

## Condylar fracture – a review

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### **Abstract**

Condylar and choronoid fractures constitutes 26-40%of all mandibular fracture. Condyle is the major growth centre of mandible.This article acts a small summarization of the views and thoughts of various surgeons and anatomists over the ages and tries to condense the vastly available information into a meaningful format applicable to current genre of maxillofacial surgeons.

Fractures of the condyle and joint represent 20-30% of all mandibular fractures, and are thus among the commonest facial fractures<sup>1</sup>. The pattern of the fracture can be extremely variable and may occur anywhere down a line from the sigmoid notch to the mandibular angle. Condylar neck fractures are clearly different from other mandibular fractures in as much as they are always located behind and above the lingula. They also differ from mandibular body fractures because they are more difficult to diagnose, both clinically and radiologically. Different treatment methods must also be employed; this is due on the one hand to the anatomically more difficult access to the joint and on the other to the fact that the articular region is a growth region, thus requiring a different approach to fractures that occur during childhood.

### **Introduction**

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### **Classification of Condylar Fractures**

### Rowe & Killey's classification (1968)

- Intra-capsular fracture - high condylar fracture
  - Involving the articular surface
  - Fracture through the neck
- Extracapsular fracture - low condylar fracture
- Injury to the capsule, meniscus and ligament
- Involving the adjacent bone

### McLennan Classification (1952)–Clinical Classification

- **Type I: No displacement**
- **Type II: Fracture deviation** – simple angulation of the fractured segments without overlap or separation.
- **Type III: Fracture displacement** – when there is overlap of fracture fragments. This overlap may be in an anterior, posterior, lateral or medial. Medial is commonest.
- **Type IV: Fracture dislocation** –The head of the condyle gets completely dislocated out of the articular fossa this dislocation can be medial or lateral and rarely anterior or posterior.
  
- **Type V: High condylar fracture with luxation**
- **Type VI: Head fracture or intracapsular fracture**

### Lindhal's classification: Comprehensive classification (1977)

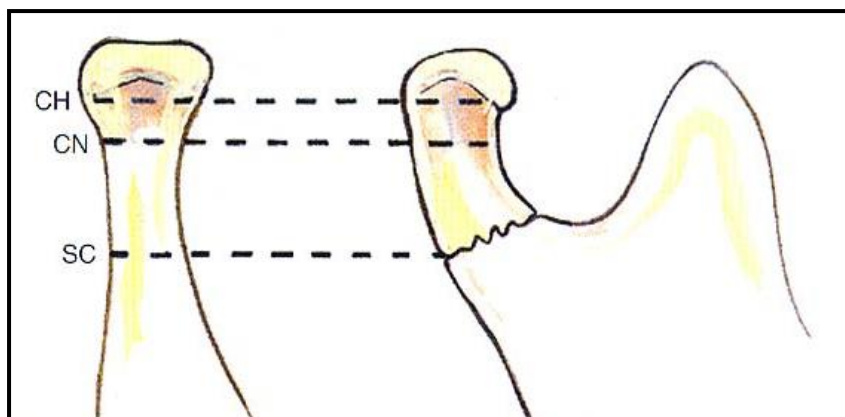
- a. The anatomic location of the fracture.
- b. The relation of the condylar segment to the mandibular segment.
- c. The relation of the condylar head to the articular fossa.

This system necessitates that radiographs be obtained in at least two views at right angles to each other. He suggested the following views to allow optimum localization

1. Orthopantomograph
2. Postero-anterior projection of the skull
3. Profile projection of the skull
4. Axial projection of the skull
5. Oblique trans-cranial views of the TMJ

To obtain proper classification, the following factors must be noted<sup>2</sup>.

#### A. Depending on fracture level



CH- condylar head / CN – Condylar neck / SC – Sub condylar

### 1. Condylar head fracture- intra-capsular –

The exact anatomic confines of the head of the condyle:

**GRAYS ANATOMY** describes the head as extending a short distance down the anterior aspect of the process, covering the entirety of the superior portion, and extending at least 5 mm down the posterior aspect. Radiographically noting the neck constriction as the head lies above the neck serves as an indicator to locate the head. The fractures of the head are necessarily intra-capsular as the capsule attaches to the neck. The head of condyle fractures can be further classified as

- a. Vertical fractures
- b. Compression fractures
- c. Comminuted fractures
- d. Condylar neck fracture –

These are fractures at the thin constricted part of the condyle. These are fairly easy to identify radiologically. The neck is caudal to the attachment of the capsule and thus makes it an extracapsular fracture.

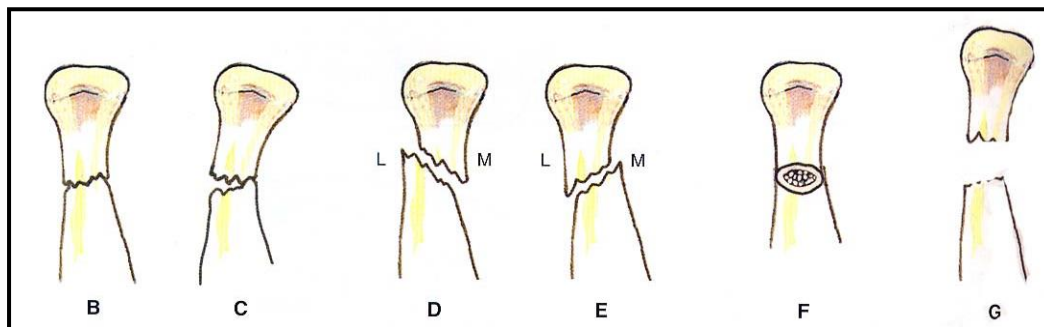
### Subcondylar fracture

These fractures are located below the condylar neck and extends from concave surface of the sigmoid notch anteriorly to the deepest point along the concave posterior aspect of the mandibular

Ramus. These can be described as “high” or “low” fractures.

### B. Relationship of condylar fragment to mandible

1. Undisplaced (fissure fracture) (B)
2. Deviated – this is simple angulation of the condylar process in relation to the distal mandibular segment without overlap.(C)
3. Displaced with medial overlap (D)
4. Displaced with lateral overlap (E)
5. Antero-posterior overlap – possible but are seldom seen. (F)
6. Without contact between fragments (G)



### C. Relationship of condylar head to fossa:

1. **No displacement** - condylar head appears in normal relation with fossa. **(H)**
2. **Displacement** – condylar head is in fossa but there is alteration of joint space. Joint space is increased.
3. **Dislocation** – The condylar process is completely out of the fossa. For this to occur there must be rupture of the capsule. The lateral capsule is usually quite thick whereas the medial joint capsule is thin and weak. As a result of this as well as the attachment of the lateral pterygoid muscle, dislocation is usually antero-medial. **(J)**



### Classification - Eckelt (Peter Ward Booth)

For a 'classification' to be useful it must be easy to use and have both therapeutic and prognostic value. The main therapeutic and prognostic factors are the **height and direction of the fracture line and the degree of displacement.**



### Classification of temporomandibular joint fractures according to the height of the fracture

#### a) Intra-capsular fractures

These fractures run very irregularly, usually diagonally through the head. Because of the anatomic variation of the capsule attachment, they can lie within the capsule as well as outside it.

#### b) High temporomandibular joint fractures

These fractures run below the capsule and always below the attachment of the lateral pterygoid muscle and the capsule attachment and above the sigmoid notch

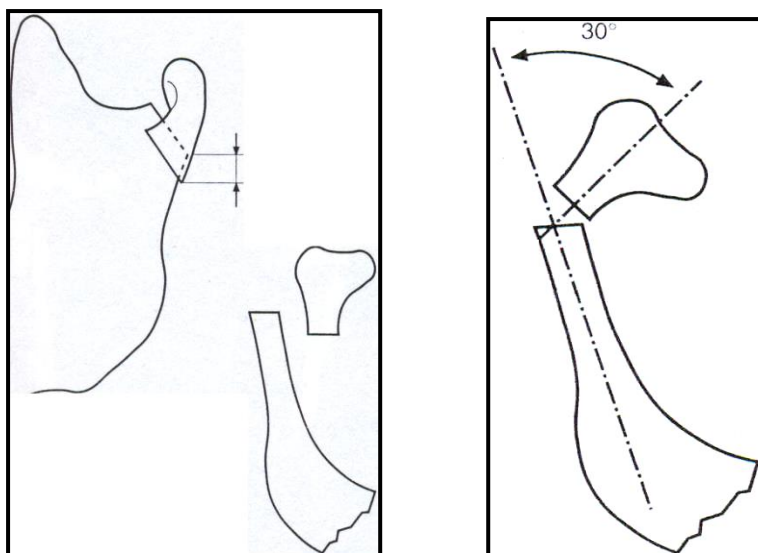
#### c) Low temporomandibular joint fractures

These fractures run from the sigmoid notch to the back edge of the mandibular ramus. The fracture line can run variably at the posterior site, following a horizontal line in some cases, but also running at an angle downwards, almost reaching to the mandibular angle, in other cases. The fracture line is dorsal to the lingual. There are numerous classifications of joint fractures.

A classification that takes both the **height of the fracture and the dislocation and luxation** of the small fragment into account has been suggested by **Spiessl & Schroll**. They differentiate 6 different fracture types

### Classification of condylar neck fractures according to Spiessl & Schroll

- **Type 1**-Condylar neck fracture without serious dislocation
- **Type II** Condylar neck fracture with dislocation
- **Type III**-High Condylar neck fracture with dislocation
- **Type IV**-Deep-seated Condylar neck fracture with luxation
- **Type V**-High Condylar neck fracture with luxation
- **Type VI**-Head or intra-capsular fracture



### Severely dislocated fractures of the articular process

The higher the fracture is located and the greater the degree of dislocation of the fragments, the less favorable are the expected functional results. Seen from a therapeutic point of view, a further differentiation of the degree of dislocation is meaningful. A functional-conservative treatment is worth considering in less severely dislocated fractures. Dislocation of fractures must always be distinguished between those with deviation and those with deviation without bony contact. Fractures occurring among juvenile patients with an intact periosteum, as at the mandibular body, are considered to be greenstick fractures. The most common form of luxation by far is the medio-ventral luxation<sup>3</sup>.

### Diagnostic criteria

- History of external violence. The rare occurrence of a pathological fracture may not be preceded by external violence.
- tenderness on mouth opening, closing, excursion and protrusion.
- Restriction of mandibular movement.
- Deviation of mandibular movement.
- Alteration of the occlusion.
- Laceration of the anterior wall of the external auditory meatus with blood in the canal.
- Imaging evidence of condylar head/neck fracture.
  - P-A view
  - Lateral oblique
  - Panoramic view
  - Reverse Townes projection
  - TMJ view
  - CT
  - MRI

### Principles of treatment of condylar fractures

**Concerning the treatment of condylar fracture, it seems that the battle will rage forever between the extremists who urge non-operative treatment in practically every case and the other extremities who advocate open reduction in almost every cases-MALKIN**

### **Goals of Therapy**

1. Obtain stable occlusion.
2. Restore interincisal opening and mandibular excursive movements.
3. To Establish a full range of mandibular movements.
4. Minimize deviation of the mandible.
5. Avoid internal derangement of the temporomandibular joint on the injured or the contralateral side.
6. Avoid the long-term complication of growth disturbance<sup>4</sup>. Condylar fractures, particularly if it must be done at the expense of other more important goals. A malunion or fibrous union that functions normally without pain is preferable to a radiographically excellent reduction that does not eliminate pain or limits motion.

### **The treatment modalities available are:**

#### **Surgical approach**

Open reduction of the fracture with osteosynthesis.

#### **Conservative - functional approach**

Treatment other than surgical intervention is termed as conservative approach. Its objective is to allow bony union to occur when there is no significant displacement of the condyle or, in case of a fracture dislocation, to produce an acceptable functional pseudo-arthritis by re-educating the neuromuscular pathways.

#### **Indications for conservative functional therapy**

- Condylar neck fractures with little or no dislocation.
- Fractures occurring during childhood (up to the age of 10-12 years).
- Intracapsular fractures, depending on the line of the fracture.

#### **Indications for Open Reduction**

##### **Absolute indications**

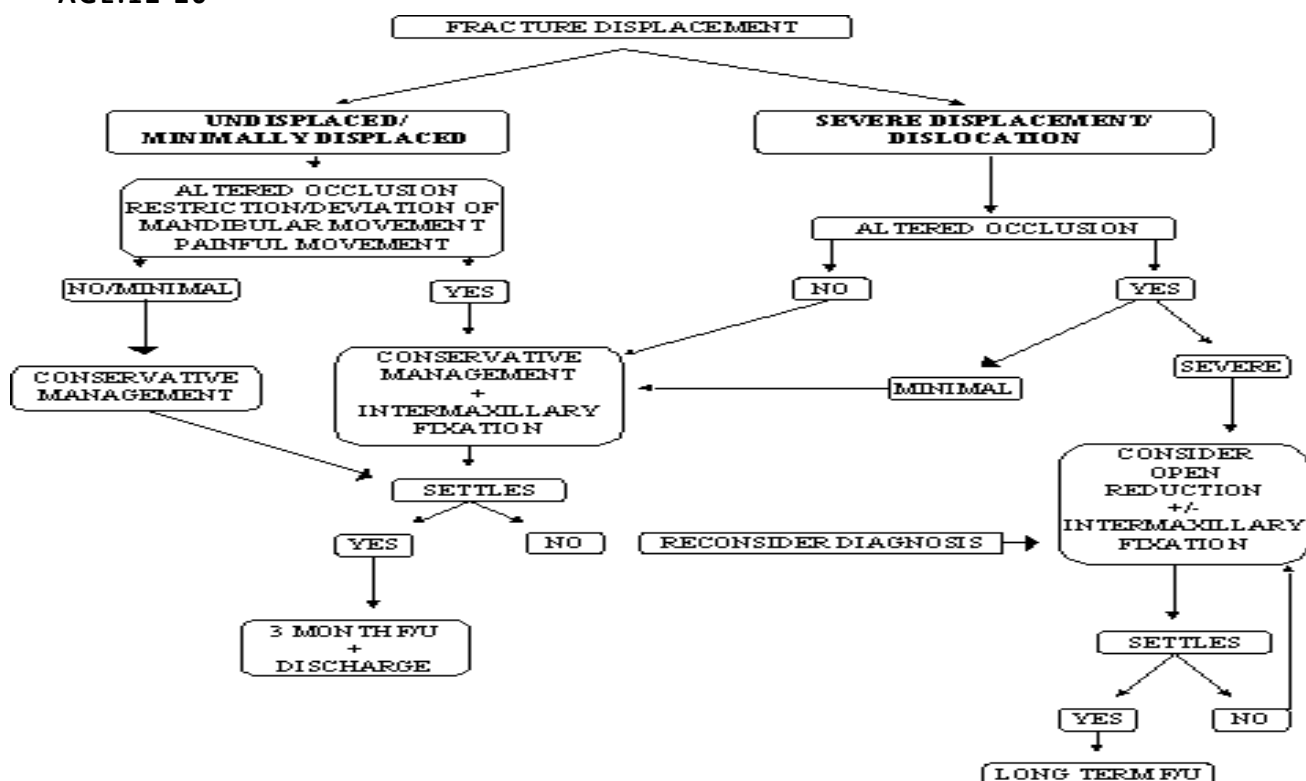
1. Limitation of function secondary to the following:
  - Fracture into middle cranial fossa
  - Foreign body within the joint capsule
  - Lateral extracapsular dislocation of condylar head <sup>5</sup>
2. Inability to achieve occlusion by closed reduction
3. Open injury (penetrating, avulsive, and lacerating) to the TMJ that requires immediate treatment.

##### **Relative Indications**

1. Bilateral condylar fractures

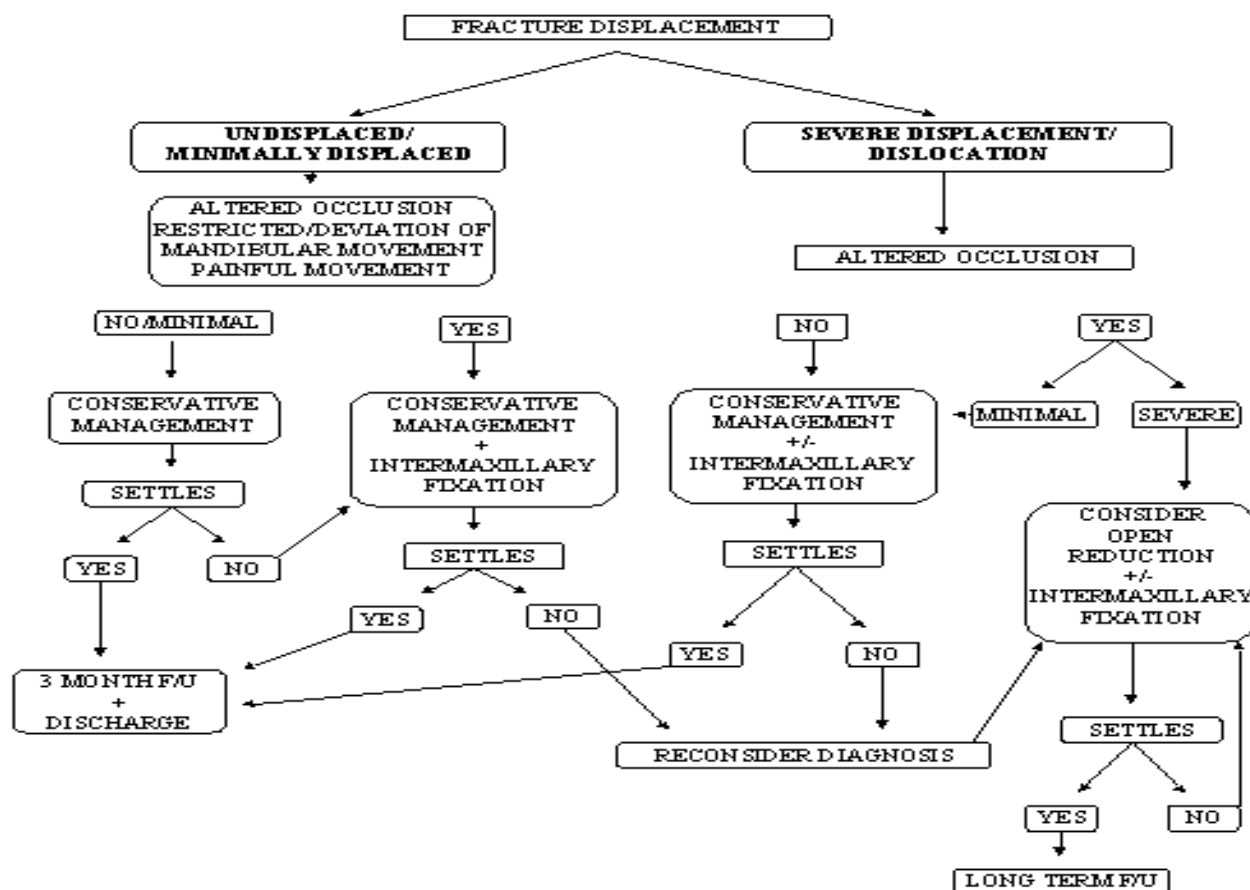
2. Situations when intermaxillary fixation is not feasible as a result of the following:
  - Medical restrictions
  - Poorly controlled seizure disorder
  - Psychiatric disorders
  - Severe mental retardation
3. Concomitant injuries
4. Displaced fractures
5. Bilateral fractures in which it is impossible to determine what the proper occlusion is as a result of loss of posterior teeth or the presence of a pre injury skeletal malocclusion
6. In fracture dislocation in adults to restore the position and function of the meniscus<sup>6,7</sup> (controversial)

**AGE:12-20**



**AGE:20+**





**CONCLUSION:**

Fractures of the mandibular condyles constitute a notable portion of mandibular fractures. A number of clinical signs and symptoms should alert the clinician to the possibility of such injuries. The use of plain radiographs in multiple views usually discloses most condylar fractures, although the advent of the CT scan has made a more definitive and detailed evaluation and description of these injuries possible. A number of classification systems have been devised to group condylar fractures, but in most instances these systems have little utility in the clinical management of these injuries.

With regard to treatment, most of the published data before the advent of rigid fixation on both animals and humans support the use of conservative therapy for the management of condylar fractures except in a specific subset of fractures in which movement is limited, adequate occlusion cannot be obtained, or intermaxillary fixation is contraindicated. However, recently there has been resurgence in literature supporting open reduction and internal fixation of condylar fractures, citing improved condylar stability and occlusal results, earlier return of joint function, and improved cosmesis. Knowledge of regional anatomy and improved techniques for surgical access to the TMJ have greatly reduced complication rates. There are a number of surgical approaches to the condylar fracture and an equal number of different methods of reduction and fixation of the fracture segments. The simplest method with the least complications based on the specifics of the fracture (location, type of fracture, displacement of segments, age of the patient and concomitant medical conditions) should be used.

**Ethical clearance – Not needed as it is a review article**

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**Conflict of interest- Nil**

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