Mandible fracture - Management

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OMFS
SDCRI, SGNR
MANAGEMENT

OPEN !
DIRECT !

CLOSE !
INDIRECT !
IMMEDIATE (PRIMARY)
1. ABC
2. Temporary stabilization
3. Tetanus prophylaxis
4. Antibiotics
5. Analgesics
6. Nutrition (oral / parenteral)

DEFINITIVE
1. Conservative management
2. Reduction
   a. Close
   b. Open
2. Fixation
   a. Indirect
   b. Direct
3. Rehabilitation
   Physiotherapy

Reduction – bringing the bone back to its anatomic position
Conservative management

- Some #s are stable and occlusion is not deranged. Such #s may be treated by
  1. soft and liquid diet
  2. preventing wide mouth opening
  3. preventing more trauma to the site (avoid crowded places)
Closed reduction & Indirect Fixation

Indications

- **Undisplaced** favorable fractures
- Grossly **communitied** fractures
- Significant **soft tissue** loss
- **Edentulous** mandibular fractures of severely atrophic ridges
- **Paediatric** fractures with developing dentitions.
- **Coronoid** process fractures
- **Condylar** fractures with minimal occlusal disturbance
Closed reduction

- Fracture is reduced by manipulating the bone without exposing the fracture site
  - By manipulation
  - By traction using elastics
- Primary aim is to get **good occlusion**
ADVANTAGES:
1. No need for GA
2. Can be used in comminuted fractures
3. Can be used in continuity defects

DISADVANTAGES:
1. May not always be accurate
2. Long period of IMF
3. Inadequate reduction
Indirect Fixation

• Mandible is stabilized against maxilla or cranium
• This indirect fixation is kept for 4-6 weeks

Methods:
1. Dental wiring with IMF
2. Cap splint
3. Gunning splint
4. Circumandibular wiring
5. External fixation with head caps, halo frames, pin fixation
DENTAL WIRING:

1. 26 gauge stainless steel wire + wire holders + wire cutter + LA \ GA

2. Scaling and polishing before wiring

3. Different types of wiring in different clinical situations

4. Wiring can be used to:
   a. splint mobile teeth
   b. stabilize fractures

5. Splinting upper and lower jaws after dental wiring is called as IMF (inter-maxillary fixation)
Different types of Dental Wiring

Gilmer direct dental wiring

ESSIG'S WIRING

Erich's arch bar

Risdon's wiring
CAP SPLINTS:

- **Two types:**
  1. metallic
  2. acrylic

- **Indications:**
  1. when teeth cannot provide adequate support for wiring (mixed dentition period)
  2. when jaws cannot be put in IMF (Asthama, children etc.)

- **Steps**
  1. impression and cast
  2. cast is cut at # site and brought into occlusion with maxillary teeth
  3. cast mounted on articulator
  4. splint fabricated (metallic or acrylic)
  5. # reduced and splint attached to teeth (with cement)
GUNNING SPLINTS:
Indications:
edentulous jaw # where open reduction and fixation cannot be done

Steps in making splint
1. impression of the upper and lower jaws
2. cast is made
3. cast is cut at # site and realignment done
4. upper and lower base plates with acrylic
5. posterior bite blocks made with hooks on buccal side
6. heat curing done
7. upper and lower splints attached to jaws with
   PERALVEOLAR wiring (maxilla) and circummandibular (mandible)
8. hooks of upper and lower splints tied together
Circummandibular wiring
HALO FRAME

EXTERNAL PIN FIXATION
Biphasic pin fixation
Open reduction and direct fixation

- Access to the fracture site through wound or incision
- Reduction performed under direct vision
- Direct Fixation of the fracture fragments
- Suturing

**INDICATIONS:**
1. Displaced/ undisplaced favourable/unfavourable #
2. When IMF is contraindicated
3. Multiple #s of mandible
4. Associated #s of midface

**ADVANTAGES**
1. Accurate reduction and fixation
2. Direct visibility of the fracture
3. Faster functional rehabilitation

**DISADVANTAGES**
1. Surgical approach and associated complications
2. expensive
SURGICAL APPROACH TO MANDIBLE

1. EXTRAORAL
   a. Through lacerations
   b. Submandibular incision (Risdon’s)
   c. Modified Risdon’s
   d. Retromandibular incision (Hind’s)
   e. Submenthal incision

2. INTRAORAL
   a. Through lacerations
   b. Vestibular incisions
     c. Anterior border of ramus incision
Risdon’s Submandibular approach
HINDS RETROMANDIBULAR APPROACH
Vestibular incision
Anterior border of ramus incision
DIRECT FIXATION

• Transosseous wiring
• Miniplate & Microplates
• Reconstruction plates
• Compression plates (Dynamic & Eccentric dynamic)
• Locking plates
• Biodegradable plates
• Titanium mesh
• Lag screw osteosynthesis
• Intramedullary k-wire fixation
TRANSOSSEOUS WIRING

First developed by Sir William Kelsey fry

Indications

• Mostly used for reduction of posterior edentulous mandibular fragment with significant displacement

• For immobilisation of major fragments when soft tissue or muscle trapped in between the fragments.

Contraindications

• Not used for compound fractures
Indications:
1. all dentulous and edentulous #s

Special Consideration:
1. in children plating should be done at lower border to prevent damage to tooth bud
2. in infected #s compression plating is preferred because it gives more rigid fixation

Advantages:
1. plates are thin. No need to take them out
2. easy to adapt to the bone
3. intraoral approach
4. less chance of damage to inferior alveolar vessels and nerve
RECONSTRUCTION PLATES (2.7mm)

Indications:

Severely oblique fractures, comminuted fractures and fractures with bone loss (compression plating will cause undesirable overlapping and collapse of the bony segments. Miniplates will be instable and will not provide adequate stability)

A MINIMUM OF THREE SCREWS SHOULD BE PLACED ON EITHER SIDE
These plate have threaded holes through which when specially Designed screws pass they get locked into them independent of The bone . the screws are anchored seperately to the plate and bone .
COMPRESSION PLATING SYSTEM (1.5 -2.7mm)

- Two types:
  1. dynamic compression plate (DCP)
  2. eccentric dynamic compression plate (EDCP)

- Principle:
  the holes in the plate are bevelled at 30-45deg. Because of this the screw first enters the bony cortex (bicortical) and then moves the bone towards the depth of bevel

- These plates are **bulky** and give a rigid fixation.
- Most of the time they require **extra oral incision**

Now not used frequently
TENSION BAND PRINCIPAL

When a DCP is tightened
Tension forces on superior
Border increases
By 10-65 %

Applying a T.B. To the superior
Surface of the fractured
Mandible, axial compression
Occurs across the full width
Of the mandible, preventing
Distraction at the occlusal border
ECCENTRIC DYNAMIC COMPRESSION PLATES
Lag screw osteosynthesis

- Main indication: in oblique #s
- Any screw that has uniform diameter along its length can be used as a lag screw
- The threads of the screw engage only one fracture fragment (the fragment away from the screw head)
- The hole in the other fragment serves as GLIDING hole (diameter larger than screw)
- The cortex near the screw head has counter sink for the screw head
- The final tightening of the screw compresses the two fragments together tightly
INTRAMEDULLARY KIRSHNER WIRE
BIODEGRADABLE PLATES

POLYMERS OF PDS, POLYGLYCOLIC ACID, POLYLACTIC ACID. NEWER ONES INCLUDE SELF REINFORCED PGA / PLA
Fracture of edentulous mandible

- Bilateral molar regions prone to # due to atrophy
- The mylohyoid and digastric muscles pull the anterior part down (BUCKET HANDLE #)
- This extreme displacement may cause respiratory obstruction

**Difficulties:**
1. Healing is delayed
2. Periosteal blood supply in old age – raising periosteal flap for plating may compromise blood supply

**Management:**
1. Closed reduction with gunning splint
2. Open reduction and miniplate fixation
3. Comminuted #s – open reduction and fixation
4. Severely atrophic mandible – open reduction with bone grafting
Mandibular #s in children

Applied anatomy:
- The bone is elastic and soft so **green stick #** is more common
- The neck of condyle is thick so # of articulating surface is common – **risk of TMJ ankylosis**
- Because of change from deciduous to permanent dentition the **occlusion can adapt** to minor discrepancies.
- Faster healing

Management:
1. Green stick #s with no occlusal discrepancies – no fixation
2. Closed reduction with **cap splint** is preferred
3. Long duration IMF is not applied due to chance of TMJ ankylosis
4. Open reduction is used only in multiple displaced #s. Plate is fixed at lower border to prevent damage to teeth buds
Fracture of condyle

Clinical features:

1. posterior gagging of occlusion (early contact of molars)
2. deviation of mandible towards the side of # (on mouth opening)
3. anterior open bite
4. trismus
5. condylar movements not felt
6. bleeding from ear
7. preauricular tenderness
MANAGEMENT:

1. **Children** – avoid IMF. Sometimes IMF is applied for pain control for 5-7 days. Functional therapy

2. **Adults unilateral** – IMF for 3-4 weeks followed by functional therapy. Or open reduction and fixation. Required in displaced and dislocated #s

3. **Adults bilateral** – at least one side should be done by open reduction and fixation with IMF for 3-4 weeks. Or open reduction and fixation for both sides
COMPLICATIONS

1. **Delayed union** – when the healing takes more than 6 weeks. Due to infection, inadequate fixation, diseases affecting bone vascularity and healing (diabetes, osteopetrosis), smoking

2. **Malunion** – when the reduction is not accurate the bone heals at that inaccurate site

3. **Non-union** – when there is no union. Due to infection, inadequate fixation, diseases affecting bone healing, soft tissue between # fragments

4. **Infection and osteomyelitis**

5. **Trismus**

6. **Nerve injury**

7. **Malocclusion**
The thorpe system is a two Stage screw system. The first screw is a hollow Plasma coated screw which Passively anchors the plate To the bone. then the Conical expansion screw is Placed in the head of the Anchor screw to fix the Screw to the plate.
Indications for removal

1. Vertical # involving crown and root
2. Complete subluxation of tooth
3. Teeth with large periapical pathology
4. Grossly infected # line
5. Bad periodontal condition with grade III mobility
6. Advanced caries
7. Root stumps