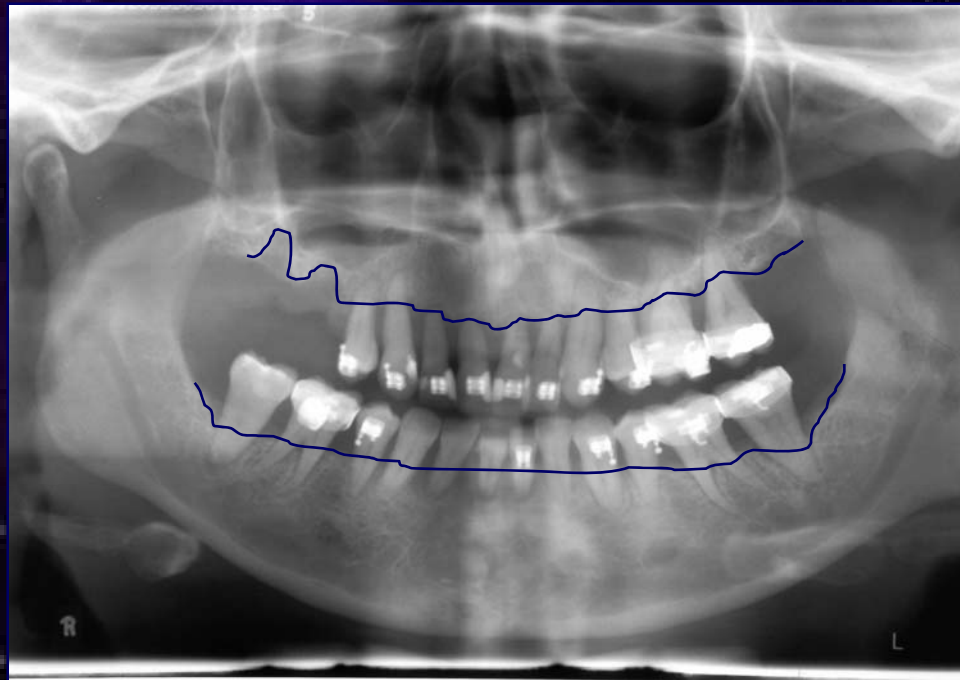


# Periodontal Consideration Before and After Orthodontic Treatment

Tsung-Ju Hsieh, D.D.S., M.S.D.



# Potential periodontal problems

- Before Orthodontic Treatment
- During Orthodontic Treatment
- After Orthodontic Treatment

# Before Orthodontic Treatment

- Malocclusion vs. Periodontitis
- Sequence of Treatment?
  - Periodontal surgery?
- Gingival Recession?
  - Prevention?

# Malocclusion vs. Periodontitis

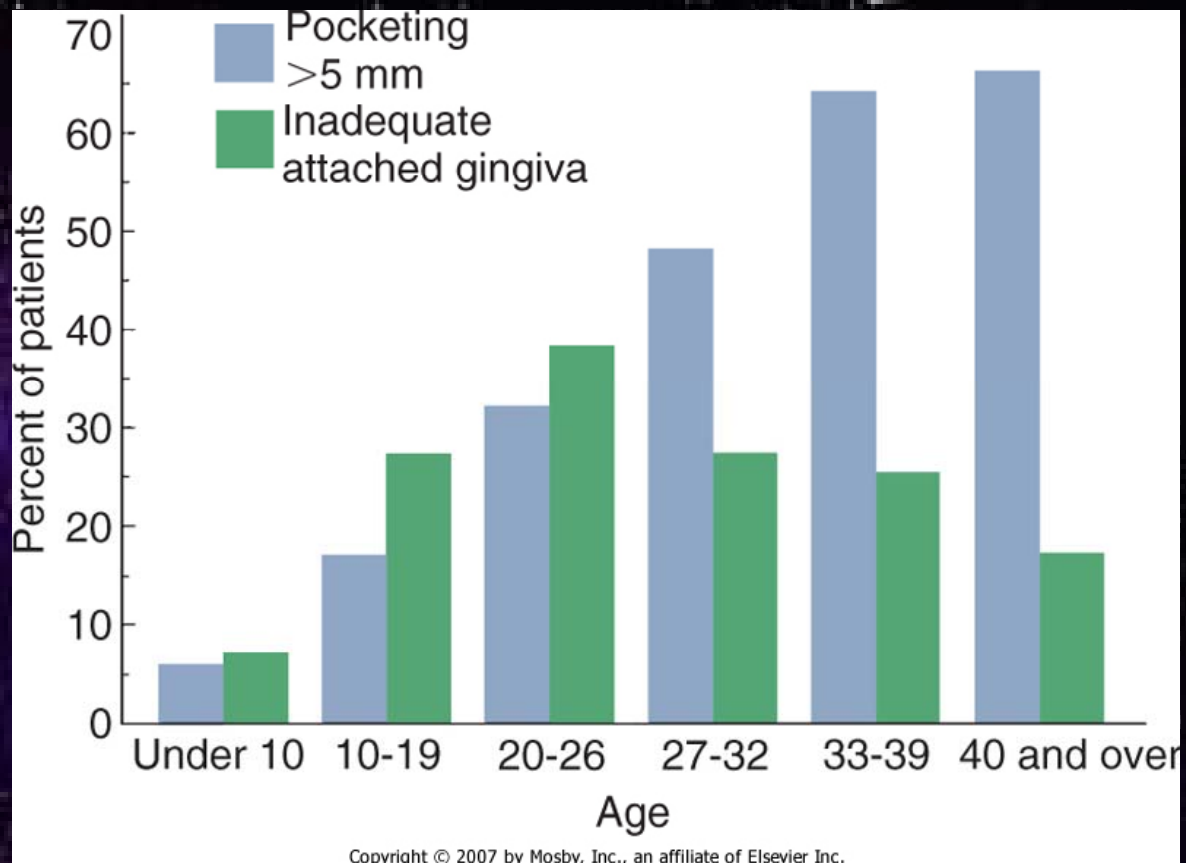
- Malocclusion has little if any impact on diseases of the teeth (caries) or supporting structures (periodontitis).
  - Helm S. Acta Odontol Scand 1989
- Motivation determine oral hygiene much more than how well the teeth are aligned.
- Plaque is the major determinant.

# Malocclusion vs. Periodontitis

- Comparison of periodontal status 10-20 years after ortho treatment: orthodontic treated patient = untreated individuals → no benefit of orthodontic treatment on future periodontal health → untreated malocclusion doesn't have a major role in the cause of periodontal problems.
- Long-term studies showed no indication that orthodontic treatment increased the chance of later periodontal problems

# Adult orthodontics with periodontitis

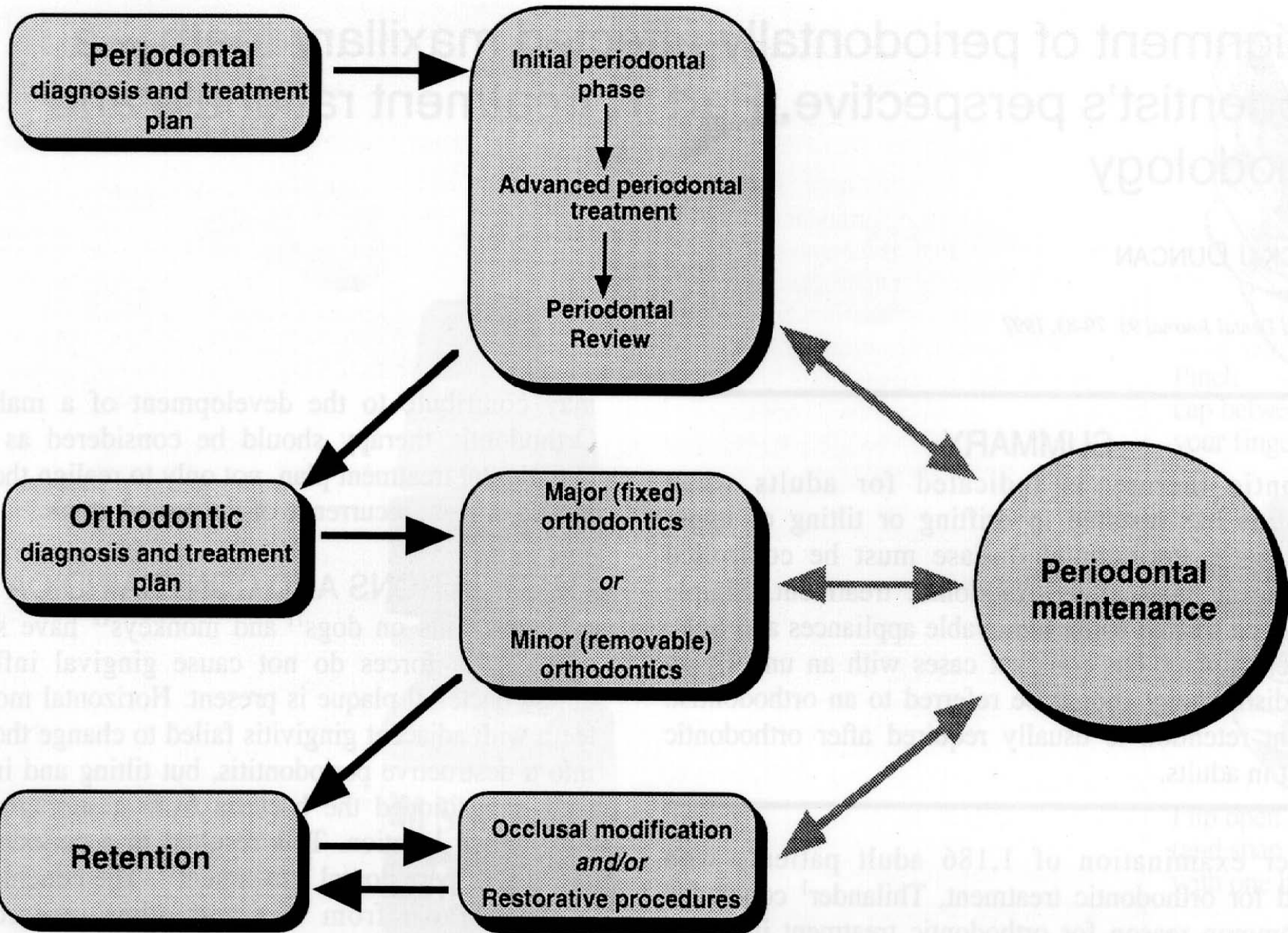
- >75% have periodontitis by age 40
- Beginning or even advanced periodontal breakdown does not contraindicate orthodontic treatment
- 2 major types of periodontal findings in ortho patients:
  - Mucogingival problems: inadequate attached gingiva
  - Inflammatory lesions of the gingiva or periodontium



- The prevalence of periodontal disease is a function of age.
- The prevalence of mucogingival problems peaks in their twenties.

- **Persistent bleeding on probing** is the best indicator of active and presumably progressive periodontal disease.





- Tooth movement in adults with reduced but **healthy** periodontium did not result in further significant loss of attachment (none of the adults had mean loss of attachment of more than 0.3mm)



– Boyd, 1989

# Ortho vs. Perio

- Orthodontic tooth movement + poorly controlled periodontal health → **rapid and irreversible breakdown** of the periodontal support apparatus.
- Initiate ortho tx at least **6 months** after full perio tx to allow healing and resolution of inflammation.

## BOX 8-3

### SEQUENCE OF TREATMENT IN PATIENTS WITH MULTIPLE PROBLEMS

1. Disease control
  - Caries control
  - Endodontics
  - Initial periodontics (no osseous surgery)
  - Initial restorative (no case restoration)
2. Establishment of occlusion
  - Orthodontics
  - Orthognathic surgery
  - Periodontal maintenance
3. Definitive periodontics (including osseous surgery)
4. Definitive restorative
  - Cast restorations
  - Splints, partial dentures

# Positive Structure



# Periodontal Surgery before or after Orthodontic Treatment?

- A nondefinitive **open flap curettage** prior to orthodontic intervention
  - eliminate gross inflammation
  - enhance attachment at a more coronal level

# Periodontal Surgery before or after Orthodontic Treatment?

- Guided-tissue regenerative (GTR) surgery
  - May result in spontaneous realignment of maxillary incisors.
  - This suggests that GTR should be performed well in advance of orthodontic treatment, and the need for tooth movement reassessed when healing is complete
- Periodontal surgery for pocket elimination should follow orthodontic treatment

# Gingival Recession

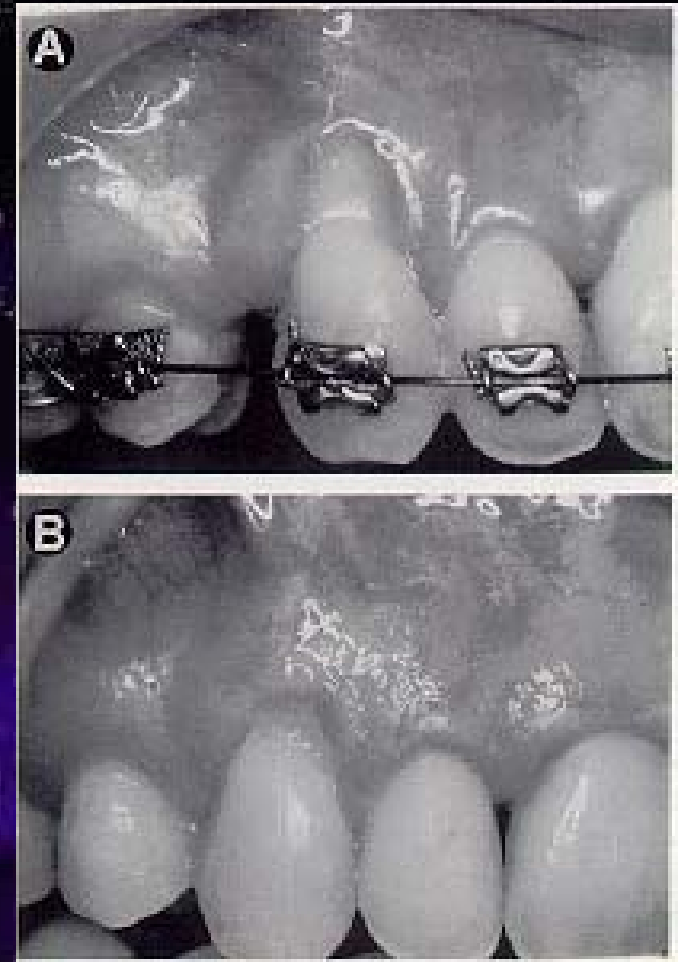


# Gingival recession

- Cause:
  - Toothbrush trauma
  - Plaque-induced inflammation
  - The stretching and thinning of the gingiva that might be created by labial tooth movement.
- **Gingival thickness** is more important than surface quality (keratinized or non-keratinized)

# Root coverage needed?

- An abrasion defect is evident in the root surface. The tooth brushing technique was adjusted to minimize the trauma to the tissue.
- Because the tooth was planned to be moved in disto-lingual direction, surgical correction of the recession defect was postponed until completion of the tooth movement.
- The reduction in the recession and the increase of the gingiva zone that has taken place as a consequence of the changed position of the tooth.



# Gingival Recession

- The gingival dimensions will increase because of growth in the alveolar process and that teeth will often change their position in a bucco-lingual direction in the developing dentition, mucogingival problems such as recession type defects will often be eliminated spontaneously in the growing child, provided adequate plaque control is established and maintained.
  - Powell, 1982; Persson 1986; Andlin-Sobocki 1991

# Gingival Recession

- Reparative surgical treatment of recession type defects in the **developing** dentition may not be necessary and should therefore be postponed until growth is completed.

# Adequate Attached Gingiva?

- 2 mm of keratinized gingiva (corresponding to 1 mm attached gingiva) is adequate to maintain gingival health (not correct any more)
  - Lang and Loe, 1972
- A certain quantity of gingiva does not seem to be essential for the maintenance of periodontal health and the preclusion of recession.
  - Wennstrom, 1994

# Adequate Attached Gingiva?

- the incidence of recession in areas without an attached portion of gingiva was not greater than that observed in areas with a wide area of attached gingiva
  - Schoo, 1985; Kisch, 1986; Wennstrom, 1987; Freedman, 1992

# Surgical treatment to prevent recession?

- Surgical treatment with the sole purpose of increasing the apico-coronal width of the gingiva to maintain periodontal health and prevent the development of soft tissue recession cannot be considered justified.
  - The European Workshop on Periodontology, 1993

# Potential periodontal problems

- Before Orthodontic Treatment
- **During Orthodontic Treatment**
- After Orthodontic Treatment



# Periodontal Problems During Orthodontic Treatment

- Hyperplastic gingivitis: developed 1-2 months after orthodontic appliance is placed
- Hyperplastic and inflammatory tissues may also interfere with completion of orthodontic treatment and be implicated in relapse tendencies.

# Periodontal Problems During Orthodontic Treatment

- The use of steel ligatures is recommended on all brackets, even the tooth-colored brackets, because elastomeric rings have been shown to attract significantly more plaque than steel ties.

– Forsberg 1991



- Professional scaling may be particularly indicated during active intrusion of elongated maxillary incisors, and when new attachment attempts are made, because orthodontic intrusion may shift supragingival plaque to a subgingival location.
  - Ericsson, 1977&1978; Melsen 1988&1992



# Treatment for orthodontically induced gingival hyperplasia

- Electrosurgical treatment:
  - contraindicated because of the proximity to metal which would conduct electrosurgical current and cause irreversible destruction and extreme pain.
- Laser treatment:
  - Carbon dioxide (CO<sub>2</sub>)
  - Neodymium: yttrium aluminum garnet (Nd: YAG)

# Laser Treatment

- Advantages:
  - Superior hemostasis
  - Less postoperative discomfort
  - Better acceptance by patients
  - Superior esthetic results (gingival architecture)
  - Decreased posttreatment bacteremia

# CO<sub>2</sub> Laser treatment

A



B



C



D

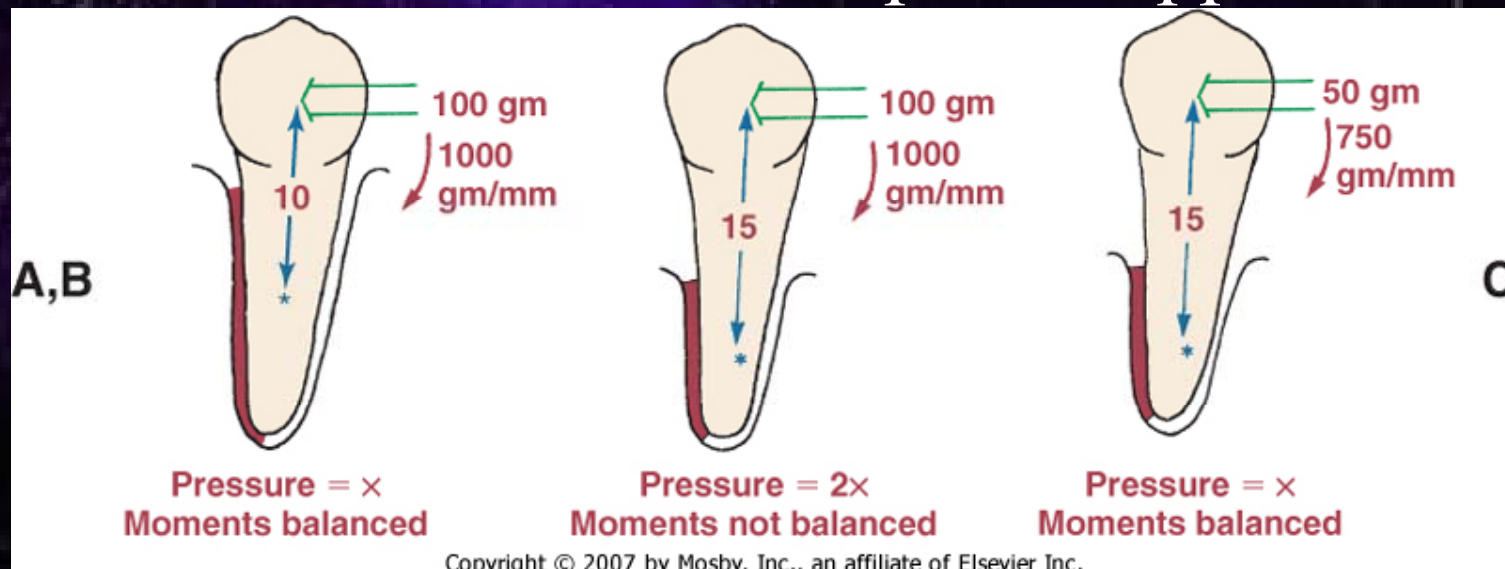


# Interval of Perio maintenance

- S/RP on an accelerated schedule, typically at **twice** the frequency they would require without orthodontic treatment.
- e.g.: Perio maintenance every 3 months prior to ortho tx → perio maintenance every 6 weeks.

# Effects of Reduced Perio Support

- ↓ Periodontal support → the same force against the crown produces greater pressure in the PDL → **lighter orthodontic force** to move teeth with reduced perio support.





- Unwise to move a tooth into an area where bone has been destroyed by periodontal disease, because of the risk that normal bone formation will not occur as the tooth moves into the defect.
- Move away from this area and prepare for prosthetic replacement.
- Exception: localized aggressive periodontitis

# Reasons for favorable response

- Relative young age of the patients
- The original attack was almost entirely on the first molars
- The disappearance of the specific bacterial flora.

# Black triangle

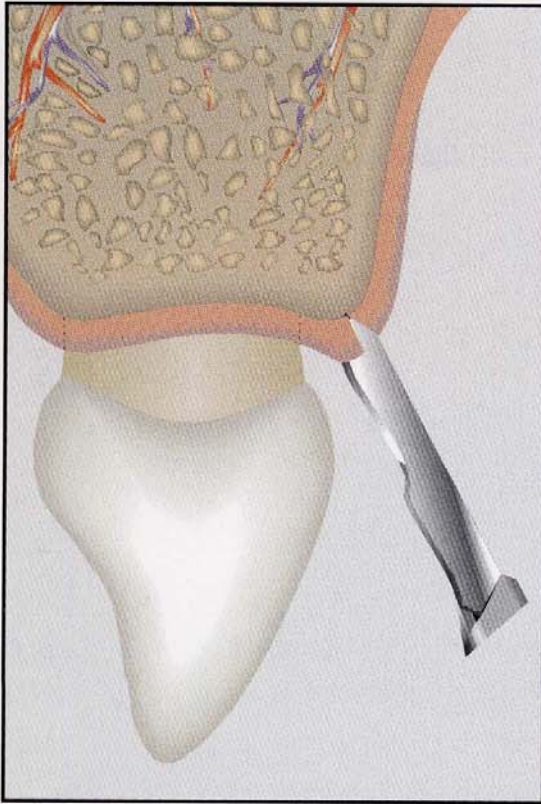
- Interproximal stripping and close space
- Converge root angulations
- Perio surgery to augment interdental papilla



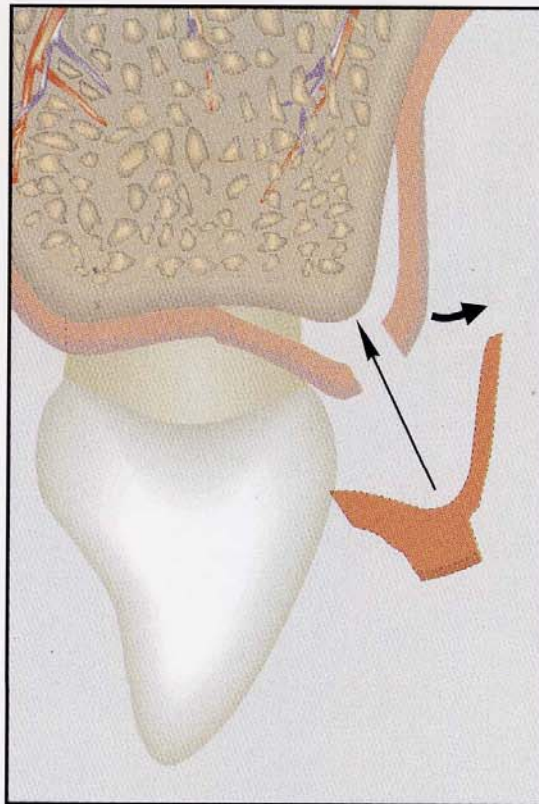
# Black triangle



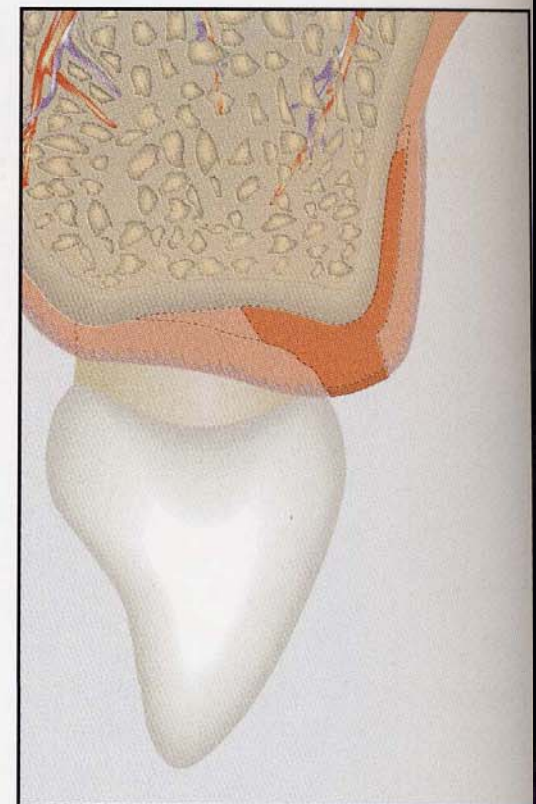
# Perio surgery



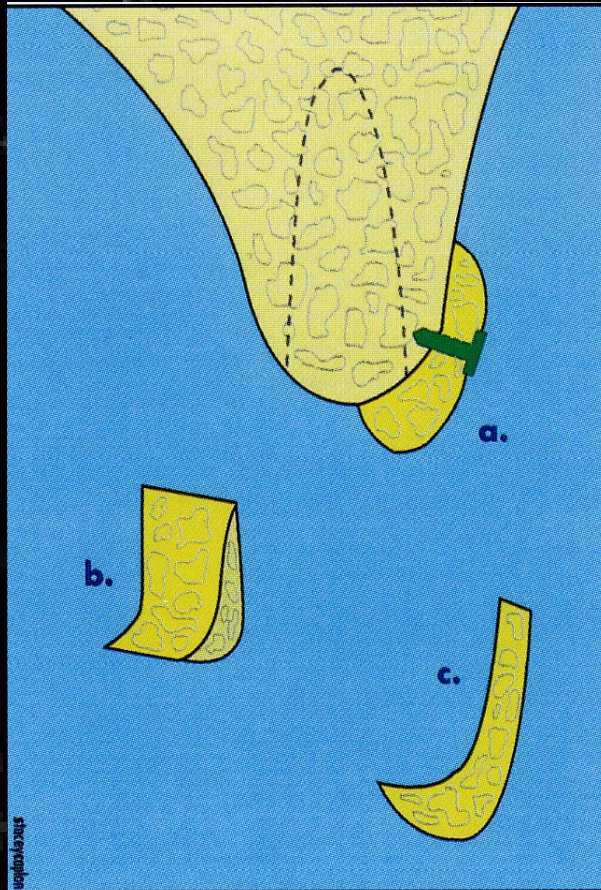
**Fig 1a** Intrasulcular incision and buccal incision are made across the interdental papilla, leaving the existing papilla attached to the palatal flap.



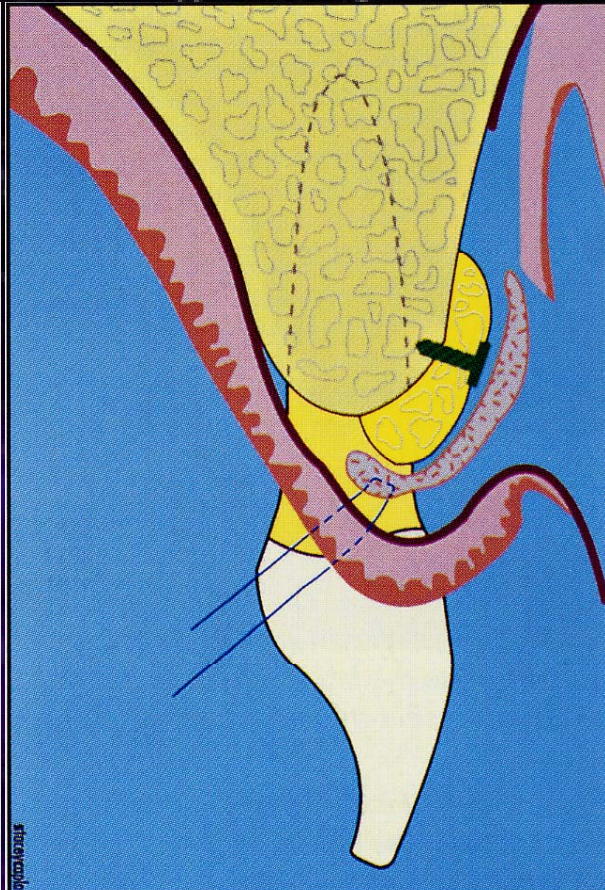
**Fig 1b** Split-thickness flap is elevated buccally and palatally.



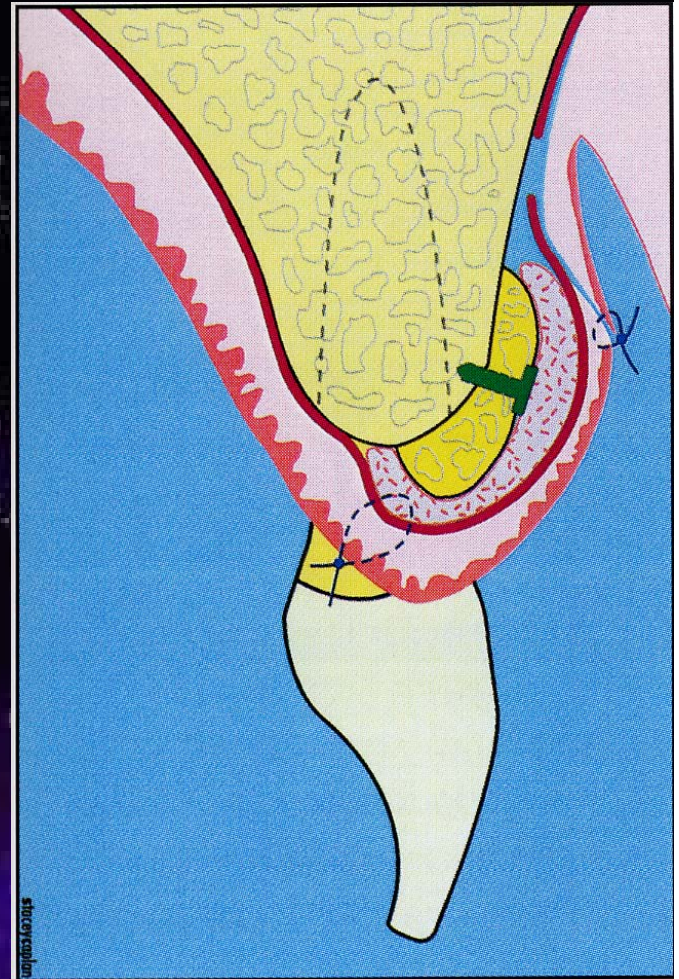
**Fig 1c** Buccal and palatal flaps are sutured together after connective tissue from retromolar area is placed under flap.



**Fig 7** Fixation of the bone to the alveolar crest; a saddle-shaped graft fits over the interdental bone crest (a). b = internal view of the osseous graft; c = profile view of the osseous graft.

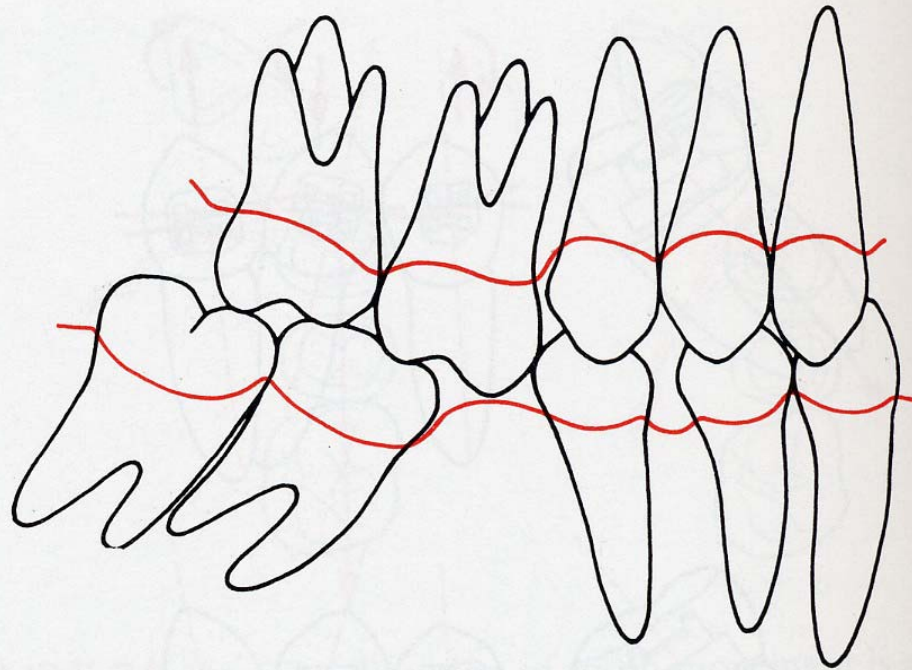


**Fig 8** Elevation of a mucoperiosteal flap coronally and fixation of the cancellous osseous graft that fits over the interdental bone crest. A connective tissue graft is placed on top of the osseous graft.



**Fig 12** Flaps are returned and sutured over the grafted materials to obtain complete closure.

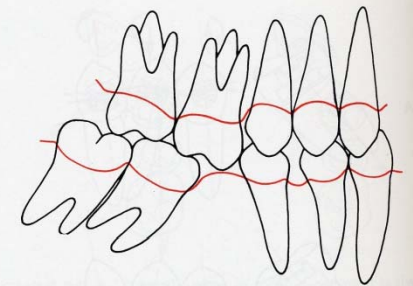
# Molar uprighting



**FIGURE 20-6** Loss of a lower molar can lead to tipping and drifting of adjacent teeth, poor interproximal contacts, poor gingival contour, reduced interradicular bone, and supra-eruption of unopposed teeth. Since the bone contour follows the cemento-enamel junction, pseudopockets form adjacent to the tipped teeth.

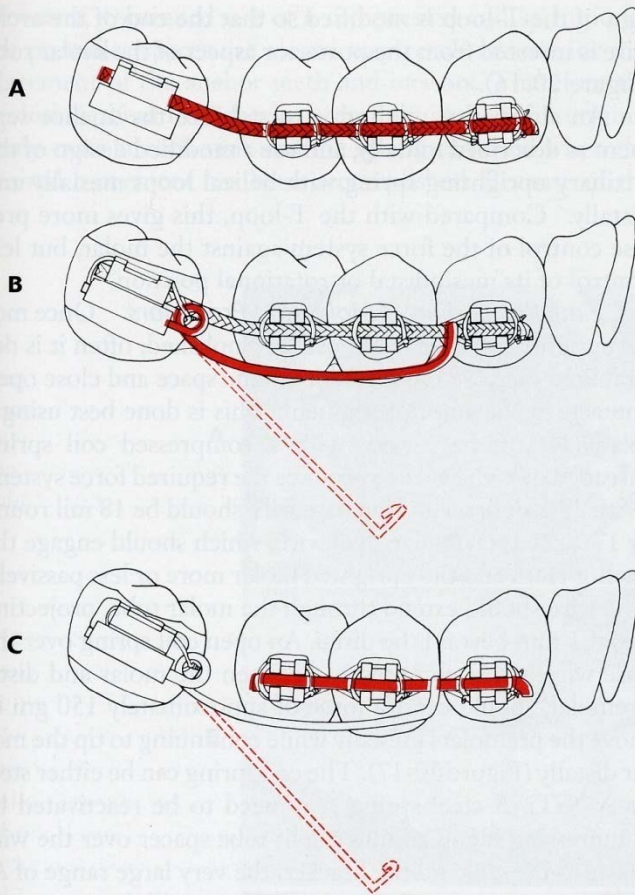
# Tx options of missing lower 1<sup>st</sup> molar

- Upright 2<sup>nd</sup> and 3<sup>rd</sup> molars and open space for 1<sup>st</sup> molar pontic
- Extract 3<sup>rd</sup> molar and upright 2<sup>nd</sup> molar and open space for 1<sup>st</sup> molar pontic
- Upright 2<sup>nd</sup> and 3<sup>rd</sup> molars but close space to eliminate the cost of prosthesis

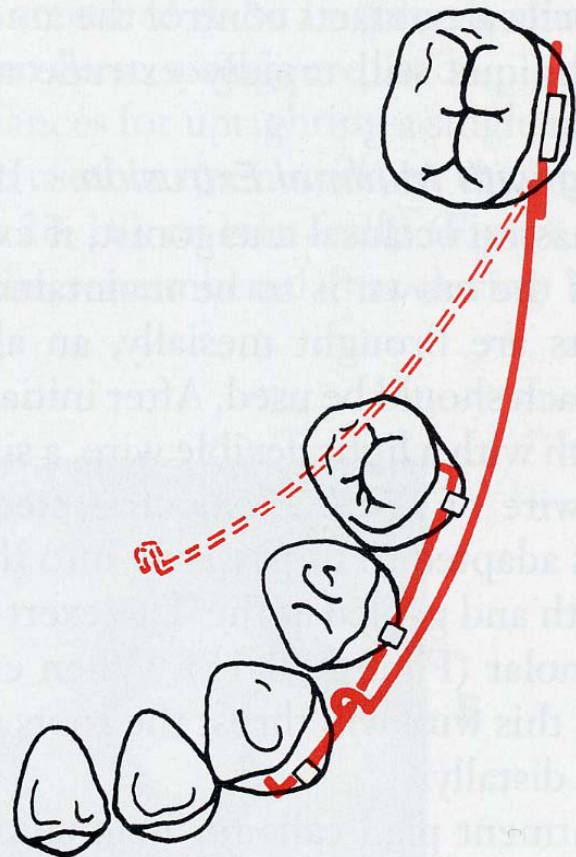


**FIGURE 20-6** Loss of a lower molar can lead to tipping and drifting of adjacent teeth, poor interproximal contacts, poor gingival contour, reduced interradicular bone, and supra-eruption of unopposed teeth. Since the bone contour follows the cemento-enamel junction, pseudopockets form adjacent to the tipped teeth.

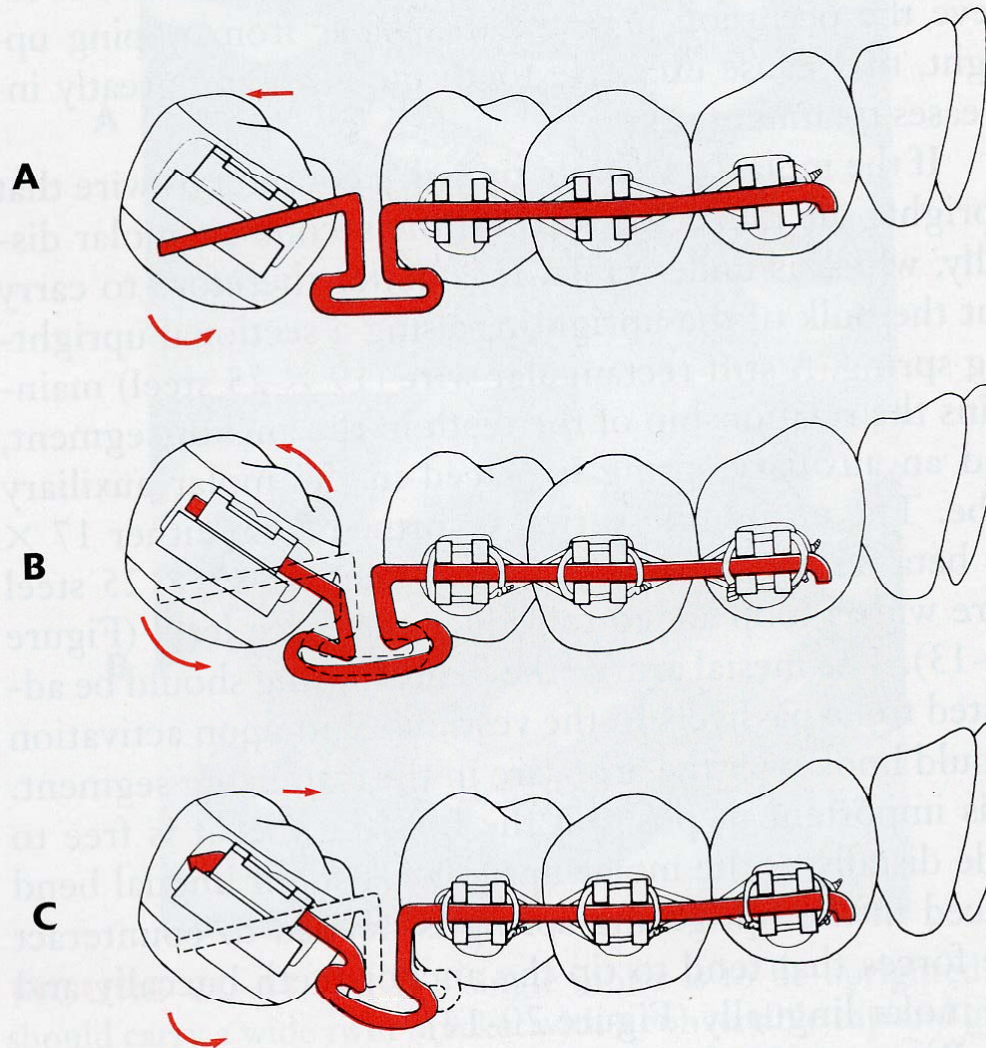




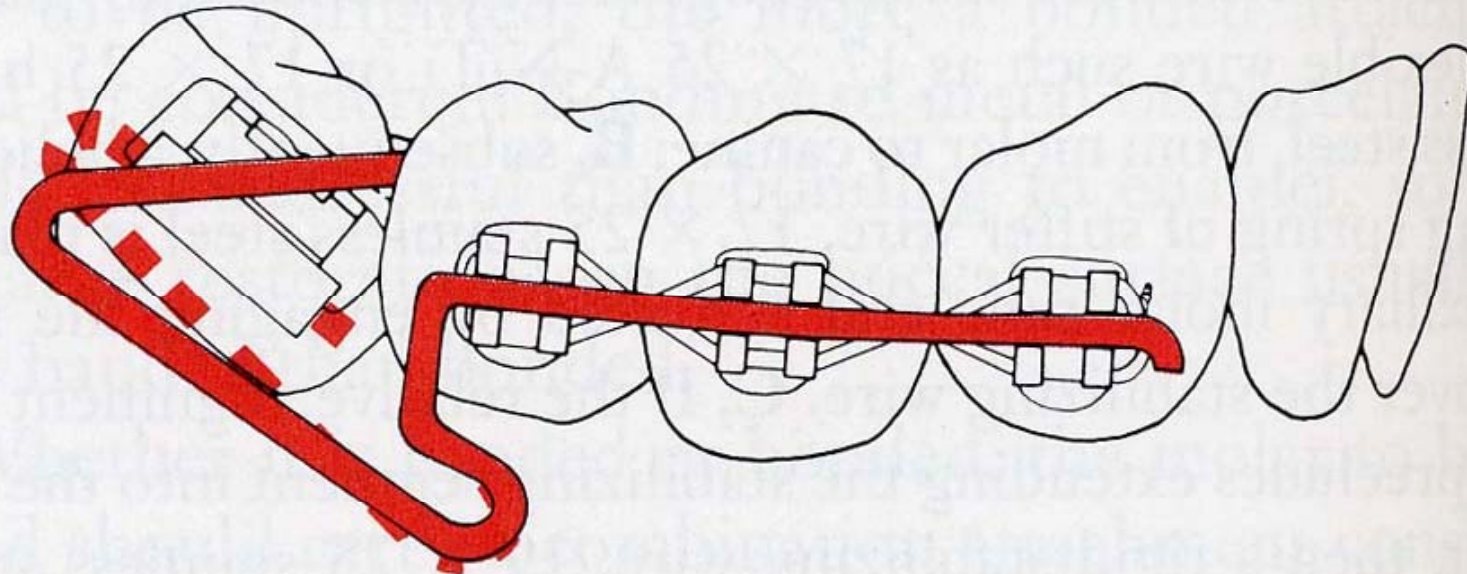
**FIGURE 20-13** Fixed appliance technique for uprighting a single molar. **A**, Initial bracket alignment is achieved by placing a light flexible wire such as  $17 \times 25$  A-NiTi or  $17 \times 25$  braided stainless steel, from molar to canine; **B**, subsequently, a helical uprighting spring of stiffer wire,  $17 \times 25$  stainless steel is placed in the auxiliary molar tube and activated by engaging the mesial hook over the stabilizing wire. **C**, If the relative alignment of the molar precludes extending the stabilizing segment into the molar bracket, then a rigid stabilizing wire,  $19 \times 25$  stainless steel, is placed in the premolars and canine only (with the brackets bonded so this wire is passive—see Figure 20-3). The mesial arm of the uprighting spring should be adjusted to lie passively in the vestibule before engagement.



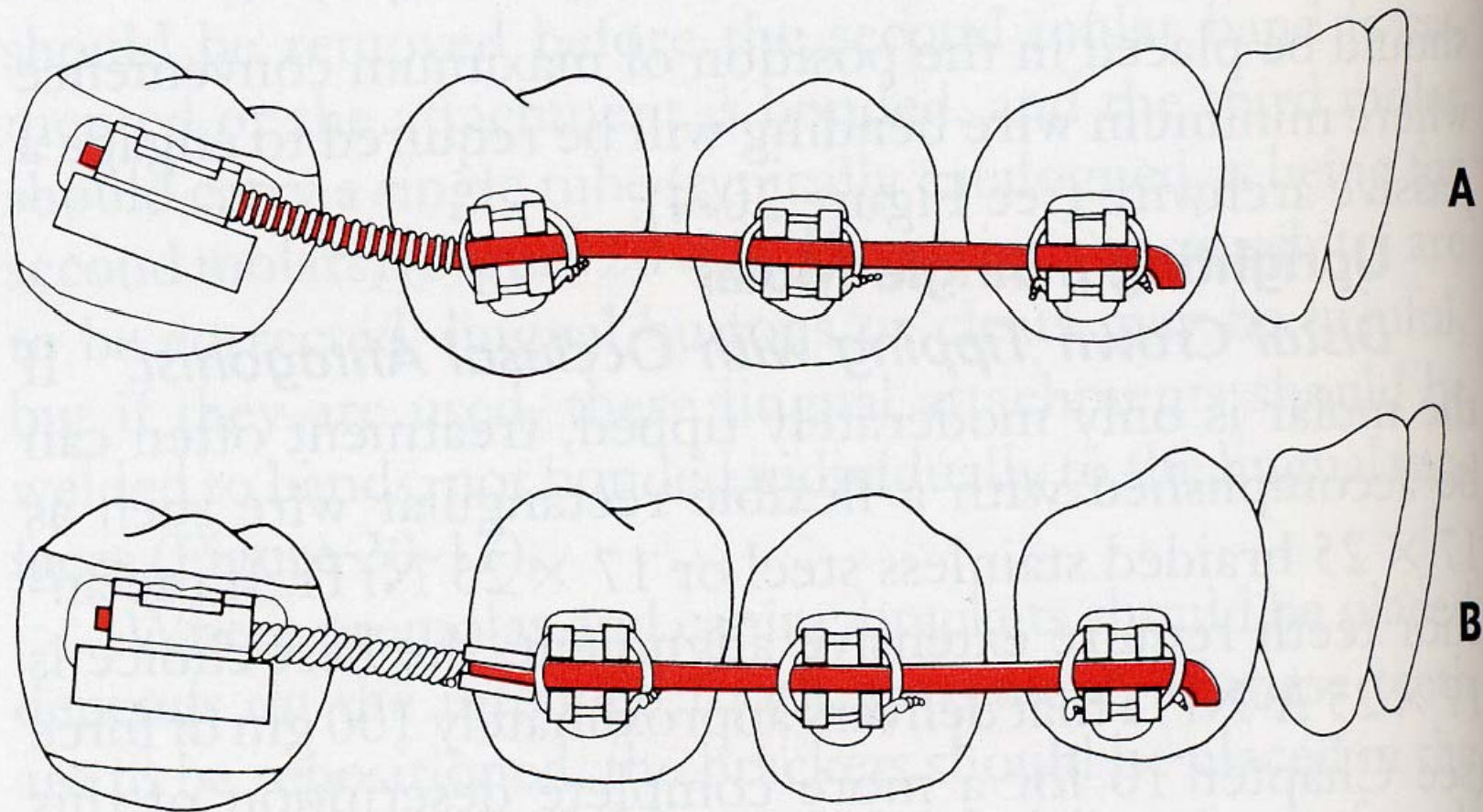
**FIGURE 20-14** Because the force is applied to the facial surface of the teeth, a helical uprighting spring tends not only to extrude the molar but also to roll it lingually, while intruding the premolars and flaring them buccally. To counteract this side effect, the uprighting spring should be curved buccolingually so that when it is placed into the molar tube, the hook would lie lingually to the archwire prior to activation (*dotted red*).



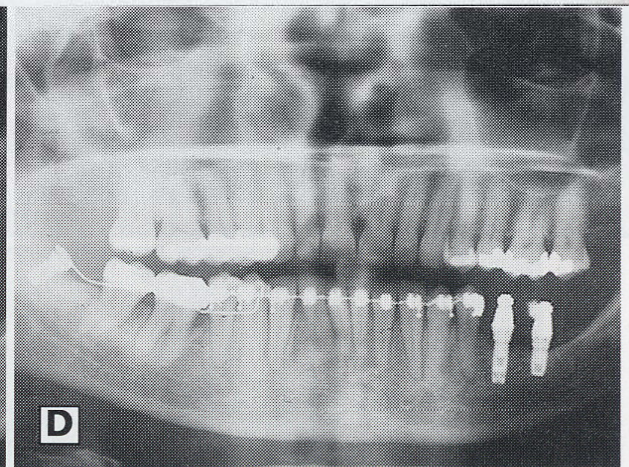
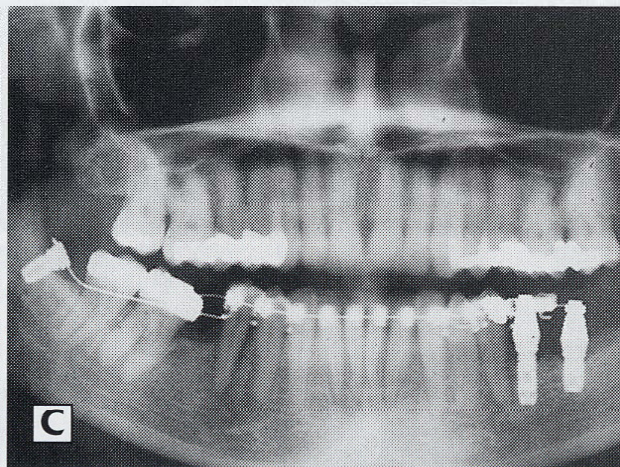
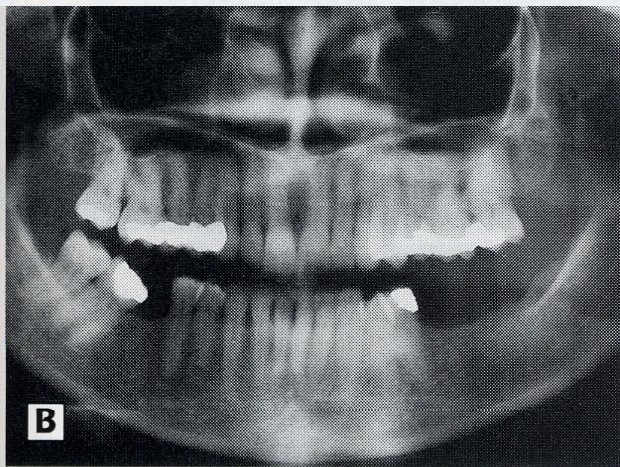
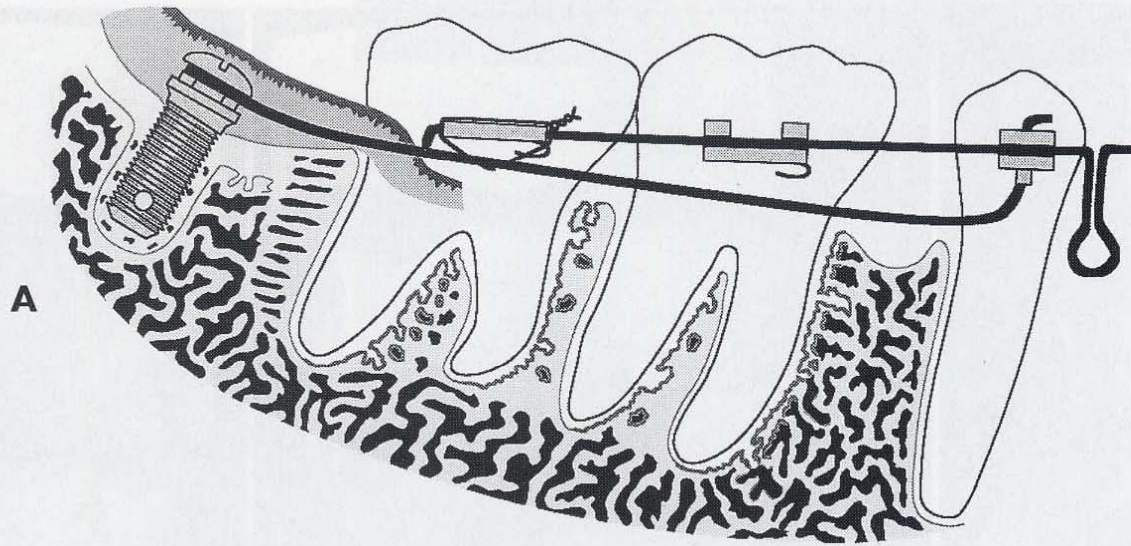
**FIGURE 20-15** A, T-loop spring in  $17 \times 25$  steel wire, showing the degree of angulation of the wire before inserting it into the molar tube that is necessary to upright a single tipped molar; B, T-loop spring active to upright the tooth by distal crown tipping; C, pulling the distal of the wire through the molar tube and opening the T-loop generate a mesial force that results in molar uprighting by mesial root movement with space closure.



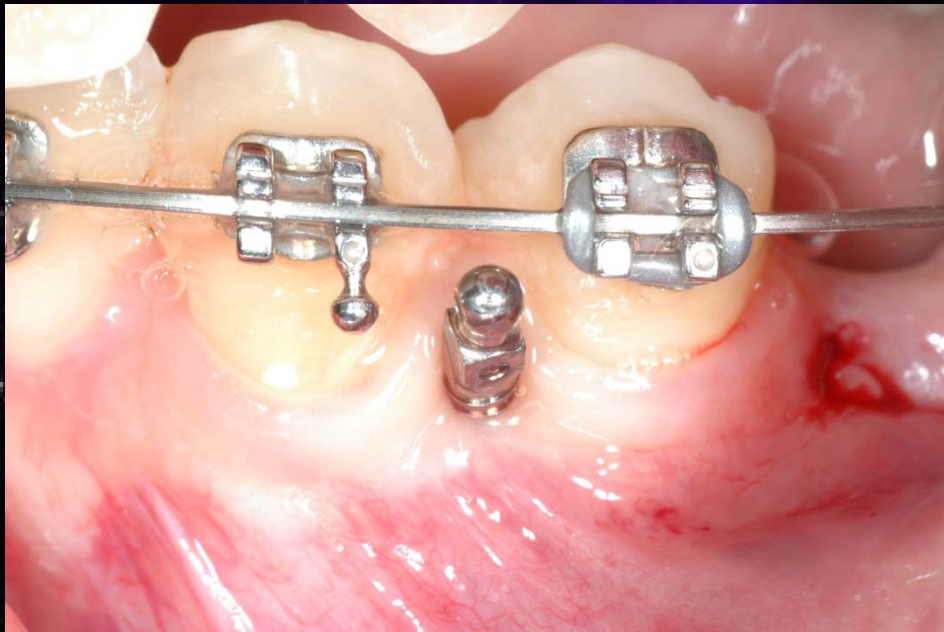
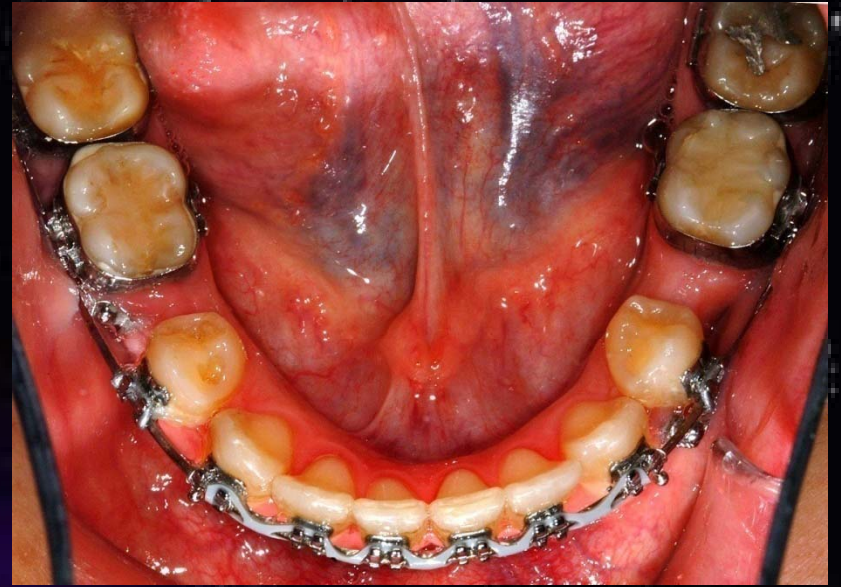
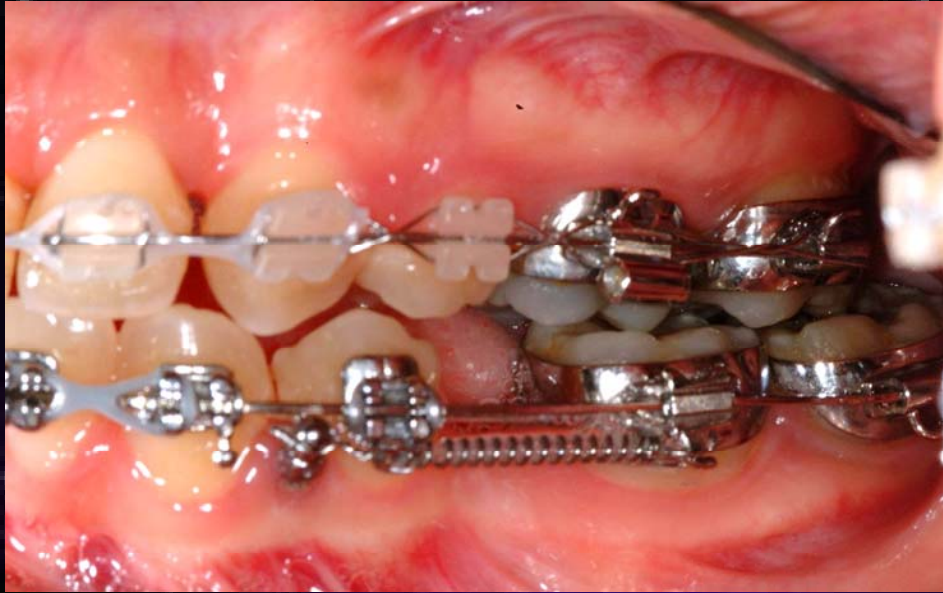
**FIGURE 20-16** Modification of a T-loop that may be used to upright a severely tipped or rotated molar. The terminal part of the spring is inserted from the distal opening of the molar bracket.



**FIGURE 20-17** A, Compressed coil spring on a round wire (usually 18 mil steel) may be used to complete molar uprighting while closing remaining spaces in the premolar region. B, The coil spring may be reactivated by addition of a splint spacer over the archwire.



**FIGURE 21-16** A, Drawing and, B-D, panoramic radiographs showing the use of an implant for retromolar anchorage. Note that a wire extending forward from the implant stabilizes the premolar and through it, the anterior teeth, so that they are not pulled posteriorly in reaction to anterior movement of the second and third molars. (From Roberts WE: Dental implant anchorage. In Epker B, Stella JP, Fish LC (editors): *Dentofacial deformities: integrated orthodontic and surgical management*, vol IV, ed 2, St Louis, Mosby, 1999.)





A

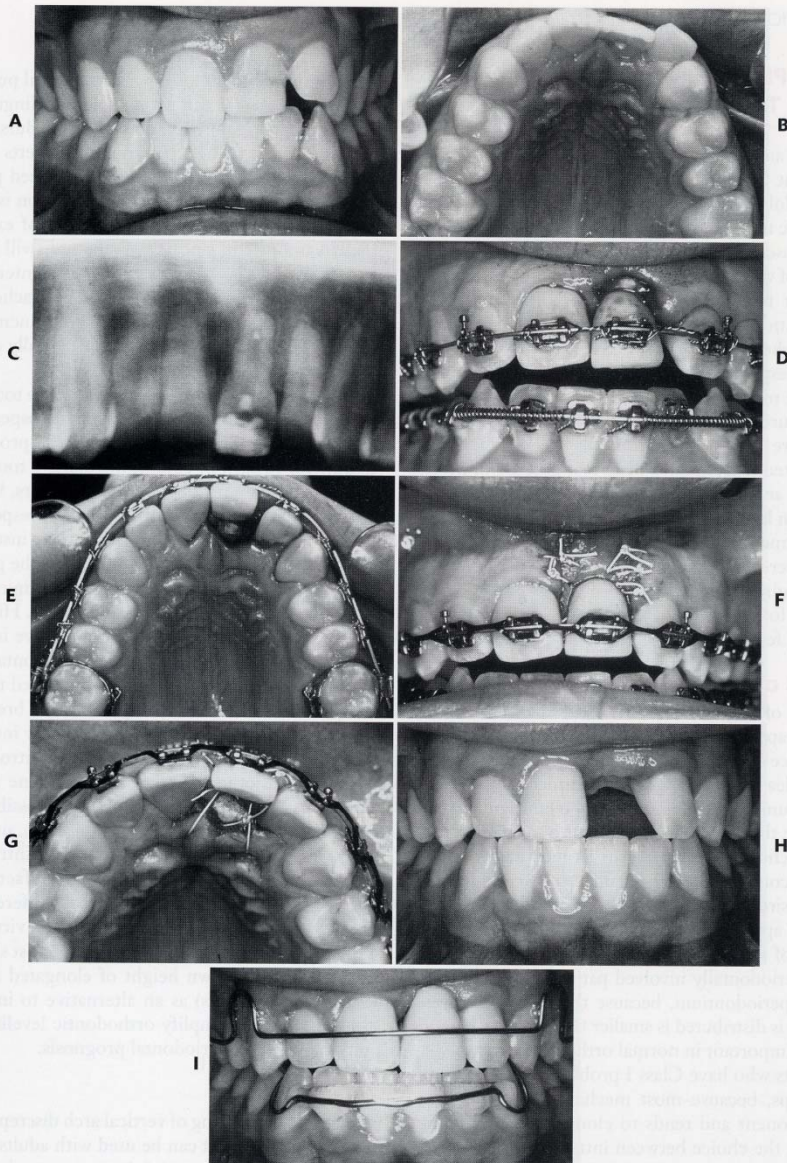


B



C





**FIGURE 21-22** A-C, This young man's maxillary left central incisor was fractured in an accident and became ankylosed, making alignment of the other maxillary incisors and comprehensive orthodontic treatment impossible. D and E, After initial alignment of the maxillary arch, the crown of the ankylosed central incisor was cut off, the root canal was filled with calcium hydroxide, and the gingiva was sutured over the residual root. A pontic was tied to the archwire, with orthodontic force to close the excess space in the area. F and G, Three months later, with the excess space closed, gingivoplasty was done in the affected area, and comprehensive orthodontics was completed during the next year. H and I, At the conclusion of treatment a retainer with a replacement tooth was made, to be worn until an implant could be placed at about age 19, after completion of vertical growth. Resorption of the endodontically-treated root fragment would be expected over the next 2 to 3 years, but resorption of alveolar bone would not occur during that time, so the alveolar bone was effectively "banked" until the time of implant placement.

- Cut off crown to preserve ridge width
- Endodontic treatment with calcium hydroxide
- Wait until the growth is complete
- Root resorption occur
- Implant placement

# Potential periodontal problems

- Before Orthodontic Treatment
- During Orthodontic Treatment
- **After Orthodontic Treatment**

# Periodontal Consideration after Orthodontic Treatment

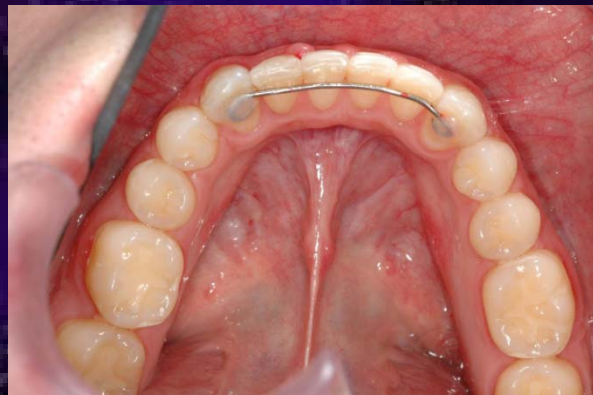
- Mobility
- Relapse
  - Circumferential Supracrestal Fiberotomy (CSF)

# Mobility

- Greater mobility in the adult after the orthodontic treatment than prior to treatment.
- Because of this mobility, adults need a **longer** period of retention than would a child

# Retention in Adult

- Lower rate of ossification: longer retention
- If there has been significant periodontal loss prior to orthodontic treatment, the necessity for permanent splinting is almost always assured.



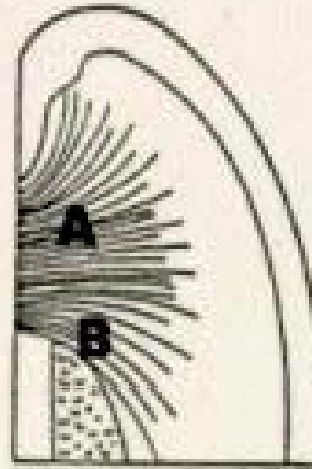
# Retention for Adults

- Permanent Retention: bonded retainer is preferred
- removable plate or spring retainer :
  - ongoing jiggling of the teeth because of the relapse tendency during the day.
  - Jiggling forces may facilitate the progress of attachment loss in periodontitis in the presence of plaque

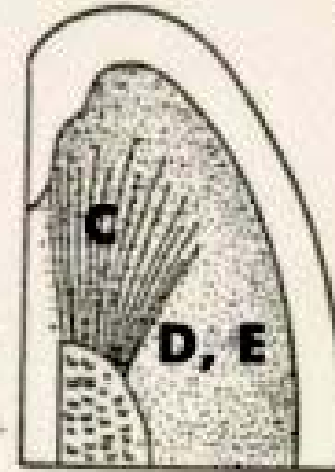
# Relapse

- Transseptal fibers stretches elastically during orthodontic treatment and trends to pull the teeth back toward their original position.

Buccal view

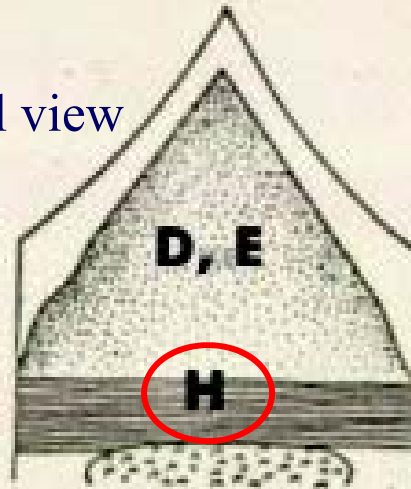


Buccal view

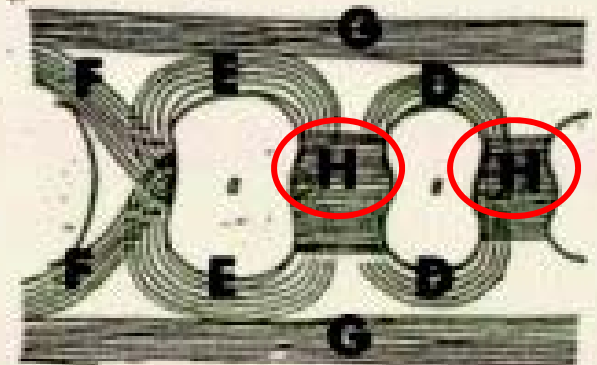


- A. Dentogingival
- B. Dentoperiosteal
- C. Alveologingival
- D. Circumferential
- E. Semicircular
- F. Transgingival
- G. Intergingival
- H. Transseptal

Buccal view



Occlusal view





# Circumferential Supracrestal Fibrotomy (CSF)

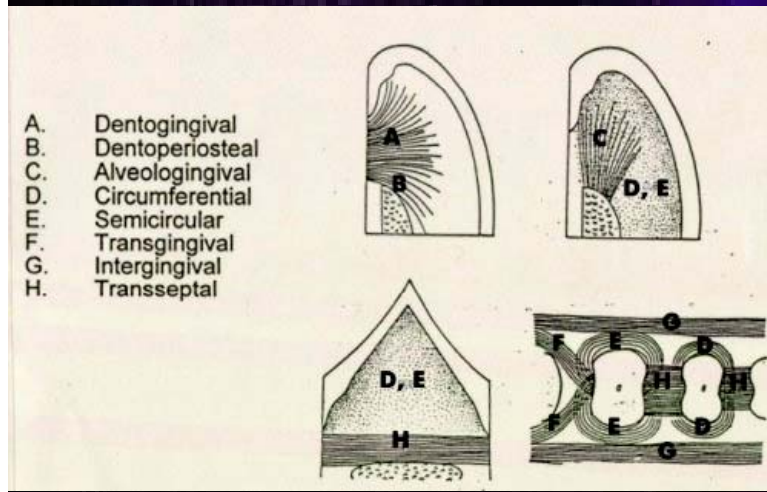
- supra-alveolar fibers do not adapt to new tooth positions and are in part responsible for relapse

–Thompson

# Circumferential Supracrestal Fibrotomy (CSF)

- the term “circumferential supracrestal fibrotomy” was first introduced
- Not only transect free gingival fibers but also transseptal ones

– Campbell and associates, 1975



# Indications

- Rotated tooth
- Crowded mandibular teeth
- Median diastemas: recommended by Campbell and associates
- Palatally blocked maxillary lateral incisors: relieve possible fiber tension, which could produce palatal relapse

# Contraindications

- Gingival recession or lack of attached gingiva
- Poor oral hygiene, gingivitis, or any periodontal pocketing
- Excessive labial root prominence with the distinct possibility of a dehiscence should not have any labial incision.
- Incising the midportion of the labial gingiva of mandibular incisors and canines: this might precipitate gingival recession.
- Incising the gingiva while the tooth is being rotated.

# Procedures of CSF

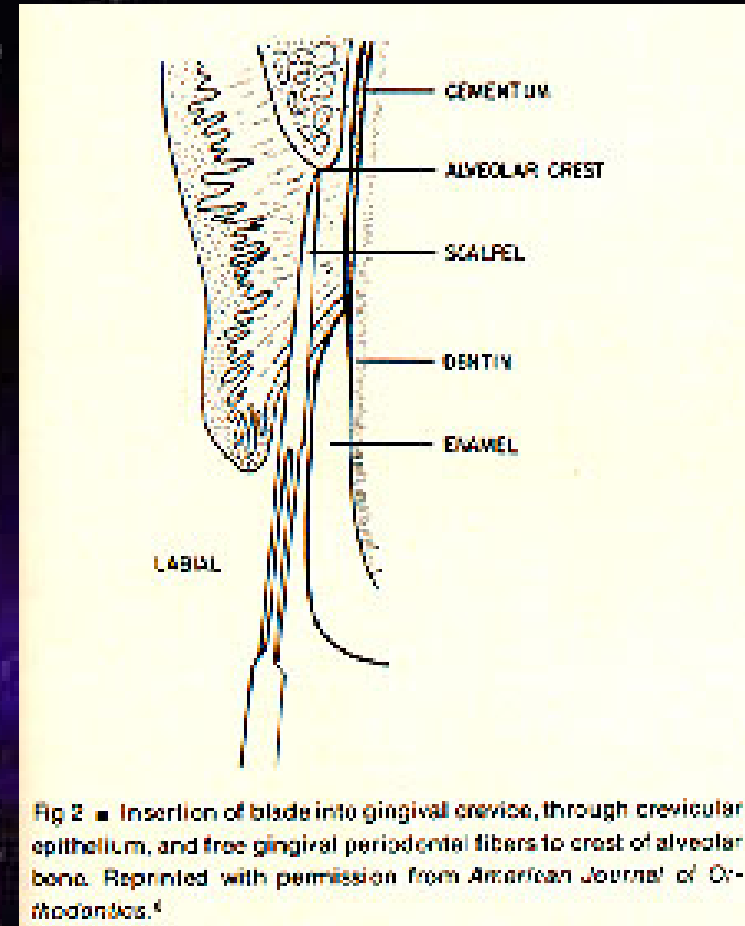
- Anesthesia
- Surgical technique
- Timing of the procedure
- Indications
- Contraindications

# Anesthesia

- intrapapillary injection
- inserted from the facial aspect of the papilla to the lingual aspect, and an anesthetic solution deposited as the needle is withdrawn



# Surgical Procedures



# Timing

- A few weeks before debonding or at the same time of debonding
- Obstacles: orthodontic bands that extend subgingivally, coupled with plaque accumulation
- If the gingival condition is unsatisfactory, the procedure can be delayed until sufficient resolution has occurred.



# CSF

- Placement of retainers immediately after surgery:
  - mandibular arch: a canine-to-canine retainer
  - maxillary arch: a removable Hawley appliance with palatal acrylic resin cut away from the marginal gingiva of the teeth in which surgery was performed.

# Summary

- Before Orthodontic Treatment
  - Sequence of Treatment?
    - Periodontal surgery?
  - Gingival Recession?
    - Preventive graft?
- During Orthodontic Treatment
  - Treatment of hyperplastic gingivitis
- After Orthodontic Treatment
  - Retention in Adults
  - CSF