

# *Monteggia Fracture-Dislocations*

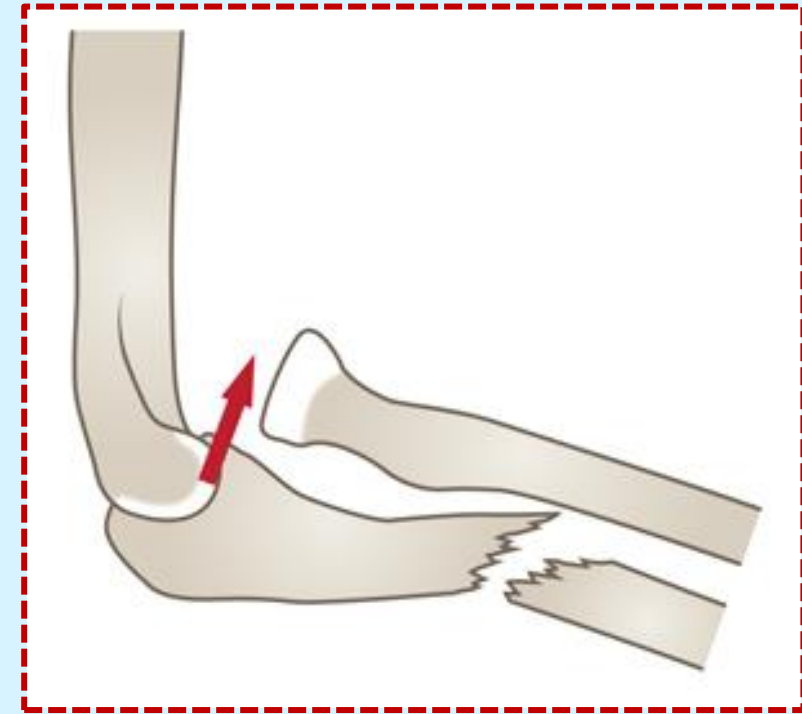


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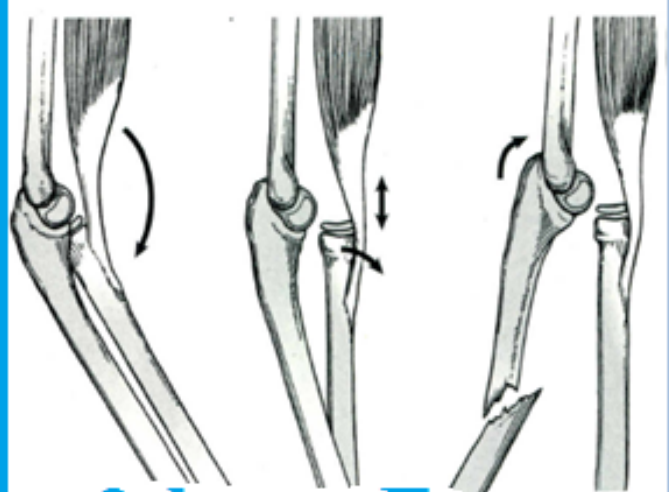


# *Introduction*

- $< 1\%$  of all pediatric forearm fxs
- typically between 4-10 years



# Mechanism of Injury



(شایعترین مکانیسم: افتادن روی out stretched hand)



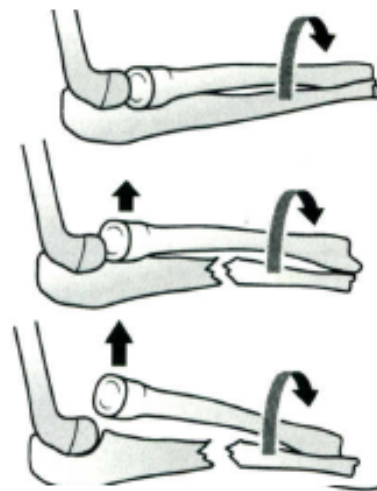
3- hyper pronation



مونتریا



type1: outstretchfall  
type2: supin.&rot.  
type3: Varus  
type4: hyper pron.



# Classification

## BLE 12-1 Author's Classification of Monteggia Fracture-Dislocations

Type	Dislocation	Fracture
True lesions		
I	Anterior	Metaphysis-diaphysis
II	Posterior	Metaphysis-diaphysis
III	Lateral	Metaphysis
IV	Anterior	Radial diaphysis, ulnar diaphysis
Hybrid lesion	Anterior, posterior, Metaphysis or olecranon or lateral	

### Equivalent lesions

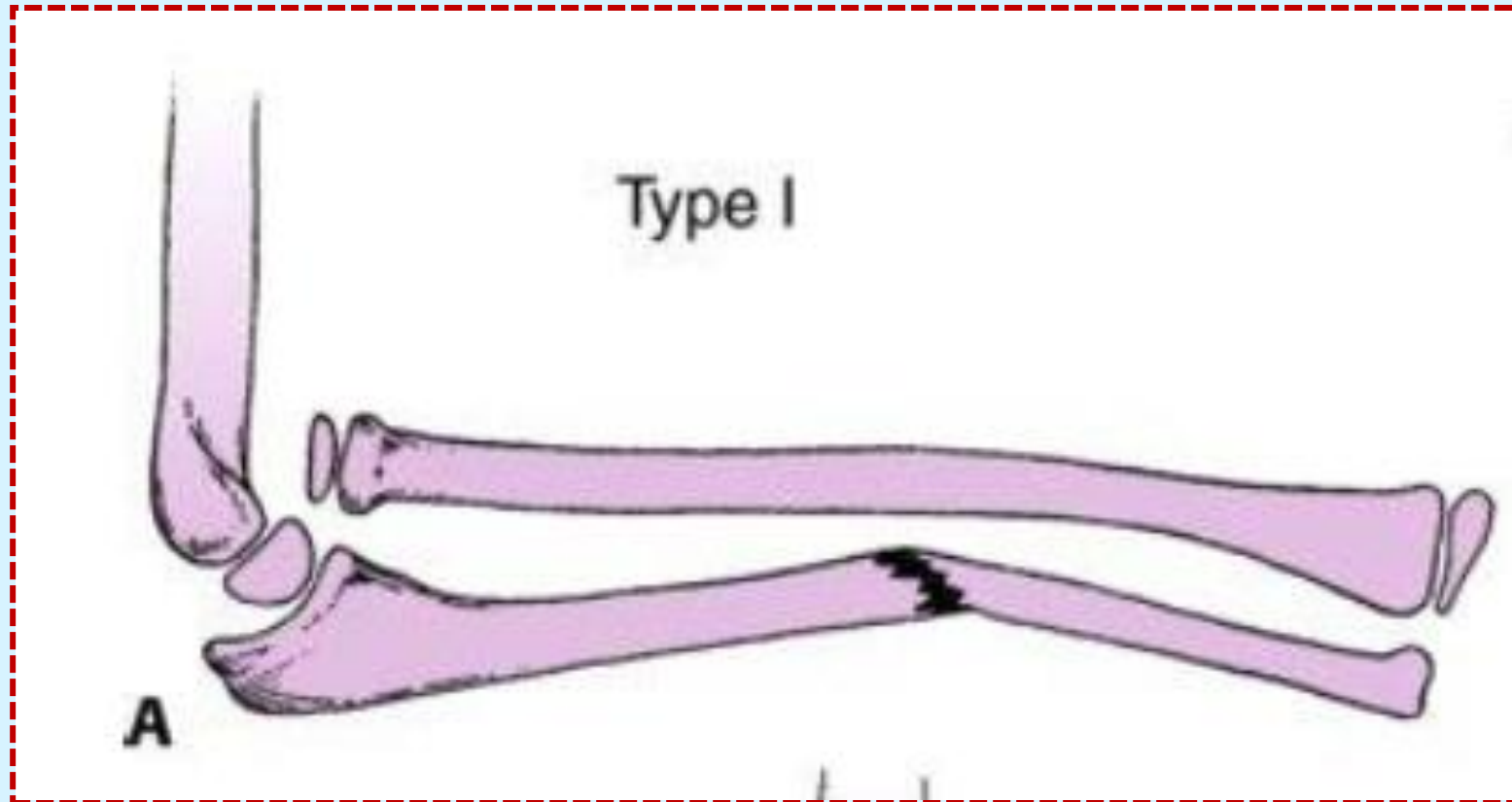
- I Isolated radial head **dx/pulled elbow**  
Radial neck fracture (isolated)  
Radial neck fracture in combination with a fracture of the ulnar diaphysis  
Radial and ulnar fractures with the radial fracture above the junction of the middle and proximal thirds  
Fracture of ulnar diaphysis with anterior dislocation of radial head and an olecranon fracture

### II Post elbow dx

### III Ulnar fx+ lat. condyle fx

### IV ~~None described~~

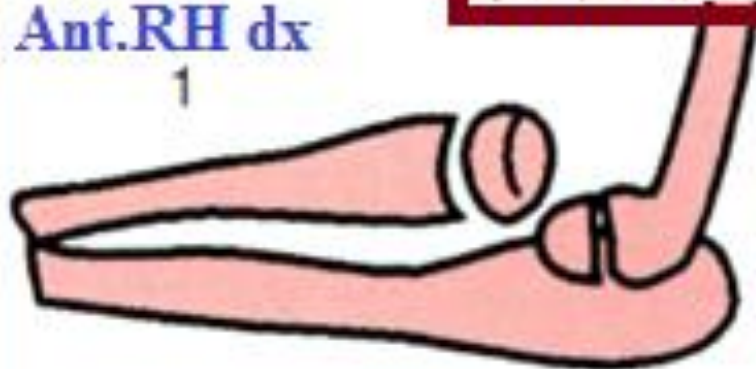
□ ***Bado Type I*** : most common (70-75%)





isolated  
Ant.RH dx

1



monteggia-1 equivalent

Ufx + RHfx

2



RNeck  
fx

3

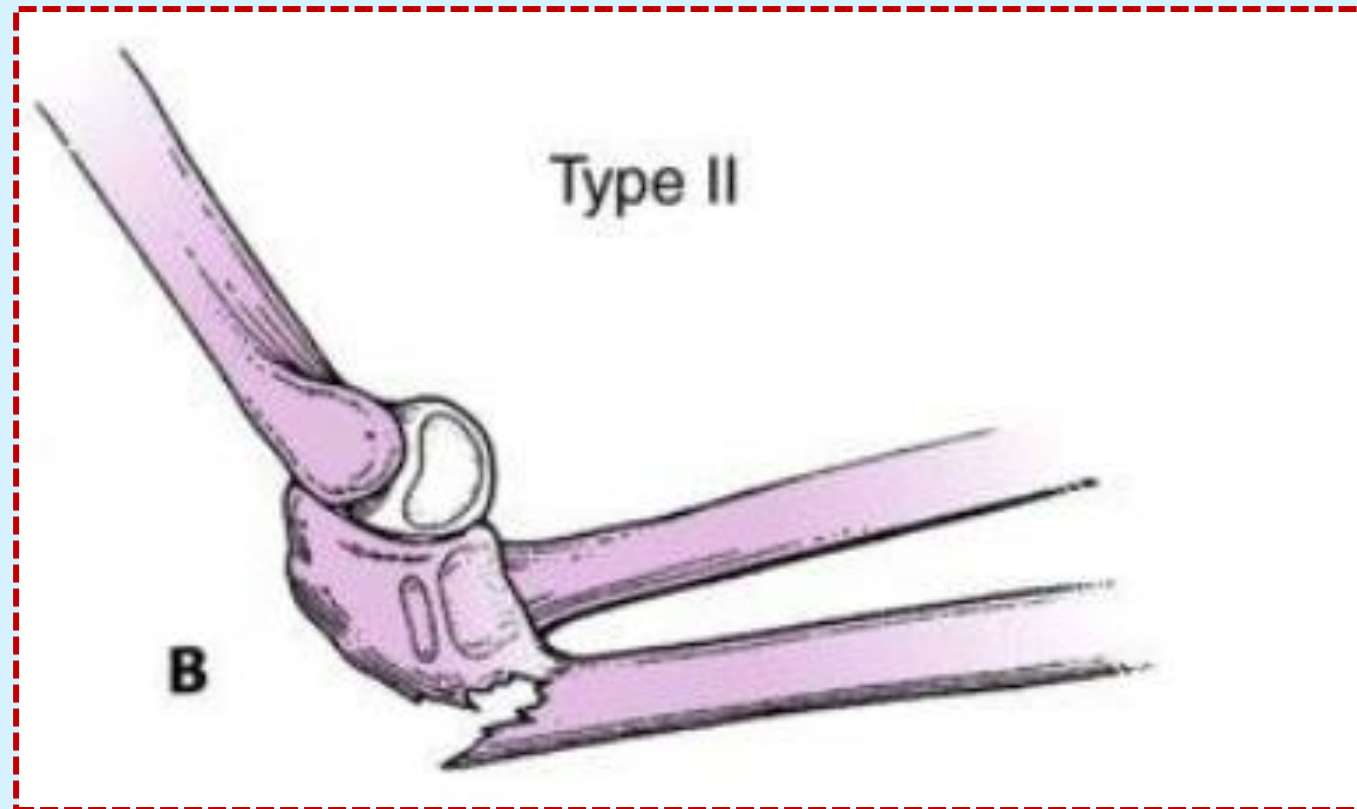


4



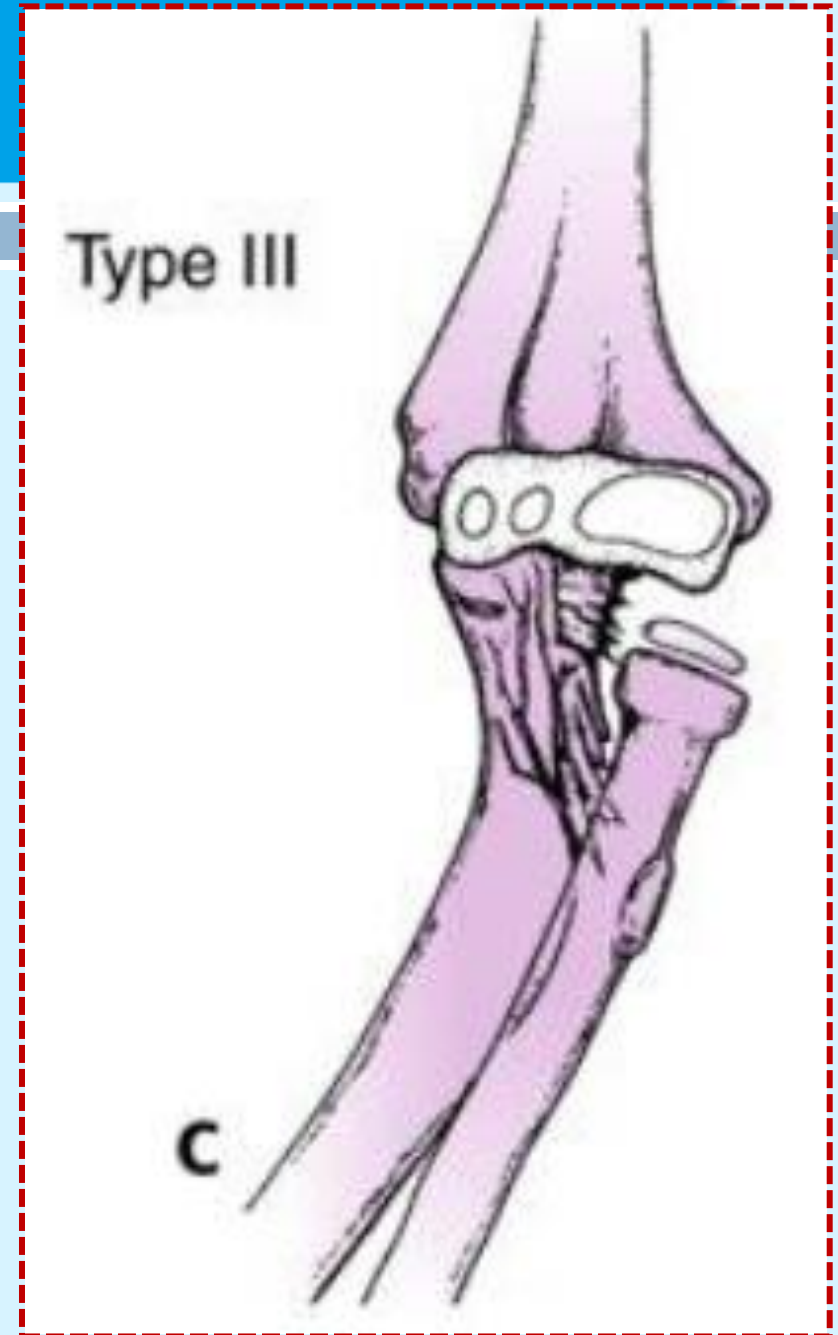
Elbow (UH) Dx  
+/- prox R fx

- ***Bado Type II*** : most common Monteggia lesion in adults, (6% in children),



## *Bado Type III :*

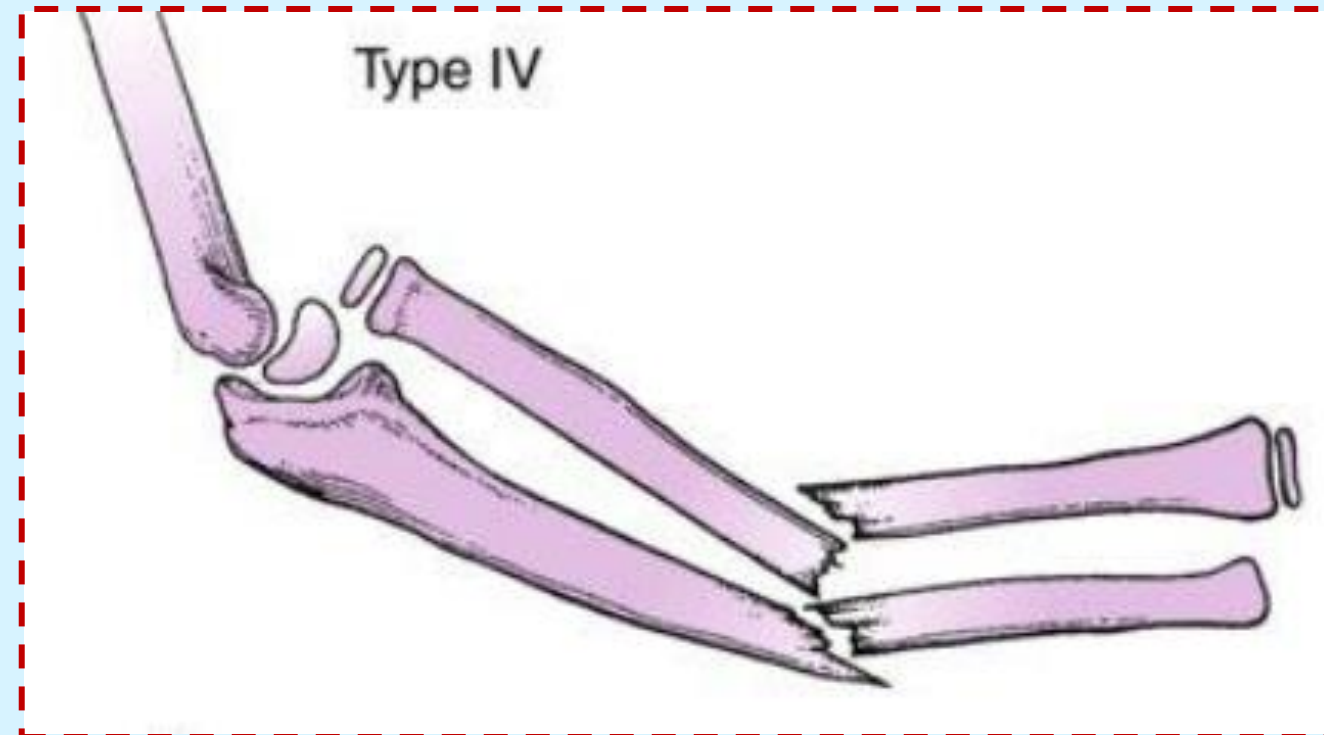
- second most common.
- olecranon fx and a lateral or anterolateral radiocapitellar Dx but no radioulnar dissociation!
- not a true Monteggia!





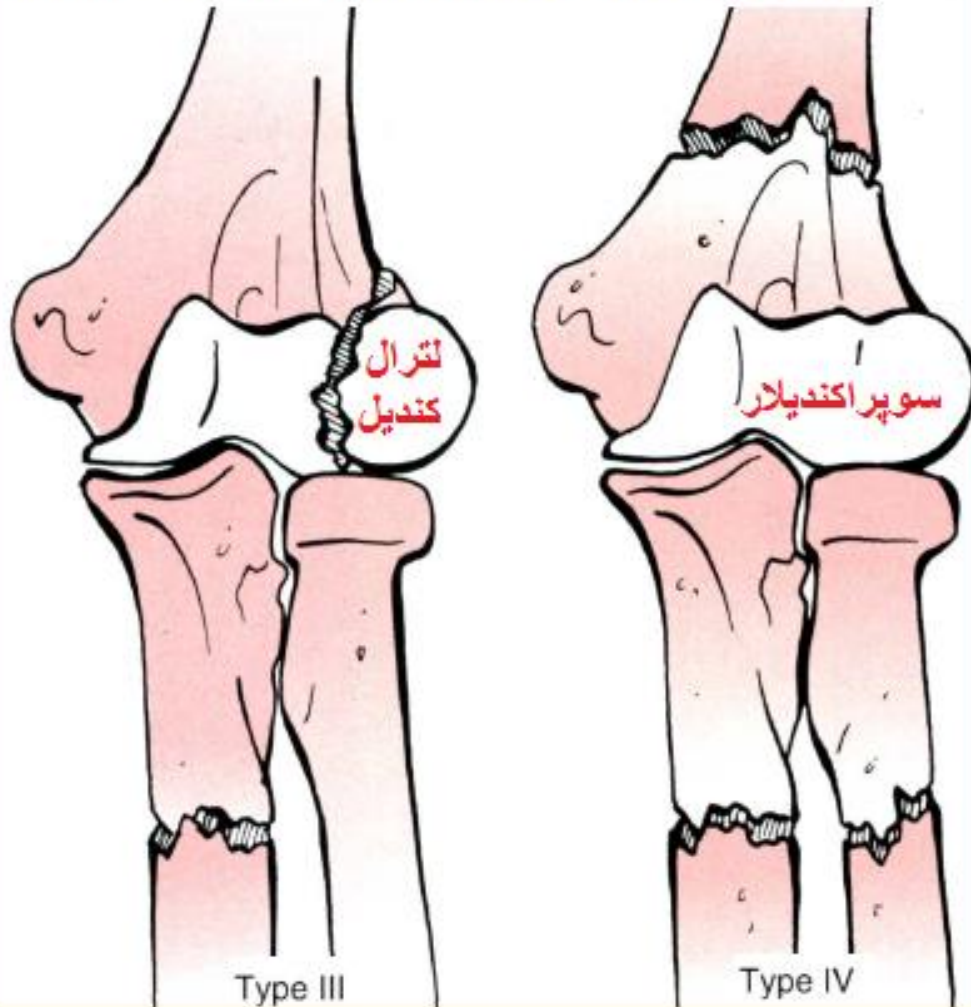
## □ *Bado Type IV*

□ Type IV lesions are **relatively rare** in children.



### *Type III and Type IV Equivalents*

dist humerus fx(supracondylar/lat condyle)  
in association with prox forearm fx!



**Type III:** lat dx radial head associated  
with an ulnar metaphyseal fx.

(2<sup>nd</sup> most common pediatric Monteggia)  
associated with an olecranon fx and a lat/  
antlat radiocapitellar dx but no radioulnar  
dissociation, the injury is **not a true**  
**Monteggia** lesion!!!

**Failure of Radial Head Reduction,  
is more common in type 3 Monteggia!!!**

# Close reduction

## Type 1 (سوپیئیشن + ترکشن)

Angulation correction



Longitudinal traction

(Supination)



Flexion 90°–100°



Immobilization/flexion  
100°–110° supination



## Type 2 (پروئیشن + ترکشن)



(بی حرکتی در اکستنشن یا فلکشن ۶۰ درجه)





# Close reduction

## Type 3

(فارس و لگوس)

Elbow extended!

Abduction

Pressure over  
radial head

Supination

Immobilization  
Flexion 90°/supination

(توجه: ترکشن نمی خواد!)

(OR Rx: as high as 12%!!!)

جراحی ↑

## Type 4 (مثل تایپ ۱)

Radial angulation  
correction

Traction  
longitudinal/supination  
transform to type I

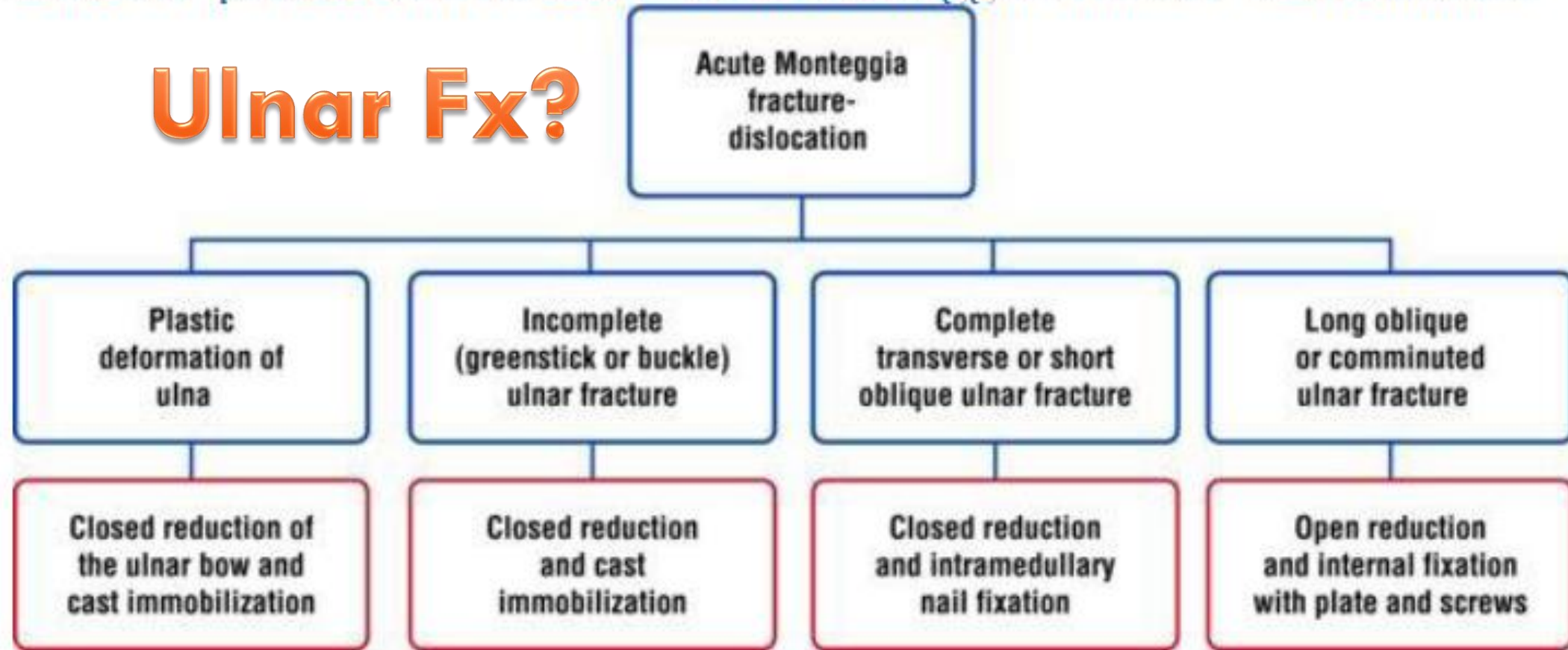
Flexion 80°-100°

Immobilization  
Flexion 100°-110°/supination

## Algorithm 11-1

Authors' preferred treatment of all Monteggia fracture–dislocations.

### Ulnar Fx?





**TABLE 12-2**

## Treatment of Monteggia Fracture-Dislocations in Children According to Ulnar Injury

Type of Ulnar Injury	Treatment
Plastic deformation ( <b>&gt;6y, &gt;10 deg.</b> )	Closed reduction of the ulnar bow and cast immobilization
Incomplete (greenstick or buckle) fracture	Closed reduction and cast immobilization
Complete transverse or short oblique fracture	Closed reduction and intramedullary K-wire fixation
Long oblique or comminuted fracture	Open reduction and internal fixation with plate

From Ring D, Jupiter JB, Waters PM. Monteggia fractures in children and adults. J Am Acad Orthop Surg 1998;6:215–224, with permission.

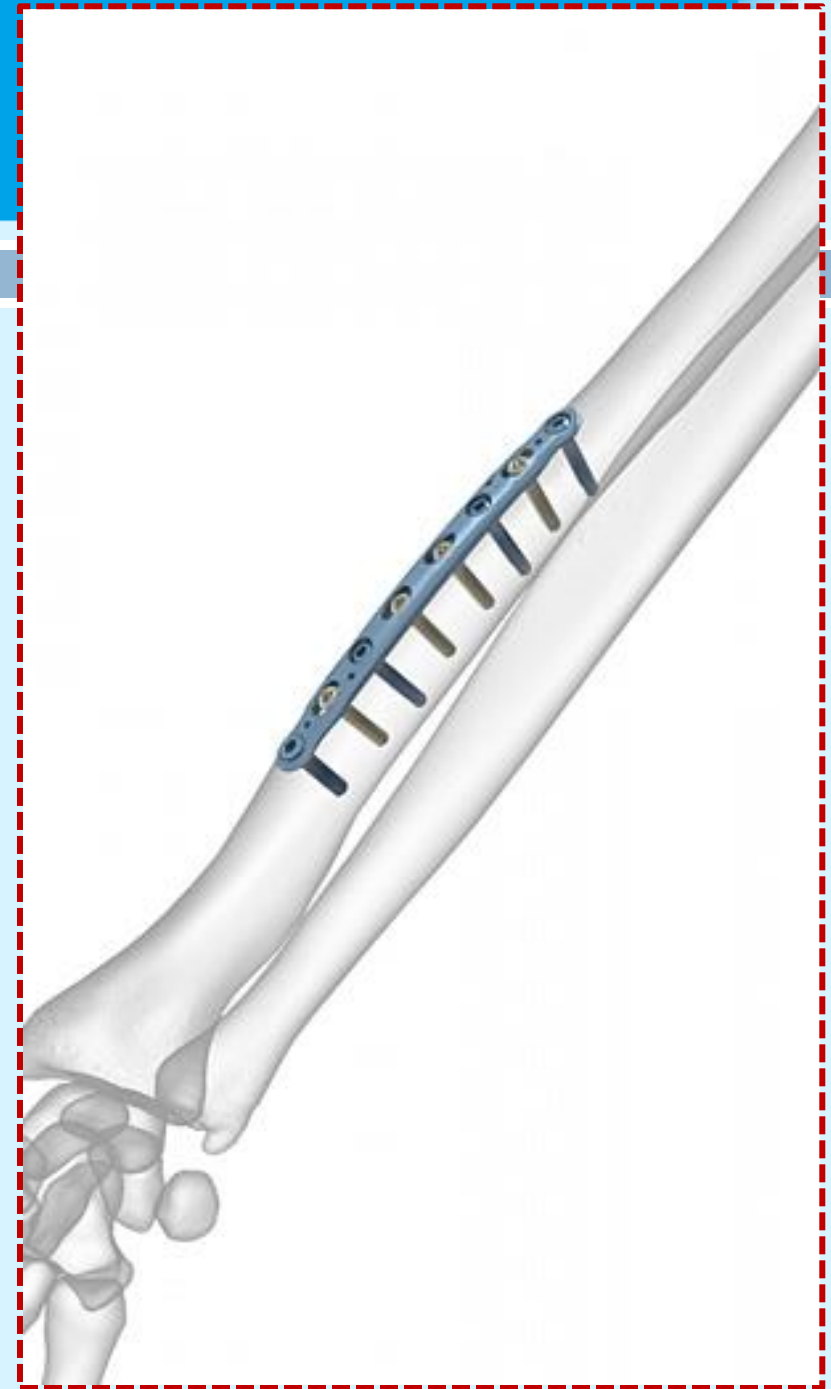
# *Radiographic Evaluation and Immobilization*

- **Up to 10 degrees** of ulnar angulation is acceptable in younger children, provided the **radial head reduction is concentric and stable.**

# The degree of flexion (long-arm splint, cast)

- ⇒ When the radial head is dislocated in a straight lateral or anterolateral position, flexion to 100-110 degrees improves stability.
- ⇒ If there is a posterolateral dislocation, flexion to 70-80 degrees has been recommended.
- ⇒ Forearm is usually in **supination**, (tightens the interosseous membrane and further stabilizes the reduction)

- In children older than 12 years, plating of the radius (Type IV) through a volar Henry approach provides more rigid stabilization.



# Treatment Options For Chronic Monteggia

- The diagnosis of an acute Monteggia fracture–dislocation is often missed by skilled radiologists, emergency room physicians, pediatricians, and orthopedic surgeons, particularly when the ulnar injury is subtle or in the form of plastic deformation.
- The shape of the ulna in patients with a seemingly isolated dislocation of the radial head usually indicates persistent plastic deformation or malunion of the ulna and a traumatic etiology to the radial head dislocation



# chronic Monteggia Vs congenital radial head Dx

- the shape of the radial head is concave in most chronic Monteggia but is convex in congenital radial head Dx.
- In congenital radial head Dx, the capitellum is often hypoplastic.

## Cong. Rad. Head dx

inability to fully  
extended the elbow



Usually  
bilat.



post Rad.  
head dx!



دررفتگی خلفی (گاهی قدامی)  
بیشتر دوطرفه (گاهی یکطرفه)  
رادیوس بلند با قوس اولنا  
کپیتولوم کوچک و گاهی  
کلسیفیکیشن اطراف سر رادیوس

## Cong. radial head dx

1- dome  
shape RH



2- post Sx

3- flexion loss  
(ext:NL)



**No Rx needed unless symptomatic !**

Chronic Monteggia  
with ulnar bow line.  
(8-year-old girl )  
Note the persistent  
ulnar bow and  
overgrowth of radius.



Chronic Monteggia lesion with a  
persistent anterior radial head  
Dx and **ossification of the  
displaced annular ligament.**



# Operative Treatment of Chronic Monteggia

- 1- annular lig. Repair/reconstruction alone,
- 2- ulnar osteotomy ± annular lig.  
Repair/reconstruction
- 3- radial osteotomy.



## *Indications*

- Symptomatic patients with a chronic Monteggia lesion (indication)
- Asymptomatic patients with a chronic Monteggia lesion (relative indication)

## *Contraindications*

- Radial head enlargement or deformity
- Flattening of the capitellum
- joint arthrosis

# Fowles et al.

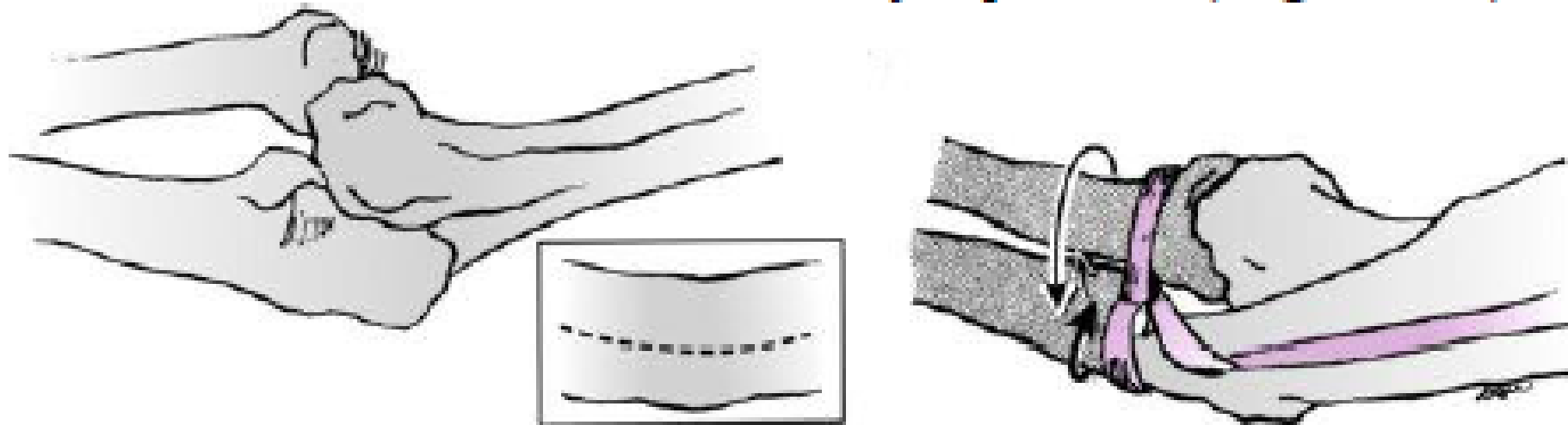
- **reconstruction** provides the best results in pts who have had a Dx for  **$\leq 3-6$  months**.
- They also reported successful relocations **up to 3 years**.
- Freedman et al.: for up to **6 years** after injury.

# Seel and Peterson:

- the **age** and the **duration** of the Dx are **unimportant** !
- Their criteria for surgical repair were:
  - (1) normal concave radial head
  - (2) normal shape of the ulna and radius  
(deformity is correctable by osteotomy).

Figure 11-43 Bell Tawse reconstruction.

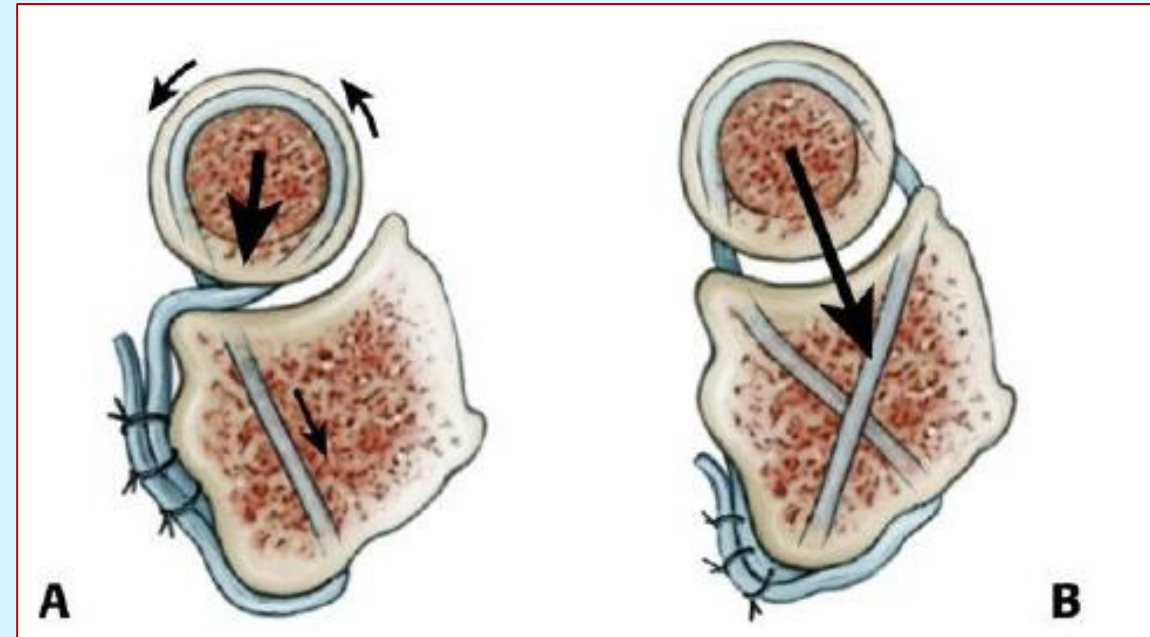
The central slip of the triceps is used to reconstruct an annular ligament in Bell Tawse reconstruction. The direction of stability is posterior (*large arrow*).



# Annular ligament reconstruction

A: The Bell Tawse: results in a posteriorly directed force.

B: The Seel and Peterson: crossing drill holes are created at the anterior and posterior rim of the lesser **sigmoid notch**. (may improve stability of the radial head. )



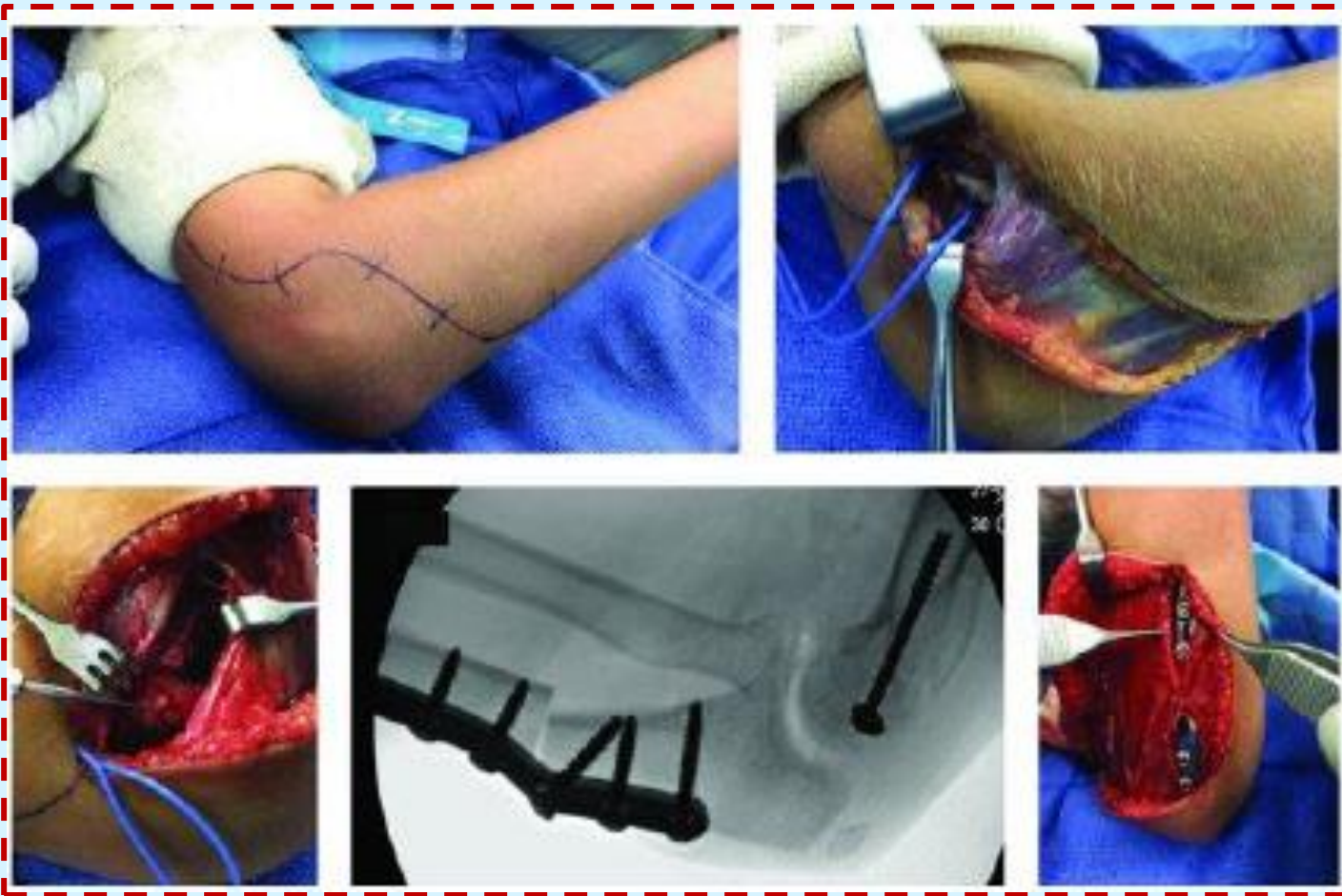




A: 8-year-old female - chronic type I Monteggia, (+ ipsilateral medial epicondyle fx.)

- Note the **positive ulnar bow sign** + ant. radial head Dx.

# Annular lig. R + ulnar osteotomy





☆ برای درمان منتزایی مزمن: (ارجح مولف راکوود)



- معمولاً اعاده **Ulnar length & alignment**

موجب جااندازی سر رادیوس می شه!  
(بازسازی آنولر لیگامنت ممکنه غیر ضروری باشه)

- برای حفظ ریداکشن بی حرکتی در ۱۰۰ تا ۱۱۰ درجه فلکشن  
مفیده و فلکشن بیشتر از این خطر آسیب به نرووسکولر داره!



