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# Five Millimeters from Greater Tuberosity to PHILOS; The Fact or The Myth?

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# Faculty Disclosure Information



Nothing to disclosure



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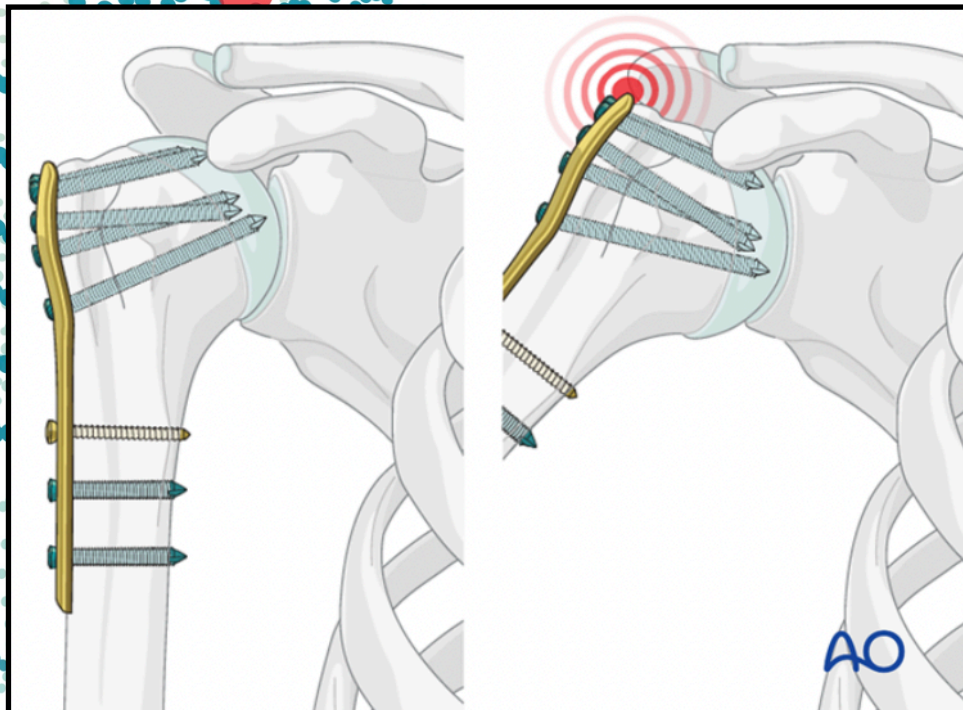
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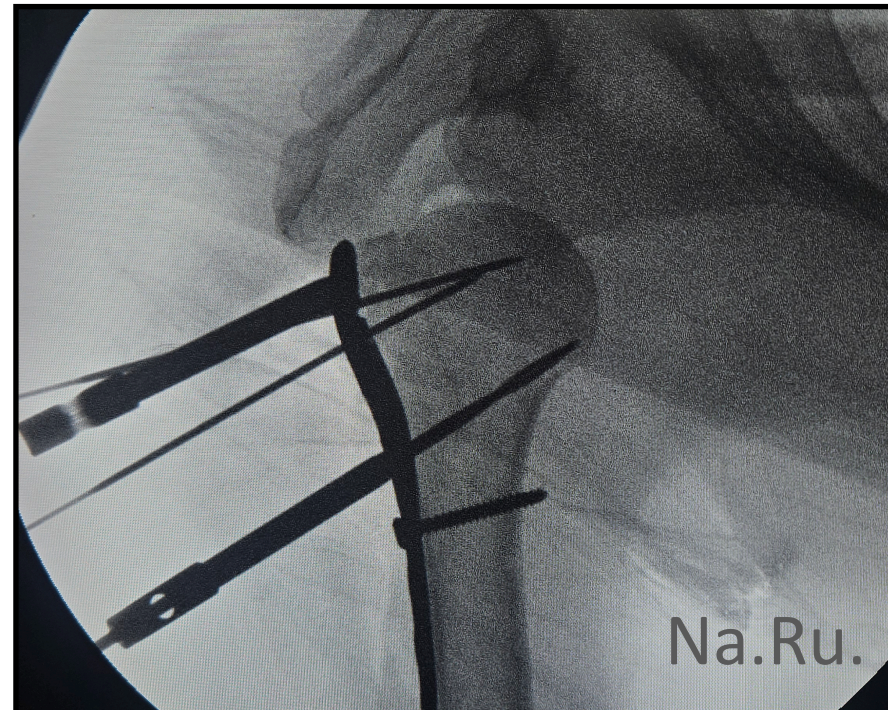


# Which One Do You Choose?

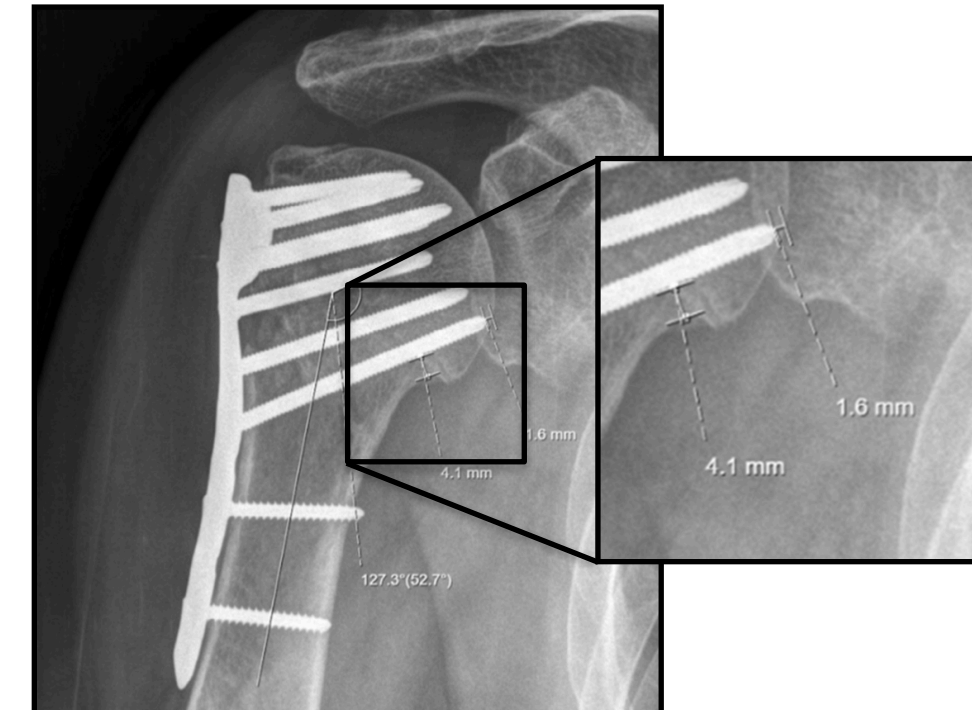
## Between impingement and fixation failure



The correct plate position is about **5-8 mm** distal to the top of greater tuberosity



Especially when facing with small-sized patients



Calcar screw should be positioned within **12mm** from inferior cortex to prevent fixation failure



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(1) <https://surgeryreference.aofoundation.org>

(2) Eric MP, JSES 2017.



# Calcar Screw Location Reference

## Rather than GT-PHILOS distance



### Inclusion

Age  $\geq 20$

Neer II-III

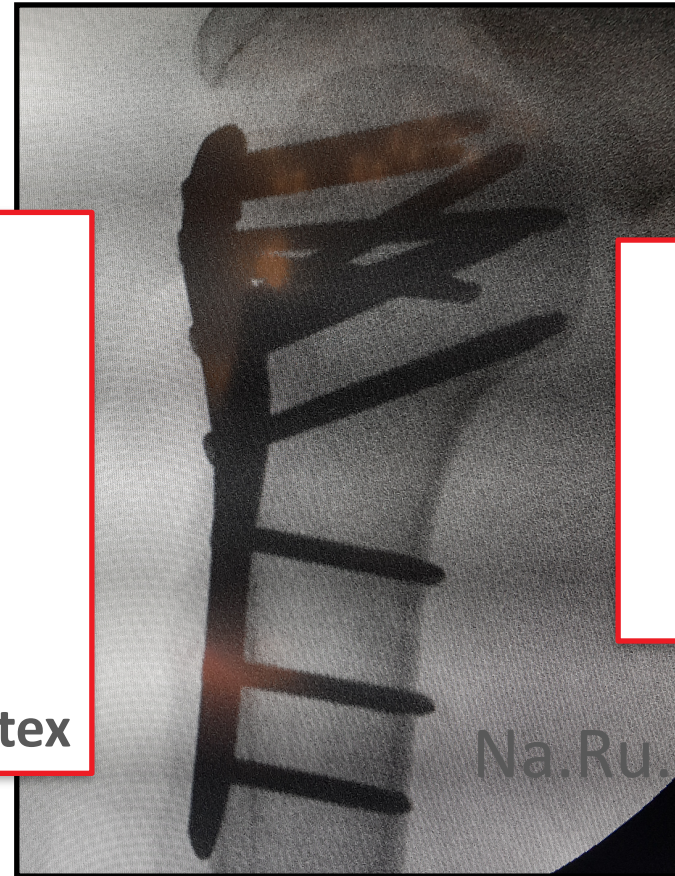
Adequate reduction quality

*Head-shaft displacement  $< 5\text{mm}$*

*GT displacement  $< 5\text{mm}$*

*Head-shaft alignment  $120^\circ$ - $150^\circ$*

Calcar screw position  **$< 12\text{mm}$**  from inferior cortex



Reverse reference of PHILOS placement  
from the tip to the base

### Exclusion

Pathologic fracture

Neurological disorder / Dementia

Ipsilateral upper extremity fracture

Previous ipsilateral shoulder surgery

### Outcome

Pain : VAS

ROM : FF / ADER / IR

Function : CSS / ASES / SPADI



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# A 1-Year Outcome of 46 PHILOS

## Single-centered retrospective review



**70 cases**  
of displaced proximal humerus fracture  
underwent PHILOS fixation

From Jan 2017  
to May 2022

**50 cases**  
included after exclusion criteria

**46 cases**  
with 1-year follow-up

**Group 1**  
GT-PHILOS distance  $\geq 5mm$   
**27 cases**

**Group 2**  
GT-PHILOS distance  $< 5mm$   
**19 cases**



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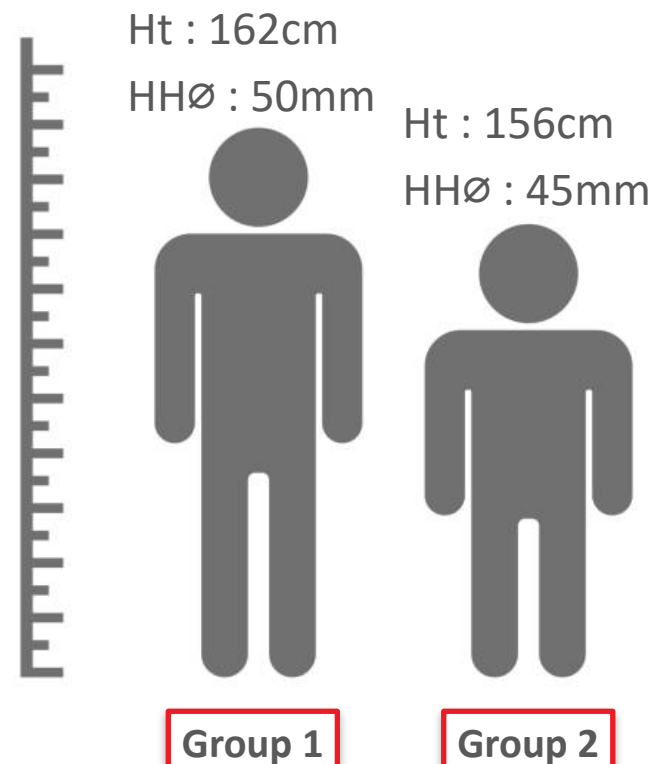


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# Size Does Matter!

## Patients size affected GT-PHILOS distance



| Parameter             |                   | Group 1 (n=27)<br>GT-PHILOS ≥ 5mm | Group 2 (n=19)<br>GT-PHILOS < 5mm | P-value |
|-----------------------|-------------------|-----------------------------------|-----------------------------------|---------|
| Age                   | Year              | 55.14±17.02                       | 64.81±15.69                       | 0.067   |
| Gender M/F            | M/F               | 44.44%/55.56%                     | 21.05%/78.95%                     | 0.101   |
| Dominant side         |                   | 44.4%                             | 47.4%                             | 0.845   |
| Weight                | kg                | 66.01±10.96                       | 58.19±10.34                       | 0.019   |
| Height                | cm                | 162.85±9.41                       | 156.05±7.83                       | 0.013   |
| BMI                   | kg/m <sup>2</sup> | 24.88±3.66                        | 24.22±4.54                        | 0.585   |
| Neer classification   | II/III            | 7.41%/92.59%                      | 31.58%/68.42%                     | 0.051   |
| Humeral head diameter | mm                | 50.18±4.12                        | 45.76±5.22                        | 0.003   |
| Calcar screw distance | mm                | 3.78±3.5                          | 3.10±1.9                          | 0.09    |



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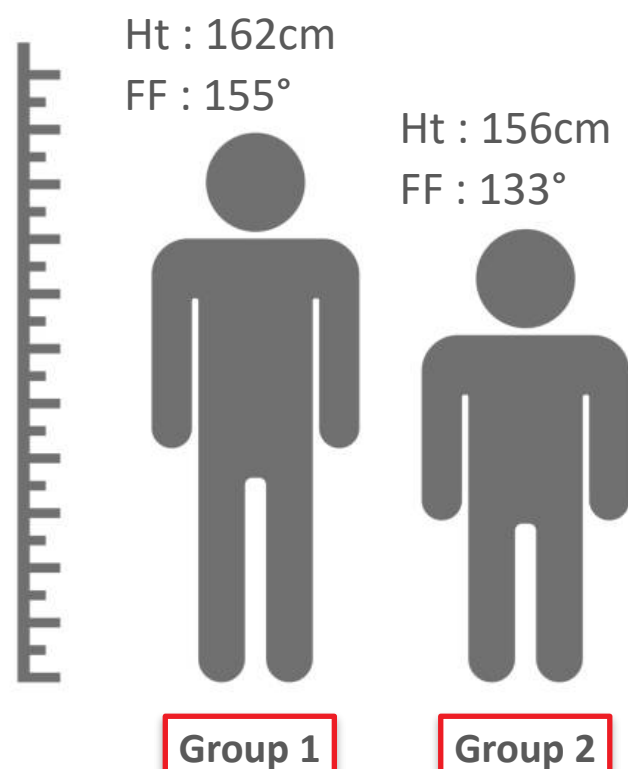


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# Size Also Does Matter!

## GT-PHILOS distance affected FF



| Outcome | Group 1 (n=27)<br>GT-PHILOS ≥ 5mm | Group 2 (n=19)<br>GT-PHILOS < 5mm | P-value |
|---------|-----------------------------------|-----------------------------------|---------|
| VAS     | 0.33±0.68                         | 0.68±0.82                         | 0.121   |
| FF      | 155.19°±17.79°                    | 133.42°±25.82°                    | 0.001   |
| ADER    | 42°.41±15.15°                     | 41.58°±13.55°                     | 0.850   |
| IR      | 7.09±1.92                         | 6.42±2.06                         | 0.047   |
| CSS     | 81.00±14.85                       | 75.42±12.95                       | 0.193   |
| ASES    | 90.92±11.84                       | 90.03±10.67                       | 0.794   |
| SPADI   | 8.98±12.98                        | 11.87±12.14                       | 0.450   |

IR was evaluated by numerical level

Functional outcome was **not significantly affected** by range of motion



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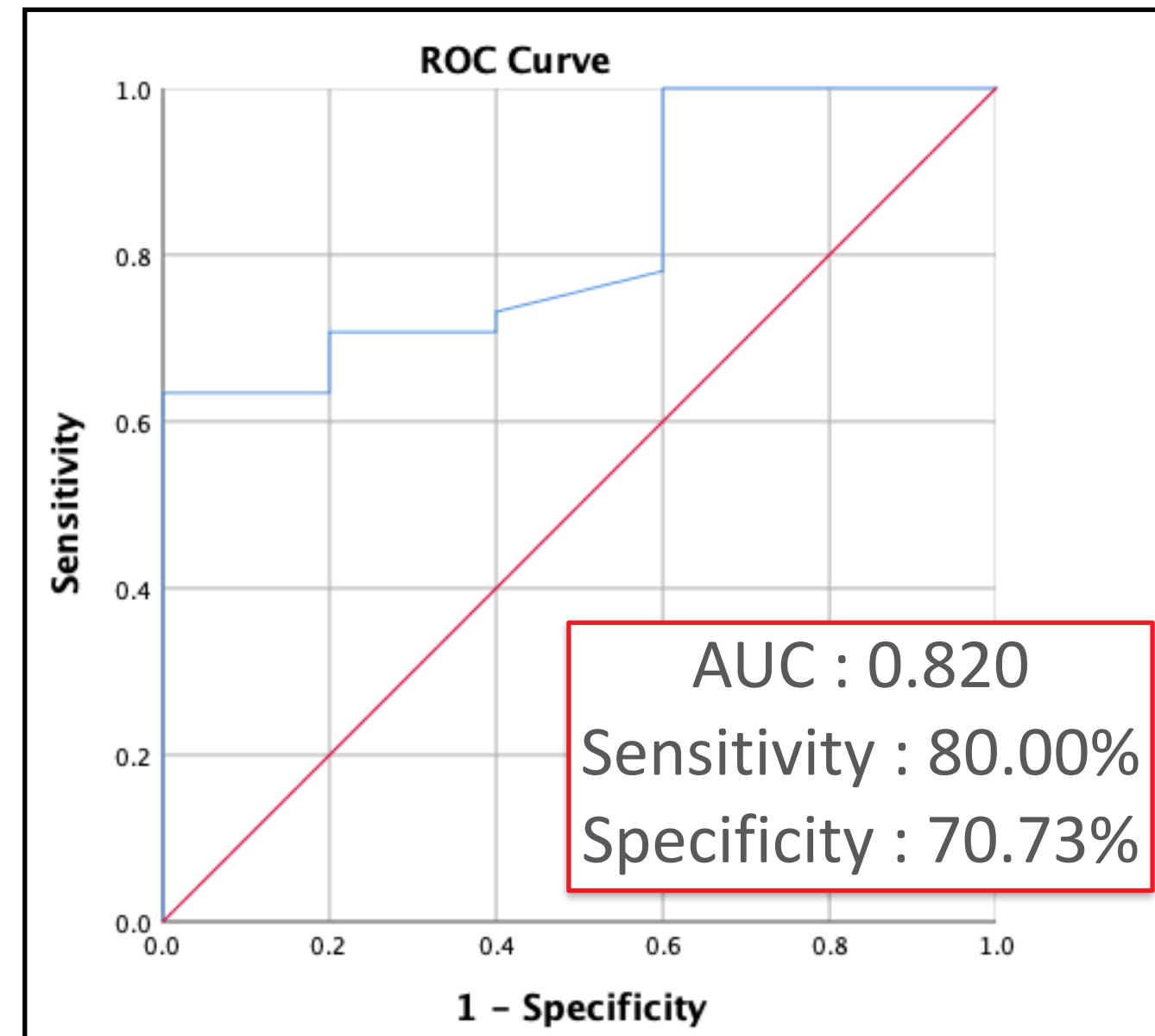


# 5mm Is Mandatory

## GT-PHILOS distance was a good predictor



Optimal threshold of  
**GT-PHILOS distance  $\geq 4.8\text{mm}$**   
is needed to gain  
**forward flexion  $\geq 120^\circ$**



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# Keynote Messages

## What should we concern for small patients



Using calcar screw placement rather than GT-PHILOS distance, PHILOS fixation for *small patients may not achieved 5mm of GT-PHILOS distance*

Small-sized patient was defined by *height less than 156cm* and *humeral head diameter less than 45mm*

GT-PHILOS distance did *not affect* functional outcome and range of motion *except forward flexion*

*GT-PHILOS distance  $\geq 4.8\text{mm}$*  predicted *forward flexion  $\geq 120^\circ$*



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