

# Minimal Access Olecranon Osteotomy: A New and Validated Technique

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Robert Jones and Agnes Hunt Research Day – 29<sup>th</sup> April 2022



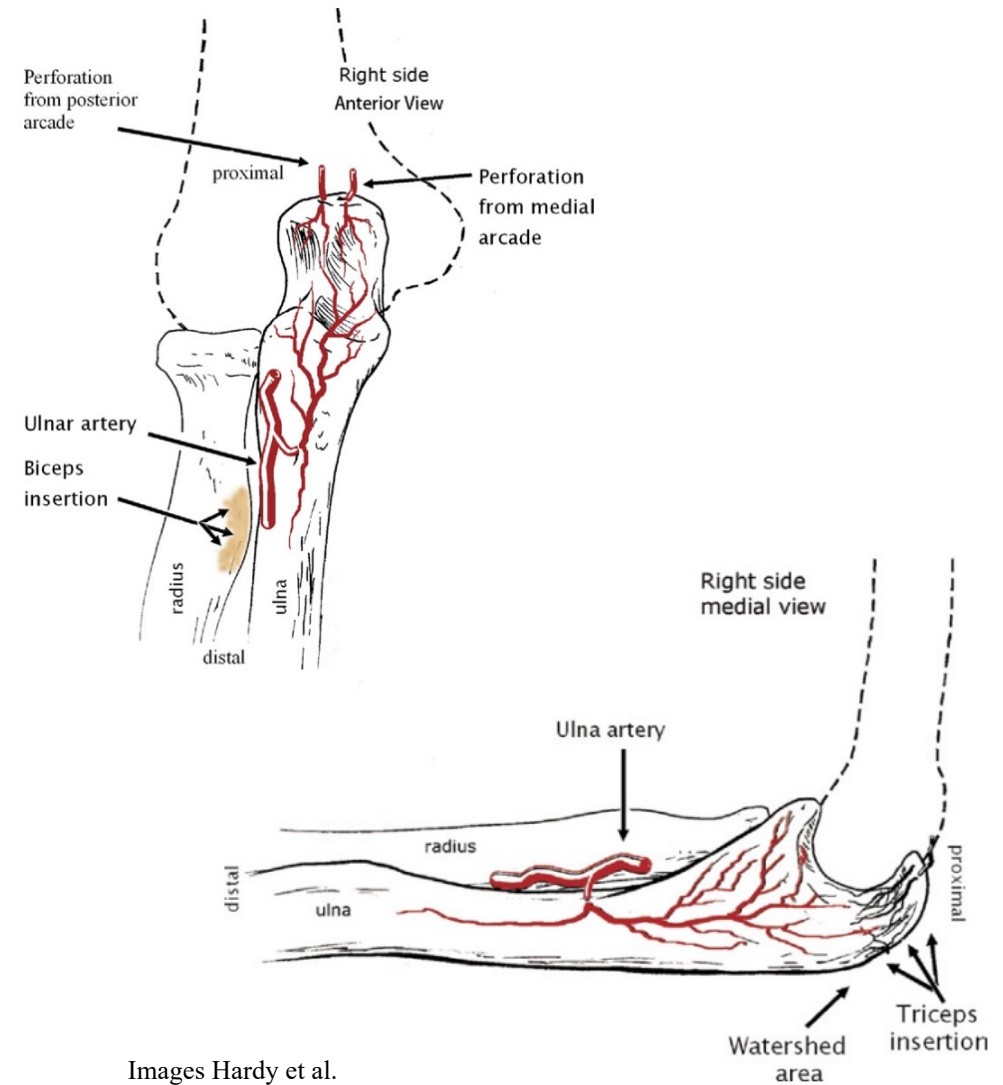
# Background

- Distal humeral fractures
  - 2-6% of adult fractures
  - 96% involve articular surface
- Complex fracture patterns
- Visualisation of articular surface = critical
- Multiple approaches available



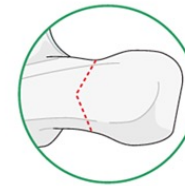
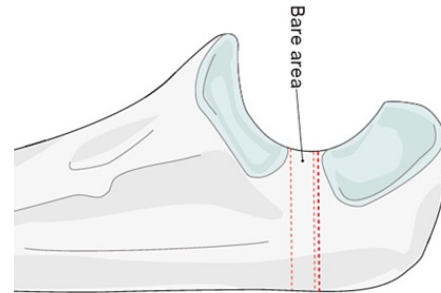
# *“The front door to the elbow is at the back”*

- Posterior approach
- Preserves ligament insertions
- Blood supply
  - Two perforating vessels proximally
  - One nutrient artery branch distally
  - Watershed area halfway between tips of olecranon and coronoid
- Insertion of triceps



# Ulnar Bare Area

- Olecranon osteotomy exiting ulnar bare area (UBA)
  - 25-30mm from ulnar tip
  - “Mean angle 20° vertical plane”
  - Subject to variation
- Aim of study to provide method of accurate identification of UBA intra-operatively, with minimal soft tissue disruption

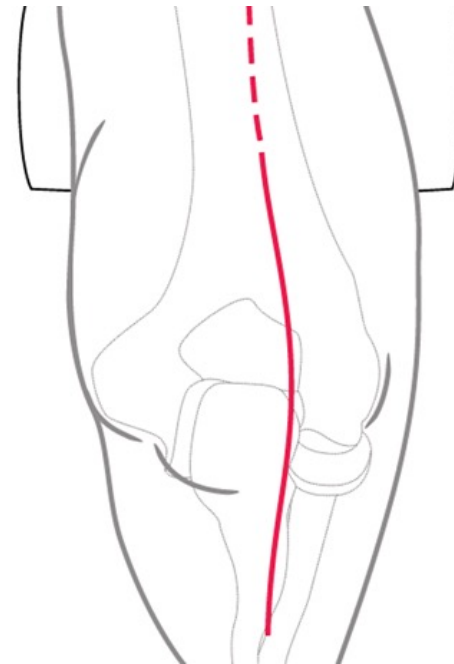
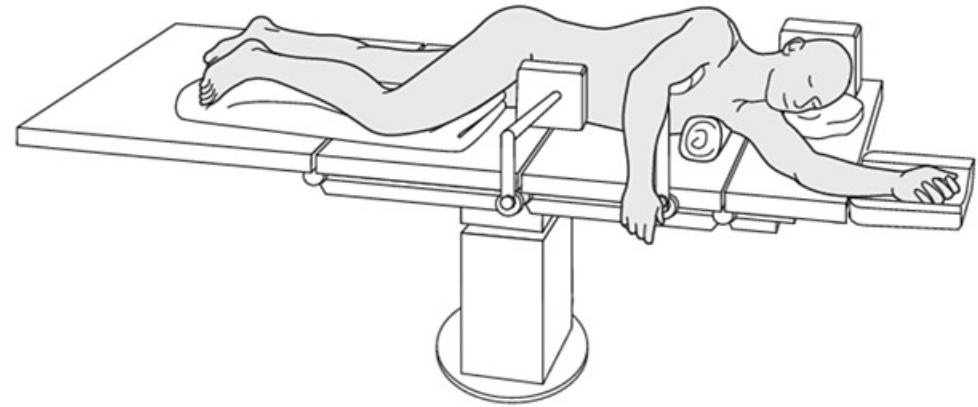


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# Technique

- Patient set-up
- Posterior approach



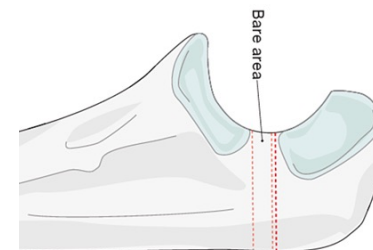
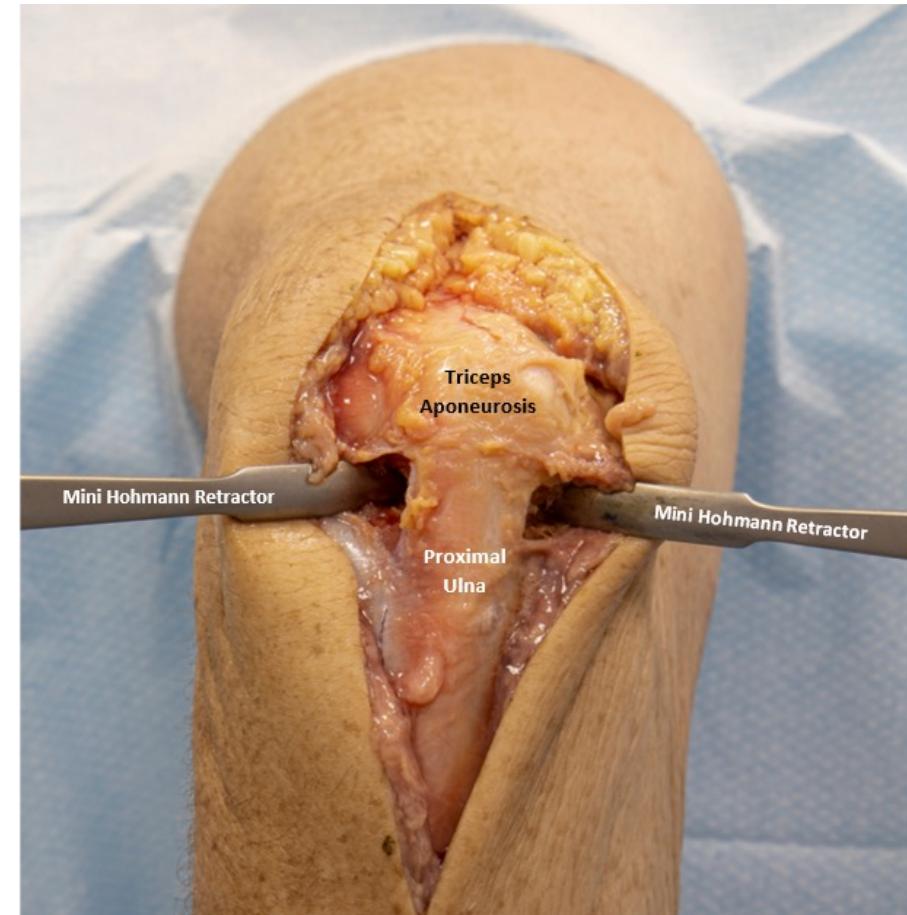
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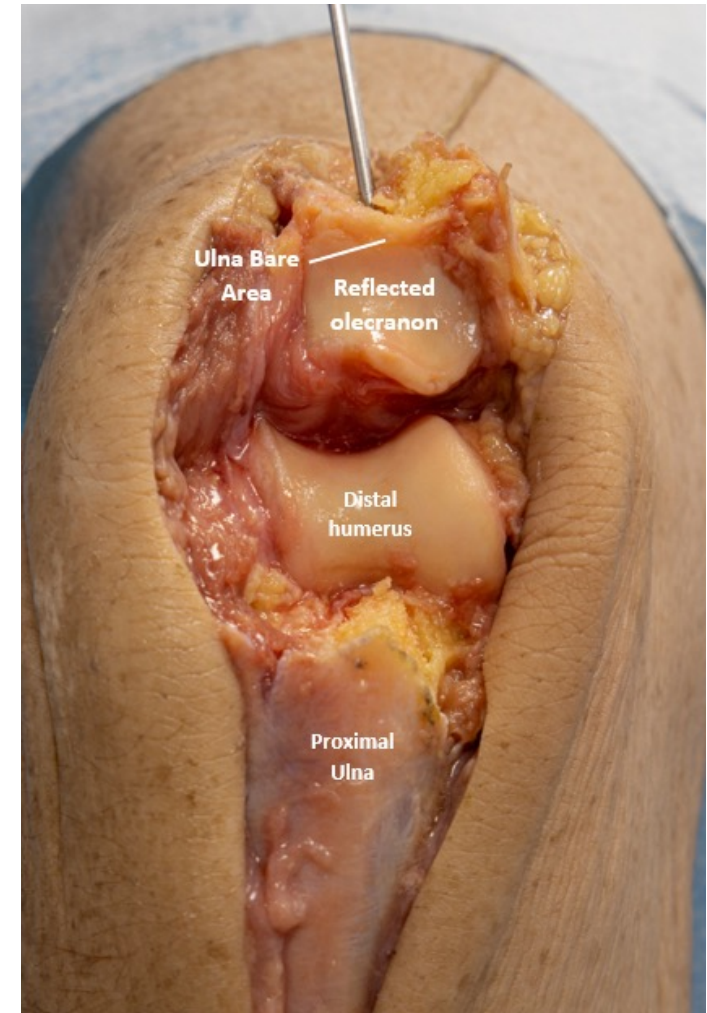
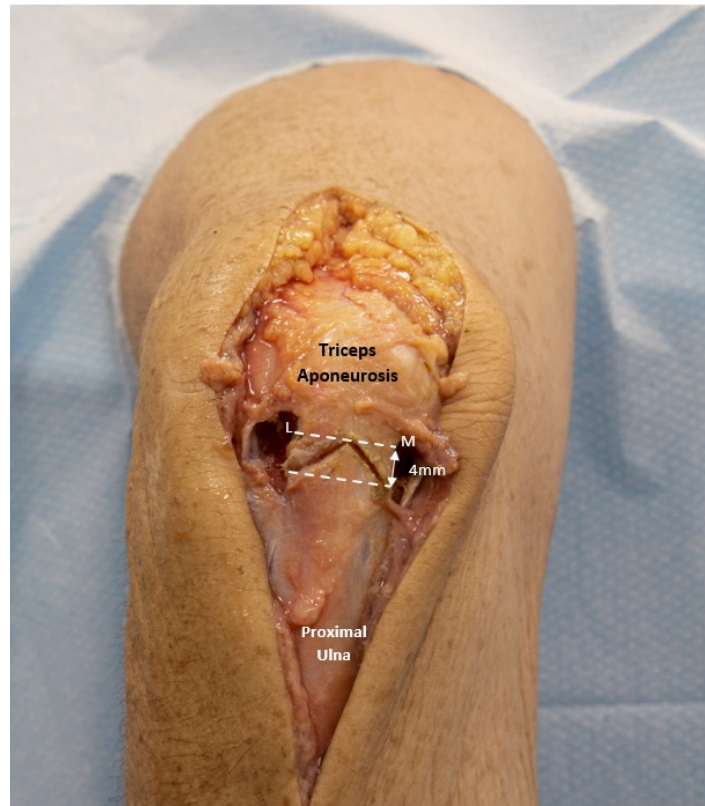
# Technique

- Patient set-up
- Posterior approach
- Minimal dissection
- Pre-plating
- Placement of retractors medially and laterally at level of joint
- Application of pressure for identification of the “Crown”
  - “Keystone” in olecranon articular surface



# Technique

- Identify osteotomy landmarks
- Critical distance: **4mm**
- Chevron osteotomy





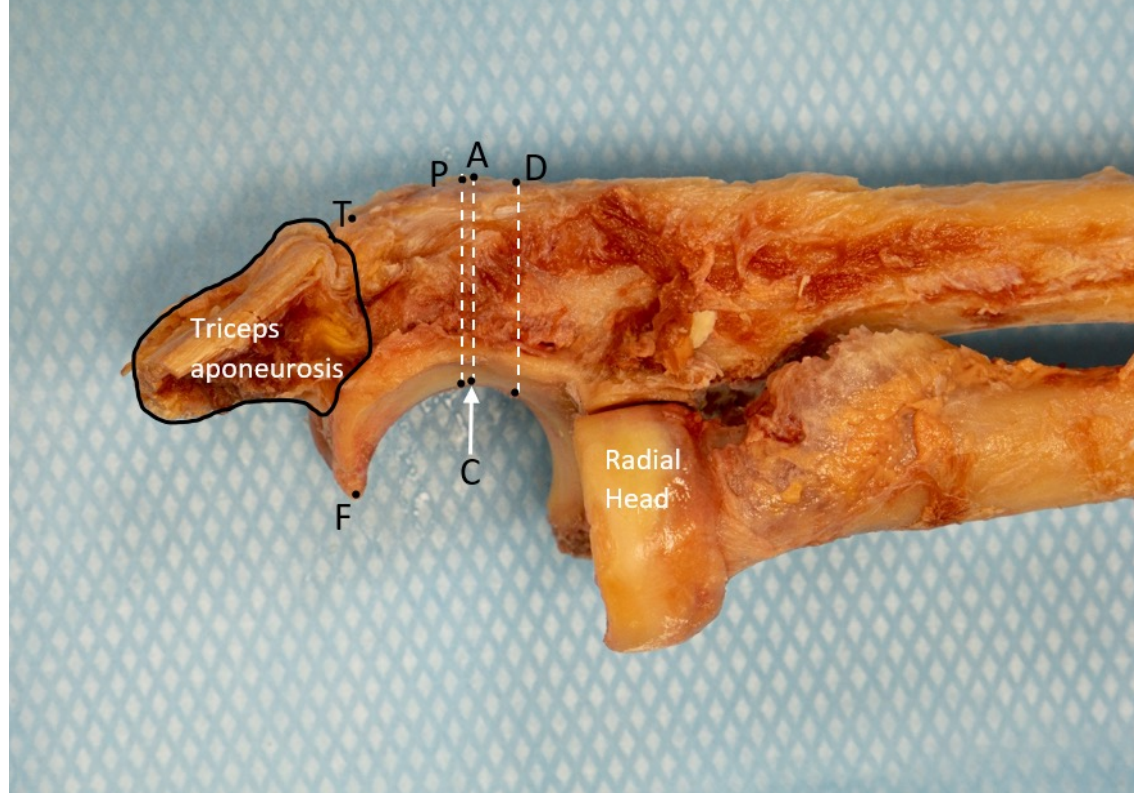
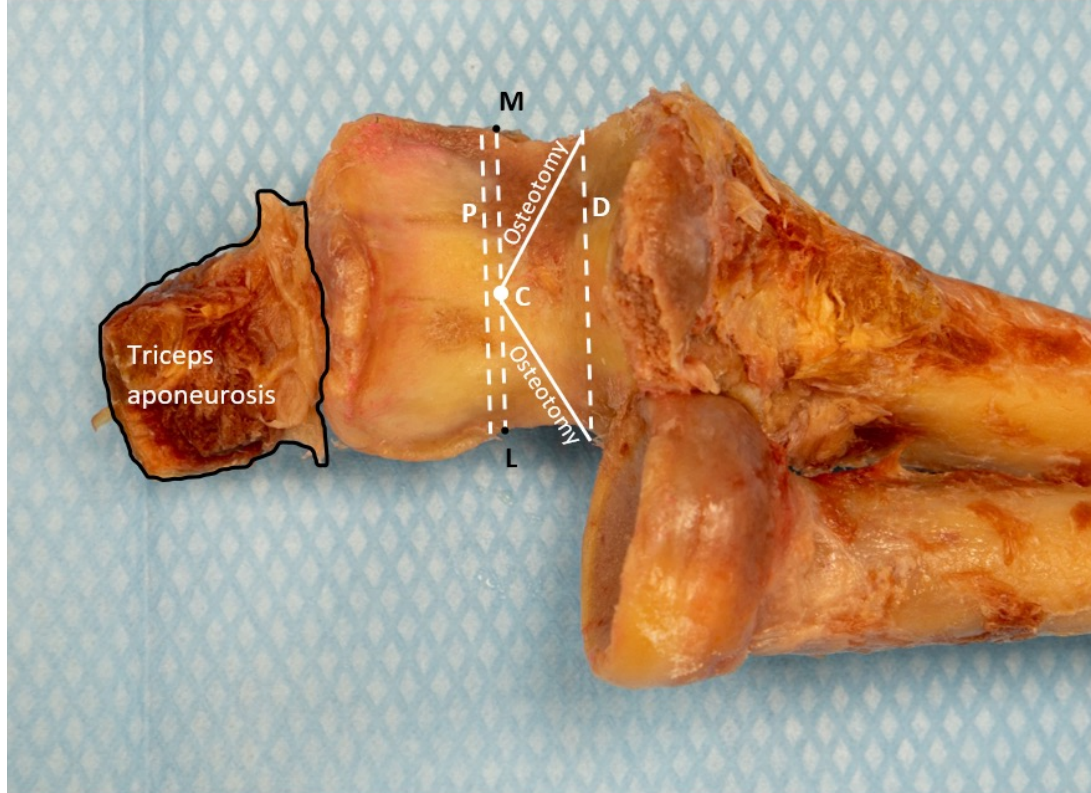
# Cadaveric Study

- 24 elbows in 12 cadavers (6 male, 6 female) studied
- Measurements repeated by two assessors





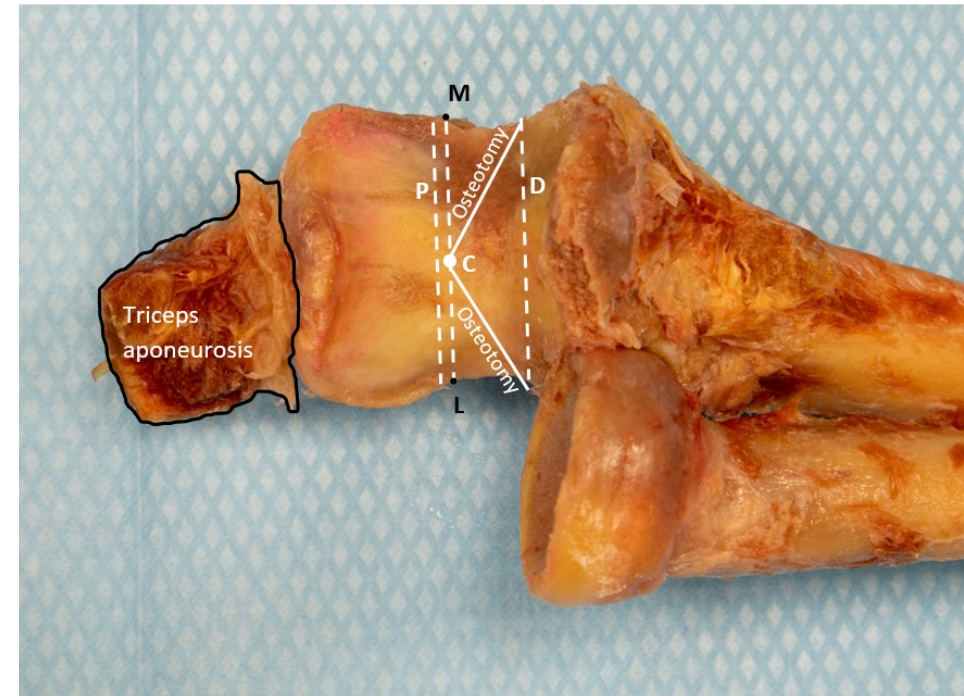
# Cadaveric Study





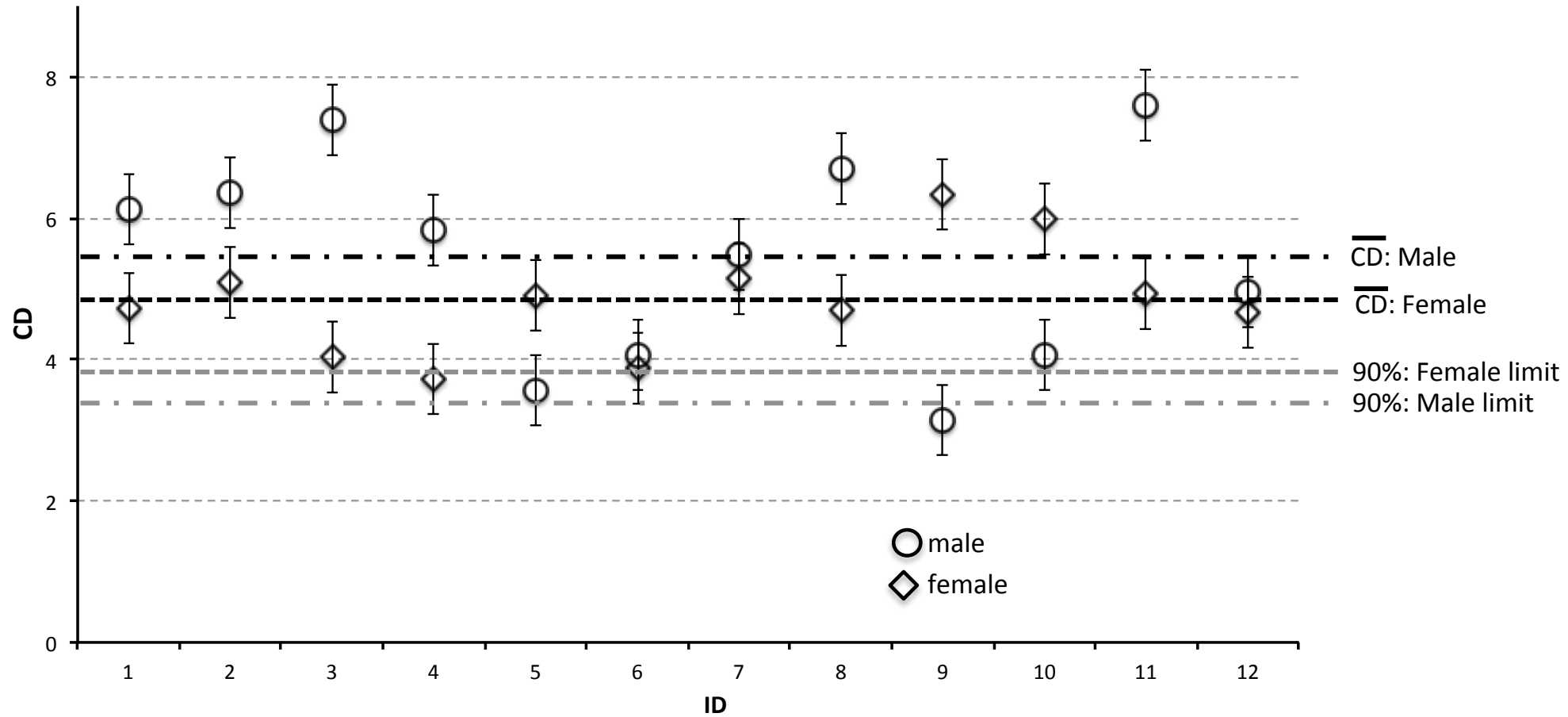
# Cadaveric Study

- 24 elbows in 12 cadavers (6 male, 6 female) studied
- Measurements repeated by two assessors
- Distal ulnar bare area boundary:
  - f:CD = **4.8mm**  $\pm$  0.4
  - m:CD = **5.4mm**  $\pm$  0.8





# Cadaveric Study



**Figure:** Measured distances from the Crown (C) to the distal boundary of the UBA (D) for the male and female cadaveric subjects.



# Cadaveric Study

- 24 elbows in 12 cadavers (6 male, 6 female) studied
- Measurements repeated by two assessors
- Distal ulnar bare area boundary:
  - f:CD = 4.8mm  $\pm$  0.4
  - m:CD = 5.4mm  $\pm$  0.8
- Radiological and anatomical measurements comparable
- Anatomical Ratio:
  - f:CD = 0.25ML
  - m:CD = 0.198ML
- Radiological Ratio:
  - f:CD = 0.206FT
  - m:CD = 0.171FT

# Discussion

- Restoring the articular surface is of vital importance when surgically managing intra-articular fractures of the distal humerus.
- A trans-olecranon osteotomy provides the best method of visualising the articular surface of the distal humerus.
- Exiting in the ulnar bare area is critical to preserving the articular cartilage.
- Previous studies have shown high non-union rates following olecranon osteotomies, due to extensive soft tissue stripping and devascularisation of the proximal ulna.



# Conclusions

- Using this minimally invasive technique, we have been able to accurately identify the ulnar bare area intra-operatively.
- The results are reproducible, with no anatomical variability present in our study.
- This is a validated technique, which is safe, reproducible and realistic to achieve intra-operatively, whilst maintaining the surrounding soft tissue envelope.



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# Thank you



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Raising funds for Royal Stoke University Hospital and County Hospital, Stafford