

Intra-Articular Distal Humerus Fractures

Assessment, Approach, Reduction, and Fixation

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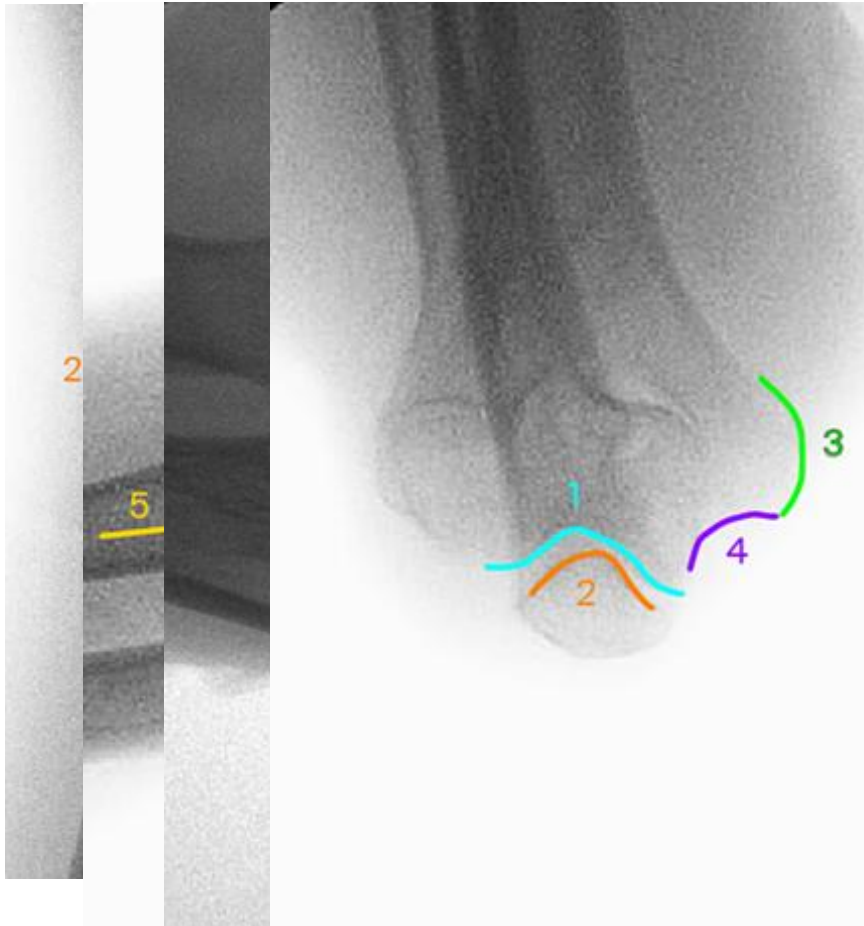
Two things make these a challenging assessment

✗ **Anatomy**

✗ **Biology**

All about anatomy – and getting to see it

CTs are fine but you have to know what you are seeing in the OR

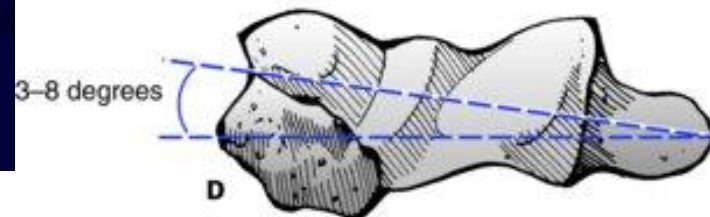
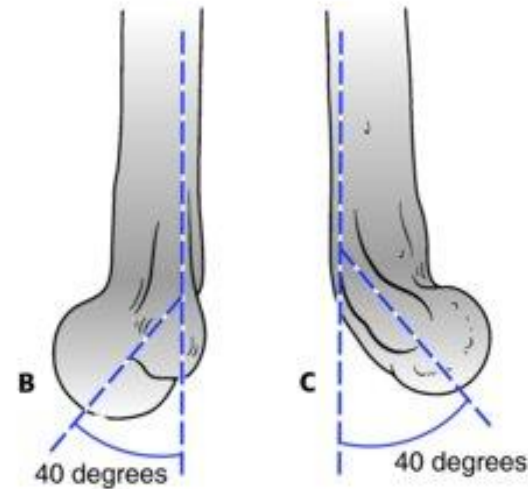
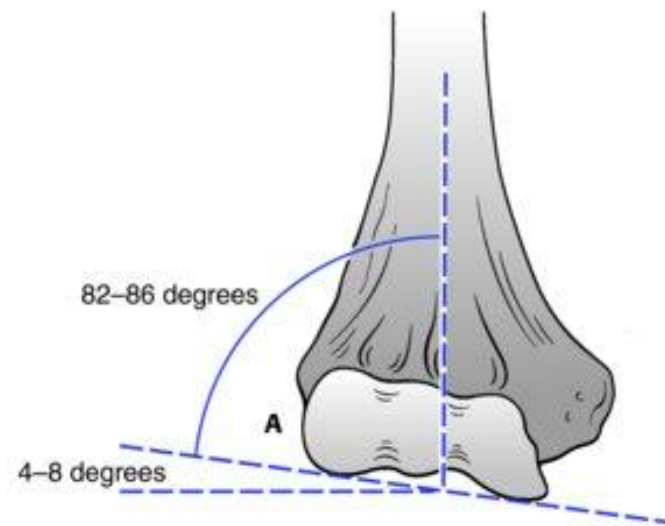


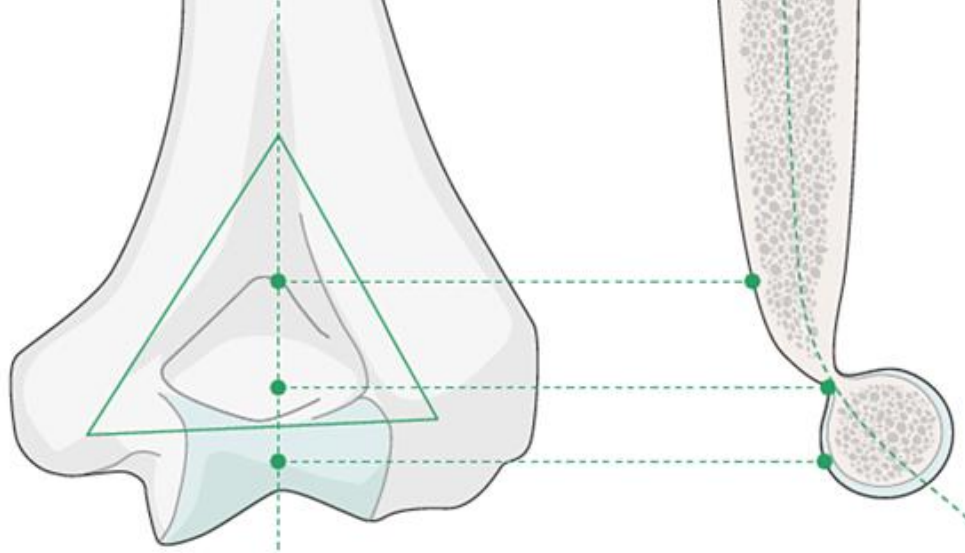
AO



Anatomy

- Hinged joint with single axis of rotation (trochlear axis)
 - At bottom of virtual distal humeral triangle
- Trochlea is center point of AI with a lateral and medial column
- Trochlear axis compared to longitudinal axis is 4-8 degrees in valgus

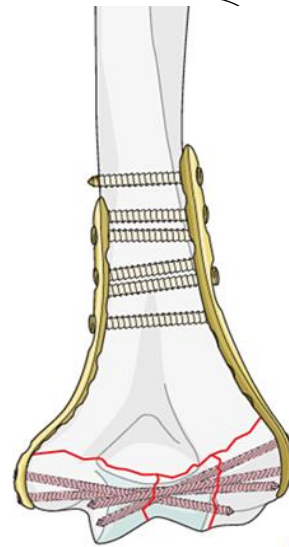
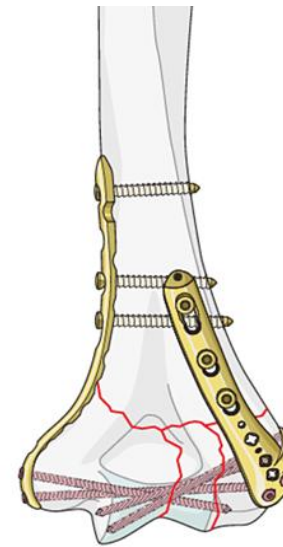




Triangle-of-stability concept

surgical fixation of a distal humerus fracture

means anatomic articular reduction and rigid fixation



180°



90°



90°

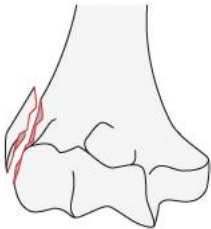
Distal Humerus Fx Assessment

Extra-articular

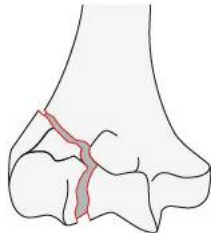
Simple

Complex

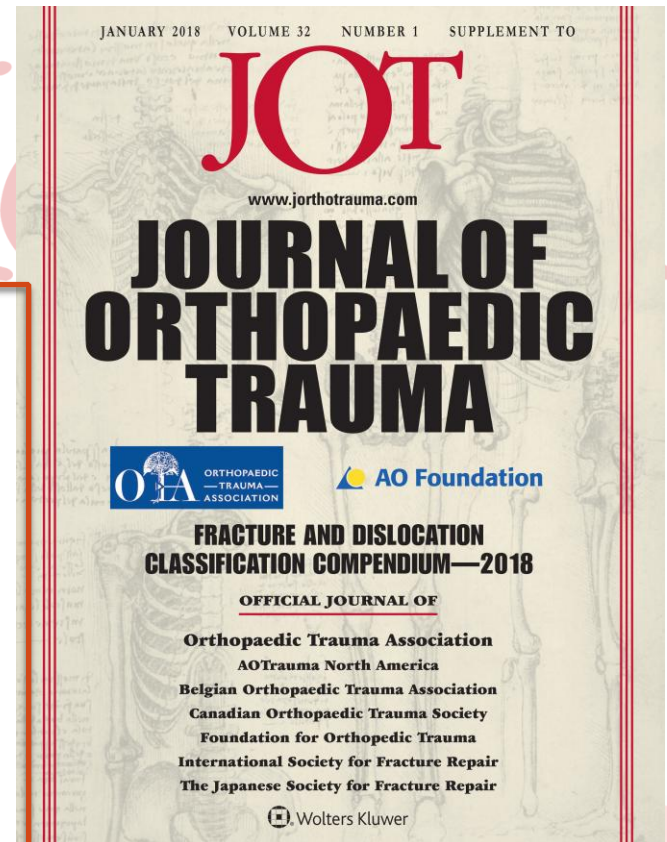
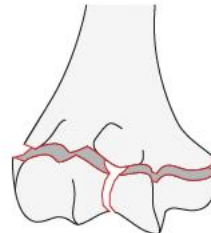
Humerus, distal end segment,
extraarticular fracture
13A



Humerus, distal end segment,
partial articular fracture
13B



Humerus, distal end segment,
complete articular fracture
13C



Distal Humerus Fx Assessment

These type of fractures

Extra-articular

Simple

Complex



Distal Humerus Fx Assessment

Talk about these type of fractures

Complex

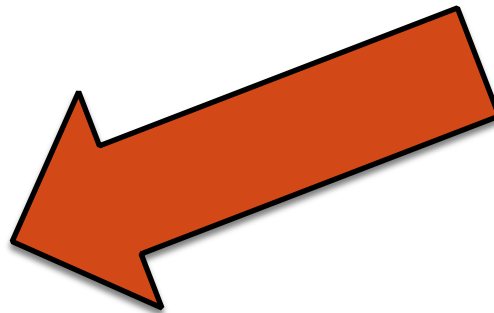
All pieces easily reducible

Some bone missing

Some cartilage missing

What cartilage

Is that an elbow?





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Options

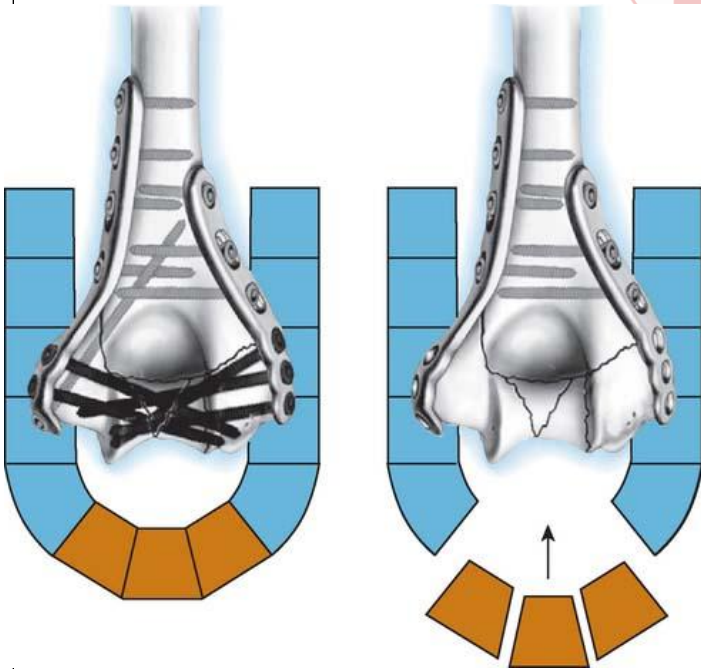
Approaches

What to do with the pieces

Where to find new pieces

What pieces of metal to use

Goals are the same



- Implant use determined by fracture pattern
- USE what is needed to **permit early ROM with minimal soft tissue stripping**
- Some evidence you can immobilize 2 weeks
- “Bag of bones” technique
 - VERY Rarely indicated in young patients
 - Distal impacted fractures in elderly with early ROM

Approaches



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What cartilage

Is that an elbow?

- Been 25 years since I performed a(n) (chevron) osteotomy
- 50% hardware removal rate or unhappiness factor of 10
- Makes it hard to do revision TEA
- So, I NEVER do it
 - I know – never say never



Approaches



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Positioning

Lateral decubitus position

Prone positioning possible

Supine position - OK as well

- Arm hanging over a post
- Prefer a sterile bump in case convert to TEA
- Sterile tourniquet better
- Midline posterior skin incision



Approaches

All pieces easily reducible

Some bone missing

Some cartilage missing

What cartilage

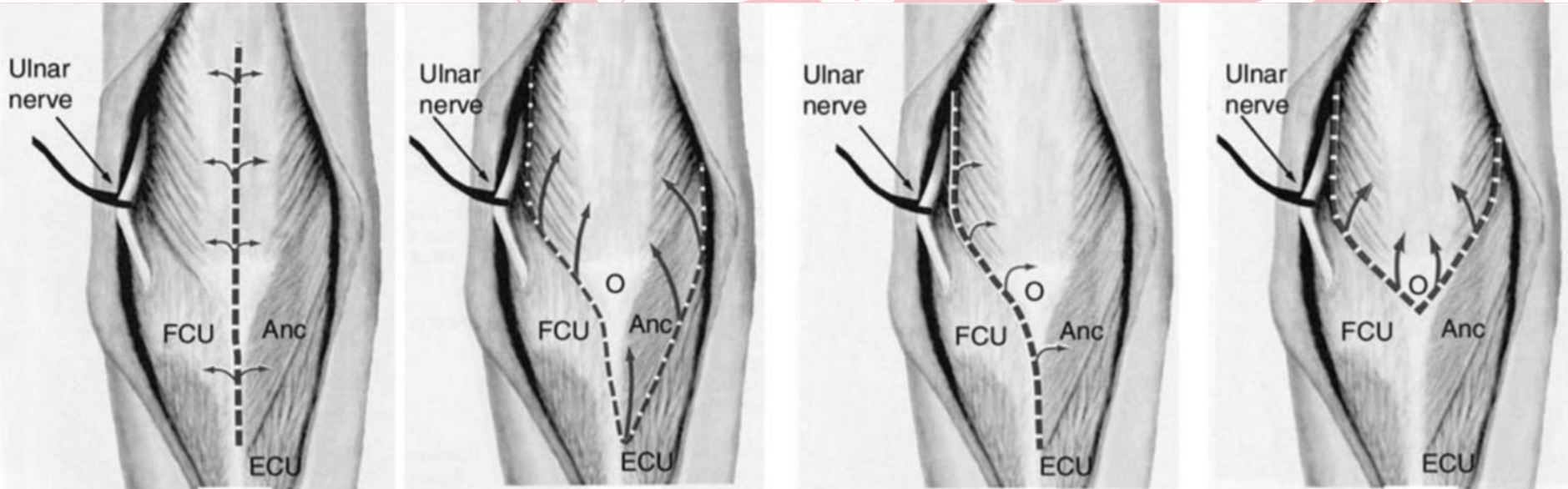
Is that an elbow?

- Reduction seems to influence outcome in articular fractures
 - Depends on patients' factors
- Exposure affects ability to achieve reduction
- Many different exposures give OK to complete **visualization** of articular surface
- Choose the exposure that fits the fracture pattern or your experience

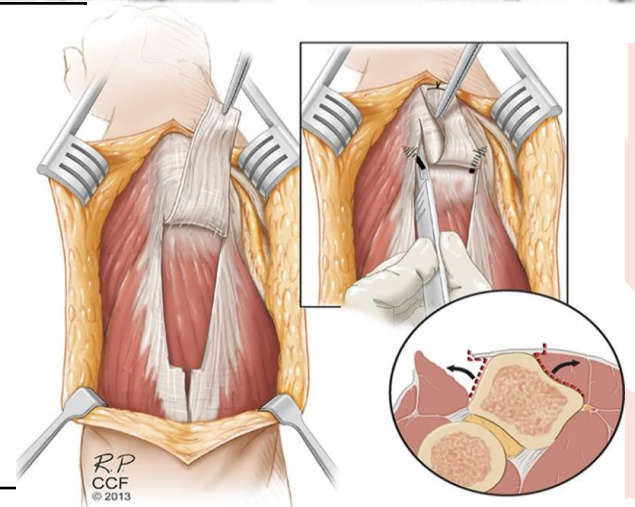
Approaches



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Triceps Split
TRAP Flap
Para-tricepital
Morrey Medial Approach
Olecranon osteotomy
Tongues



Approach I Use

All pieces easily reducible

Some bone missing

Some cartilage missing

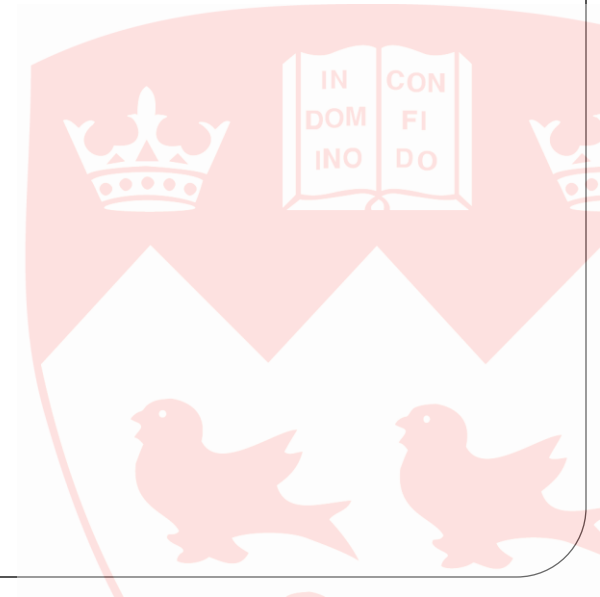
What cartilage

Is that an elbow?

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Split

Paratricepital



H

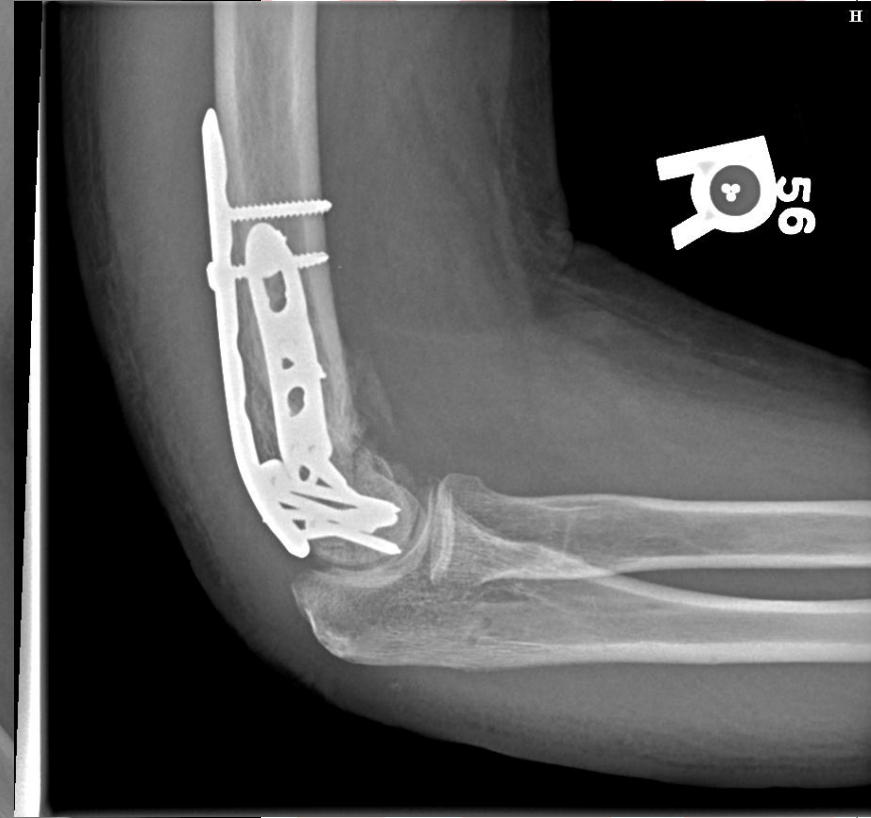
A

R

R

L





Principles

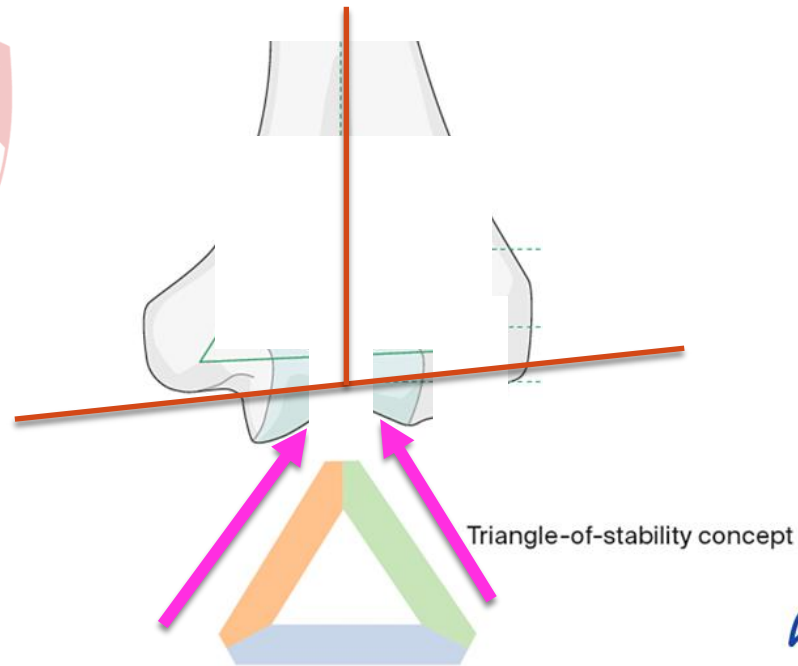
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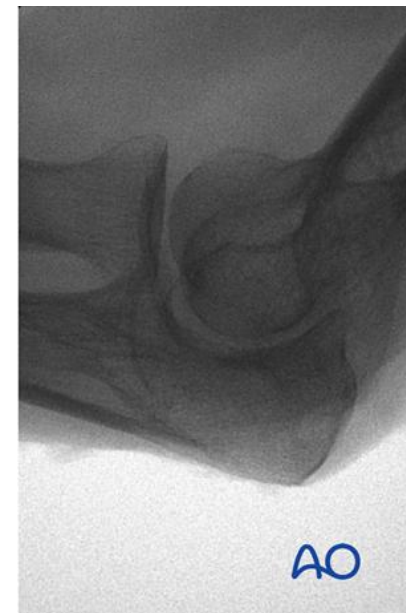
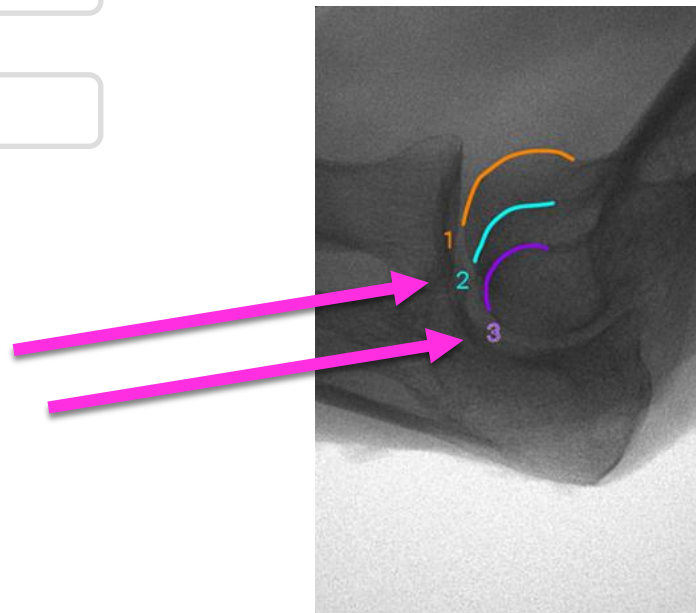
Some cartilage missing

What cartilage

Is that an elbow?



AO



CON
FI
DO

Examples



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All pieces easily reducible

Open Fracture

Some bone missing

Fibula / allograft

Some cartilage missing

What cartilage

Is that an elbow?



Approach I Use

All pieces easily reducible

Some bone missing

Some cartilage missing

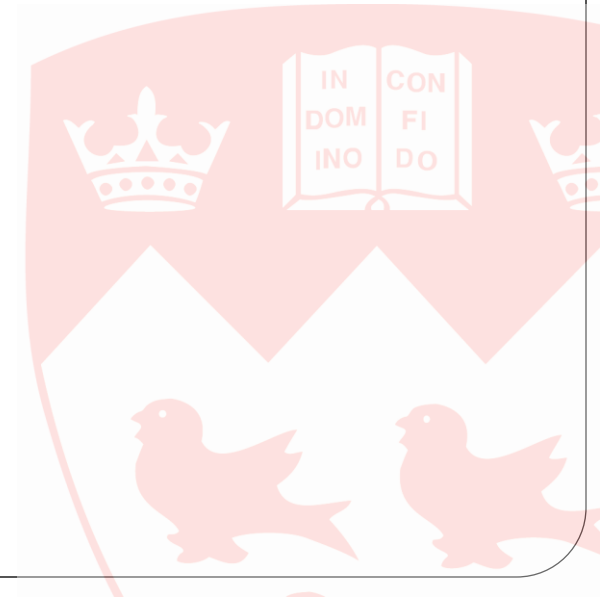
What cartilage

Is that an elbow?

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Split

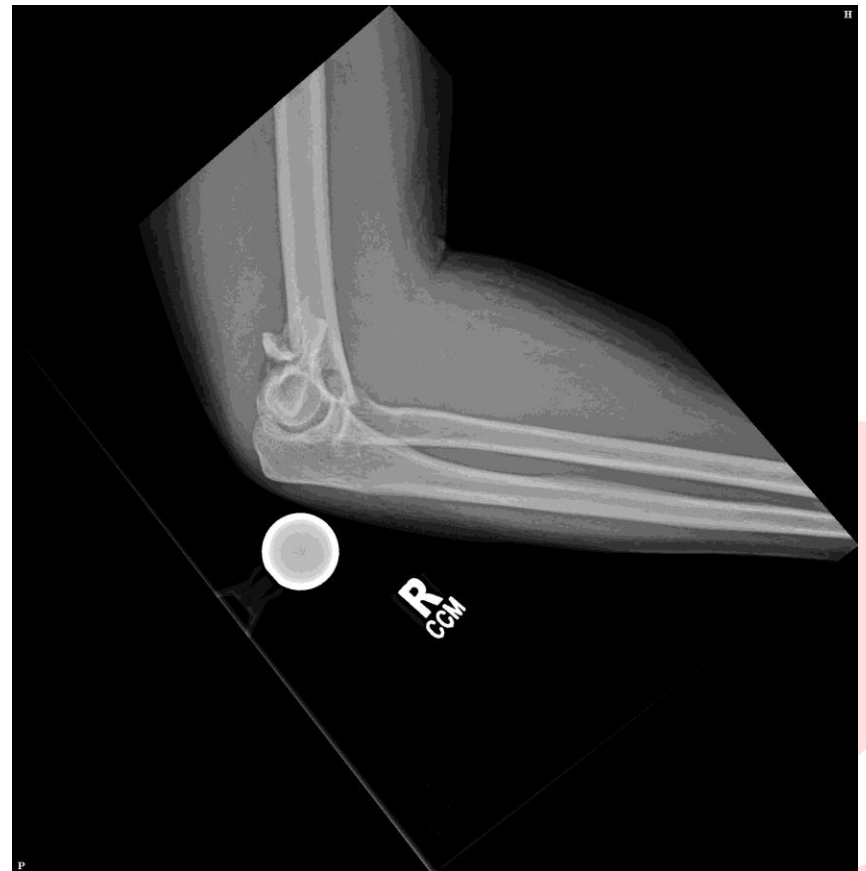
Paratricepital

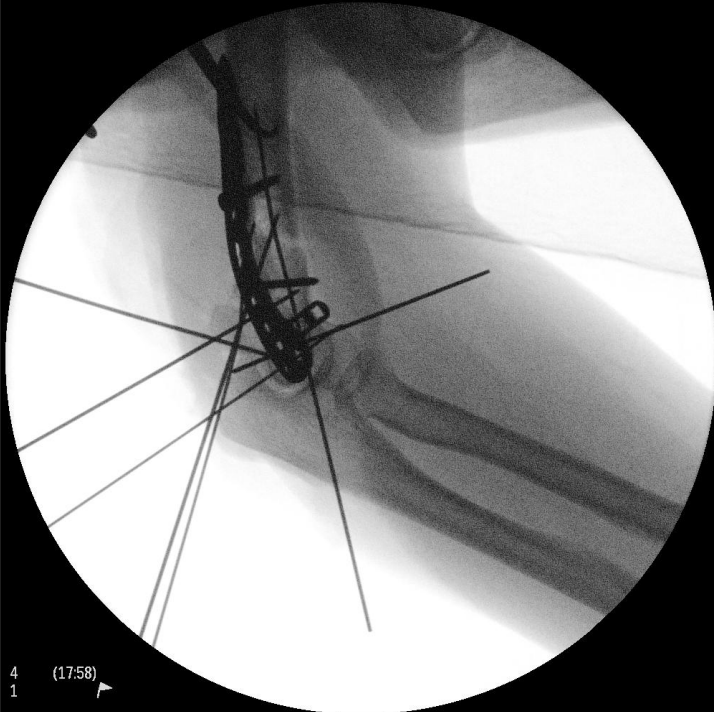


Young patient



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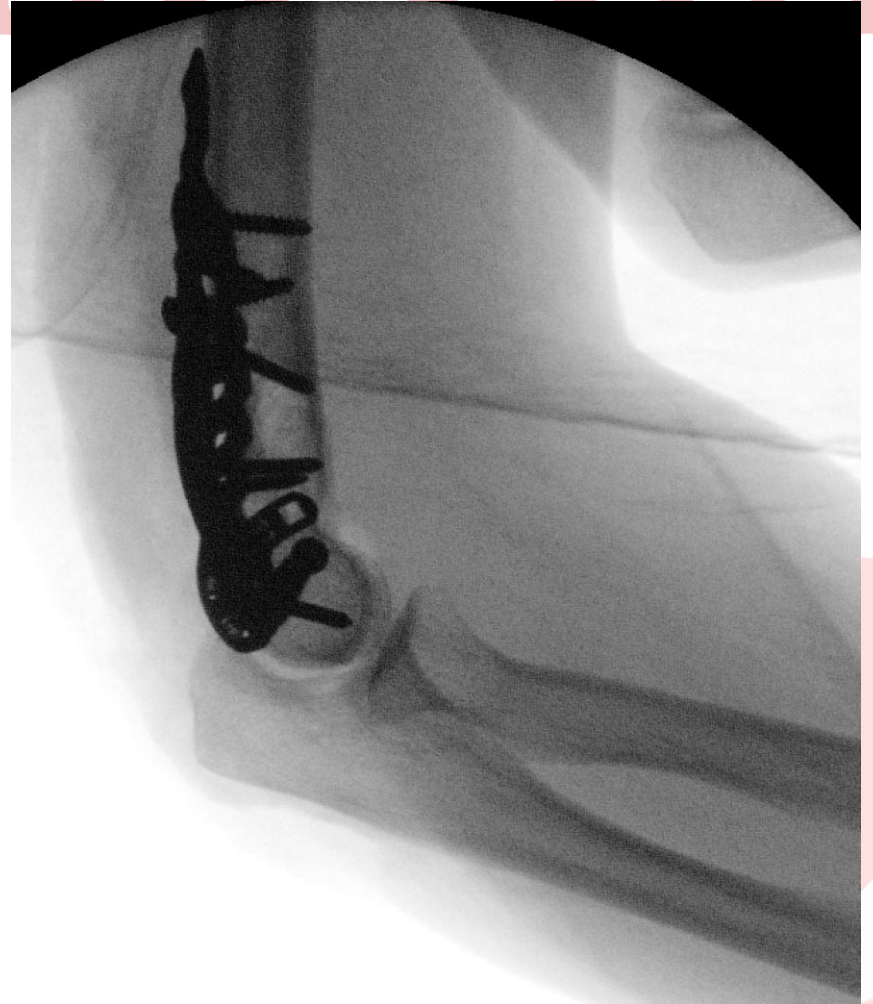
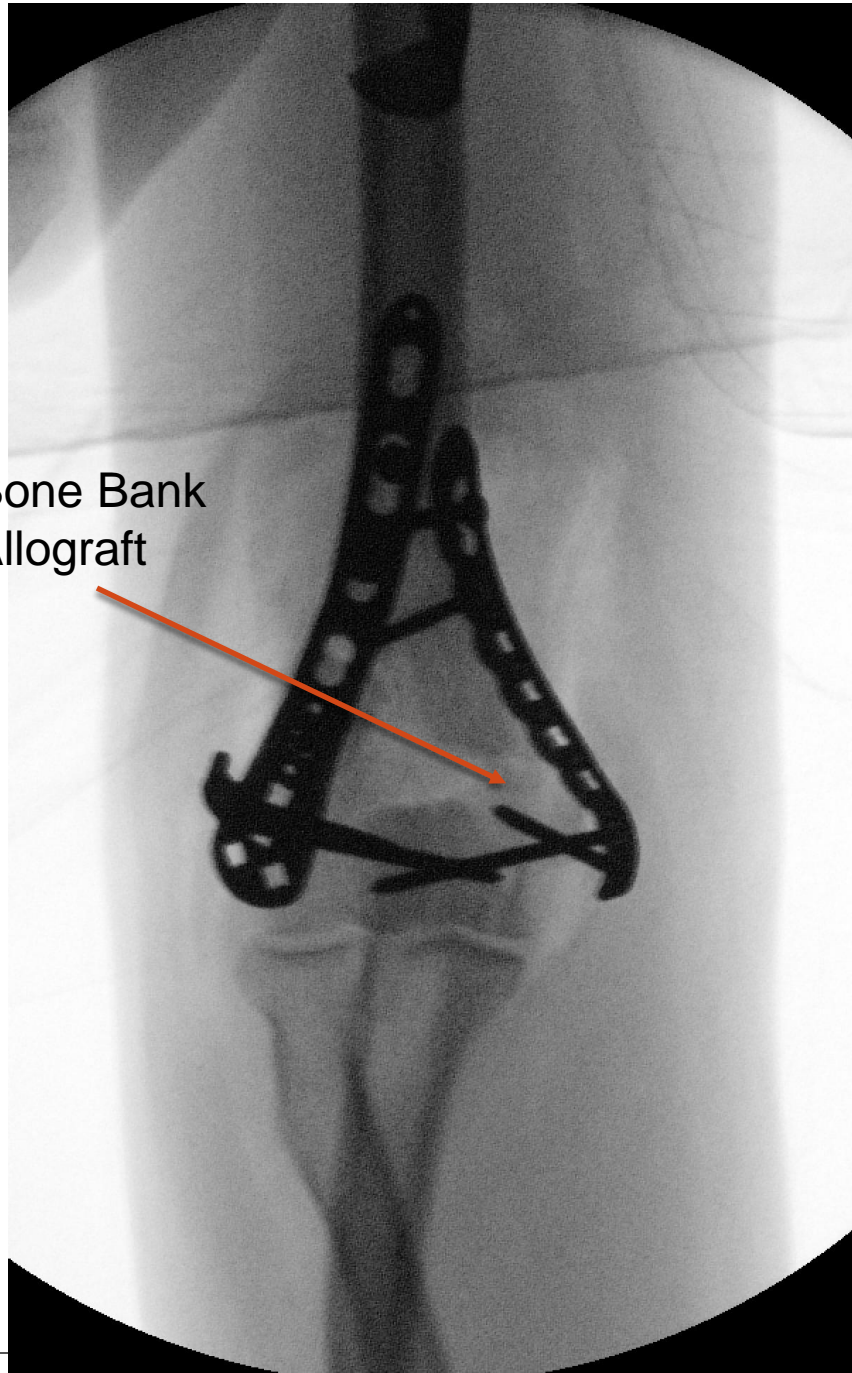
4 (17:58)
1

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3 (17:42)
1

Bone Bank
Allograft



8 Year follow up



Approach



All pieces easily reducible

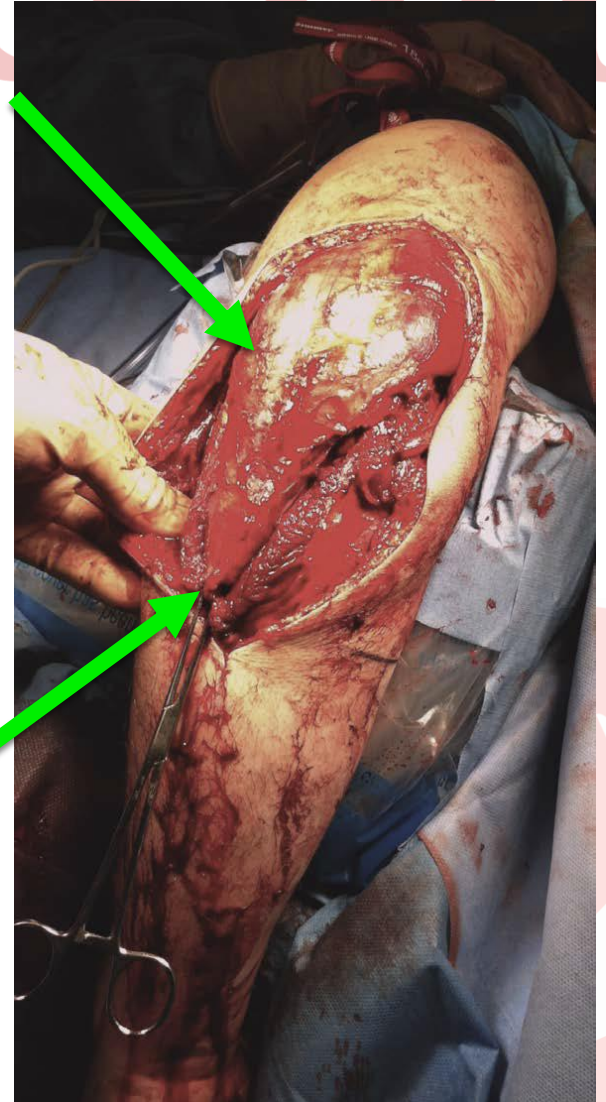
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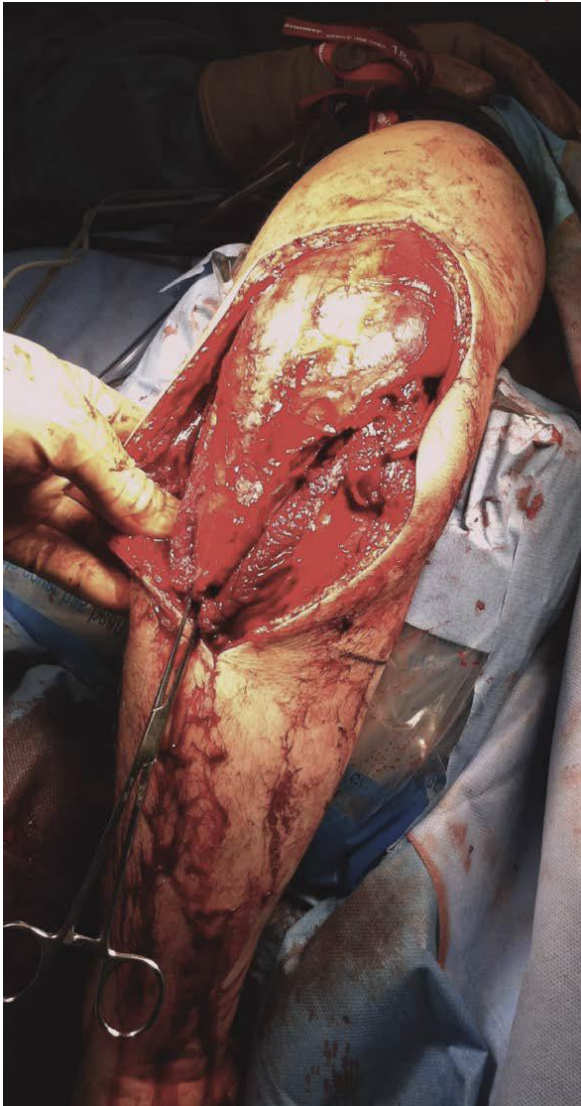
Is that an elbow?

TRAP



Approaches

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TRAP Flap (complex cases)

- Posterior approach
- Flap lifted off ulna to about 15 cm distal to joint
- Preserve triceps to anconeus NV Bundle
- Preserve MCL and LCL
- Repaired through 3 ulna holes with FibreWire

Approach I Use?

All pieces easily reducible

Some bone missing

Some cartilage missing

What cartilage

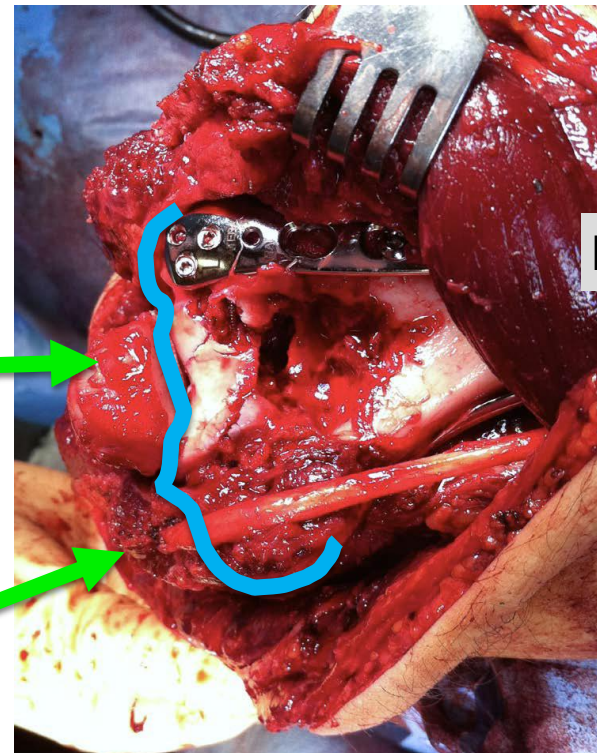
Is that an elbow?

Osteotomy 10-25% of Olecranon after exposure- throw it out or bone graft

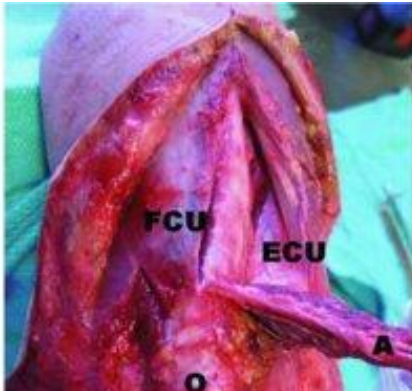
Can take down LCL – 100% of joint and operate in front

Ulna

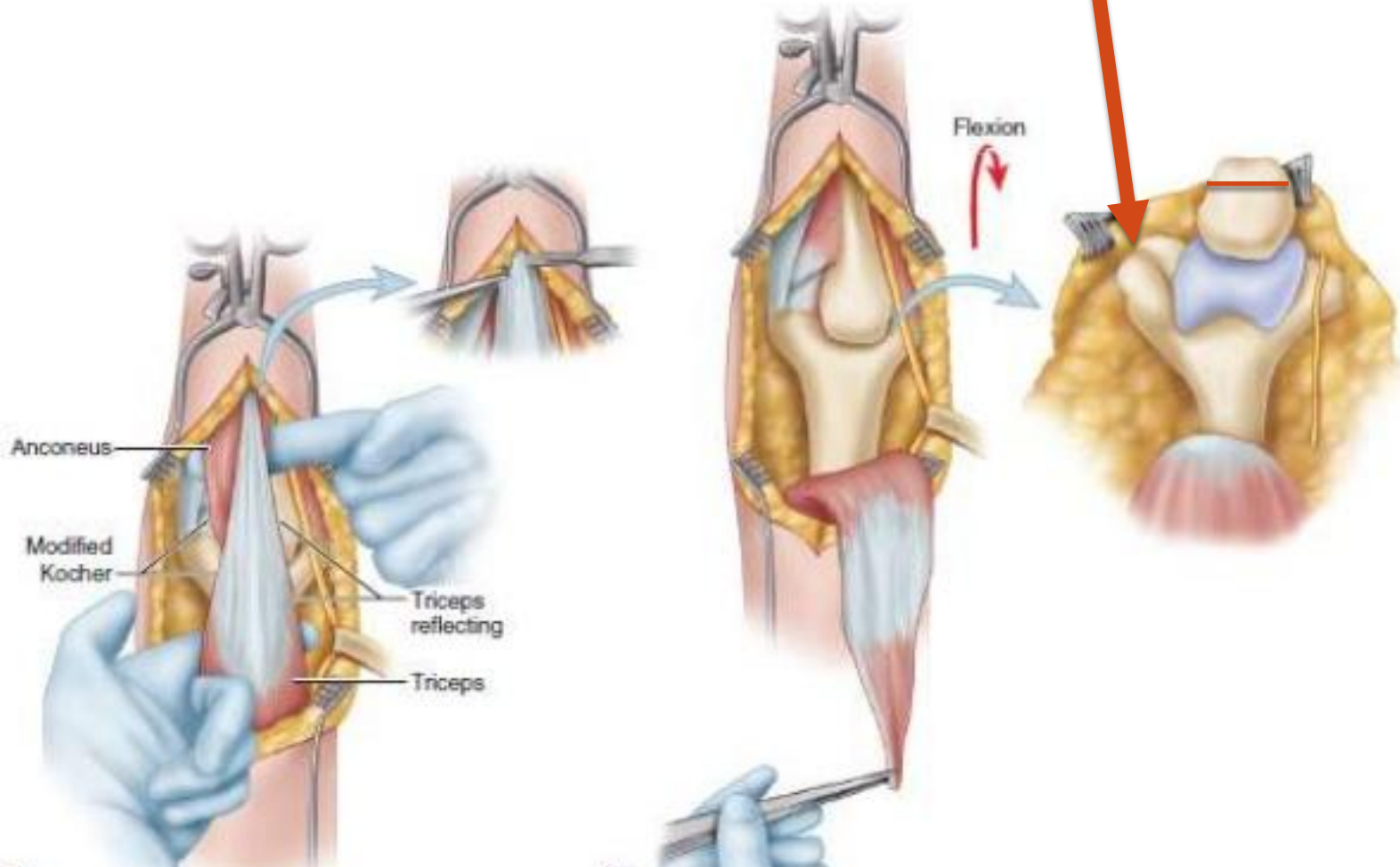
Ulnar
Nerve



Head



LCL is a secret



Examples



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All pieces easily reducible

Some bone missing

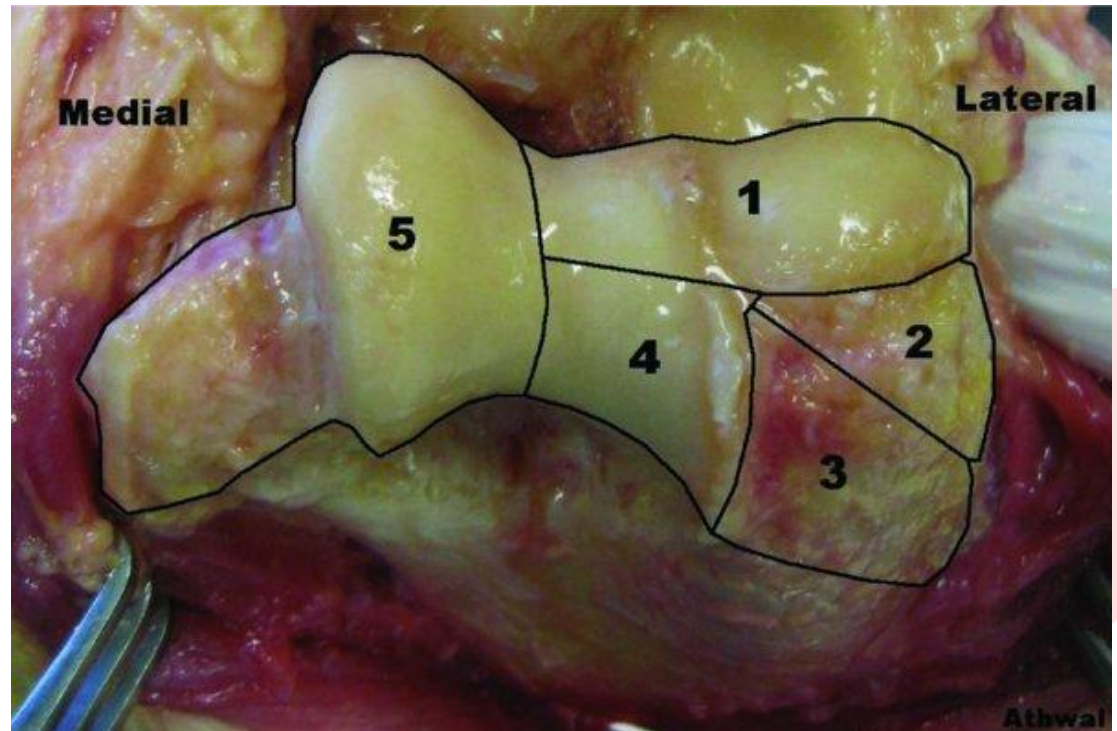
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What cartilage

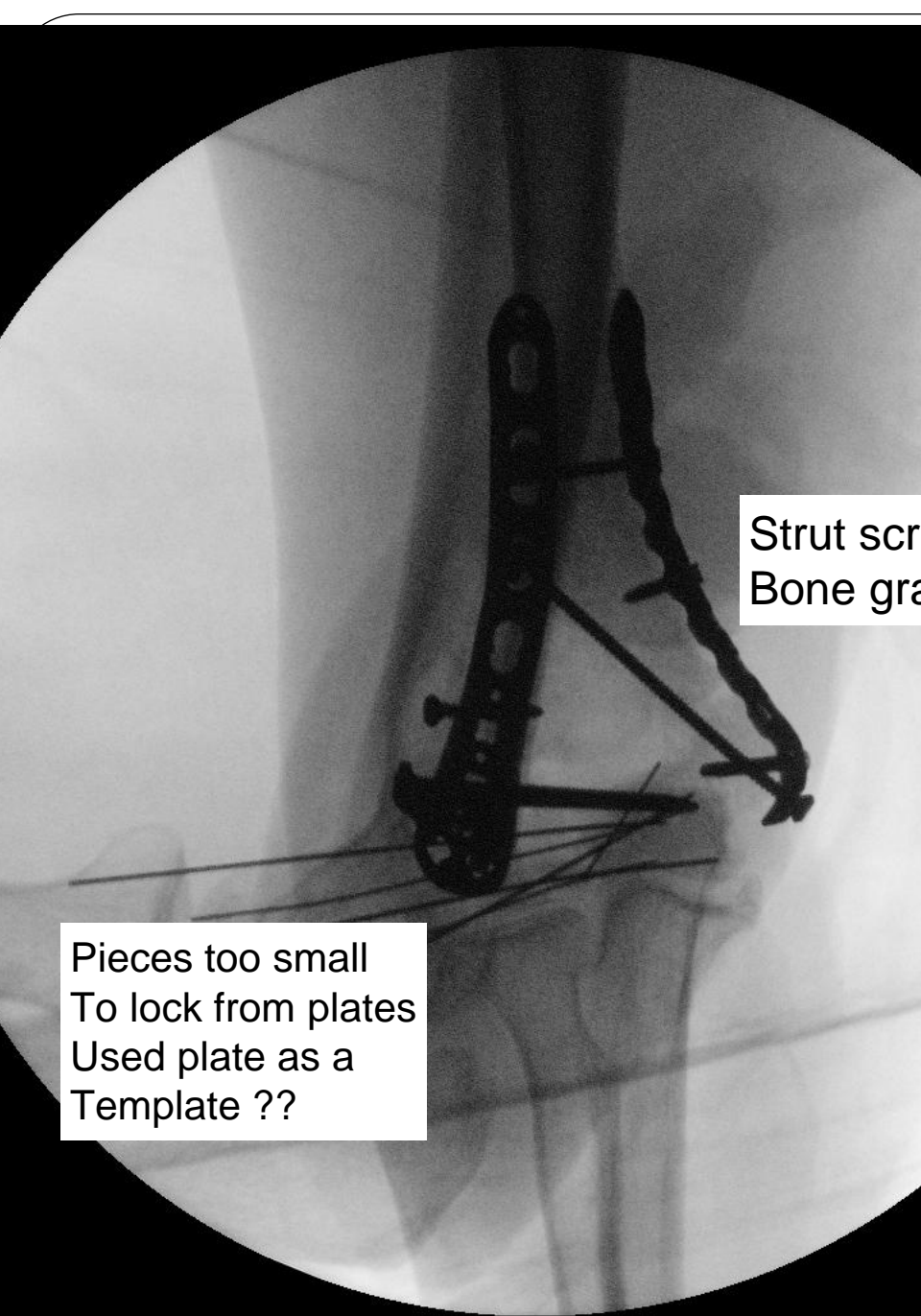
Is that an elbow?

Realize where it is missing from

Ring Classification

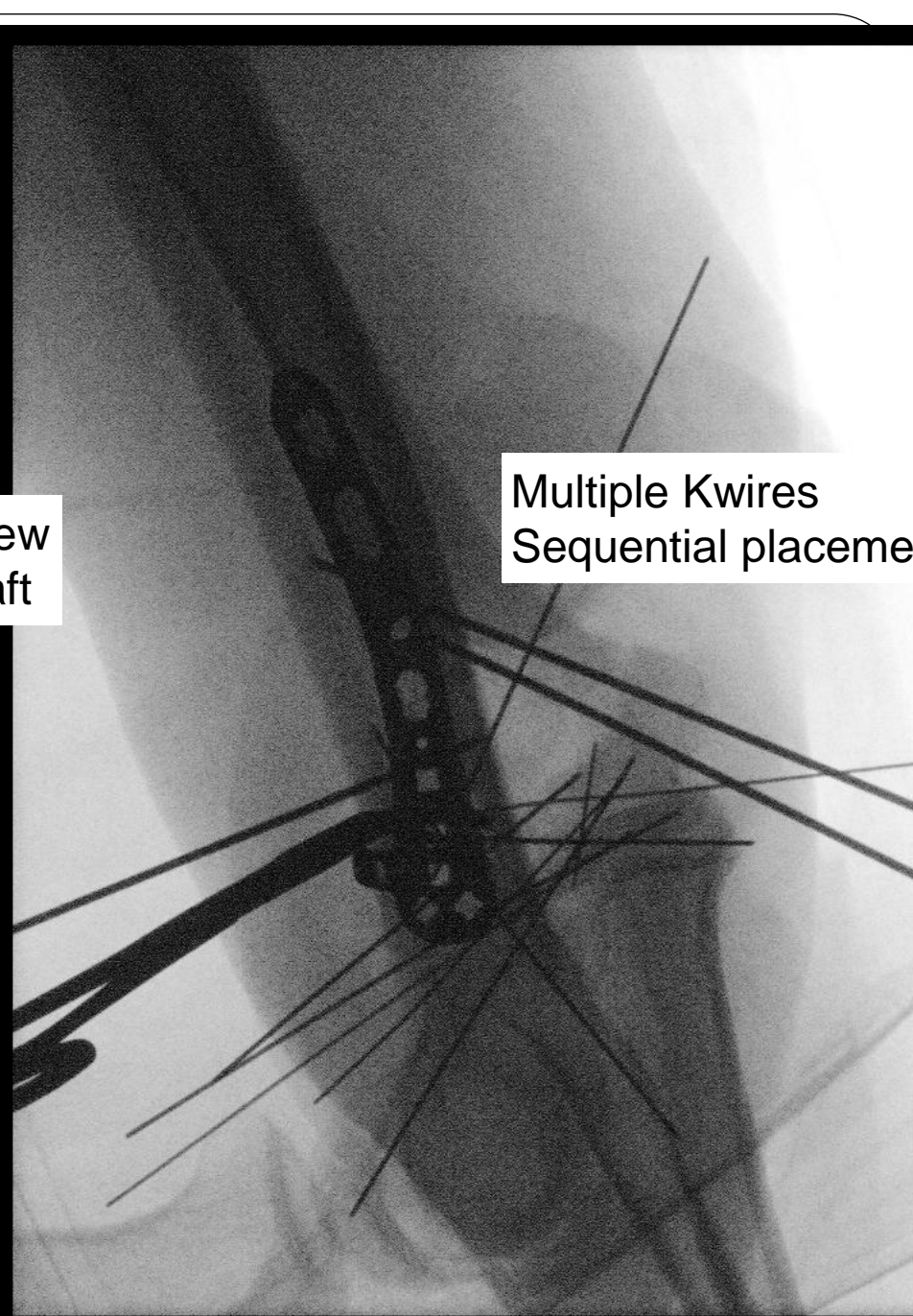






Strut screw
Bone graft

Pieces too small
To lock from plates
Used plate as a
Template ??

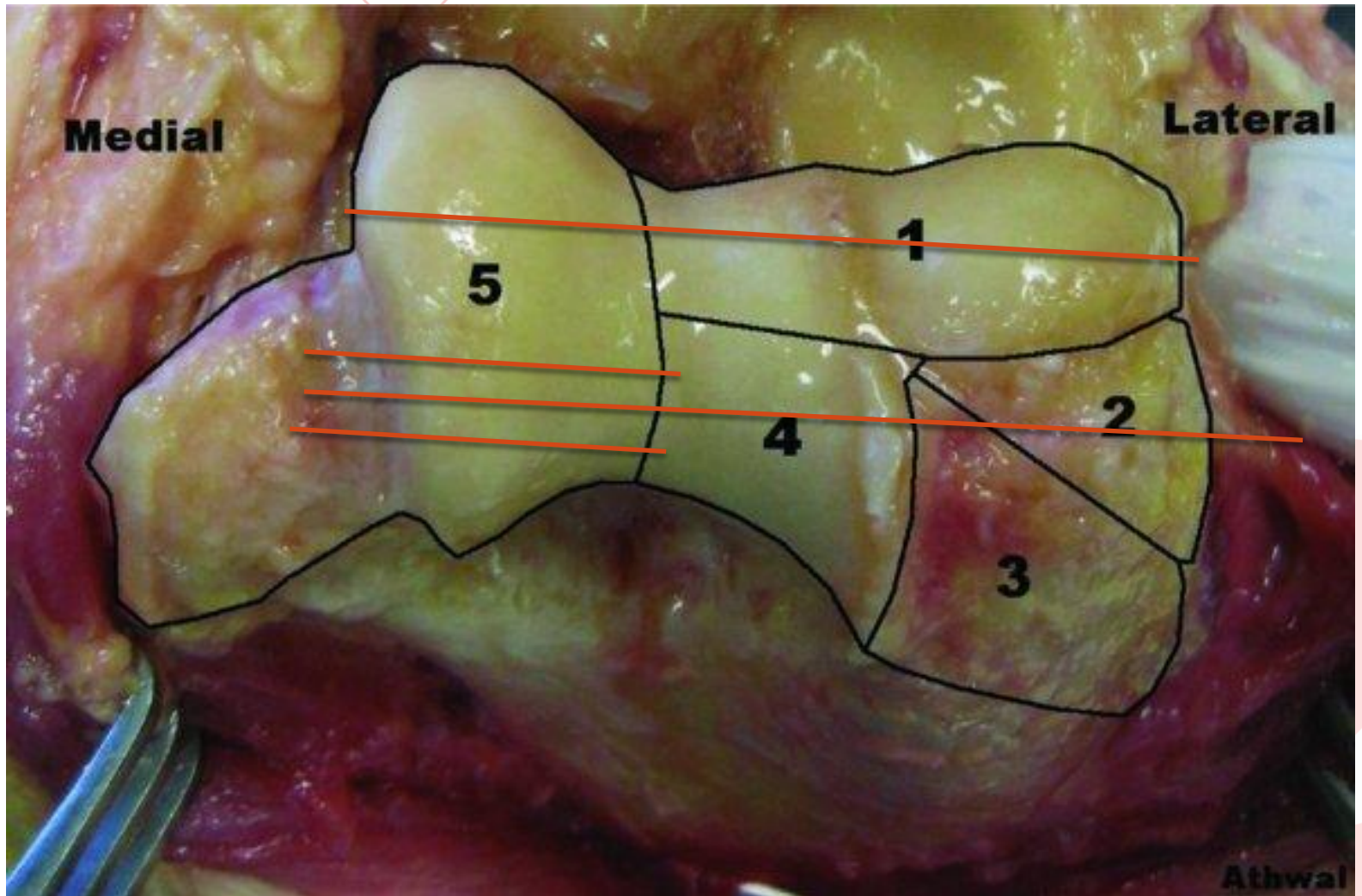


Multiple Kwires
Sequential placeme



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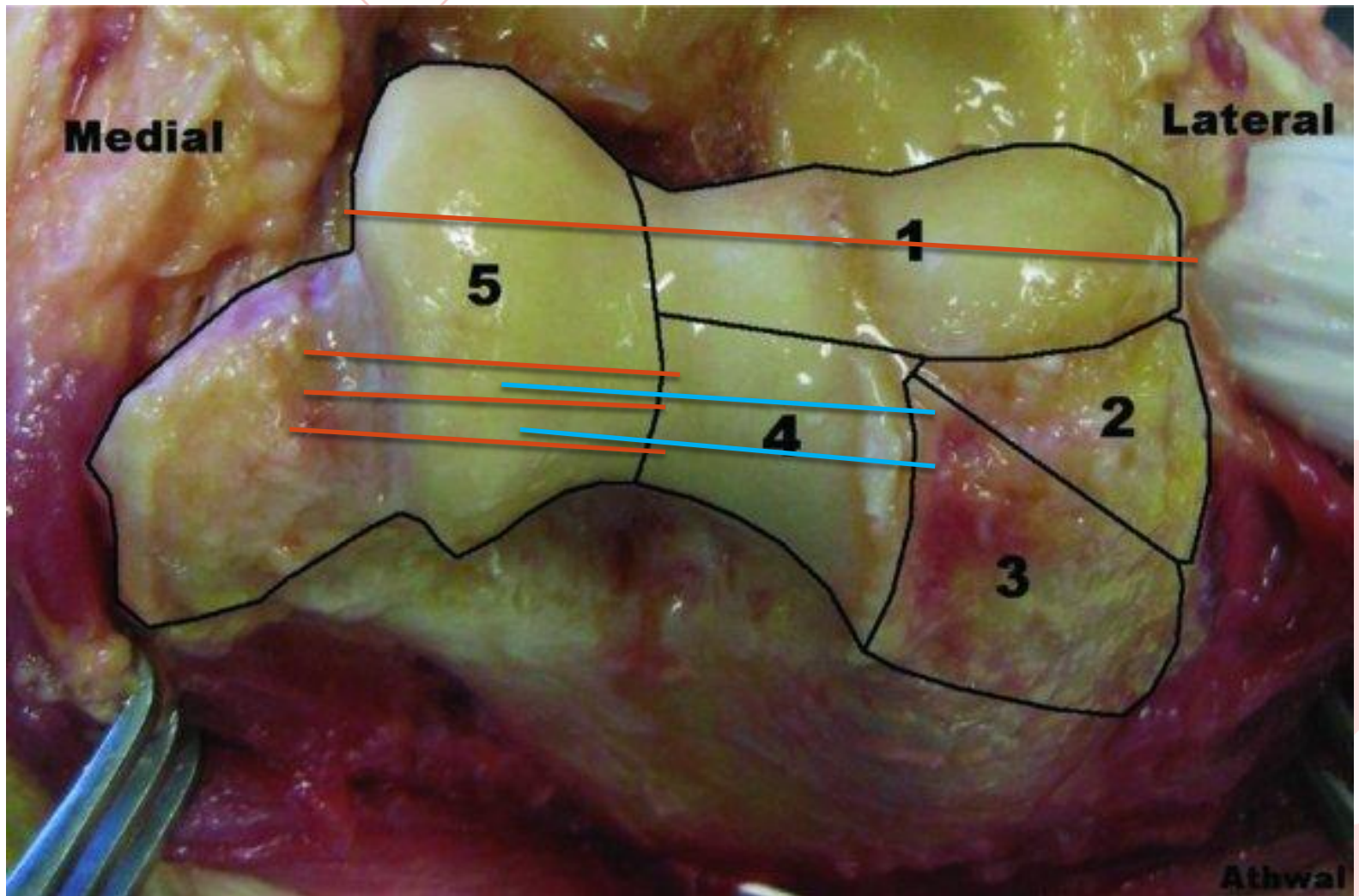
Small K-wire Usage



Small Kwire Usage



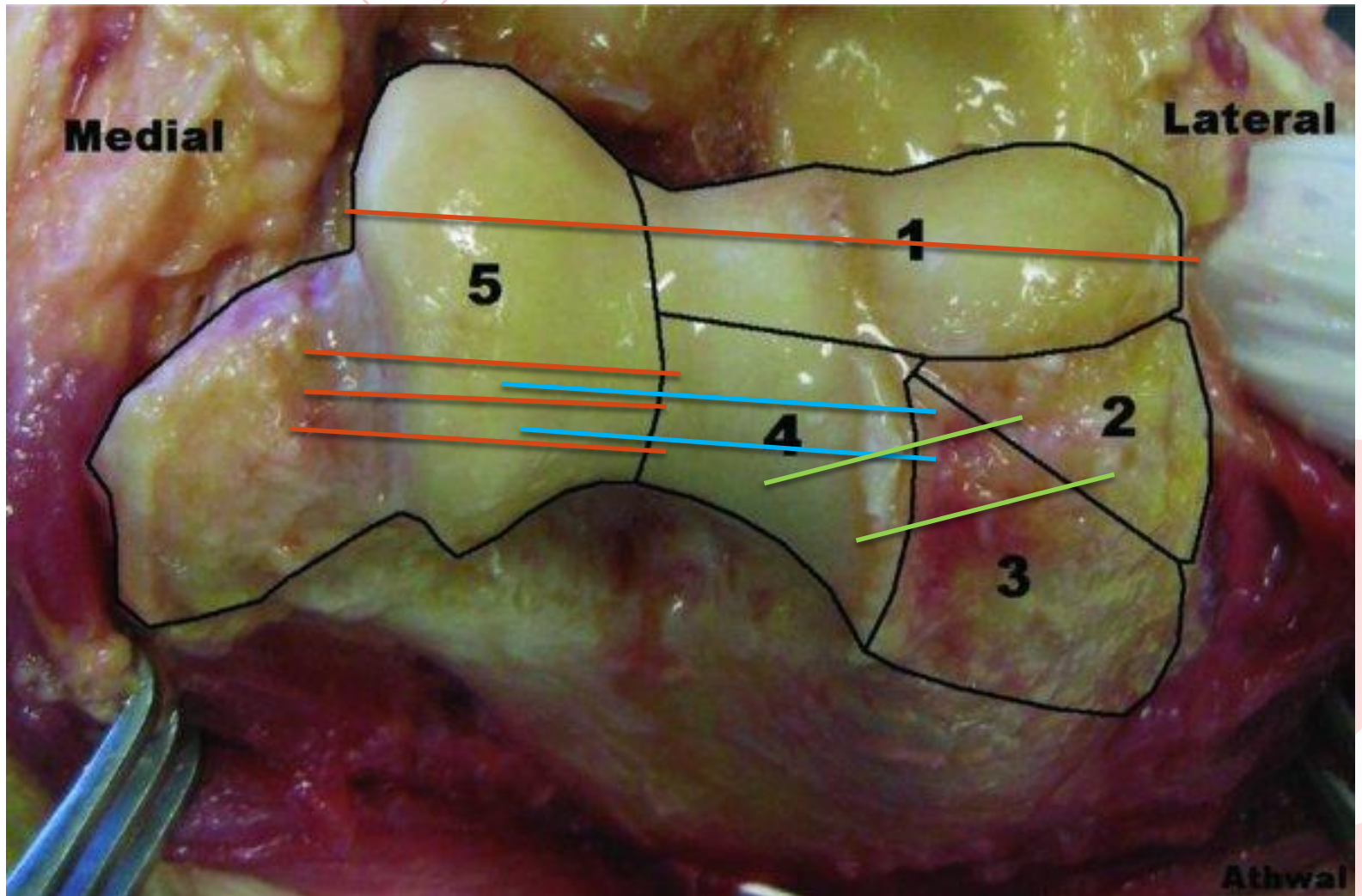
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Small Kwire Usage



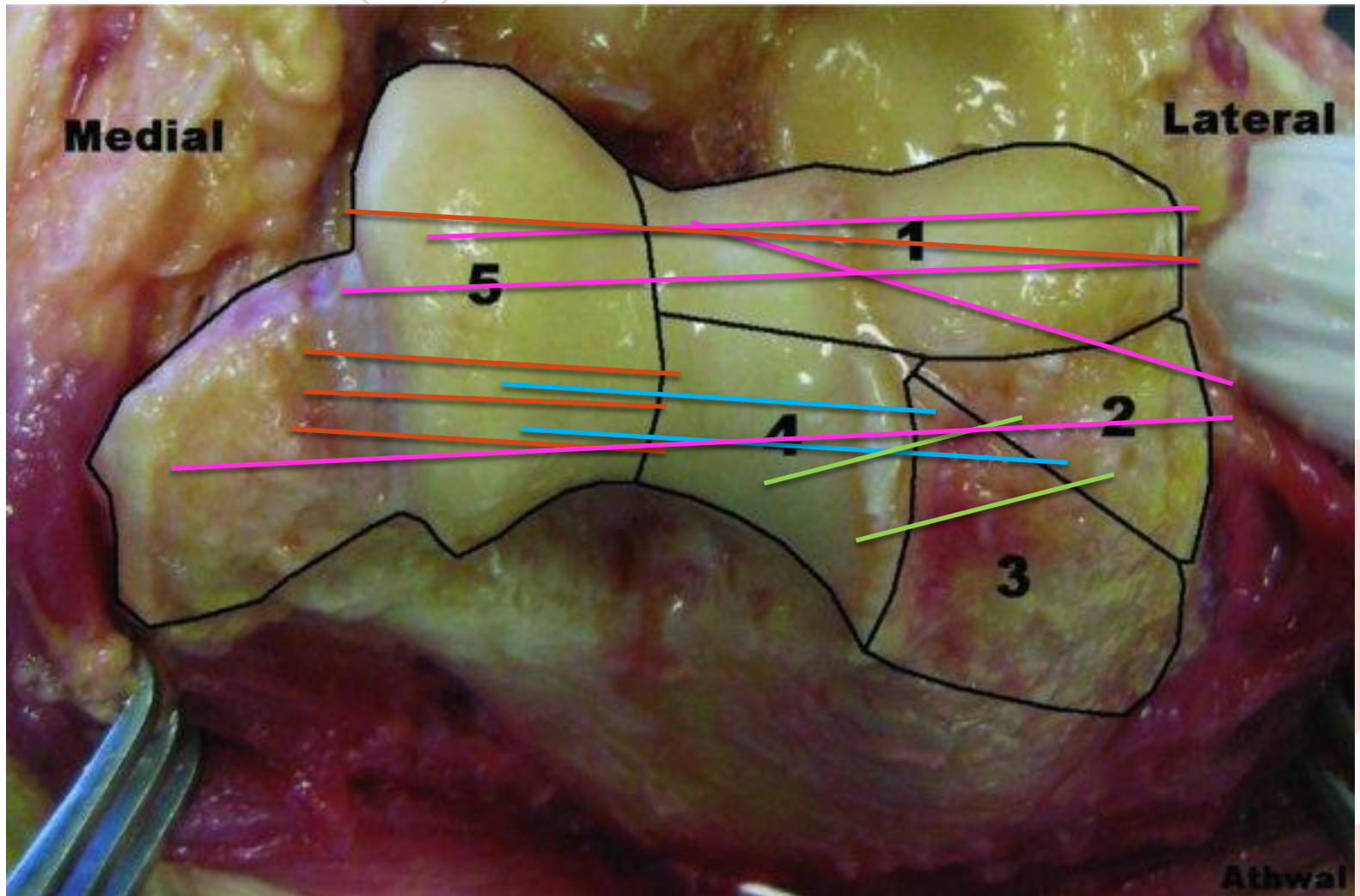
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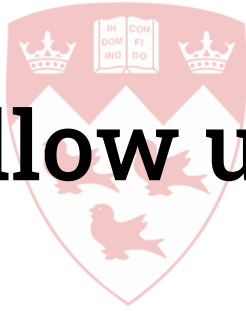
Small Kwire Usage



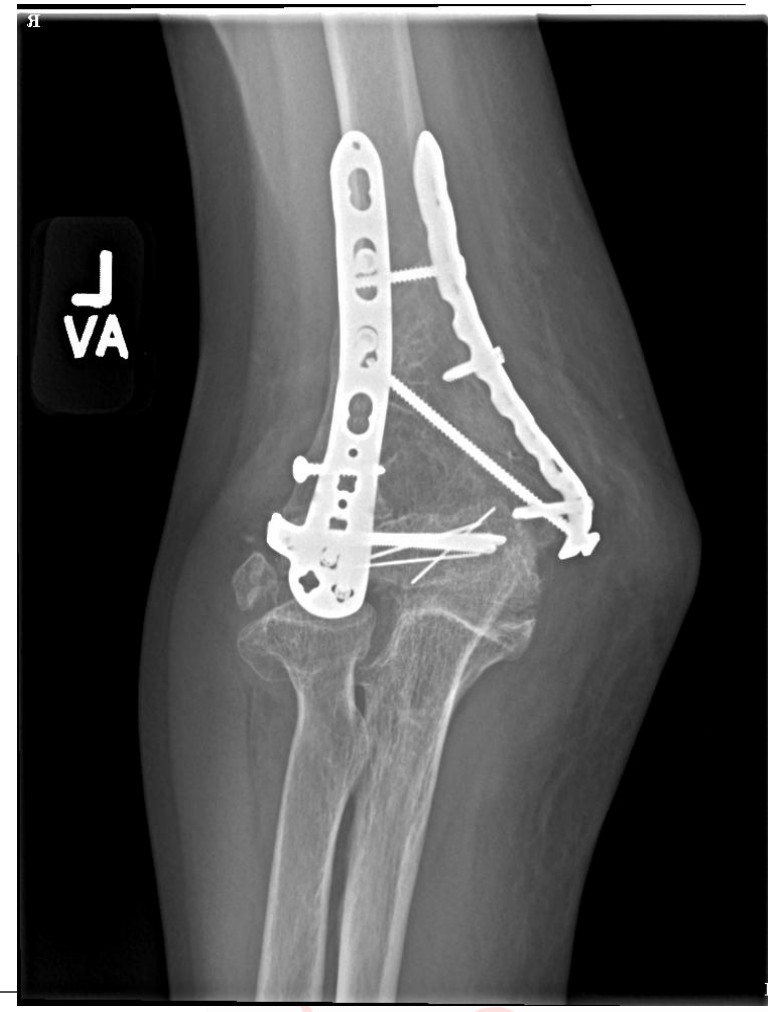
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6 year Follow up



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DERMOPLASTY

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- Option for revision in young patient where TEA not an option
- Done a few – surprisingly, happy patients
- Use abdominal dermis – allows primary closure

Examples



polytrauma

All pieces easily reducible

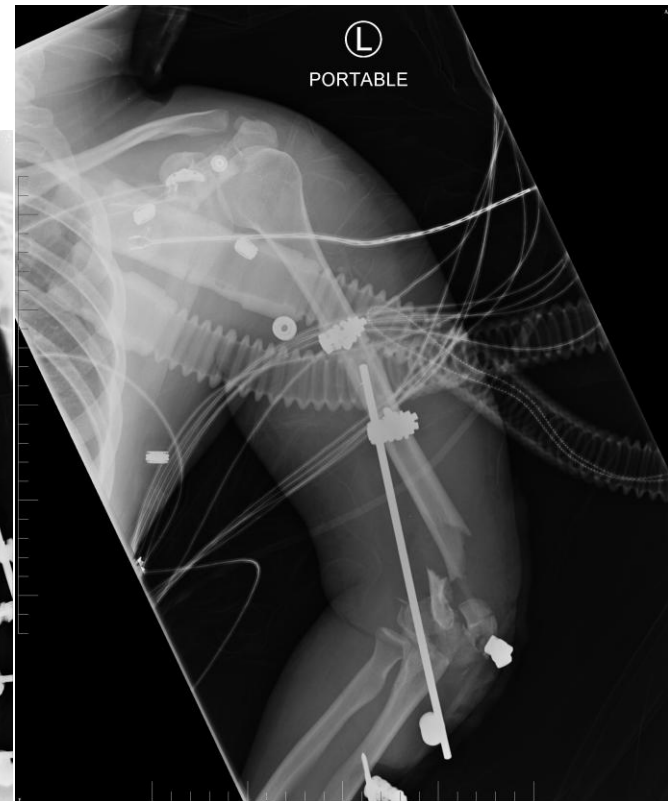
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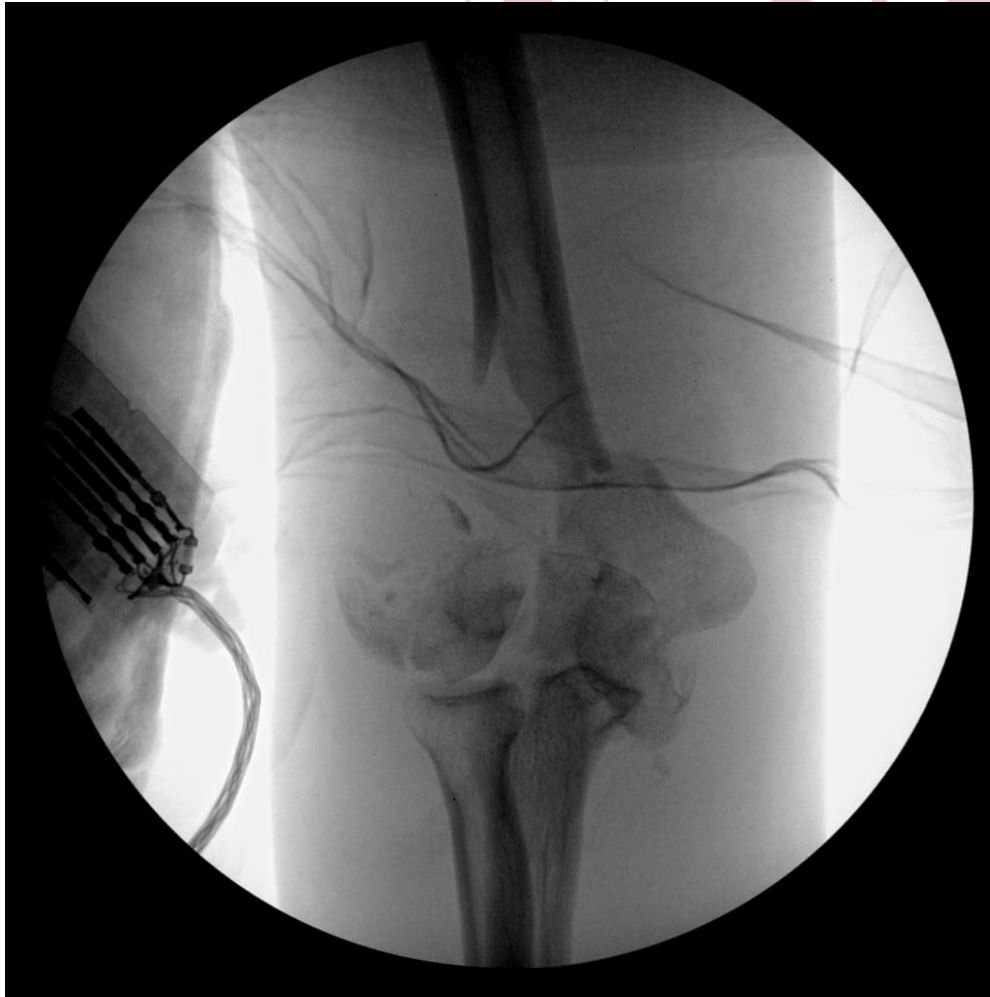
What cartilage

Is that an elbow?

- NV?
- Intubated



Osteotomy DONE!



Just a bad day



M



Approaches



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What cartilage

Is that an elbow?

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Medial Morrey

TEA/Hemi
Allograft

Triceps Splitting

Allograft



Allograft

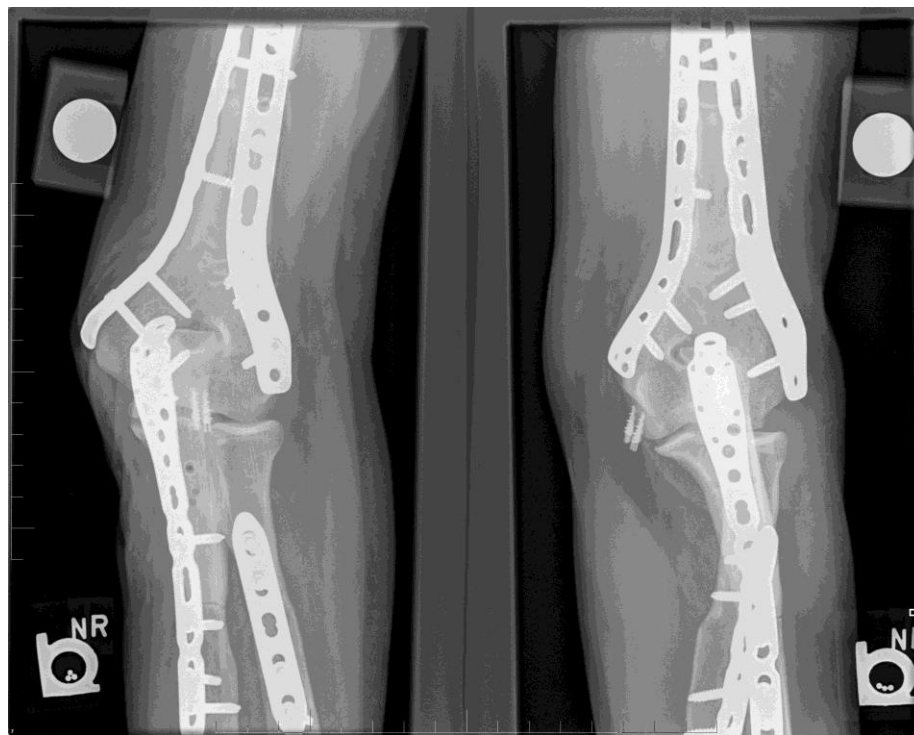
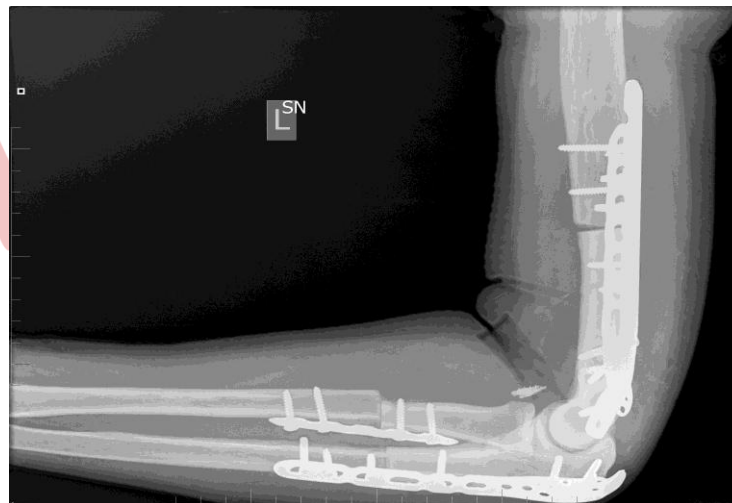


N

1



2 other sx
Sent in



Examples



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What cartilage

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Examples



M

All pieces easily reducible

Some bone missing

Some cartilage missing

What cartilage

Is that an elbow?

Somebody tried
3 weeks old

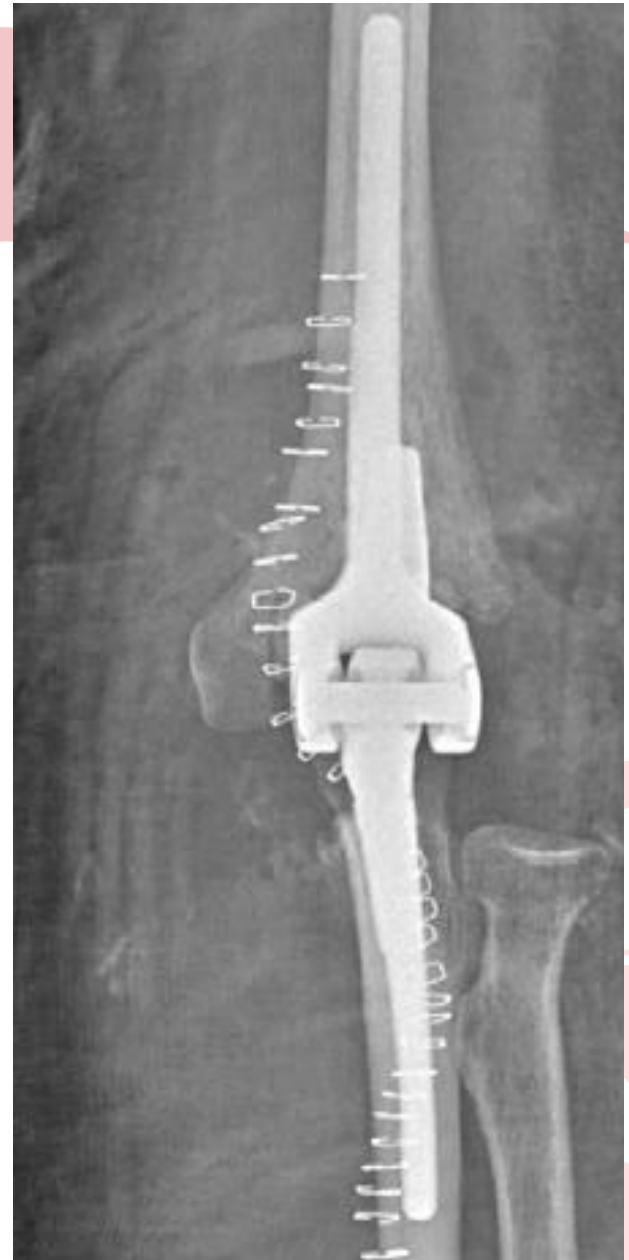




M

1

- Is there any good artificial elbow?
- One that lasts
- One that can be used under 60?



Thanks

