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Predicting Risk Factors for Retear in Massive Rotator Cuff Double Row Repair- Using Multiple Regression Analysis and Follow up MRI study

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Faculty Disclosure Information

- *The authors have no relevant financial or non-financial interests to disclose.*
- *The authors have no conflicts of interest to declare*

Lacunae in Literature

- *No single study* analyzing all risk factors – "Massive Cuff" repair
  - **Demographics factors (Age,sex,BMI)**
  - **Rotator cuff tear characteristics (Retraction, fatty degeneration, GFDI)**
  - **Gleno humeral – "bony indices" (CSA, AI, AHI)**

- Retear rates after Massive Cuff Repair - ? Debatable

Aims and Objectives

Primary Aim:

-Retear rates – "Massive Cuff" repair

-Identification of "*independent risk factors*" - influencing retear

Secondary aim:

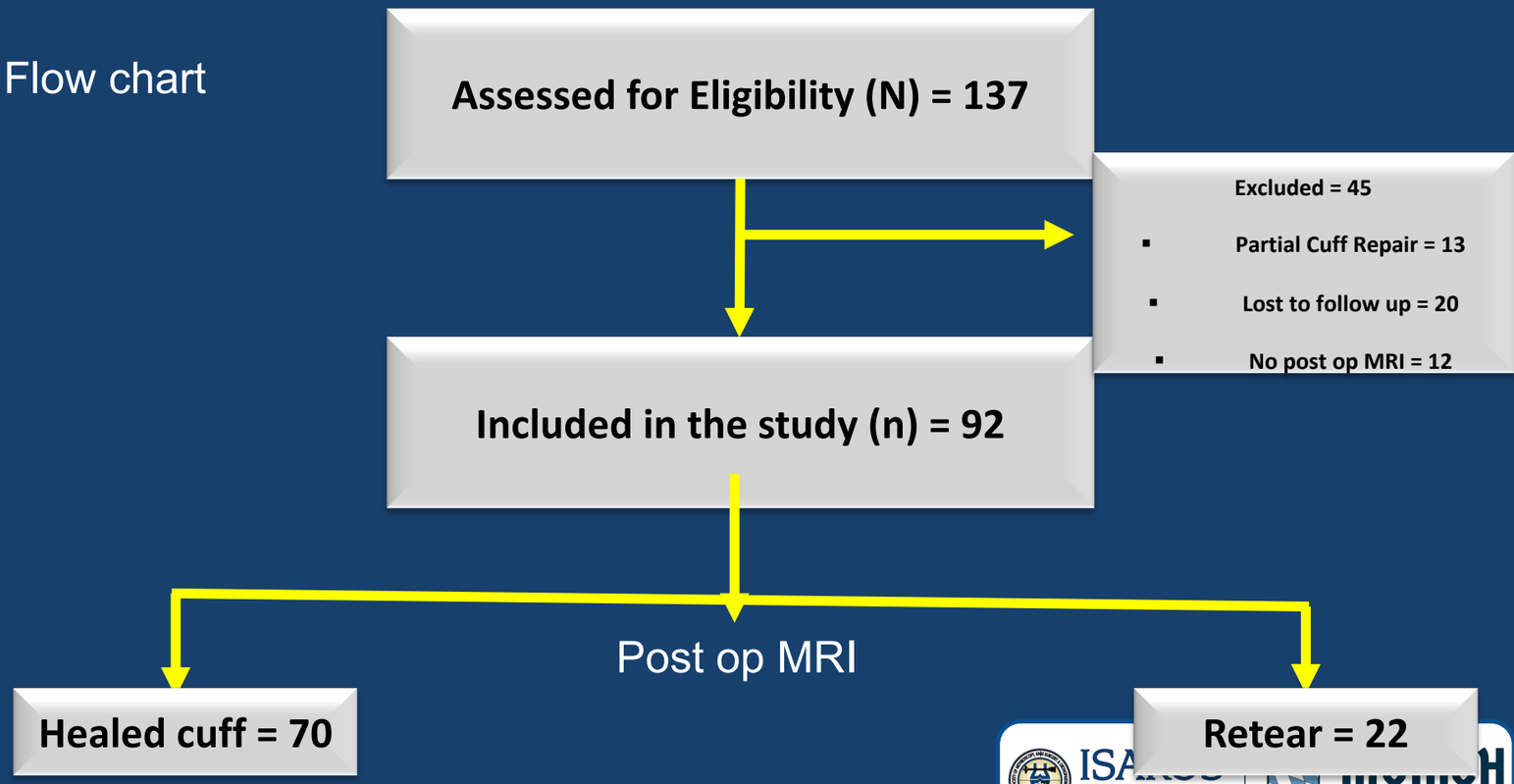
-Functional Outcomes - "Healed Vs Retear"

Material & Methods

- Retrospective Study
- IRB approval taken
- Study Period: 2018 – 2021; Ganga Hospital, Coimbatore

Inclusion Criteria	Exclusion Criteria
• Massive cuff tear	• Cuff tear with stiffness
• Hamada Gr 1 and 2	• Partial Cuff repair
• cuff repair- Double-row Knotted	• Irreparable Cuffs
• Min - 12 months follow up	• Hamada Gr 3 & 4

Flow chart



Flow chart

Assessed for Eligibility (N) = 137

Excluded = 45

- **Partial Cuff Repair = 13**
- **Lost to follow up = 20**
- **No post op MRI = 12**

Included in the study (n) = 92

Post op MRI

Healed cuff = 70

Retear = 22

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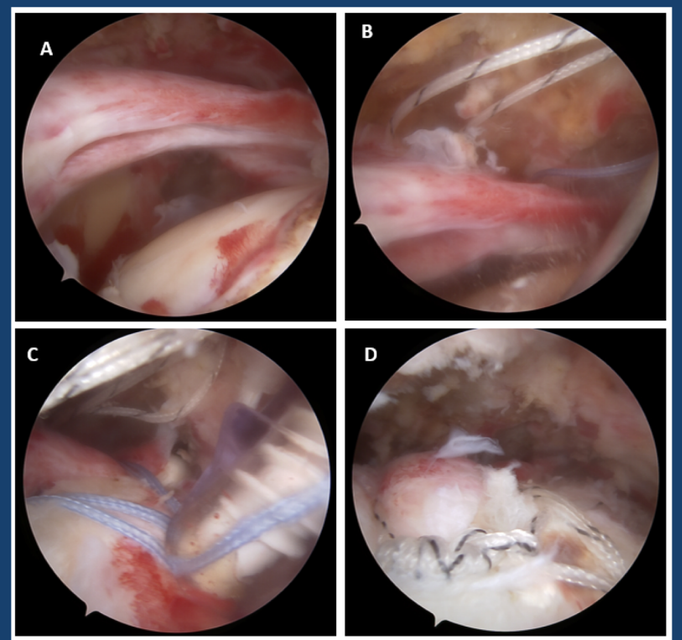
Surgical Technique

- Beach chair position
- Knotted "double row" technique
- Acromioplasty done in patients with acromial spur
- Biceps tenotomy – Degenerated biceps anchor complex



Data Collected for study

Clinical data

Radiological data

Pre Op "3-Xray" Bony indices
- Critical Shoulder Angle (CSA)
- Acromial Index (AI)
- Acromio Humeral Interval (AHI)

Pre Op "4- MRI"
- Cuff tear size (ML & AP)
- Muscle fatty infiltration (FI)
- Global fatty degeneration Index (GFDI)
- Occupancy ratio (OR)

Postop MRI
- At 12 Months Cuff Healing

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Data Collection

Clinical data

- Demographics: Age, Sex, BMI
- Hand Dominance
- Duration of Symptoms
- **Functional Scores**
  (Pre Op & Final F/u)
  ASES, Constant & VAS

Radiological data

Pre Op
" 3-Xray"
Bony indices

- Critical Shoulder Angle (CSA)
- Acromial Index (AI)
- Acromio Humeral Interval (AHI)

Pre Op
"4- MRI"

- Cuff tear size (ML & AP)
- Muscle fatty infiltration (FI)
- Global fatty degeneration Index (GFDI)
- Occupancy ratio (OR)

Postop MRI

- At 12 Months Cuff Healing

Statistical Analysis

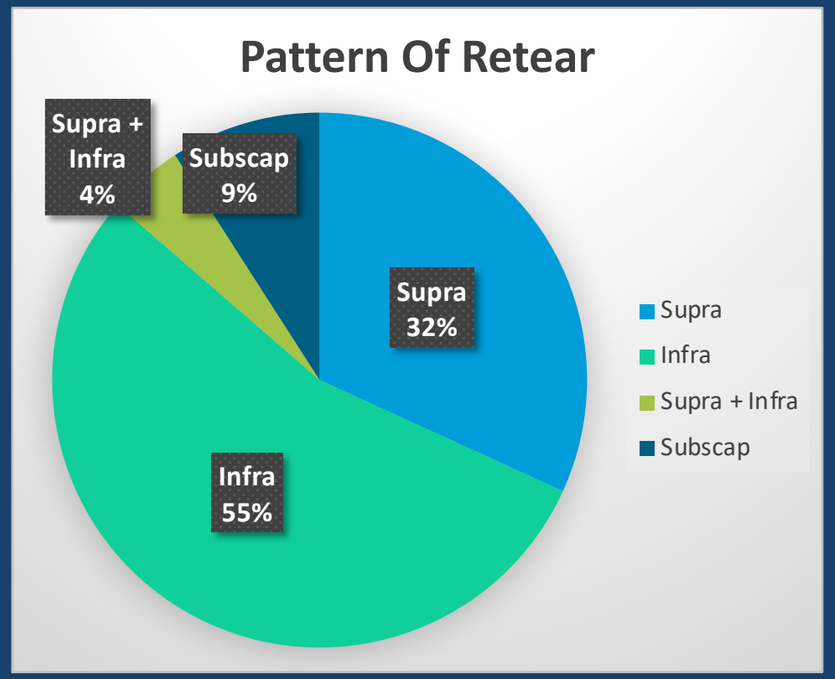
- SPSS version 22
- Continuous variables - Independent t-test
- Categorical variables - Fisher's exact test or Chi-square test
- *Reliability -Intraclass correlation coefficients (ICCs)* between the 2 independent observers
- *"Regression analysis" - Identifying "Independent" risk factors*
- The p-value of < 0.05 - significance for all statistical tests.

Results – Re-tear Rates- @ 12m postop MRI

- Retear rate : **22/92 = 23%**

Type 4 -Sugaya = 5 pts

Type 5 -Sugaya = 17 pts



55% Pts = Infra Retear

Demographics Analysis – "Healed Vs Retear" Groups

	Healed (n-70)	Retear (n-22)	P value
Age	56.27 ± 9.009	59.59 ±9.420	.139
Sex (M:F)	48:22	12:10	.650
BMI	26.883 ± 2.4504	28.273 ±3.3511	.082
Dominant : non dominant	44:26	14:8	.551
Duration of Symptoms(days)	75.59 ± 67.963	143.68±145.907	.003 (Sig)
Mean Follow up (Months)	19.84	16.68	0.08

Duration Of Symptoms – Higher in Retear Group

Comparing Pre Op "3 -Xray Indices" – "Healed Vs Retear" Groups

	Healed (n-70)	Retear (n-22)	P value
Critical shoulder angle (CSA˚)	32.524 ± 3.845	30.932 ± 3.795	.093
Acromial index(AI)	.6177 ±.074	.5955 ± .065	.211
Acromio-humeral Interval (AHI)	7.4686± .839	4.9941 ± 1.39065	.001 (Sig)

AHI – Lower in Retear Group

Comparing Pre Op MRI Parameters – "Healed Vs Retear" Groups

	Healed (n-70)	Retear (n-22)	P value
Tear Size AP (Cm)	5.046 ±.587	5.259 ±.689	.158
Tear Retraction (Cm)	2.734 ± .451	3.414 ±.396	.001 (Sig)
GFDI	0.346±.1921	1.600 ± .7204	.031 (Sig)
Occupancy Ratio	0.593 ±.1921	0.455 ±.1011	.043 (Sig)

Tear Retraction and GFDI – Higher in Retear Group

Occupancy Ratio – Lower in retear Group

Regression Analysis – Independent "Risk Factors"

	Adjust Odds Ratio	95% Confidence Interval		P Value
		Upper Limit	Lower Limit	
Duration	2.011	0.153	26.464	.595
CSA	19.383	0.511	735.392	.110
Acromial Index	2.011	.588	6.870	0.310
AHI	**2658.326**	11.744	601746.523	**.004**
Tear Size (AP)	.213	0.004	10.690	.439
Tear Retraction	**19.583**	4.388	87.393	**0.001**
Occupancy Ratio	3.872	1.595	9.402	0.301
Supra Fatty Infiltration	5.117	0.110	237.340	.404
Infra Fatty Infiltration	**389.049**	2.696	56132.102	**.019**
Subscap Fatty Infiltration	25.844	0.186	3593.944	.196
T Minor Fatty Infiltration	0.050	0.002	1.568	.088
GFDI	**92.321**	0.000	8.926	**.043**

Duration of Symptoms – Not Sig

Occupancy Ratio – Not Sig

Significant Risk Factors

AHI = < 5 mm

Tear Retraction: > 3.5 Cms

Infra Atrophy: > Gr 2

GFDI: > 1.6

Discussion

- Most important finding in our study:
  - Retear Rate = 23%

- **Significant "Risk Factors" (4/7):**

  -Acromio Humeral Interval(AHI),

  -Tear Retraction,

  -Infra -Fatty Infiltration(FI) and

  -GFDI

- Infra retear – Most Common

- Better functional scores in healed group

Kim etal Vs Our Study

J Shoulder Elbow Surg (2017) ■■, ■■–■■

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ORIGINAL ARTICLE

Factors affecting rotator cuff integrity after arthroscopic repair for medium-sized or larger cuff tears: a retrospective cohort study

Young-Kyu Kim, MD, PhD[a], Kyu-Hak Jung, MD[a,*], Jin-Woo Kim, MD[b], Ui-Seok Kim, MD[a], Do-Hyun Hwang, MD[a]

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"Large to Medium" Cuff tears

Mean Tear Size AP = 3.2 Cm

N = 180

2y Follow up MRI

Retear = 15.2 %

RISK FACTORS:

~~BMI~~, Delamination , Tear retraction, AHI and ~~Occupancyatio~~

OUR STUDY

N = 92

MRI = 12 m

Retear: 23%

CSA and Acromial Index – Not assessed

Lee etal Vs Our Study

Evaluation of the Risk Factors for a Rotator Cuff Retear After Repair Surgery

Yeong Seok Lee,* MD, Jeung Yeol Jeong,* MD, Chan-Deok Park,* MD, Seung Gyoon Kang,* MD, and Jae Chul Yoo,*† MD
Investigation performed at the Department of Orthopaedic Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

OUR STUDY
N = 92
MRI = 12 m
Retear: 23%

RISKFACTORS:
~~Age~~
Tear Size
Supra Fatty Degeneration

N = 693
MRI = 5.4 m
Retear = 7.2 %

Bony Indices(CSA,AI,AHI) – Not assessed

"Small- medium" Cuff tear : AP > 1.5 CM

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Strength

- *Only study to assess "all risk factors" for retear in "Massive Cuff" tear.*

- GFDI (Global Fatty Degeneration Index) – Importance *highlighted* in our study

Limitation

- Retrospective Study – Inherent Selection Bias

- Smaller sample size

- Intra operative assessment:-Tendon quality ,
  -Ease of cuff reducibility and
  -Quality of repair were not considered in our study

Conclusion

- Overall Retear rates after Massive Cuff repair – 23% (Not very high!!!)

- Risk factors:
  - **AHI (Acromio Humeral Interval) < 5 mm**
  - **Retracted cuff tears (> 3.5 Cms)**
  - **GFDI (Global Fatty Degeneration Index) > 1.6**
  - **Advanced Infra fatty infiltration (> Gr 2)**

- Patient to be counselled – Higher chances of retear with these risk factors

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