MANAGEMENT OF INTRAARTICULAR FRACTURES OF ELBOW JOINT

By Dr B. Anudeep
M. S. orthopaedics
Final yr pg
INTRAARTICULAR FRACTURES

Intercondylar fracture

Capitellum #

Radial head #

Trochlea #

Olecranon #

Coronoid #

Elbow dislocation
Intercondylar fracture of humerus

- This is most common distal humeral fracture
- Females are common than male
- It occurs in older patients with osteoporotic bone

Mechanism of injury

- Force is directed against the posterior aspect of an elbow flexed >90 degrees
Clinical evaluation

- Pain
- Swelling
- Range of movements are restricted
Radiographic evaluation

- **Standard** anteroposterior and lateral views of elbow should be obtained
- Traction radiographs better to know the fracture pattern and preoperative planning
CT scan
- Often obtained for surgical planning
- Especially helpful when shear fractures of the capitellum and trochlea are suspected
- 3D reconstruction improves the intraobserver and interobserver reliability of several classification systems
Classification

AO CLASSIFICATION

Type 1: complete articular fractures, metaphysial simple

Type 2: complete articular fractures, metaphysial multifragmentary

Type 3: complete articular, multifragmentary.
Treatment

- The goal of treatment is anatomical restoration of joint surface with stable fixation.
- This allows early motions.
- No role of conservative treatment.
- Open reduction and internal fixation with 90–90 loking plate.
- Posterior approach with olecranon osteotomy technique used most commonly.
Complications

- Post traumatic arthritis
- Infections
- Non union
- Malunion
- Ulnar neuritis
- Heterotopic ossificans
- Non union of olecranon
- Stiffness of the elbow
CAPITELLUM FRACTURES

- These represent <1% of all elbow fractures (1)
- It occurs in the coronal plane parallel to the anterior humerus
- Articulates with proximal radius, allows for forearm rotation

![Image of elbow fracture]
Mechanism of injury

Direct axial compression transmitted to the capitellum by the radial head with the elbow in a semi flexed position can create a shear fracture of the anterior portion of the capitellum.
Classification

**Bryan and morrey classification**

**Type 1**: large osseous component of capitellum, sometimes trochlear involvement.

**Type 2**: articular cartilage with minimal sub chondral bone attached.

**Type 3**: markedly comminuted

**Type 4**: extension into the trochlea.
Clinical features

- Pain and swelling over elbow
- Tenderness on the lateral aspect
- Limitation of flexion

Investigations

- Anteroposterior and lateral view x rays to be taken.
3D reconstruction most important. It delineates fracture anatomy and classification.
Treatment

Nonoperative
- Used in non displace fractures
- It should immobilized in posterior splint for 3weeks followed by range of elbow motions.

Operative
- The goal treatment is antatomical restoration.
- **Open reduction and internal fixation with HERBERT SCREWS**
  - indications
    - displaced Type I fractures (>2mm)
    - Type IV fractures
- **Fragment excision**
  - indications
    - displaced (>2mm) Type II fractures
    - displaced (>2mm) Type III fractures
- **Total elbow arthroplasty**
  - Indications
    - unreconstructable capitellar fractures in elderly patients with associated medial column instability
POST OP MANAGEMENT

- Above elbow pop slab for 2 weeks
- Suture removal after 2 weeks
- Active assisted elbow exercises by patient for 2 weeks
- Physiotherapist assisted elbow exercises after 4 weeks
- Load bearing and strengthening exercises after 6-8 weeks
Complications

- Elbow contracture (most common)
- Nonunion (1-11% with ORIF)(2)
- Ulnar nerve injury
- Heterotopic ossification (4% with ORIF)(2)
- Avascular necrosis of Capitellum
- Nonunion of Olecranon osteotomy
TROCHLEA FRACTURES

- It is very rare fracture
- It is associated with the elbow dislocation

Treatment
- Undisplaced fractures are managed with posterior splint for 3 wks, followed by range of motions
- ORIF is indicated in displaced fractures

Complications
- Post traumatic arthritis
- Malunion
Radial head fractures

- It is common in adult
- Radial head fractures accounts for 1.7% to 5.4% of all fractures (3)

Mechanism of injury

- Most of fractures results of a fall onto the outstretched hand (while arm pronated, head impacted in capitellum) and high energy injuries due to fall from height or during sports
Classification

Mason

Type I:Undisplaced.

Type II:Displaced.

Type III:Comminuted.

Type IV:## associated with post. Elbow dislocation & coronoid #.
Clinical features

- Pain on passive rotation of the forearm.
- Tenderness and swelling over the radial head.
- Restricted elbow and forearm movements.
- Distal radius ulna joint (DRUJ) stability
  - Palpate wrist for pain and DRUJ stability, compare to contralateral side
Investigations

Radiographs

- Anteroposterior and lateral radiographs of elbow to be obtained.

- Oblique view to be taken when fracture is not suspected in Ap and lateral views.
CT scan - useful for comminuted fractures to further delineate fracture fragments
Treatment

Principals

1. Correction of any block to forearm rotation.
2. Early range of elbow and forearm motions.

Nonoperative treatment

Most of the isolated radial head fractures can be treated conservatively by POP for 3 wks, then active exercises to start.
Operative treatment

1. Fracture with gross comminution.
2. Absolute indication is type 2 fracture which restricts forearm pronation – may be fixed with HERBERT SCREW.
3. In type 4 excision of head is indicated when elbow is stable.
4. Radial head replacement - comminuted fractures (Mason Type III) with 3 or more fragments where ORIF not feasible.
Complications

1. Elbow Contractures
2. Post traumatic radio-capitellar osteoarthritis.
3. Complex regional pain syndrome.
OLECRANON FRACTURE

- The incidence is 11.5 per 100,000 population per year.
- It accounts 8% to 10% of elbow fractures. (5)
- **Mechanism of injury**:
  - **Direct**: A fall on the point of the elbow results comminuted olecranon fracture.
  - **Indirect**: A strong, sudden eccentric contraction of the triceps upon a flexed elbow typically results transverse or oblique fracture (more common).
  - Combination of these two produce displaced, comminuted fracture.
Clinical evaluation

- Pt typically present with the hand supported by contralateral hand with elbow in flexion.
- Pain, swelling, tenderness over elbow.
- Inability to extend the elbow actively

Investigations

- Anteroposterior and lateral radiographs of elbow should be obtained.
Classification

MAYO classification

Type I: undisplaced # of proximal 1/3.
   1a: non comminuted
   1b: comminuted

Type II: displacement of proximal fragment without elbow instability.
   2a: non comminuted
   2b: comminuted

Type III: features of instability of the ulnohumeral joint.
   3a: non comminuted
   3b: comminuted
Objectives of treatment

- Restoration of articular surfaces.
- Restoration and preservation of the extensor mechanism.
- Restoration of elbow motion and prevention of stiffness.
- Prevention of complications.
Treatment

Non operative

1. Indicated in non displaced and displaced fractures in low functioning older individuals.
2. Immobilization in long arm cast or splint with elbow in 45 to 90 degrees of flexion.
3. After 3 wks remove the cast and allow protected range of motion exercises, avoiding active extension and flexion >90 degrees.
Operative treatment

Indications are

1. Displaced fractures
2. Articular incongruity

Types of operative treatment

- Tension band wiring in combination with two k-wires – avulsion type of olecranon fracture.
- 6.5mm cancellous lag screws fixation with combination with tension band wiring.
Plate fixation in comminuted fractures.
Postoperatively – posterior splint should be applied 3 to 4 days then range of motions to start.
Complications

- Hardware failure
- Infections
- Pin migration
- Ulnar neuritis
- Heterotopic ossificans
- Non union
- Decreased range of elbow motion.
ELBOW DISLOCATION

- It accounts for 11% to 28% injuries to the elbow (6)
- Posterior dislocation is common
- Simple dislocations are purely ligamentous
- Complex dislocations are associated with fracture
- Highest incidence in the 10-20 yrs age group associated with sports injuries (7)
Mechanism of injury

Most commonly injury is caused by fall onto on outstretched hand or elbow.

Posterior dislocation: This is combination of elbow hyperextension. Valgus stress, arm abduction and forearm supination.

Anterior dislocation: Direct forces strikes the posterior forearm with the elbow in flexed position.
Clinical features

 A complete elbow dislocation is extremely **painful**.
 The arm will look deformed and may have an odd twist at the elbow.
 Tenderness, swelling will also present.

Investigations

 Antero posterior and lateral radiographs of elbow to be obtained.
 CT scans may help to identify bony fracture fragment.
Classification

- Simple vs complex
- According to the direction of displacement ulna relative to humerus:
  1. Posterior
  2. Posterolateral
  3. Posteromedial
  4. Lateral
  5. Medial
  6. Anterior
Treatment principles

- Restoration of the inherent stability of elbow.
- Restoration of the trochler notch of the ulna, particularly coronoid process.
- Radiocapitellar contact is very important to the stability.
- The LCL is more important than MCL in traumatic elbow instability.
- Post reduction stability should allow for extension of the elbow to 30 degrees of extension.
Treatment

Non operative

- Acute simple elbow dislocation should undergo reduction with the pt under sedation and adequate analgesia.

- **Technique** - In posterior dislocation – longitudinal traction and flexion of elbow is needed.

- Neurovascular status to reassessed.

- Post reduction radiographs are essential.

- After reduction, forearm should in 90 degrees flexion with posterior splint.

- ROM to start after 4 wks.
Operative treatment

Indicated when elbow is not reduced in proper position.

When elbow dislocates before taking post reduction radiographs.

Options are

1. Open reduction and repair of soft tissue.
2. Hinged external fixation.
3. Cross pinning of the joint.
Complications

- Stiffness
- Neurovascular injury
- Compartment syndrome
- Persistent instability
- Arthrosis
- Myositis ossificans
CORONOID FRACTURE

- It occurs in 10 to 15% of elbow dislocation. (8)
- More common with posterior elbow dislocation.

Mechanism of injury

- Fracture of the coronoid process is thought to result from elbow hyperextension with either avulsion of the brachialis tendon insertion, or shearing off by the trochlea.
Classification

Regan and morrey – based on size of fragments
Type 1 – avulsion of the tip of coronoid process
Type 2 – single or comminuted involving 50% or less
Type 3 – single or comminuted involving >50%
Treatment

- Sutures can be used for fixation of small coronoid fracture fragments.
- Lag screws can be used for larger fragments.
Conclusion

- The history and mechanism of injury is essential
- Radiographs and advanced imaging is required to allow identification of fracture pattern
- In surgical management of intra-articular fractures, anatomical reduction, rigid and stable fixation are the prime importance in achieving an excellent outcome
References


References


Thank you