Autograft vs Allograft Comparison in Pediatric MPFL Reconstruction

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Department of Orthopaedic Surgery
Disclosures

- None
Introduction

- MPFL reconstruction commonly used for treatment of patellar instability

- Multiple graft types and surgical techniques are available

- Few Studies look at survivorship of graft options and cost analysis
Objectives

- Compare Graft options in MPFL reconstructions (Autograft vs Allograft)
  - Primary Outcomes
    - Survivorship
    - Clinical Outcomes
    - Cost (Surgical Time, Graft, Reoperation)
  - Secondary Measures
    - Graft Size Differences
    - TT-TG Differences
Methods

• Retrospective
• Single Surgeon
• MPFL reconstruction for Patellar Instability
• 2 Cohorts
  – Autograft (Gracilis Tendon) : 21
    ○ Acute: 5
    ○ Chronic: 16
  – Allograft (Gracilis Tendon) : 35
    ○ Acute: 12
    ○ Chronic: 23
Methods

• Surgical Technique
  – Diagnostic Knee Arthroscopy
  – Gracilis Tendon: L Shaped Tunnel through patella with femoral interference screw
Methods

• Kujala Score at >6 month post-op (estimated full recovery)
  – Validated Pediatric Patellofemoral Clinical Outcomes Scoring

• Cost Analysis
  – Variables
    ✽ Surgical Time
      = Additional Time for Graft Harvest and closure
      = Allograft Expense
      = Reoperation
KUJALA SCORING QUESTIONNAIRE

Name: [Redacted] [Redacted]  Date: 06/15/15

Physician: [Redacted]

1. Limp:
   - a) None
   - b) Slight or periodic
   - c) Constant

2. Support:
   - a) Full support without pain
   - b) Painful
   - c) Weightbearing impossible

3. Walking:
   - a) Unlimited
   - b) More than 2 km
   - c) 1-2 km
   - d) Unable

4. Stairs:
   - a) No difficulty
   - b) Slight pain when descending
   - c) Pain both when ascending and descending
   - d) Unable

5. Squatting:
   - a) No difficulty
   - b) Repeated squatting painful
   - c) Painful each time
   - d) Possible with partial weightbearing
   - e) Unable

6. Running:
   - a) No difficulty
   - b) Pain after more than 2 km
   - c) Slight pain from the start
   - d) Severe pain
   - e) Unable

7. Jumping:
   - a) No difficulty
   - b) Slight difficulty
   - c) Constant pain
   - d) Unable

8. Prolonged sitting with knee flexed:
   - a) No difficulty
   - b) Pain after exercise
   - c) Constant pain
   - d) Severe pain
   - e) Unable

9. Pain:
   - a) None
   - b) Slight and occasional
   - c) Interferes with sleep
   - d) Occasionally severe
   - e) Constant and severe

10. Swelling:
    - a) None
    - b) After severe exertion
    - c) After daily activities
    - d) Every morning
    - e) Constant

11. Abnormal painful kneecap movements:
    (patellar subluxations)
    - a) None
    - b) Occasionally in sports activities
    - c) Occasionally in daily activities
    - d) At least one dislocation after surgery
    - e) More than two dislocations

12. Atrophy of thigh:
    - a) None
    - b) Slight
    - c) Severe

13. Flexion deficiency:
    - a) None
    - b) Slight
    - c) Severe

Score: [Redacted]  Print Form  Submit
Statistical Analysis

- Chisq. P-value
- T-test p-value
- Wilcoxon two sample test
- Statistical Significance ($p < 0.05$)
# Results

<table>
<thead>
<tr>
<th>Sex</th>
<th>Auto</th>
<th>Allo</th>
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<tbody>
<tr>
<td>F</td>
<td>17(81%)</td>
<td>24(69%)</td>
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<tr>
<td>M</td>
<td>4(19%)</td>
<td>11(31%)</td>
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<tr>
<td>Chisq. P-value</td>
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<tr>
<th>Side</th>
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<tr>
<td>Right</td>
<td>7(33%)</td>
<td>15(43%)</td>
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<tr>
<td>Left</td>
<td>14(67%)</td>
<td>20(57%)</td>
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<td>Chisq. P-value</td>
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<table>
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<tr>
<th>Acute. Chronic</th>
<th>Auto</th>
<th>Allo</th>
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<tbody>
<tr>
<td>Acute</td>
<td>5(24%)</td>
<td>12(34%)</td>
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<tr>
<td>Chronic</td>
<td>16(76%)</td>
<td>23(66%)</td>
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<td>Chisq. P-value</td>
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## Results

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<th>Allo</th>
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<tr>
<td>Fail (0)</td>
<td>6 (29%)</td>
<td>0</td>
</tr>
<tr>
<td>Success (1)</td>
<td>15 (71%)</td>
<td>35 (100%)</td>
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<tr>
<td>Chisq. P-value</td>
<td><strong>0.003727</strong></td>
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<td>Fisher p-value</td>
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<tr>
<td>Mean</td>
<td>15.333</td>
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<td>SD</td>
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<td>T-test p-value</td>
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<tr>
<th>Kujala</th>
<th>Auto</th>
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<tbody>
<tr>
<td>Mean</td>
<td>80.333</td>
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<td>9.879</td>
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## Results

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<tr>
<th>Surgical Time</th>
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<tr>
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<td>134.524</td>
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<td>SD</td>
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<td>19.568</td>
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<th>TT-TG</th>
<th>Failed</th>
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<td>Mean</td>
<td>17.65</td>
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<td>SD</td>
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<td>4.34</td>
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<td>0.477</td>
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<th>Graft Size</th>
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<tr>
<td>Mean</td>
<td>5.28</td>
<td>5.7</td>
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<tr>
<td>SD</td>
<td>0.37</td>
<td>0.45</td>
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<tr>
<td>T-test p-value</td>
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<td><strong>0.0009</strong></td>
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Results

• Surgical Time:
  – Autograft: 135 min (38 min more)
  – Allograft: 97 min

• Kujala Scores:
  – Autograft: 80
  – Allograft: 92

• Cost:
  – Extra OR time for Autograft: 40 min = $445
  – Allograft Cost: $1058
  – Reoperation: 34,740 (Charge to Patient/Insurance)
    ◦ Direct Cost to Hospital (~ $4500)
Results

• Failure
  – Autograft: 6 of 21 (28%)
    ○ All chronic dislocators
  – Allograft: 0 of 35 (0%)

• Average Time to Failure: 14 months
Results

• TT-TG
  – No difference btw grafts that failed vs survived

• Graft Size
  – Significant difference in size (Larger cadaver graft)
Discussion

• Higher Failure Rate in Autograft Reconstruction
  – Theory:
    ○ Ligamentous Laxity
    ○ Learning Curve
    ○ Graft Size

• Higher Cost in Autograft
  – Allograft cost more than increased OR time but significant reoperation rate in autograft

• Improved Clinical Outcome Scores in Allograft Group
  – Due to significantly higher rate of failure in autograft group
Discussion

• Weakness
  – Small Study Size
    ◦ Overall uncommon procedure
  – Retrospective
  – No Preoperative Clinical Outcome Scores
    ◦ Assume poor due to need for surgical intervention
  – Secondary procedures difficult to stratify (i.e. chondroplasty)

• Strengths
  – Paucity in Literature in regards to cost analysis and direct graft survivorship comparison
  – Single surgeon, single technique
Conclusion

- Recommend Allograft Reconstruction for Chronic Patellar Instability
  - Decreased Cost
  - Improved Clinical Outcome scores
  - Lower reoperation rate
Thank You