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Title: **Contribution Of The Bony Bankart In Calculating Glenoid Bone Loss**

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All authors have no conflicts of interest to disclose.

INTRODUCTION

- Magnitude of glenoid bone loss (%BL) in patients with anterior shoulder instability alters the surgical reconstruction options.

- Deficiency ≥ 25% of the glenoid width is associated with poor outcomes after arthroscopic repair & is an indication for more extensive bony reconstruction (Burkhart et Beer, 2000).

Objective: Hypothesized that calculating the glenoid %BL with an arthroscopically reduced bony Bankart would favor less aggressive surgical reconstruction.
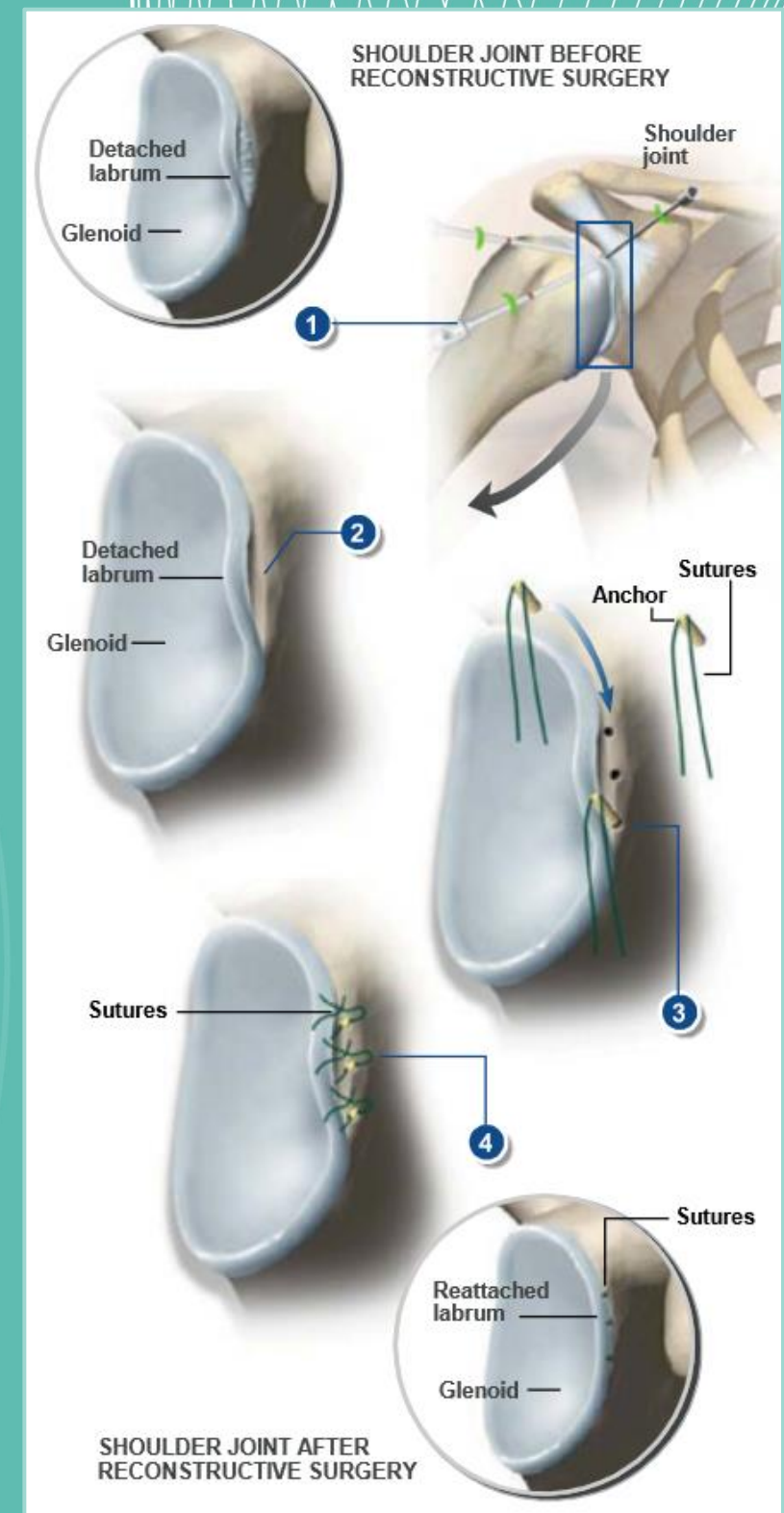
METHODS

EQUATION DERIVATION

1. Obtain an *en-face* 2D or 3D CT scan view of the glenoid head.

2. Approximate the glenoid surface as a circle and area of the bony fragment with a hemi-ellipse.

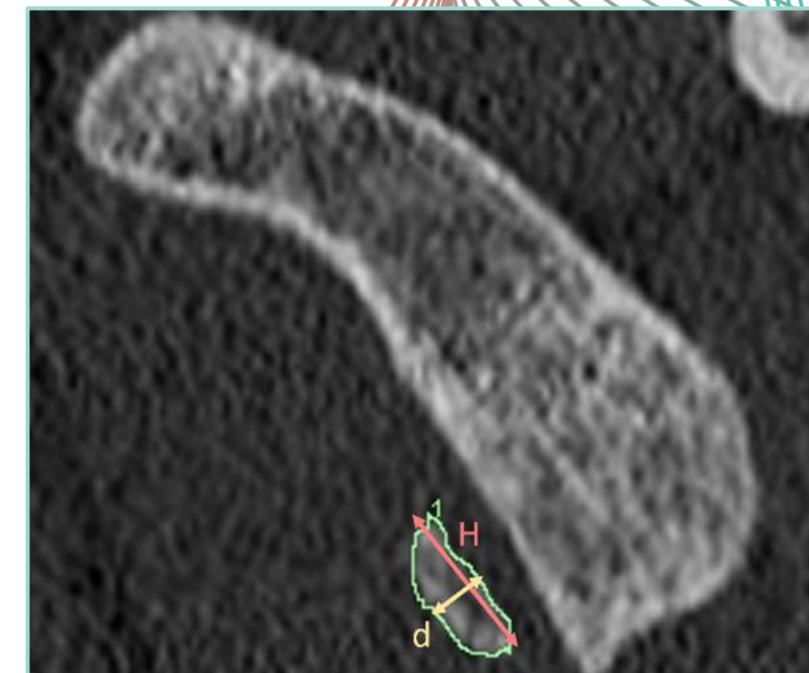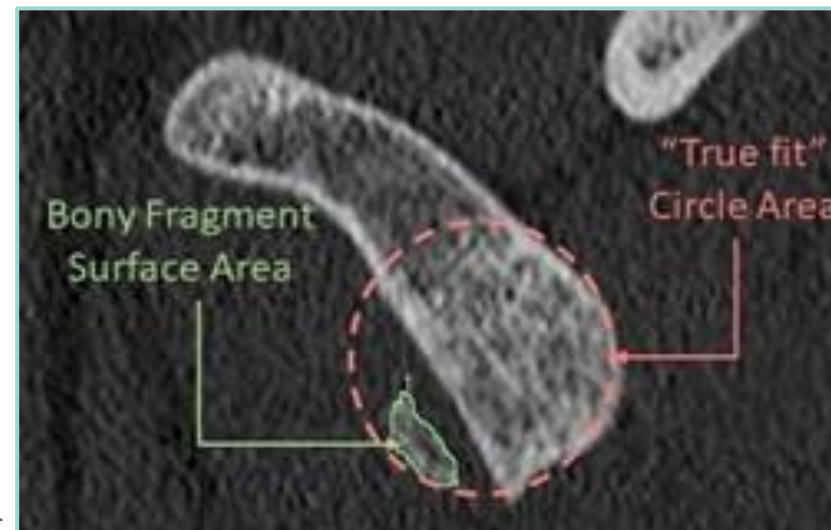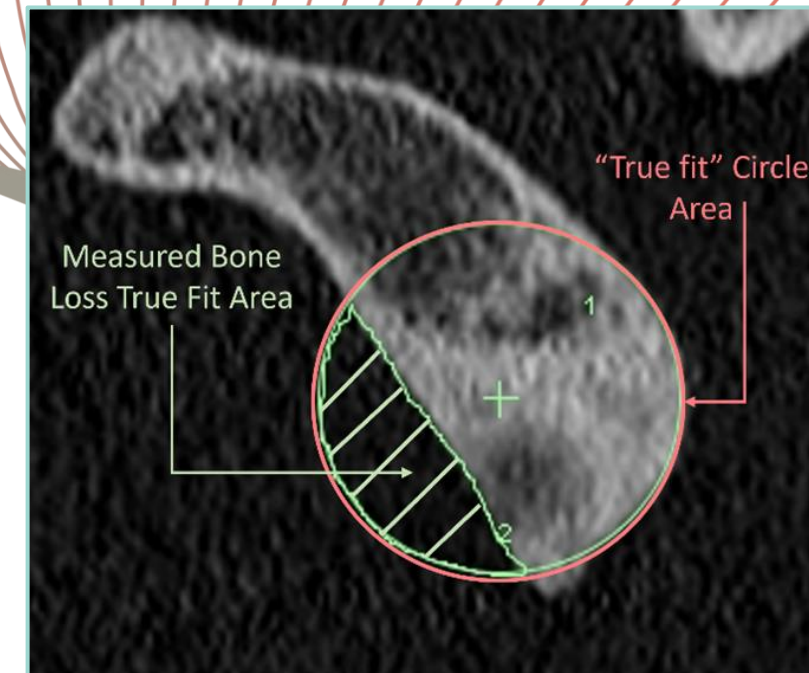3. Measure the "True Fit" circle area with PACS InteleViewer Software (red).

4. Approximate the true bone loss area with PACS InteleViewer (green).

$$\%BL_{no\ Bony\ Bankart} = \frac{A_{measured\ BL}}{A_{Glenoid\ "true\ fit"\ Circle}} \times 100\%$$

5. Measure the dimensions of the bony Bankart fragment: Height (H) Depth (d)

$$A_{bone\ fragment} = \frac{\pi H d}{4}$$

METHODS

EQUATION DERIVATION

6. Approximate the true area of the bony Bankart fragment (green).
7. Approximate the %BL with the addition of the bony Bankart fragment.

Where the $A_{bony\ Bankart}$ is obtained by:
a) Equation: Approximation with dimensions of the hemi-ellipse
b) Software: Direct area measurement with PACS InteleViewer

$$\%BL_{with\ Bony\ Bankart} = \frac{A_{measured\ BL} - A_{bony\ Bankart}}{A_{Glenoid\ "true\ fit"\ Circle}} \times 100\%$$
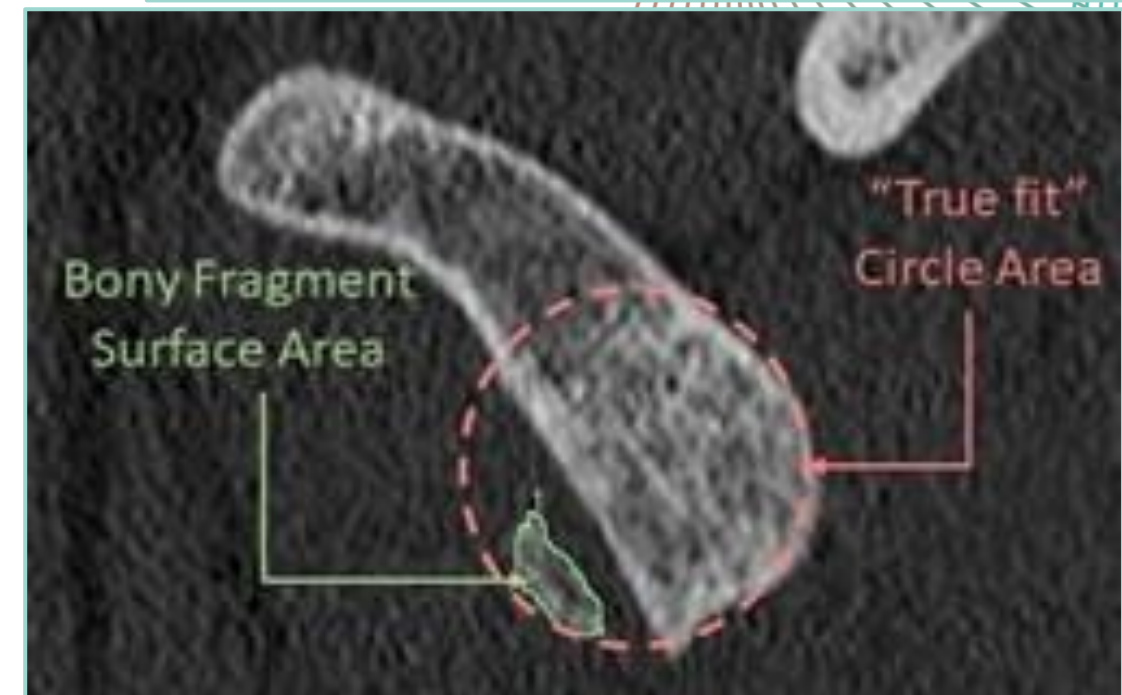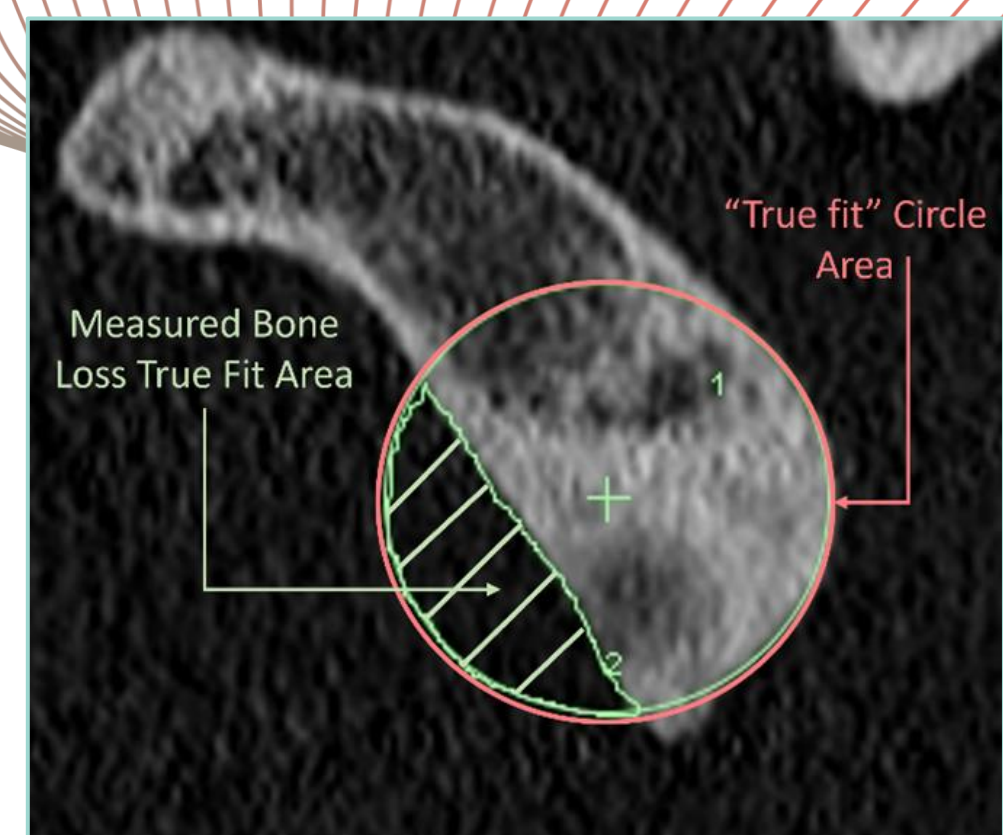
METHODS

PATIENT SELECTION

- Patients who underwent surgery for shoulder instability who were suspected to have significant bone loss at the MGH in the last 12 years.

- Inclusion criteria:
  - All genders
  - > 18 years
  - Presence of Bankart lesions with bony Bankart fragments

- Exclusion criteria:
  - Incomplete medical charts or imaging
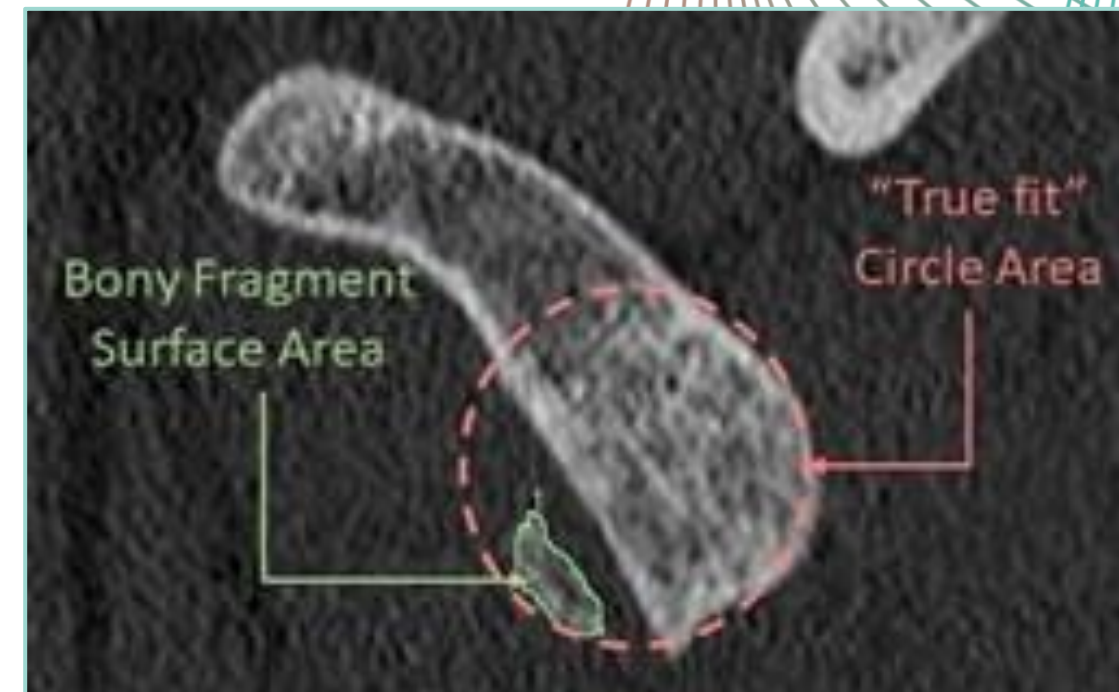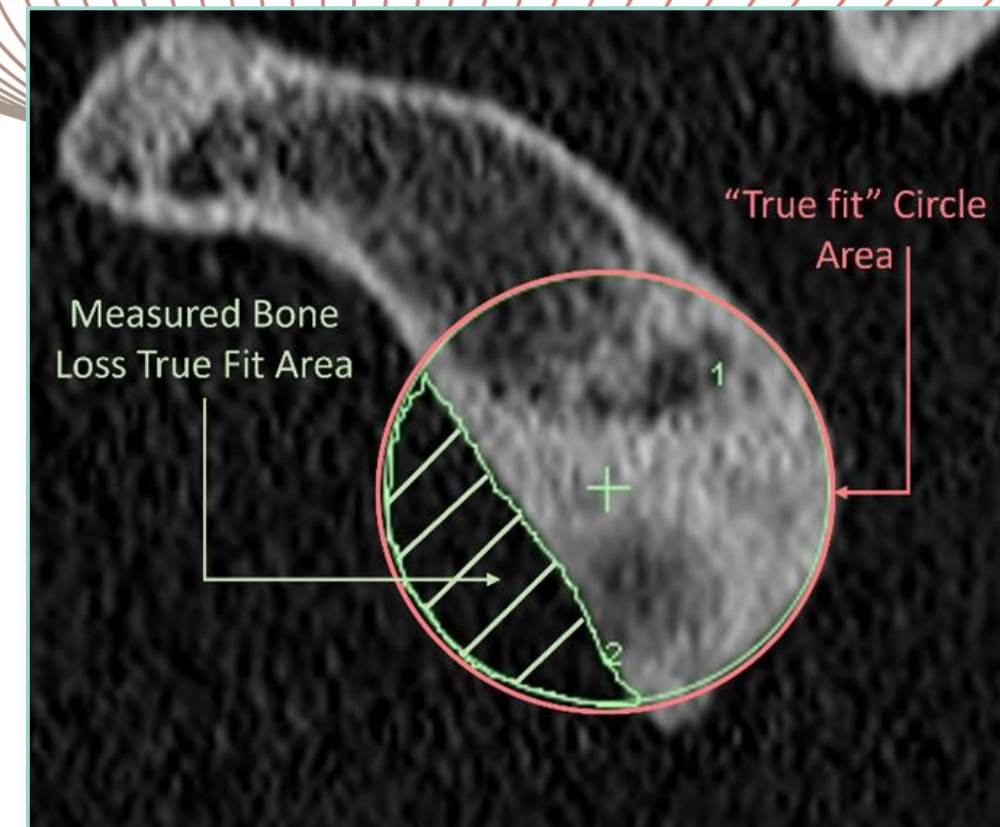
RESULTS

PATIENT DEMOGRAPHICS

- 26 patients:
  - ♂ – 25 Male
  - ♀ – 1 Female

📅 Average age: 35 ± 14.7 years

- Affected shoulder:
  - – 13 Right
  - – 13 Left

- Surgery:
  - 13 Arthroscopy
  - 9 Trauma
  - 3 Post-Traumatic
  - 1 Other

GLENOID %BONE LOSS
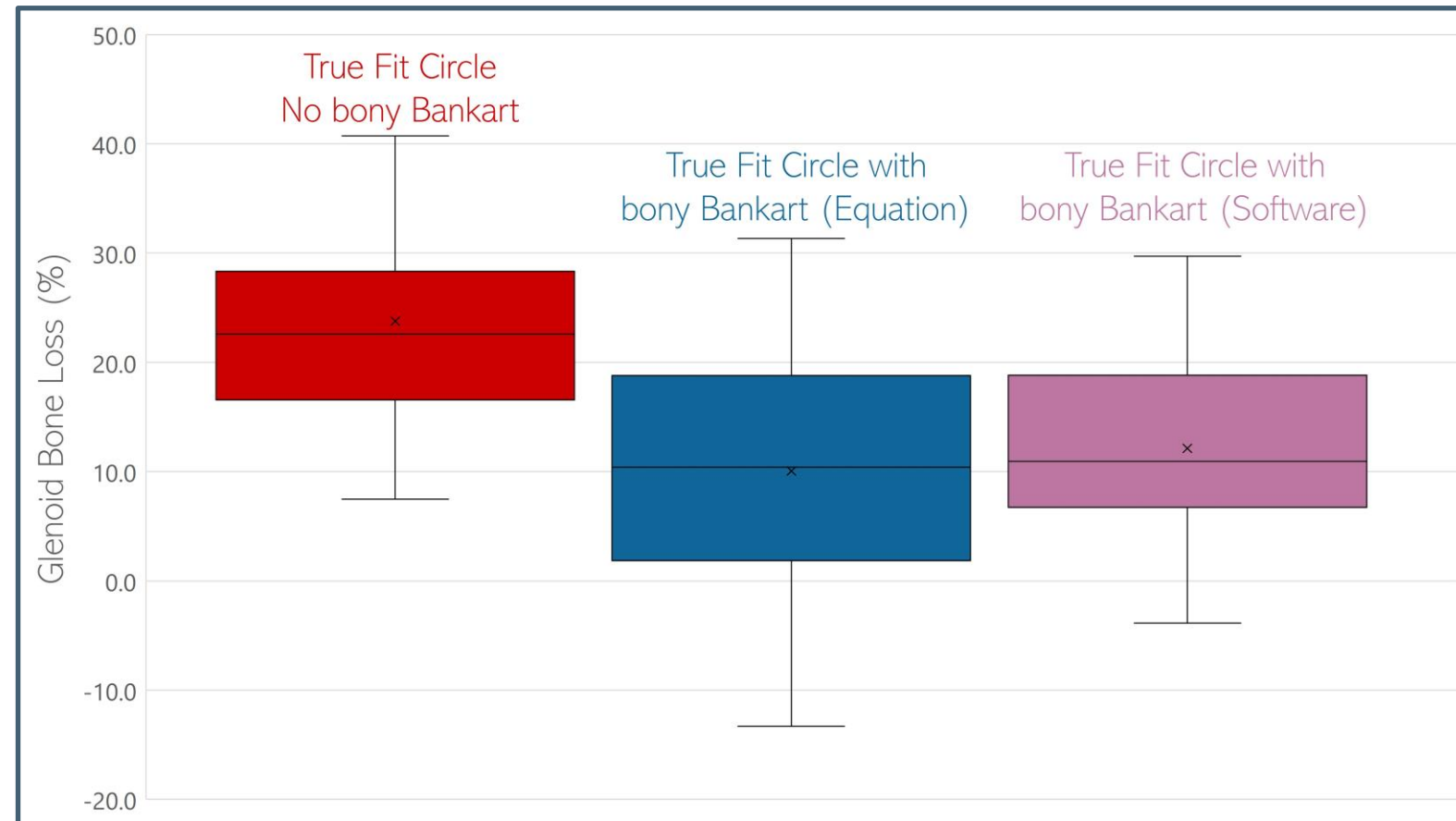
- **%BL no bony Bankart = 23.8%**
- %BL with bony Bankart (equation) = 10.1%
- % BL with bony Bankart (software) = 12.1%

RESULTS

REDUCTION IN %BONE LOSS

Reduction in %BL
(equation) = 11.7%

Reduction in % BL
(software) = 13.7%

No statistically significant difference between equation *vs.* software
- p-value = 0.46
- CI (95%) = 3.97%

GLENOID %BONE LOSS
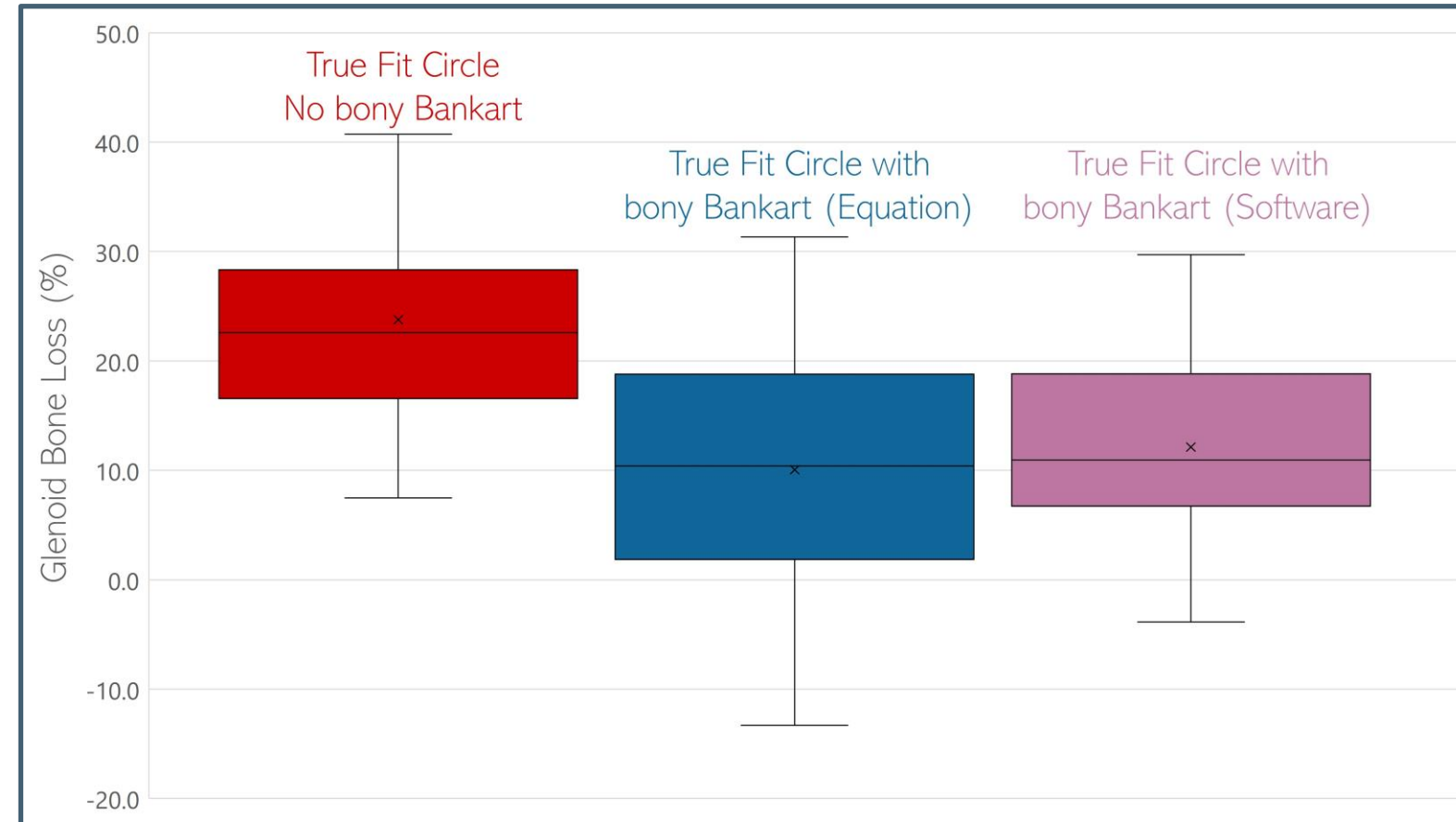
- %BL no bony Bankart = 23.8%
- %BL with bony Bankart(equation) = 10.1%
- % BL with bony Bankart(software) = 12.1%

RESULTS
PRE-OPERATIVE PLAN COMPARISON

For critical %BL cut-off of
13.5% → Change in surgical
approach for 50% of patients
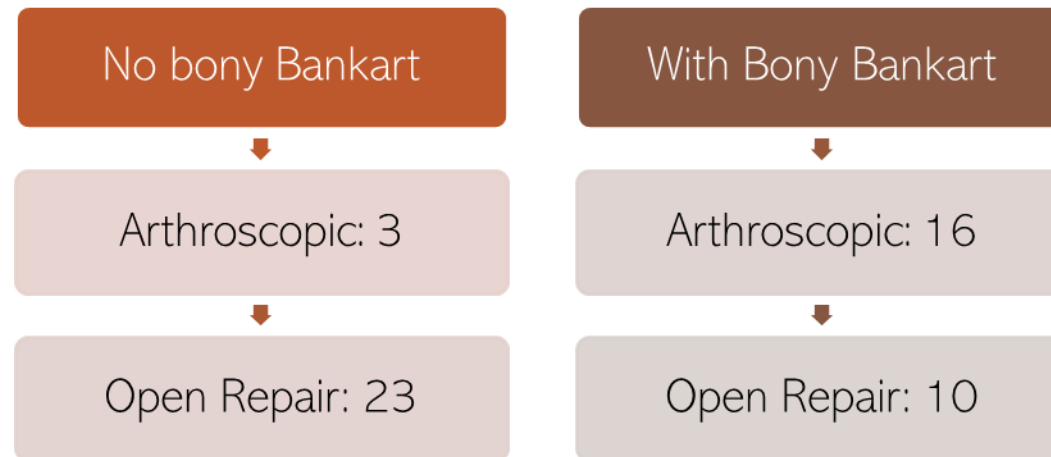
For critical %BL cut-off of
25% → change in surgical
approach for 35% of patients.

No bony Bankart	With Bony Bankart
↓	↓
Arthroscopic: 3	Arthroscopic: 16
↓	↓
Open Repair: 23	Open Repair: 10

No bony Bankart	With Bony Bankart
↓	↓
Arthroscopic: 15	Arthroscopic: 24
↓	↓
Open Repair: 11	Open Repair: 2
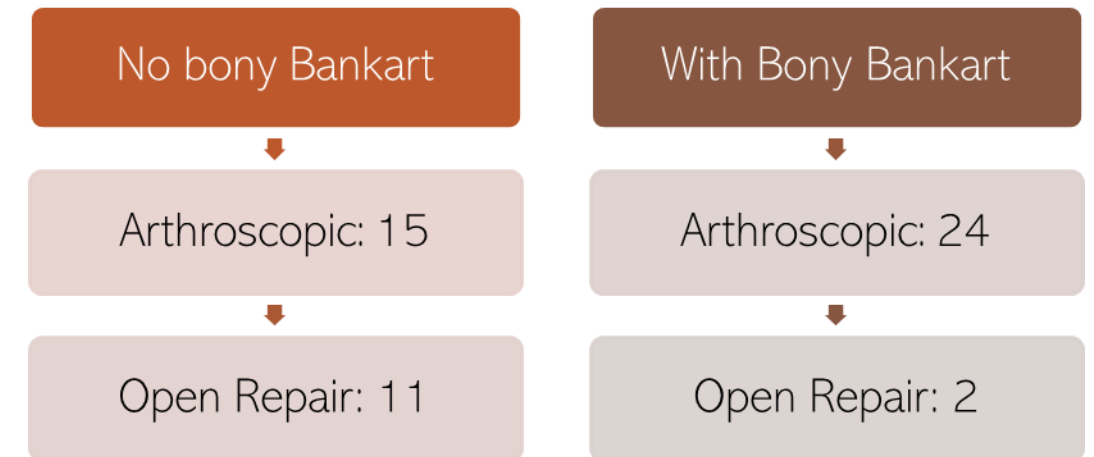
RESULTS
RATER VALIDATION

INTER-RATER VARIABILITY

- No bony Bankart:
  $p = 0.49$, CI = 3.37%

- With bony Bankart (Equation):
  $p = 0.78$, CI = 3.47%

- With bony Bankart (Software):
  $p = 0.54$, CI = 2.84%

INTRA-RATER VARIABILITY

- No bony Bankart:
  $p = 0.62$, CI = 3.38%

- With bony Bankart (Equation):
  $p = 0.42$, CI = 3.21%

- With bony Bankart (Software):
  $p = 0.47$, CI = 2.64%

No statistically significant difference for inter- and intra-rater variability!

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CONCLUSIONS

Through this calculation, we can better represent overall glenoid bone deficiency after shoulder instability.

Future studies will assess the impact of this new equation on the best clinical decision-making process for arthroscopic *vs.* open repair.
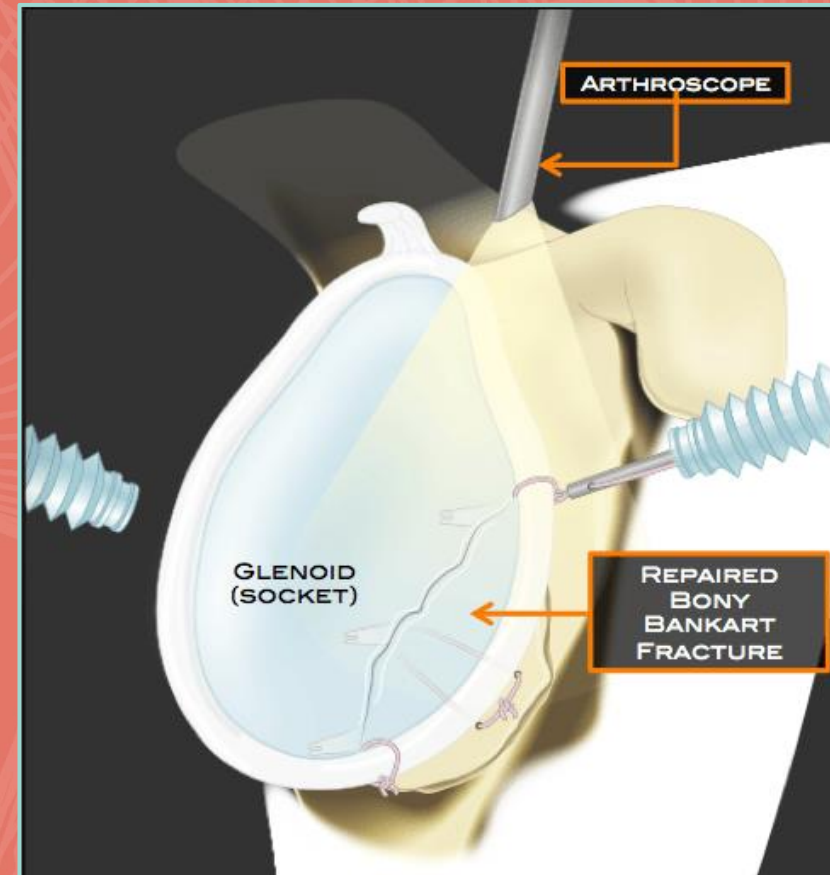
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