Serum Lipid Abnormalities Associated with Preoperative Rotator Cuff Tear Size and with Retear after Arthroscopic Repair

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Introduction

- Several factors have been suggested as risk factors for rotator cuff retear.
  - Intrinsic factor
    - Age, diabetes, smoking, osteoporosis, hypercholesterolemia
  - Factors related cuff tear
    - Tear thickness, tear size, fatty degeneration

I (or co-authors) have no conflict of interest to declare.
Recently, most studies have reported that dyslipidemia could be a risk factor for RCT.

However, there is little information as to which components of serum lipids play adverse roles in rotator cuff healing.

**Purpose**

The purpose of this study was to evaluate whether any dyslipidemia is associated with increment of preoperative tear size and structural integrity after ARCR.
Materials and Methods

- **A retrospective study**
  - From January 2011 to February 2017

411 patients who underwent ARCR

226 patients met our exclusion criteria.
- Inappropriate laboratory data = 68
- Acute trauma history = 5
- Previous surgery = 10
- Partial-thickness RCT = 85
- Revision surgery = 16
- Isolated subscapularis tendon tear = 23
- Absence of 1 year follow up ultrasonography = 19

185 patients were included in this study.
(79 patients had large to massive tear; 50 patients had retear)

- **Inclusion criteria**
  - Follow up ultrasonography at least 1 year after surgery
  - Perform blood test and physical examination
  - Informed consent document

- We enrolled 106 male and 79 female patients, with a mean age of 60.7 ± 7.3 years.
Materials and Methods

- Evaluated factors
  - Physical factors
    - Sex
    - Age
    - BMI
  - Comorbidities
    - Diabetes
    - Hypertension
    - Hyperthyroidism and hypothyroidism
    - Obesity: BMI > 25kg/m²
  - Serum lipids levels
    - Continuous and categorical values
    - Following NECT/ATP III guideline
Materials and Methods

- Evaluated factors
  - MRI indexes related to the chronicity of RCT
    - Goutallier grade
    - Tangent sign
    - Global fatty degeneration index
    - Tendon retraction degree of Patte
  - Tear status measured at the time of arthroscopy surgery
    - Tear size
      - DeOrio and Cofield classification
    - Tear length
    - Tear width
    - Delamination
Materials and Methods

- Evaluation of postoperative rotator cuff integrity
  - Ultrasonography
    - Retear was confirmed by following criteria
      - Tendon discontinuity
      - Hypoechoic portion within the tendon
      - Thinning of tendon
Materials and Methods

- Statistical methods
  - Point-biserial raw
    - To evaluate the difference of retear rate according to tear size
  - Logistic regression analysis
    - To evaluate risk factor for retear
    - Multivariate logistic regression analysis
      - Performed after assessment of multicollinearity
  - Significance was set at $p < 0.05$
## Results

### Strengths of Associations between Retear of Posterosuperior Cuff Tendon and Various Factors

<table>
<thead>
<tr>
<th></th>
<th>Univariate analysis</th>
<th>Multivariate analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>p-value</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>&lt; 0.001</td>
<td>4.12 (1.86-9.12)</td>
</tr>
<tr>
<td>Obesity</td>
<td>0.047</td>
<td>1.98 (1.01-3.76)</td>
</tr>
<tr>
<td>Critical shoulder angle</td>
<td>0.014</td>
<td>1.23 (1.04-1.46)</td>
</tr>
<tr>
<td>Tear size</td>
<td>&lt;0.001</td>
<td>2.42 (1.57-3.72)</td>
</tr>
</tbody>
</table>

- p-value of the Hosmer-Lemeshow test was 0.289

### Strengths of Associations between Size of Posterosuperior Cuff Tear and Various Factors

<table>
<thead>
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<tr>
<td></td>
<td>p-value</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Age</td>
<td>&lt; 0.001</td>
<td>2.31 (1.49-3.56)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.015</td>
<td>2.66 (1.21-5.83)</td>
</tr>
<tr>
<td>Hypo-HDLemia</td>
<td>0.016</td>
<td>2.12 (1.15-3.91)</td>
</tr>
<tr>
<td>Critical shoulder angle</td>
<td>0.014</td>
<td>1.23 (1.04-1.46)</td>
</tr>
</tbody>
</table>

- p-value of the Hosmer-Lemeshow test was 0.328
### Results

#### Strengths of Associations between Retear of Repaired Small and Medium size Posterosuperior Cuff Tendon and Various Factors

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<tr>
<td></td>
<td>p-value</td>
<td>Odds Ratio (95% CI)</td>
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<tr>
<td>Diabetes</td>
<td>0.046</td>
<td>3.26 (1.02-10.41)</td>
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<tr>
<td>Critical shoulder angle</td>
<td>0.007</td>
<td>2.97 (1.34-6.57)</td>
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</tbody>
</table>

- p-value of the Hosmer-Lemeshow test was 0.501

#### Strengths of Associations between Retear of Repaired Large and Massive size Posterosuperior Cuff Tendon and Various Factors

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<tr>
<td></td>
<td>p-value</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.007</td>
<td>4.55 (1.52-13.64)</td>
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<tr>
<td>Obesity</td>
<td>0.026</td>
<td>2.86 (1.46-7.19)</td>
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<tr>
<td>Hypo-HDLemia</td>
<td>0.042</td>
<td>2.59 (1.04-6.47)</td>
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<td>Hyper-non-HDLemia</td>
<td>0.047</td>
<td>2.82 (1.02-7.82)</td>
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<tr>
<td>Critical shoulder angle</td>
<td>0.048</td>
<td>1.61 (1.01-2.57)</td>
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</tbody>
</table>

- p-value of the Hosmer-Lemeshow test was 0.179
Limitation

- It was a retrospective study with relatively short-term follow-up.
- This study has a possible selection bias, in that patients with high morbidity or multiple systemic diseases associated with dyslipidemia were possibly excluded.
- We included only patients with symptomatic RCTs who received ARCR.
- The possibility that medications taken after surgery, including drugs for dyslipidemia, diabetes, or thyroid abnormality, could have affected postoperative serum lipid levels.
Preoperative hypo-HDLemia has a significant association with the increment of tear size and with retear after ARCR in large- to massive-sized RCT.
References