Cracked Tooth Syndrome
“กลุ่มอาการฟันร้าว”

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• ให้ดำเนินกั้นความได้
• บอกความชุก และสาเหตุของการเกิด
• อาการและการวินิจฉัย
• ชนิดของรอยร้าว
• การรักษา และการป้องกัน
A toothache caused by a broken tooth without associated cavity or advanced gum disease. Biting on the area of tooth fracture can cause severe sharp pains. These fractures are usually due to chewing or biting hard objects such as hard candies, pencils, nuts, etc. Sometimes, the fracture can be seen by painting a special dye on the cracked tooth.

Treatment usually is to protect the tooth with a crown. However, if placing a crown does not relieve pain symptoms, a root canal procedure may be necessary.

Cameron, 1964
• Generally run in a mesiodistal direction
• Sometimes runs in buccolingually
Epidemiology

- Restored
- Ages 30 up
- Male = Female
- Mand 2\textsuperscript{nd} molars > mand 1\textsuperscript{st} molars > max 1\textsuperscript{st} premolars
Epidemiology

• Maxillary molars: Oblique ridge
• Loading of mandibular molars during mastication is higher than max molars
• “Wedging effect” of MP cusp of max molars
Etiology

- **Most common cause:** Masticatory or accidental trauma
- **History of biting on a hard objects**
- **Cofactors** that decrease the stability of a tooth:
  - Wide & deep cavity prep
  - Wrong cavity design
Cofactors

- Nonrestored deep carious lesion
- Endodontically treated teeth
- Deep occlusal groove
- Extensive loss of enamel & dentine: attrition, erosion, Anorexia nervosa, Bulimia
Cofactors

- Wedging effects of poorly fitting inlays
- Excessive amalgam condensation
- Excessive lateral condensation
- Pin: self-threading or friction-lock
- Occlusal trauma: fillings, parafunction (clenching, bruxism), malposition
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<td>Inadequate design features</td>
<td>Over-preparation of cavities, Insufficient cuspal protection in inlay/onlay design, Deep cusp–fossa relationship</td>
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<td>Pin placement, Hydraulic pressure during seating of tightly fitting cast restorations, Physical forces during placement of restoration, e.g., amalgam or soft gold inlays (historical), Non-incremental placement of composite restorations (tensile stress on cavity walls), Torque on abutments of long-span bridges</td>
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<td>Masticatory accident</td>
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<td>Damaging horizontal forces</td>
<td>Eccentric contacts and interferences (especially mandibular second molars)</td>
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Types of Cracks

- **Craze Lines**
  - Tiny cracks that affect only the outer enamel
  - No pain
  - Common in adult teeth
  - No Tx, Follow up
Types of Cracks

- Fractured Cusp
- Weakened cusp
Types of Cracks

- **Cracked Tooth**
  - Not completely separated into 2 segments
  - Root Canal Treatment is needed
• Early diagnosis & Tx are essential in saving these teeth
Types of Cracks

• Split Tooth
  • Long term progression of a cracked tooth
  • Distinct segments
  • Position & extent of crack will determine whether the tooth can be saved
Types of Cracks

- **Vertical Root Fracture**
  - Cracks begin in root & extend toward the chewing surface
  - Often show minimal signs & symptoms
  - Discover when surrounding bone & gingiva become infected
  - **Extraction**
Symptoms

• Depend on depth & location of crack
• Brief & sharp pain, on biting that ceases after the pressure has been withdrawn is a “classical sign”
• Vitality usually +ve
Symptoms

• Undiagnosed fractures
  • Enter pulp chamber: pulpal inflammation & necrosis
  • Extend to the root: localized periodontal breakdown
Clinical Test To Check Diagnosis

- Difficult
- Thorough dental history
- Check history of trauma, clenching or bruxism & chewing habits
- Examine the teeth with explorer
- Probe the gum tissue for pocketing
• **Check hot & cold sensitivity.** If a sharp pain is felt with temperature & the pain rapidly diminishes with removal of the stimulus, then a fracture is more likely

• **Check for a cracked filling**

• **Extensive intracoronal restoration**
• Might need to remove filling to visualize the crack & assess nerve involvement
• Specialized techniques ex: transillumination, magnifying loupes, staining with methylene blue
• X-ray rarely improves the diagnosis (crack runs // to the plane of film)
• But x-ray of a periodontal breakdown may indicate a split tooth
Symptoms can be elicited when pressure is applied to an individual cusp “bite tests” Bite on a hard object like an orange wood stick or tooth slooth
Pain *increases* when the force increases & relief when the pressure is withdrawn

"Greenstick fracture"·
"Split tooth syndrome"
Immediate therapy

- Splint & stabilize: reinforcement prevents further fracture
- Ortho steel bands are ideal
- Reduce occlusion
- Internal temporary filling with RC
- F/U 2-4 wk, if symptoms persist: RCT
Final therapy

- Placement of a crown or inlays with cusp coverage provides maximum protection but **does not guarantee success in all cases**

- Some cracks may continue to progress & separate, resulting in loss of the tooth
Assessment of tooth

Small peripheral crack
- Remove compromised portion
  - Restore with composite, pinned amalgam or appropriate cast restoration

Large central crack
- No pulpal involvement detected
  - Immediate stabilization with an orthodontic band or acrylic crown + occlusal adjustment if necessary
    - Permanent stabilization and cuspal protection
      - Bonded restoration, e.g., composite, bonded amalgam (with or without pins)

- Pulpal involvement detected
  - Immediate stabilization with an orthodontic band or acrylic crown + pulpal extirpation
    - Monitor symptoms and then complete endodontic treatment

- Hopeless prognosis, e.g., vertical crack, crack extending through pulpal floor, poor crown-root ratio, crack extends below alveolar bone level
  - Extract

- Cast metal restoration, e.g., gold onlay, three-quarter crown, full gold crown. Ferrule design indicated if cast post is required
Prevention

- Fractures are the 3rd most common cause of tooth loss
- Avoid or eliminate risk factors
  - Cavity prep wider than 1/2 of intercuspal distance increases the risk of cracks
  - Occlusal adjustment
  - Ortho malposed teeth
Resources:

Diagnosis, therapy & prevention of the cracked tooth syndrome. Geurtsen W et al. Quin Inter 2003: 34 (6); 409

The cracked Tooth Syndrome. Lynch CD & McConnell RJ. J Can Dent Assoc 2002; 68 (8); 470

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