Clinical outcomes of surgical treatment for the multiple knee ligament injuries with both anterior cruciate ligament and posterior cruciate ligament rupture

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Multiple knee ligament injuries

- Management of multiple knee ligament injuries (ACL and PCL injuries combined w/ MS* and/or PLS** injury) are remain difficult.
  
  * MS: medial structure
  ** PLS: posterolateral structure

- We have treated the multiple knee ligament injuries using hybrid tendon autografts ¹).

  ✓ Acute cases: Two stage²)
    - 1\textsuperscript{st} stage: Repair of the grade III MS or PLS or avulsion fracture.
    - 2\textsuperscript{nd} stage: Simultaneous ACL and PCL-Rs
  
  ✓ Chronic cases: One stage
    - Simultaneous ACL and PCL-R w/ MCL or PLC-R³)
Purpose

- To clarify clinical outcomes of our surgical treatment for the multiple knee ligament injuries with both ACL and PCL ruptures.
Methods

- 36 patients (36 knee) 2000～2017
  - 32 male, 4 female
  - Mean age: 30 yrs (16-60 yrs)

- Surgical management
  - Acute group (Group A): Two stage
  - Chronic group (Group C): One stage

- Follow-up @ over 1 year

- Evaluation
  - ROM
  - Anterior posterior knee laxity with Knee lax3® (Flex 20, 70°)
  - Stress radiography
  - Lysholm score
  - IKDC grade

Group A: 5 patients
- ACL + PCL + MS: 4 knees (80 %)
- ACL + PCL + PLS: 1 knee (20 %)

Group C: 31 patients
- ACL + PCL: 13 knees (42 %)
- ACL + PCL + MS: 13 knees (42%)
- ACL + PCL + PLS: 5 knees (16%)

Methods

Surgical technique (1st stage in Group A)

- MS or PLS injury
  - Repair w/ suture anchor for injury of insertion part
  - Suture w/ fiber wire for injury of ligament part
- Avulsion fracture of ACL or PCL
  - Fixation with pull out technique

Avulsion fracture of LCL

Repair of MS

Avulsion fracture of PCL
Surgical technique

- **ACL and PCL-Rs**
  - DB ACL-R: 9 knees, DB PCL-R: 10 knees
  - SB ACL-R: 12 knees, SB PCL-R: 11 knees
  - Semi-T and Gr hybrid graft

- **MCL-R**
  - The Semi-T from the ipsilateral knee for sMCL-R

Methods
Surgical technique

- PLS-R (modified Clancy methods)
  - The anterior half of biceps femoris tendon

- Graft fixation
  - PCL graft was tensioned @ 90 deg to obtain an anatomic position for reduction of posterior sag.
  - The grafts were simultaneously fixed @ 10 deg using staples
## Results

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Group A</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of extension (&gt;5°)</td>
<td>0 pts</td>
<td>0 pts</td>
<td>0 pts</td>
</tr>
<tr>
<td>Loss of flexion (&gt;15°)</td>
<td>0 pts</td>
<td>0 pts</td>
<td>4 pts</td>
</tr>
<tr>
<td>A-P difference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>@ 20°</td>
<td>2.2 ± 1.9 mm</td>
<td>1.9 ± 2.8 mm</td>
<td>1.9 ± 2.0 mm</td>
</tr>
<tr>
<td>@ 70°</td>
<td>2.3 ± 2.8 mm</td>
<td>1.8 ± 0.8 mm</td>
<td>2.5 ± 2.6 mm</td>
</tr>
</tbody>
</table>

### Stress radiograph

<table>
<thead>
<tr>
<th></th>
<th>Ipsilateral</th>
<th>Contralateral</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT @ 90 degrees</td>
<td>62.0 ± 6.8 %</td>
<td>62.1 ± 5.4 %</td>
<td>n.s.</td>
</tr>
<tr>
<td>PDT @ 90 degrees</td>
<td>53.5 ± 6.8 %</td>
<td>56.6 ± 5.3 %</td>
<td>n.s.</td>
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<tr>
<td>Valgus @ 30 degrees</td>
<td>7.1 ± 1.5 mm</td>
<td>6.9 ± 1.7 mm</td>
<td>n.s.</td>
</tr>
<tr>
<td>Varus @ 30 degrees</td>
<td>7.9 ± 1.8 mm</td>
<td>7.6 ± 1.8 mm</td>
<td>n.s.</td>
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Clinical outcomes

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Group A</th>
<th>Group C</th>
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</thead>
<tbody>
<tr>
<td>Lysholm score (points)</td>
<td>91.2 ± 9.2</td>
<td>94.0 ± 1.7</td>
<td>89.7 ± 10.8</td>
</tr>
<tr>
<td>IKDC Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>16 Pts (44%)</td>
<td>4 Pts (80%)</td>
<td>12 Pts (39%)</td>
</tr>
<tr>
<td>B</td>
<td>14 Pts (39%)</td>
<td>1 Pts (20%)</td>
<td>13 Pts (42%)</td>
</tr>
<tr>
<td>C</td>
<td>6 Pts (17%)</td>
<td>0 Pts (0%)</td>
<td>6 Pts (19%)</td>
</tr>
<tr>
<td>D</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 Pts (0%)</td>
</tr>
</tbody>
</table>

Complications

- Acute intraarticular infection: 3 patients in Group C
  - All patients were improved by synovectomy and continuous irrigation treatment.
Management of multiple knee ligament injuries

- Previous studies
  - Loss of knee extension (> 5 deg): None
  - The Lysholm score: Total 91 pts (Group A: 94, Group C: 89)
  - 30 pts (83%) were excellent or good in the IKDC grading.

- Current study
  - Loss of knee extension (> 5 deg): None
  - The Lysholm score: Total 91 pts (Group A: 94, Group C: 89)
  - 30 pts (83%) were excellent or good in the IKDC grading.

- This results demonstrated that the effectiveness and safety of reconstruction of the multiple knee ligament injuries.

- Two-stage reconstruction in acute phase
  - The advantages of two-stage surgical approach are shortening of the operative time, lowering of the incidence of arthrofibrosis, and convenience in terms of rehabilitation.

<table>
<thead>
<tr>
<th>Study</th>
<th>Lysholm score (Points)</th>
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Conclusions

- The present study demonstrated that the effectiveness of surgical treatment for the multiple knee ligament injuries that can restore satisfactory stability.

- To prevent knee contractures, the initial treatment and rehabilitation in the acute phase are of importance for the following surgery.
References

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