



# The traumatic injuries of permanent teeth and complex therapy

Dr. Katalin Déri

Semmelweis Egyetem

Department of Pedodontics and Orthodontics





# Risk

- *Angle II/1*
- Predisposing factor:
  - ✂ overjet
  - ✂ protrusion of upper incisors
  - ✂ insufficient lip closure



# Injury

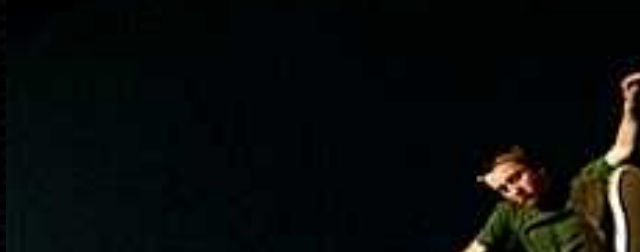
- Sport related











# Injuries

- Playground ~ school







# Injuries

- Fights





# Injuries

- Car accident

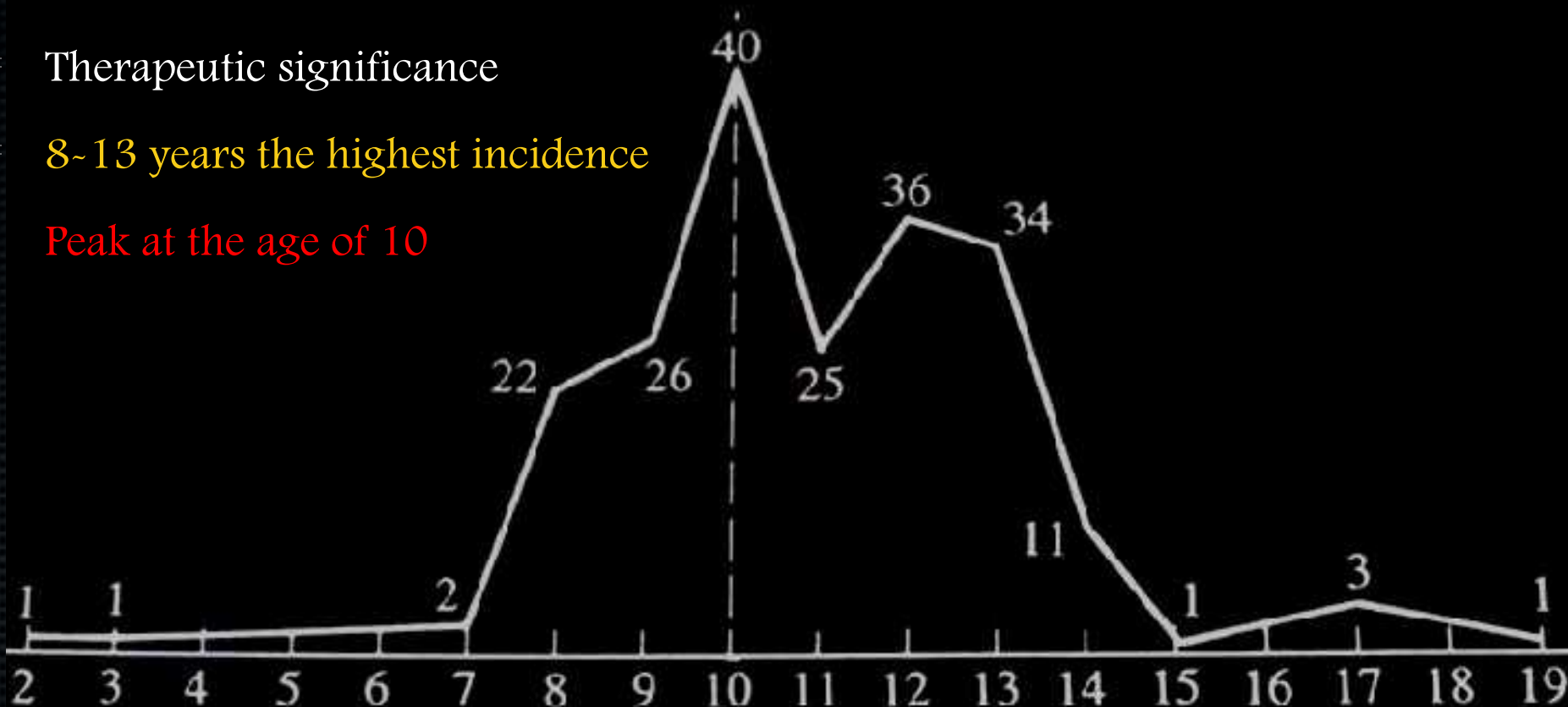


# Age distribution

- Therapeutic significance

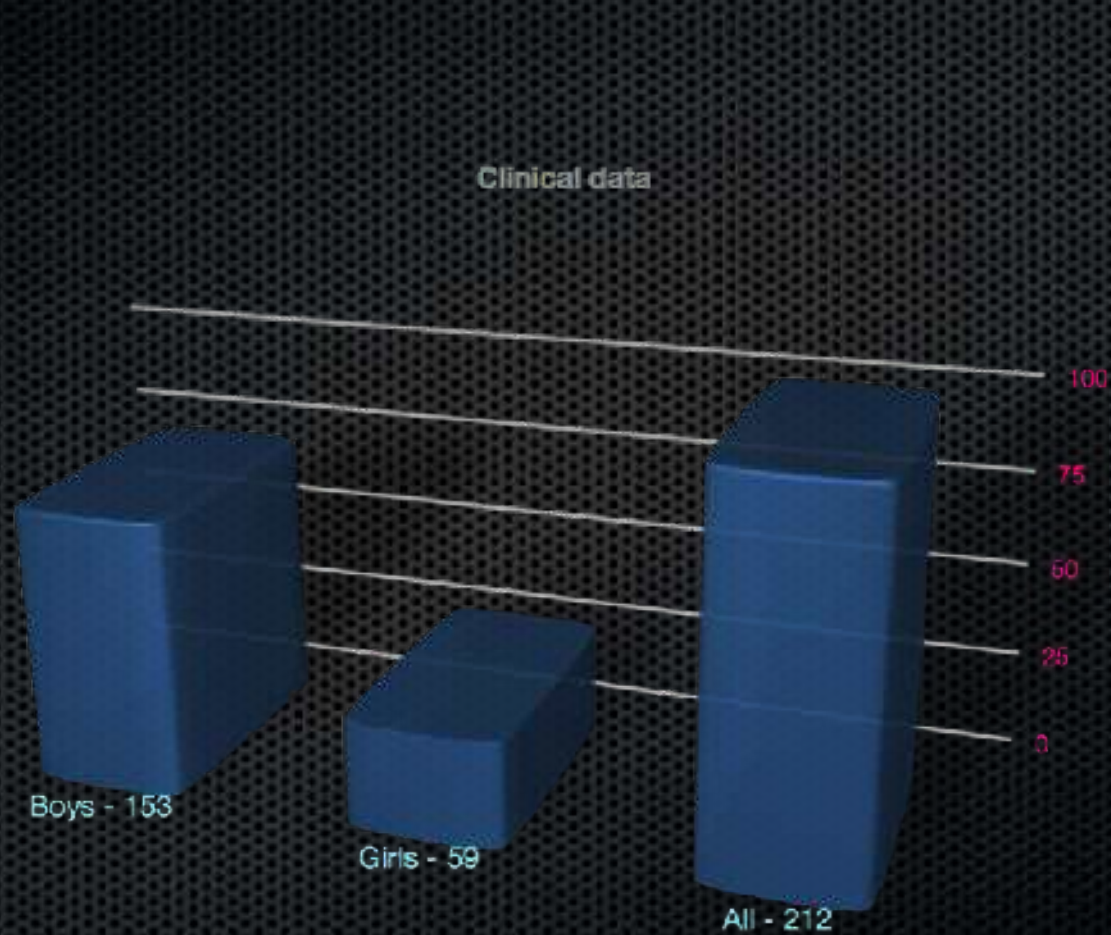
- 8-13 years the highest incidence

- Peak at the age of 10

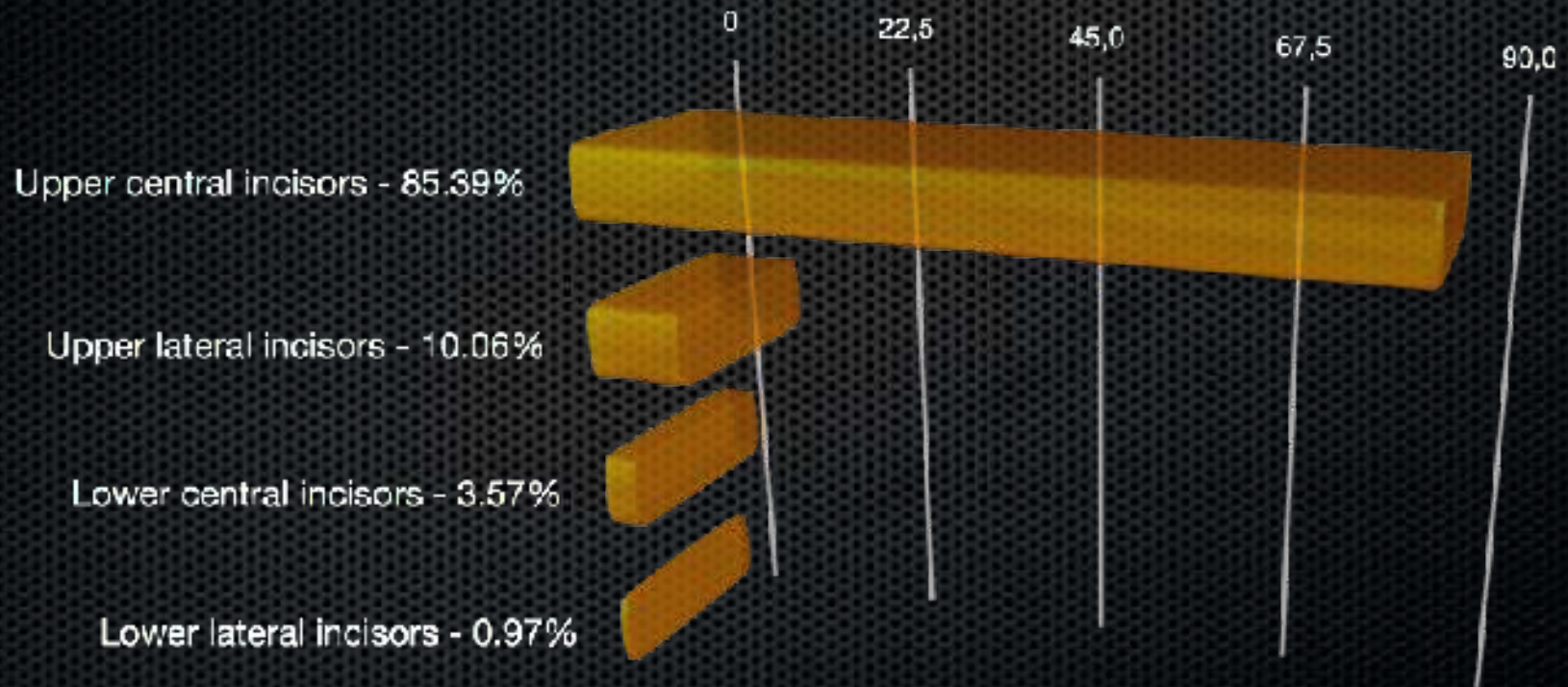




# Sex



# Incidence of injured teeth in %





# Anamnesis

- general anamnesis
- circumstances of injury
- black-out, amnesia, headache, nausea, vomit
- previous injuries : consequences, complications
- dental anamnesis

# Most important questions

## ● When?

- Time past between the injury and the treatment

## ● Where?

- Risk of infection

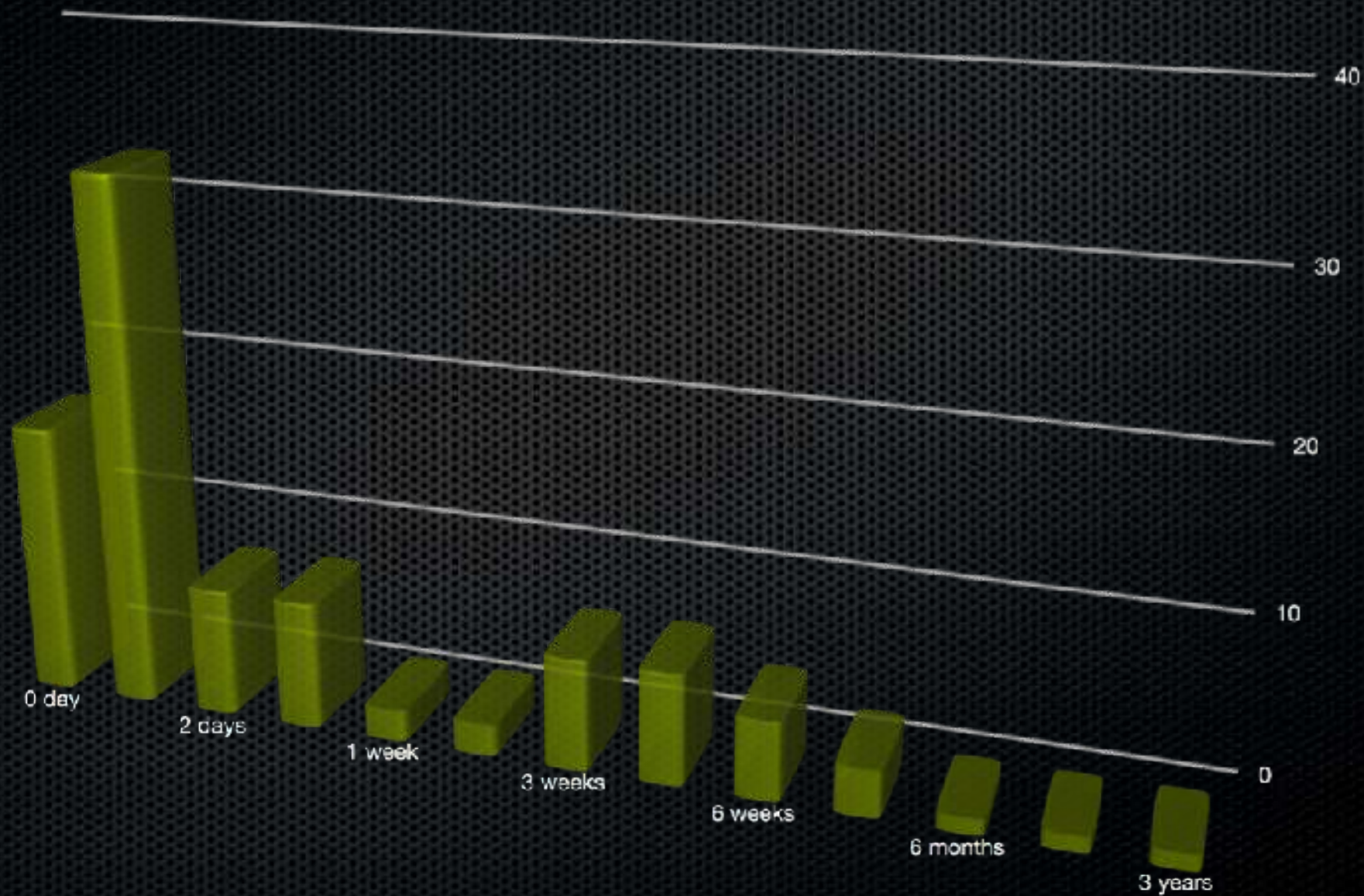
## ● How?

- Mechanism of the injury, polytrauma

-



# Time elapsed after injury



# Clinical examination

- Extraoral examination
- Intraoral examination
- Photo documentation
- X-ray



# Type of injuries

- Traumatic injuries involving:
  - the permanent teeth
  - the alveolar bone
  - the soft tissues



# Classification of dental injuries

(International Association of Dental Traumatology, 2001)

1. Coronal fracture
2. Coronal and root fracture
3. Root fracture
4. Fracture of processus alveolaris
5. Luxations and avulsion
  - (contusion, subluxation, lateral luxation, extrusion, intrusion, avulsion)



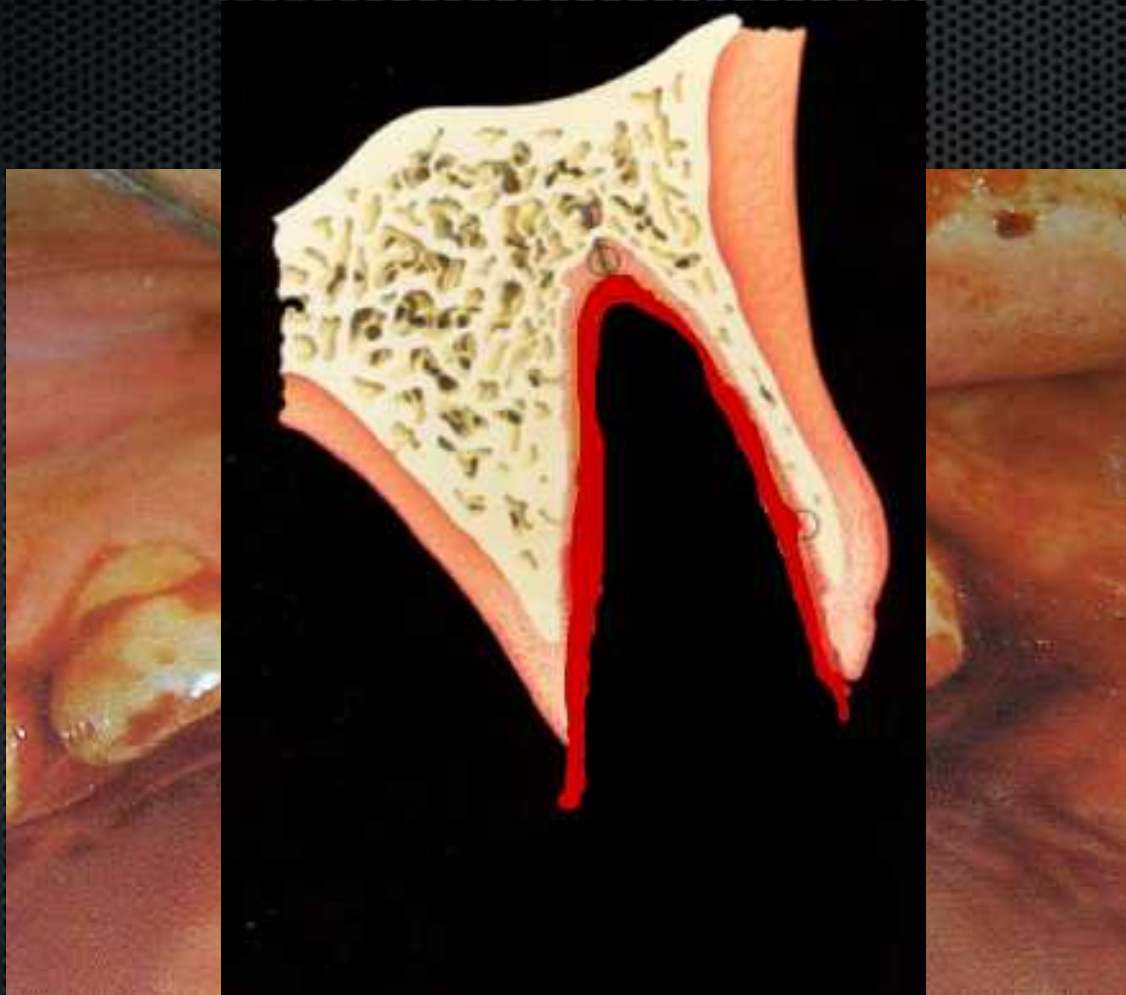
# Classification of dental injuries

Pedodontics and Orthodontics textbook

1. Luxatio totalis dentis permanentis
2. Luxatio partialis dentis permanentis
3. Intrusio
4. Fractura coronae dentis permanentis
5. Fractura radices dentis permanentis

# Luxatio totalis dentis permanentis

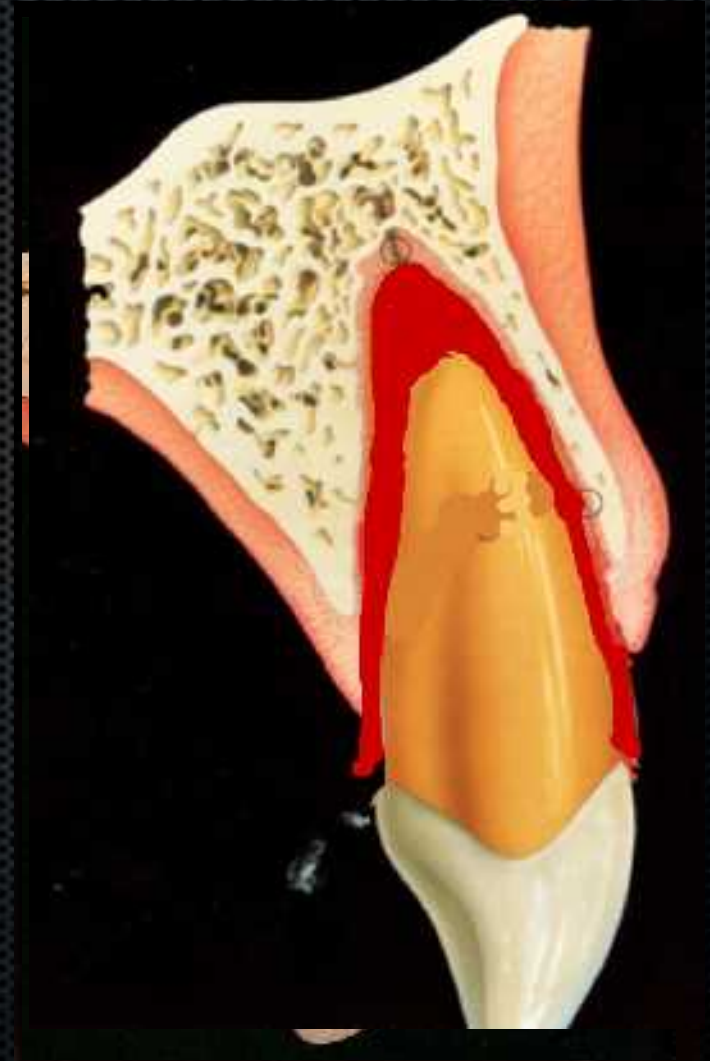
- Avulsion





# Luxatio partialis dentis permanentis

- loosening of the tooth or a partial displacement of the tooth out of its socket
  - a. subluxation
  - b. lateral luxation
  - c. extrusion



# ■ Luxatio partialis dentis permanentis

Displacement

## ■ clinical examination

### · **subluxation:**

- sensitive to touch
- mobile
- no displacement
- bleeding

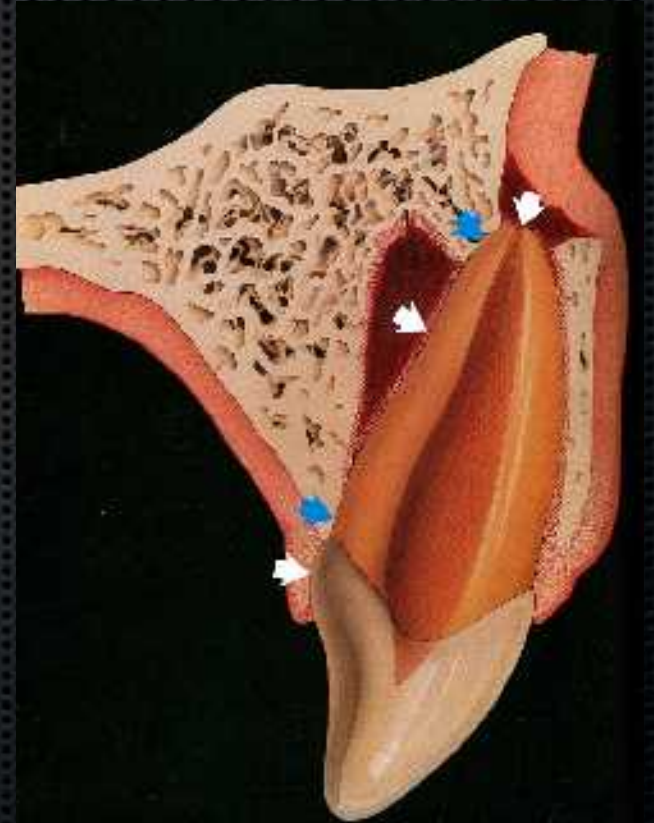
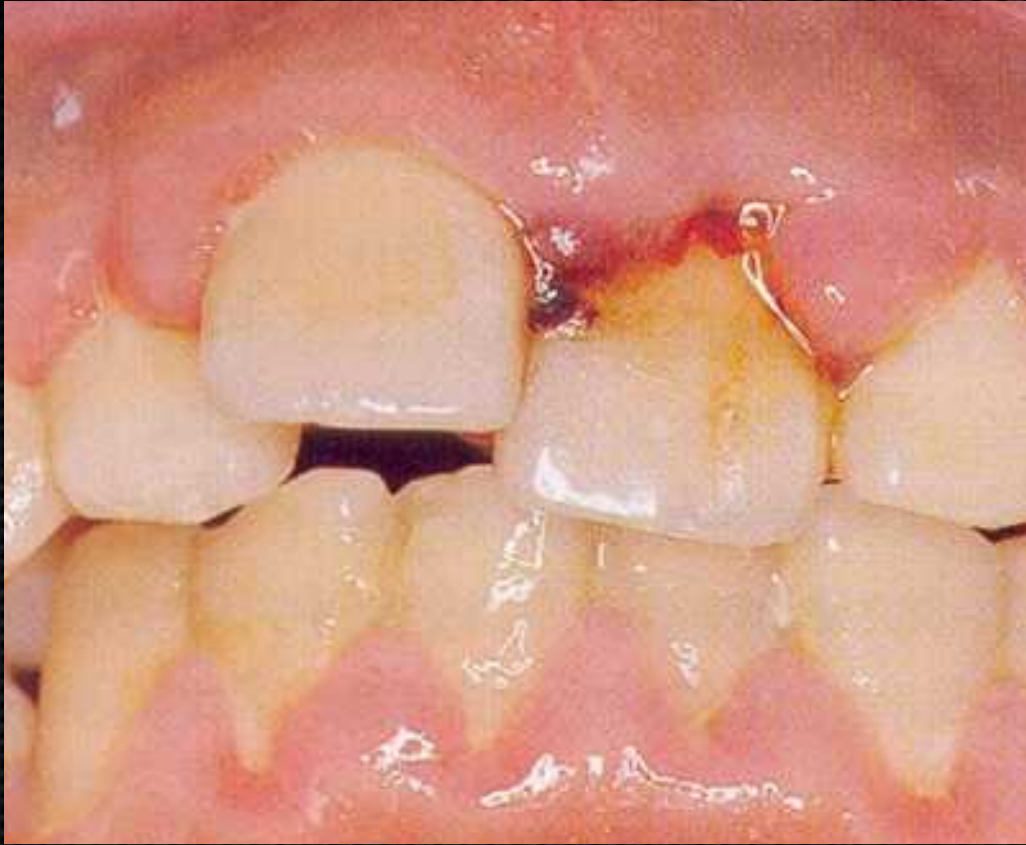
### · **extrusion:**

- axial displacement
- mobile



- lateral luxation:
  - lateral displacement
  - locked in the alveolar bone
  - no mobility
  - not sensitive
  - ankylotic signs

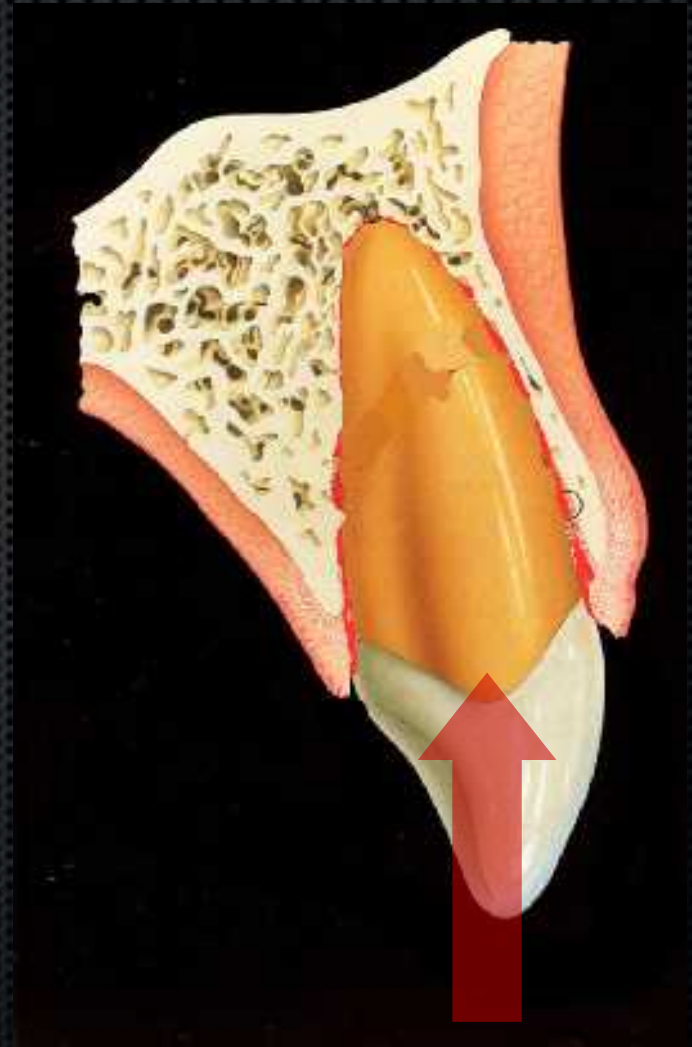
# Luxatio partialis dentis permanentis ~ luxatio lateralis





# 3. Intrusion

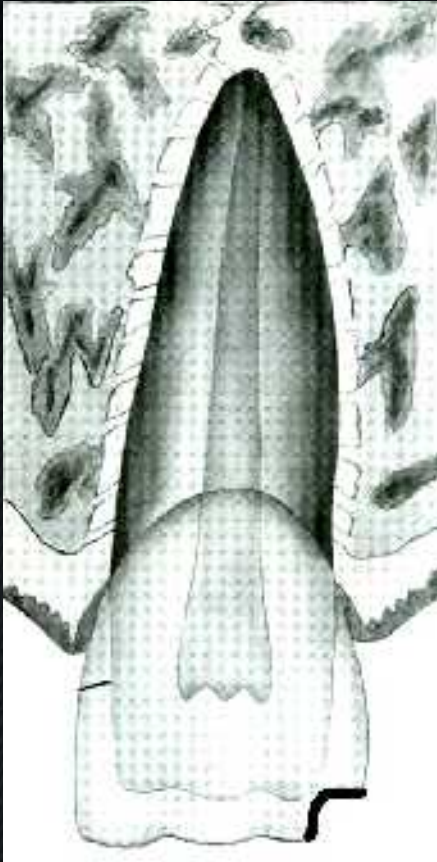
- displacement of the tooth into the alveolar bone
- (axial dislocation)



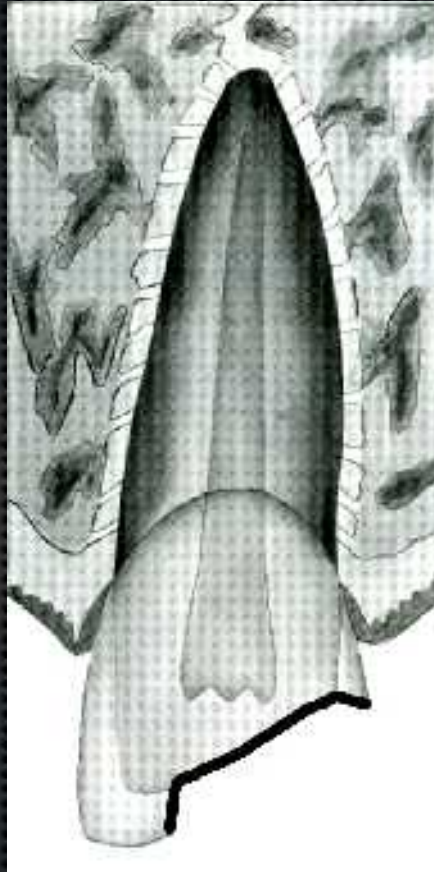
# Fractura coronae dentis permanentis

Types of coronal fracture

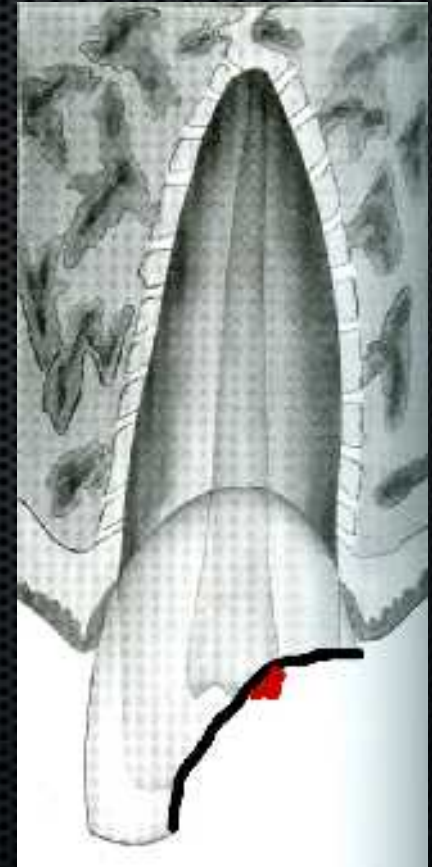
· Most frequent injury



enamel only



enamel and dentine



enamel and dentine  
with the pulp exposed



# Fractura coronae dentis permanentis

- n fracture without complication
- n complicated fracture (with pulp exposition)

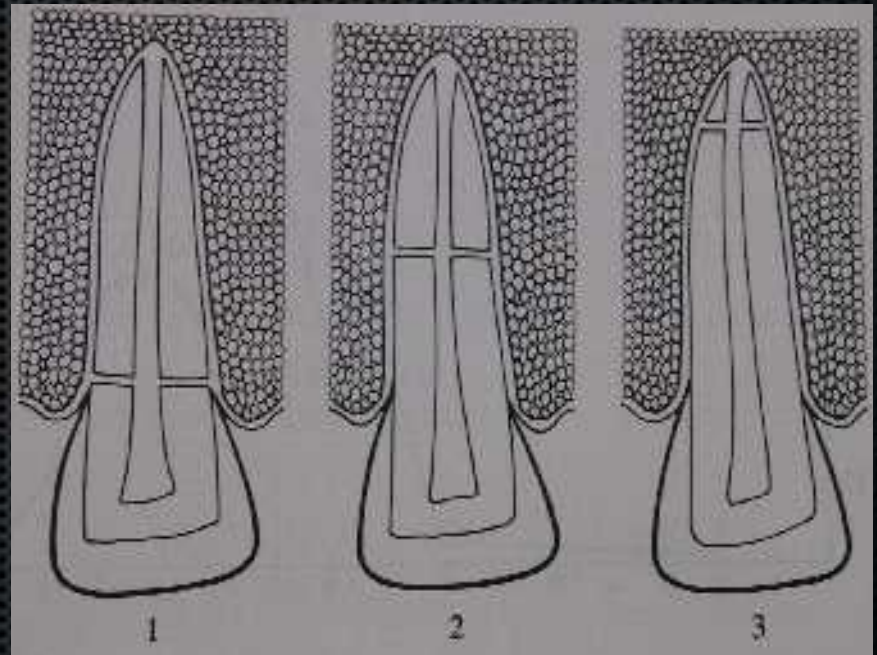






# Fractura radice dentis permanentis

1. cervical third
  2. middle third
  3. apical third
- axial fracture



# Complex therapy



# Treatment of the injuries: Avulsion

## 1. Luxatio totalis dentis permanentis

- Actions out of surgery:

- Suitable storage: in wet agent

1. physiological saline

2. saliva

3. milk

4. Dentosafe-Zahnrettungsbox





# Treatment of the injuries: Avulsion

- **Aim: replantation as soon as possible**
- **the ligaments and cells lose their vitality after 1 hour**
- 1. Preparation of the tooth and the alveolar socket
- 2. Replantation
- 3. Stabilization – using the neighboring teeth for splinting
  - acrylic splint
  - composite bonding with orthodontic archwire
  - brackets
- Woundtreatment





- Prognosis: max. **1 hour** extra-alveolar
- Fixation: closed apex ~ **7-10 days**
  - open apex ~ **2 weeks** (neurovascular reanastomosis)
- In mature tooth with closed apex, or in immature tooth with open apex (time elapsed > 30 min.)
- **In 1 week root canal treatment ~  $\text{Ca(OH)}_2$  should be placed**
- to prevent the initiation of inflammatory root resorption

# Treatment of the injuries: Avulsion

## 1. Luxatio totalis dentis permanentis

### ■ Instructions

1. pulpy diet
2. toothcleaning with soft toothbrush
3. 0,1 % chlor-hexidine

### ■ Supplementary therapy

1. Antibiotic treatment



# Treatment of the injuries: Avulsion

## Luxatio totalis dentis permanentis

- **If replantation is not possible** ( e.g.: in the case of loss of the tooth )
  1. **Temporary solution:**
    - acrylic bridge
    - orthodontic appliance
  2. **Final solution:**
    - orthodontic treatment
    - implantation
    - combined treatment

Treatment of the injuries: Avulsion  
Luxatio totalis dentis permanentis



Temporary solution



# Healing after replantation

- regeneration of the gingiva
- revascularisation of the ligaments
- renewal of the Sharpey ligaments
- open apex ~ revascularisation and reinnervation
- - **Cave:** high bacterial contamination

# Treatment of the injuries: Displacement

## 2. Luxatio partialis dentis permanentis

- **Subluxation**
  - no need to splint for stabilization
  - observation ~ x-rax
  - root canal treatment (pathological sign)



Treatment of the injuries: Displacement

## 2. Luxatio partialis dentis permanentis

- lateral luxation
- extrusion

1. reponation ( following the injury )

*fixation for 2~3 weeks*

1. later : orthodontic reposition

3. root canal treatment ( in case of the tooth with closed apex )

# Treatment of the injuries:

## 3. Intrusion

- Open apex : a chance of spontaneous re-eruption
- Closed apex :
  1. surgical or orthodontic reposition
  2. splint
  3. root canal treatment





Treatment of the injuries:

### 3. Intrusion

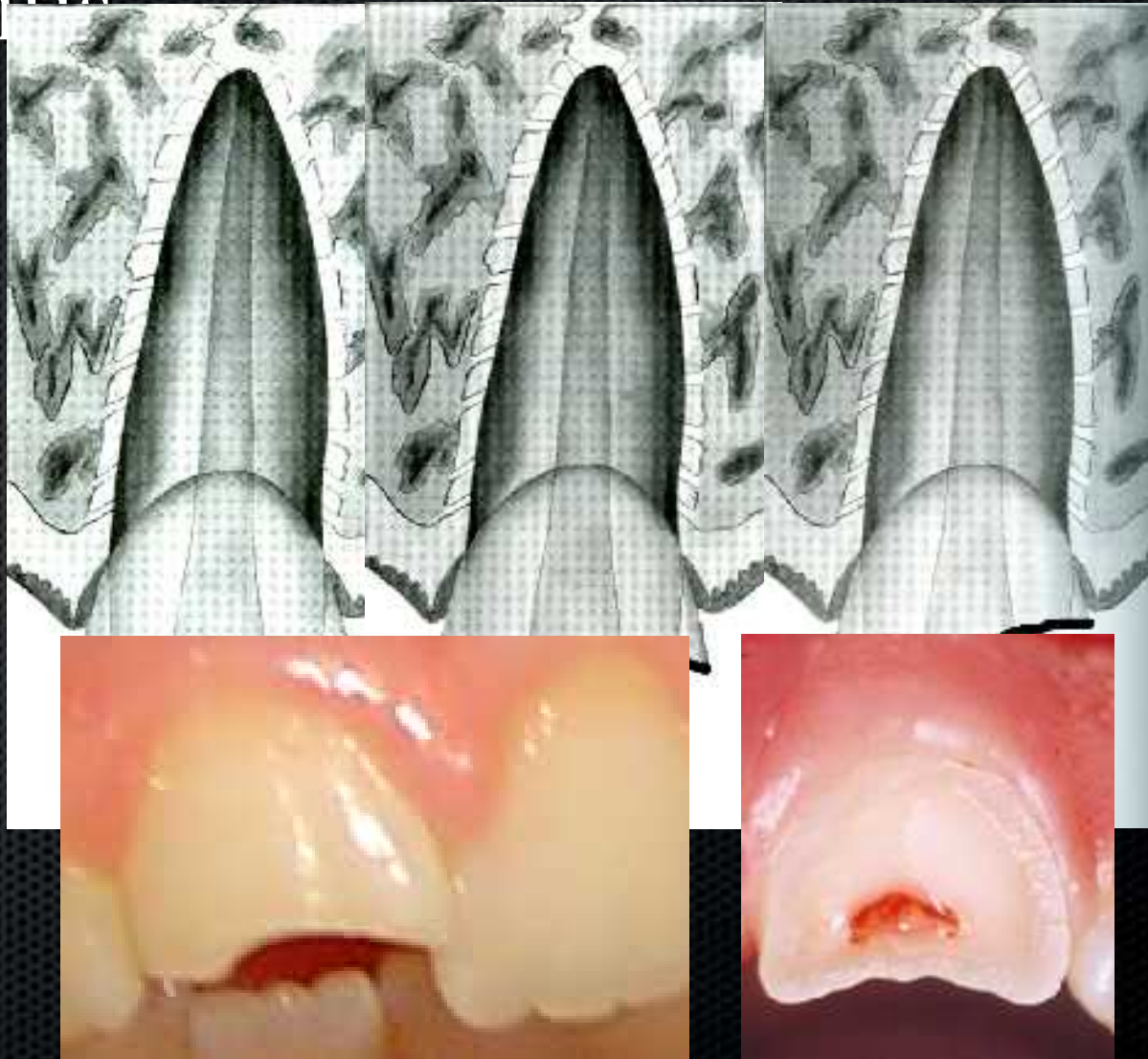


orthodontic and surgical reposition

# Treatment of the injuries:

## Fractura coronae dentis permanente

- The treatment of crown fracture depends on which third of the crown is injured





# Treatment of the injuries:

## Fractura coronae dentis permanents

### a. Enamel injuries:

1. Minor enamel fractures : polishing,  
fluoride solution ELMEX
2. Larger enamel fractures (1-2mm or  
more): composite restoration

## Treatment of the injuries:

### Fractura coronae dentis permanentis

#### b. Enamel – dentine injuries without pulp exposition

1. Calcium hydroxide liner
2. Temporary crown ( celluloid, acrylic ) – 1 year
3. X – ray control
4. Final restoration



# Fractura coronae dentis permanentis temporary crown ~ incisal restoration



# Rebonding of fractured crown





# Treatment of the injuries:

## Fractura coronae dentis permanentis

### c. Pulp exposition

- Important:

1. size of the pulp exposure
2. time between the the injury and the treatment
3. root development

# Treatment of the coronal fracture in case of pulp exposition

<b>exposition</b>	<b>time</b>	<b>root development</b>	
small	1 – 2 hours	open or closed apex	<b>direct pulp capping</b>
larger than 1 mm	more, than 3 hours	open apex	<b>pulpotomy</b>
x-large	long time	closed apex	<b>pulpectomy</b>



# Treatment of the injuries:      Root fracture

## a. fracture in cervical third:

1. root canal treatment + restoration
2. extraction + implantation
3. orthodontic extrusion

## b. fracture in middle third:

- a. reposition
- b. splint ( 6 weeks )
- c. root canal treatment ( in case of necrosis)
- d. observation

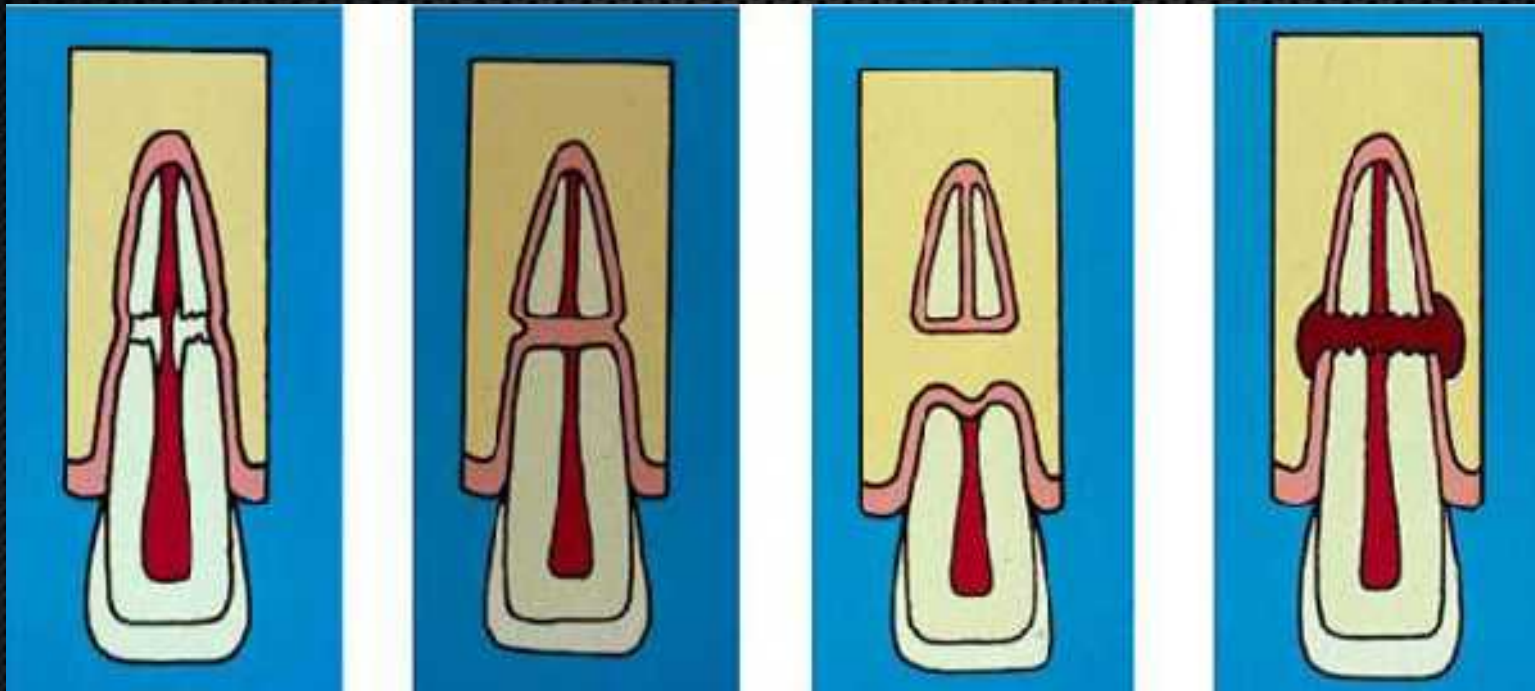
## 1. fracture in apical third:

2. root canal treatment ( in case of necrosis )

# Fractura radice dentis permanentis

## Healing

**Soft tissue, hard tissue**



**granule tissue**



# Prevention



- Protectors

# Prevention

- Mouthguard:
- Confectional
- Prefabricated
- Individual





# Education!!!



Warning ~ Child abuse!!!!



Thank you for the attention!

