Objectives

- Go over two “jaws” related cases that I saw over the course of a single shift
- Review injuries to the “jaws”
- Discuss diagnosis and management
Walt!

- 14 year old male was playing backyard football
- He was tackled and now has jaw pain
The mandible

- Mandibular foramen
- Inferior Alveolar Nerve
Mandible fractures

- Peak incidence 16-20 years (in our population)
- Males 3:1
- Location
  - <10 years old - condyles
  - >10 years old - symphysis, body, ramus
- Multiple in 40-60%
  - More common when >13 years old
- C spine injuries in <1%
- Dental injuries in 20-30%
What exam findings can help diagnose a mandibular fracture?
- Tenderness over fracture site
- Malocclusion
- Bruising in floor of mouth
- Mucosal/gingival lacerations
- Chin deviation
- Pain when opening/closing mouth
- Inability to bite down on a tongue depressor
- Tooth fracture
- Lip numbness (inferior alveolar nerve injury)

Bleeding/lacerations along the alveolar ridge suggests an open mandibular fracture
Are chin lacerations associated with fractures of the mandible?

- Yes
- Hubbard et al 1995 – prospective series of 45 children with chin lacs
- 24% had mandible fractures on panorex Xrays
Walt!

- He can open and close his mouth without pain
- Pain to palpation along body of mandible adjacent to 2\textsuperscript{nd}/3\textsuperscript{rd} left inferior molars
- No loose teeth
- He feels that his teeth are in normal alignment
- Can bite down on tongue depressor
- Pain at same site when tongue depressor is vibrated

Do you think he has a mandibular fracture?
Evaluation of mandible injuries

- Usually diagnosed with plain Xrays or panorex
- 3 view plain films are equally sensitive in detecting fractures
- Are CT scans better than plain films?
  - According to Posnick et al 1995 the answer is surprisingly NO (in children at least)
Evaluation of mandible injuries

- Charalambous et al 2005
  - Prospective study of 280 adults with possible mandible fracture
  - All got Xrays - lateral-oblique and PA
  - Radiologist was blinded to clinical probability of a fracture
  - 65 had a fracture
  - A decision rule was found that identified 5 parameters with a Sensitivity of 100% and specificity of 39% that can eliminate the need for radiography
    - Malocclusion
    - Trismus
    - Broken teeth
    - Pain with mouth closed
    - Step deformity
Treatment

- If needed, surgery should be done within 5 days of injury
  - Immobilize for 3-4 weeks (adults 6-8 weeks)

Unilateral condyle fracture

- With no malocclusion analgesia, soft diet, 1-2 week f/u Xrays
- With malocclusion 7-10 days of immobilization
Treatment

- **Bilateral condyle fracture**
  - Splints can help prevent permanent malocclusion

- **Symphysis, body, and angle fractures**
  - Non displaced are managed conservatively
  - Displaced/open need plates
  - Intermaxillary fixation requires that teeth are firmly rooted in the alveolar bone

white arrow - symphyseal fracture
red arrow - angle fracture
More about mechanism

- Falls and MVC
  - condyle, symphysis
- Assaults
  - body and angle

In adults
MVC 40%
Assault 40%
Fall 10%
Sports 5%
Other 5%
Prognosis

- Children heal in 2-3 weeks (adults 2x that)
  - Nonunion is rare
- Complications
  - Malocclusion
  - Growth asymmetry
  - Poor mastication
  - Osteomyelitis
  - TMJ syndrome
  - Salivary disorders
  - OSA
  - Chronic pain

Higher risk in condylar fractures

malocclusion
Walt! (revisited)

- His Xrays were negative for fracture
- Discharged on analgesics
- No contact sports until pain free
- No visiting mysterious islands with electromagnetic properties either
Interlude

- Which celebrities do these famous jaw lines belong to?

- Jay Leno
- Reese Witherspoon
- Robert Pattinson
Yawning Yolanda

- A 17 year old female yawned this AM (about an hour ago)
- Now she can’t close her mouth
- This happened in 4th grade too
- Review of systems is otherwise negative
A brief detour...

- What is yawning?
  - A reflex of simultaneous inhalation and stretching of the eardrums, followed by exhalation

- Why do we yawn?
  - Hypercarbia
  - To control brain temperature
  - To stretch one's muscles
  - Nervousness

- Is it ‘contagious?’
  - Contagious yawning may have developed as a way of keeping a group of animals alert
  - Autistic children don’t seem to do it
Yawning Yolanda

- On exam she is unable to close her mouth
- She has excessive salivation
- A visible depression is noted in the preauricular area
- What is the diagnosis?
  - **Dislocated TMJ (bilateral)**
TMJ Dislocations

- Occurs with
  - Trauma
  - Extreme mouth opening (yawning, laughing, singing, vomiting, dental procedures)
  - Dystonic drug reaction

- Is symmetric or unilateral dislocation more common?
  - Symmetric

**Pro-Tip:** Get Xrays to evaluate for a condylar fracture if there was trauma
TMJ Dislocations

- Displacement of the mandibular condyle from the articular groove in the temporal bone

- **Anterior**
  - Masseter/temporals muscles elevate mandible before lateral pterygoid relaxes it
  - Muscle spasm leads to trismus

- **Posterior**
  - Usually due to direct blow
  - Condyle pushed back into mastoid

- **Lateral**
  - Usually associated with fractures
  - The condyle can be felt in the temporal space
What genetic disorders can increase the likelihood of TMJ dislocations?

- Hypermobility syndromes
- Marfan or Ehlers-Danlos
Anterior TMJ dislocations

In maximally open position, the condyle is just under and slightly behind the eminence.

The dislocated jaw traps the condyle forward of and slightly above the eminence.
Anterior TMJ dislocations
Reduction

- Consider sedation and get Xrays first to r/o fracture!
- Patient seated upright – approach from the front
- Wrap your thumbs in gauze
- Place thumbs against lower molars as far posterior as possible
- Wrap your fingers under the angle of the mandible
- Exert downward pressure
  - Release condyle from articular eminence
- Then posterior pressure
  - Moves condyle back into fossa
- Splint the mandible with an ace wrap afterwards

Reduction may also be facilitated by gently rocking the mandible back and forth or by masseter muscle massage
Reduction – from behind patient

- Patient seated upright – approach from behind
  - Brace the patient’s head against your abdomen/chair
- Wrap your thumbs in gauze
- Place thumbs against lower molars as far posterior as possible and push down
- Wrap your fingers under the angle of the mandible and pull upward
- Splint the mandible with an ace wrap afterwards

Reducing one side of a bilateral dislocation at a time may be easier
Reduction

Video
Complications

- Are usually related to muscle spasm
  - The jaw can exert 300 lb/in$^2$
- Failed reduction
  - Needs open reduction in the OR
- Crush injuries (to your fingers)
- Tooth fractures
- Aspiration of gauze
  - Have suction and a pair of McGill forceps available
After reduction

- Splint the jaw for patients who are likely to continue to open their mouth widely
- Avoid vigorous mouth opening for 3 weeks
  - Support the jaw when yawning
- Analgesics
- Soft diet for at least 2-3 days then advance as tolerated
- Referral to a surgeon for recurrent dislocations
Yawning Yolanda (revisited)

- X-rays negative for fracture
- IV Versed
- Reduction attempted by Resident
- Prior to giving second dose of Versed she spontaneously reduced with masseter muscle massage
- Jaw splinted
- Soft diet x48-72 hours
- Follow up with OMFS because it is recurrent
Right before leaving her grandma said that she has TMJ syndrome

The resident asks if that is real
- Umbrella term covering acute or chronic inflammation of the TMJ
- Many proposed causes
- Treatment with acetaminophen or neuropathic agents (TCA, gabapentin)
- Biofeedback may help

Proposed TMJ syndrome causes
- Trauma
- Bruxism
- Dental malocclusion
- Excessive gum chewing or nail biting
- Size of foods eaten
- Degenerative joint disease
- Myofascial pain dysfunction syndrome
- Lack of overbite
The big 5

- Take home points about mandible injuries
  - Physical exam findings are sensitive for diagnosing potential mandible fractures
  - Bleeding /lacerations along the alveolar ridge in the floor of the mouth suggests an open mandibular fracture
  - When evaluating for fractures get 3 X-Ray views of the mandible
  - Get X-rays BEFORE reducing a dislocated TMJ
  - Protect your fingers when reducing a dislocation
References


- Textbook of Emergency Medicine 5th Edition

- Textbook of Pediatric Emergency Procedures

- Up To Date: Jaw Fractures in Children