Relationship between severity of bone bruise and meniscus tear in acute anterior cruciate ligament injury

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COI Disclosure

Shohei Yamauchi, MD

I have no financial conflicts to disclose.
ACL Injury and Bone Bruise

- Bone bruise involves the LFC and LTP in ACL injury

- **Femoral bone bruise volume** is associated with MM and LM tears

- **LTP bone bruise** is associated with MM tears

- **MM lesions** were not significantly associated with the severity of lateral bone contusions

**Relationship between bone bruise and meniscus tear remains controversial**
Purpose
To evaluate relationship between severity of bone bruises and presence of meniscus tears in acute ACL injury.
Subjects

158 patients
(2015 January ~ 2016 December)

Inclusion criteria
• Noncontact ACL injury
• Primary ACLR
• MRI within 4 weeks from injury date
• Surgery within 8 weeks from MRI date

Exclusion criteria
• Past history of knee surgery
• Unknown injury date

75 patients
(33 males  42 females)
Evaluation of Bone Bruise

- MRI: T2WI or STIR
- Location
  - LFC  MFC
  - LTP  MTP
- Severity: Depth
  - 0-5 points
    - 0: None
    - 1: Superficial
    - 2: Shallow
    - 3: Deep
    - 4: Extensive
    - 5: Generalized
Meniscus Tear

- Arthroscopy

Meniscus tear group

Meniscus tear (+)

No tear group

Meniscus tear (-)
Demographic factors of meniscus tear and bone bruise group

<table>
<thead>
<tr>
<th></th>
<th>Meniscus Tear</th>
<th>Bone Bruise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(+) 24 case</td>
<td>(-) 51 case</td>
</tr>
<tr>
<td>Age (y.o)</td>
<td>23.3 ± 10.4</td>
<td>24.4 ± 10.9</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>1.65 ± 0.1</td>
<td>1.66 ± 0.1</td>
</tr>
<tr>
<td>BW (kg)</td>
<td>62.0 ± 9.7</td>
<td>63.6 ± 10.1</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>22.7 ± 3.0</td>
<td>22.7 ± 4.0</td>
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</tbody>
</table>

Statistical analysis: Mann-Whitney U test

No significant difference
Prevalence of Bone bruise and Meniscus Tear

- LFC: 80.0%
- LTP: 76.0%
- MFC: 2.7%
- MTP: 9.3%

- LM tear: 61.3%
- MM tear: 13.3%
Severity of Bone Bruise

Statistical analysis: Mann-Whitney U test

※ : P<0.05
Bone Bruise & LM Tear

<table>
<thead>
<tr>
<th>Bone bruise severity (LFC and LTP)</th>
<th>LM tear</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Significantly associated</td>
<td></td>
</tr>
<tr>
<td>• Odds ratio</td>
<td></td>
</tr>
<tr>
<td>LFC : 3.23</td>
<td>LTP : 10.17</td>
</tr>
</tbody>
</table>

Song GY: Arthroscopy 2016

In this study
• Bone bruise severity were significantly associated at LFC ($P=0.037$) and LTP ($P=0.036$)

Our results were similar to previous research
**Bone Bruise & MM Tear**

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<td>Bone bruise severity</td>
<td>MM tear</td>
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<td>(LFC and LTP)</td>
<td></td>
</tr>
</tbody>
</table>

- Assessed patients
  - 75.4% non-contact injury
  - 24.6% contact injury
  - **Associated**
  - **Not associated**

Bisson LJ: AJSM 2013

Song GY: Arthroscopy 2016

This study included **100%** non-contact injury

**Not associated**

Bone bruise severity is **not associated with**

MM tear in non-contact ACL injury
Conclusions

- Severity of bone bruises on LFC and LTP were positively related to LM tear in noncontact ACL injury.
- Severity of bone bruises were not related to MM tear in noncontact ACL injury.

References

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Song GY: Arthroscopy 2016
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Eleftherios A: Biomaterials 2012
Bisson LJ: AJSM 2013
Brittberg M: JBJS 2003