

Which Images are Most Useful for Measuring Acromiohumeral Distance to Predict Reparability and Rotator Cuff Integrity after Arthroscopic Rotator Cuff Repair?

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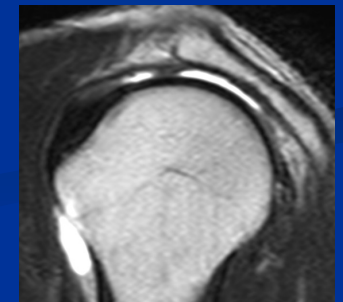
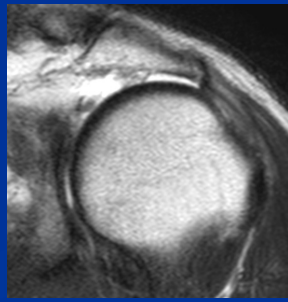
COI Disclosure Information

Presenter : Yoshitsugu Takeda MD.PhD.

I have no financial conflicts to disclose.

Introduction

- **Acromiohumeral distance (AHD)** is considered a **prognostic factor** for **reparability and rotator cuff integrity** in arthroscopic rotator cuff repair (ARCR).
- AHD is measured on a **standard true anteroposterior (AP) radiograph, three-dimensional CT, or MRI.**
- Sometimes, we find the **discrepancy of AHD** between radiograph and MRI/CT
- Several studies investigated **which image is most useful for predicting reparability and tendon healing**, however this remains to be established



Purpose

This study aimed to determine which type of imaging is most useful in measuring AHD for predicting the reparability and tendon healing after ARCR

Hypotheses

We hypothesize that MRI and 3D-CT is superior to plain radiograph for predicting the reparability and tendon healing after ARCR

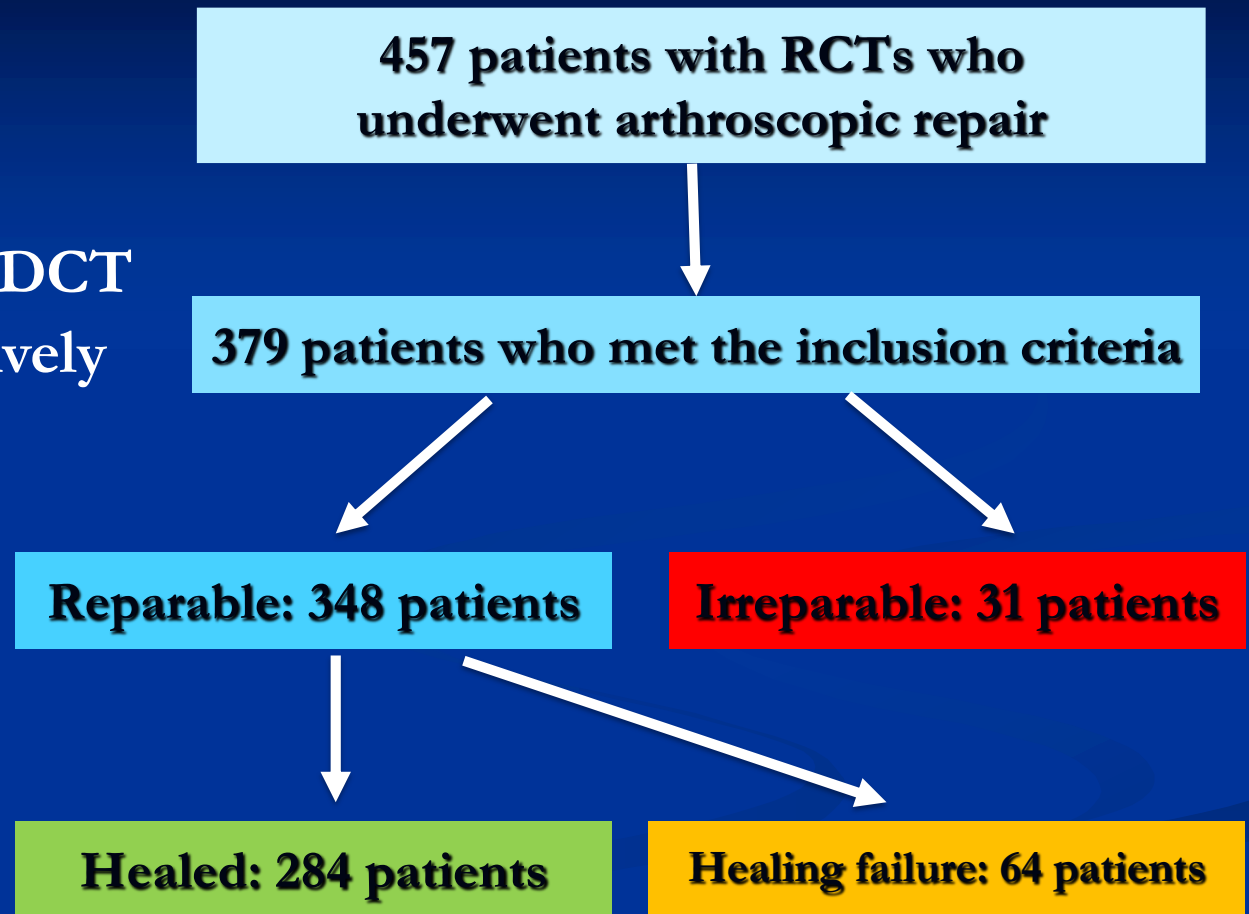
Materials and Methods

Inclusion Criteria

- Full-thickness tear
- FU>1yr.
- Preoperative True AP, MRI, 3DCT
- MRI within 6 mo. postoperatively

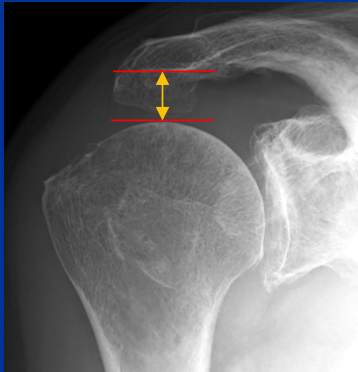
Exclusion Criteria

- Partial thickness tear
- Isolated SSc tear
- Osteoarthritis
- Instability
- History of previous surgeries



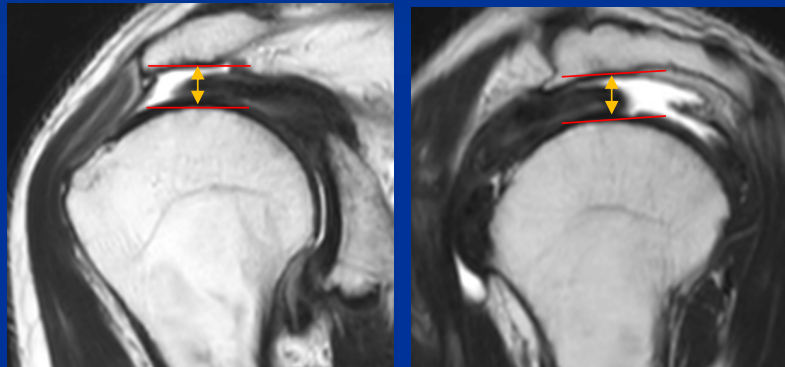
Measurement of AHD

Radiograph



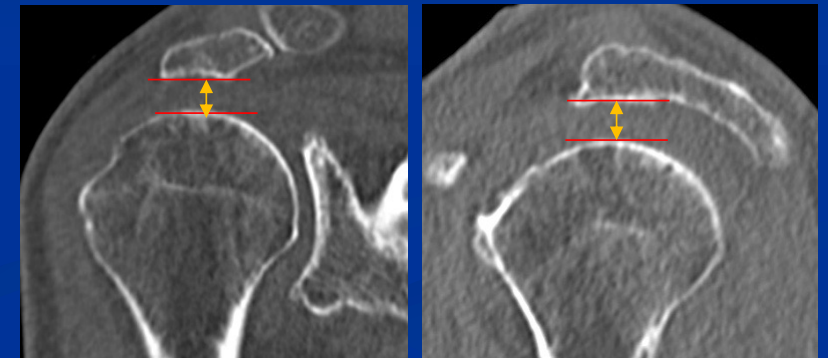
True AP view

MRI



Oblique coronal Oblique sagittal

3D-CT



Oblique coronal Oblique sagittal

Statistical Analyses

- **Mann-Whitney U test**

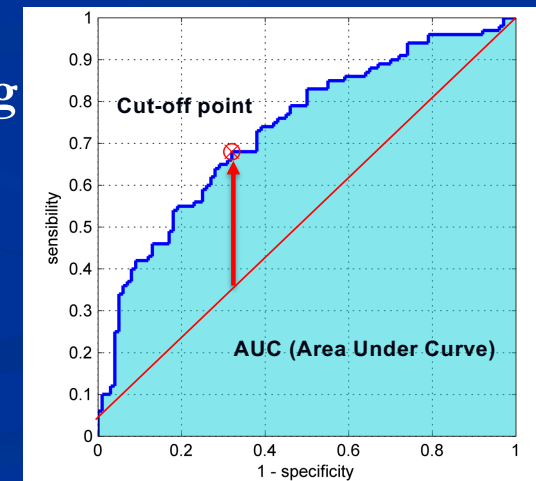
- AHD on Tue AP, MRI, and CT for Reparability & Tendon healing
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- **ROC (Receiver Operation Characteristic) curve analysis**

- Cut-off value for Reparability & Tendon healing
 - Youden index
- Prognostic value of 3 images for Reparability & Tendon healing
 - **Area Under Curve (AUC)**
 - $0.9 < \text{AUC} \leq 1$ Highly accurate
 - $0.7 < \text{AUC} \leq 0.9$ Moderately accurate
 - $0.5 < \text{AUC} \leq 0.7$ Less accurate

- **P value < 0.05**

ROC curve



Preoperative Demographics

	Reparable(n=348)		Irreparable (n=31)
	Heal(n=284)	Failure(n=64)	
Sex(M/F)	197/87	50/14	22/9
Age (y)	67.5±7.3	64.0±9.3*	66.8±8.0
Duration of symptoms	6.9±8.3	10.7±17.2*	16.3±23.4 **
Tear size(mm)			
mediolateral	27.0±9.4	37.5±7.1*	44.5±10.7 **
anteroposterior	22.7±16.3	33.2±11.6*	37.9±12.2 **
Fatty infiltration (Stage 0/1/2/3/4)			
SSP	21/78/168/11/6	0/9/42/7/5*	1/1/12/12/5 **
ISP	21/104/127/18/14	0/10/24/22/7 *	1/4/5/9/12 **
Occupation ratio (%)	51.3±12.3	41.3±11.5 *	35.9±15.2 **

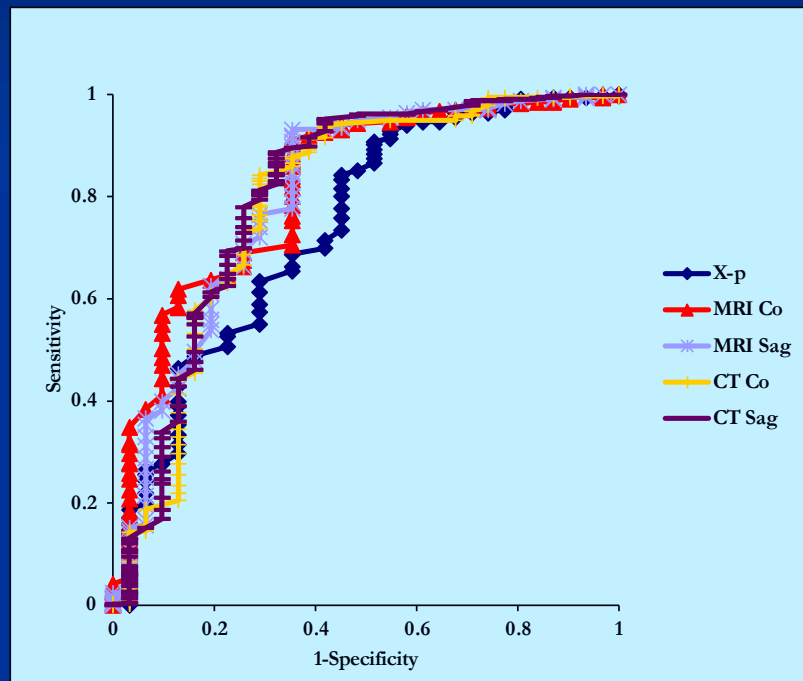
p<0.05 : * vs. Heal, ** vs. Reparable

AHD

	Reparable	Irreparable	p value
X-p	8.5±2.3	6.4±3.5	<0.001
MRI Coronal	7.5±2.0	4.7±2.4	<0.001
MRI Sagittal	7.7±3.8	4.8±2.6	<0.001
CT Coronal	7.1±2.1	4.4±2.7	<0.001
CT Sagittal	7.3±2.2	4.4±3.0	<0.001

	Healed	Healing failure	p value
X-p	8.8±2.2	7.3±2.3	<0.001
MRI Coronal	7.8±1.8	6.2±1.9	<0.001
MRI Sagittal	8.1±4.0	6.1±1.8	<0.001
CT Coronal	7.5±1.9	5.5±2.1	<0.001
CT Sagittal	7.6±1.9	5.7±2.4	<0.001

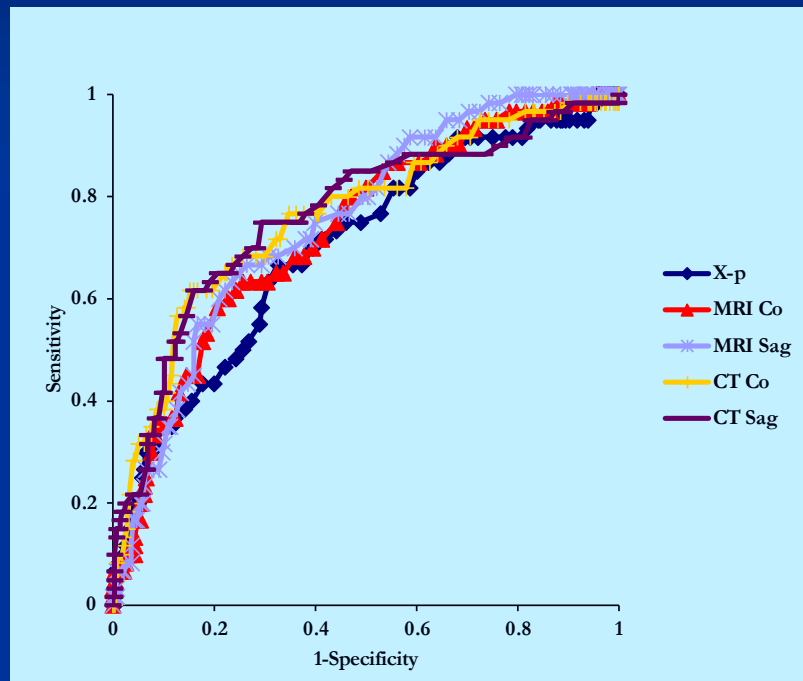
ROC curve analysis: Reparability



	AUC	Cut-off value (mm)
True AP	0.740	5.8
MRI coronal	0.817	4.9
MRI sagittal	0.802	4.5
CT coronal	0.792	4.8
CT sagittal	0.805	4.3

AUC: no significant difference between each other

ROC curve analysis: Tendon healing



	AUC	Cut-off value (mm)
True AP	0.702	7.8
MRI coronal	0.735	6.3
MRI sagittal	0.752	6.8
CT coronal	0.764	5.6
CT sagittal	0.765	5.6

AUC: no significant difference between each other

Discussion

- AHDs measured on five types of imaging (true AP view, coronal and sagittal MRI and 3D-CT) were significantly different between reparable and irreparable groups and healed and healing failure groups.
- ROC analysis showed that the predicting performance of AHD in these five types of imaging was moderately accurate, and there was no significant difference between each other
- The cut-off values of true AP radiograph for predicting reparability and healing status were 1.5~2.0mm greater than those of MRI/CT.

Limitation

- Retrospective study
- Did not assess inter- and intra-rater reliability

Conclusion

- Surgeons **can measure AHD on any type of imaging** (true AP view, coronal or sagittal view of MRI/3D-CT) for predicting reparability and healing status after ARCR.
- Care should be taken to interpret the **cut-off values for predicting reparability and rotator cuff integrity** after ARCR, because the cut-off values of **radiographs are 1~2mm greater** than those of CT and MRI.

References

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