Radiological evaluation of the ScaphoLunate InterCarpal Ligamentoplasty for chronic scapholunate dissociation in cadavers

L. Athlani(1), N. Pauchard(1), G. Dautel(1).


Gilles Dautel and Nicolas Pauchard declare a conflict of interest with Arthrex®. The other authors declared no potential conflicts of interest.

INTRODUCTION

- SUL = Ligamentoplasty: ScaphoLunate & InterCarpal
  - Indication: Chronic Reducible ScaphoLunate Dissociation without arthritis (Garcia Else Stages 3 and 4).
  - Palmar Longus
  - Dorsal ScaphoLunate Interosseous Ligament and Dorsal Inter-Carpal Ligament.
  - Rotary Subluxation of Scaphoid and DISI Deformity.
  - Aim of this study: evaluate radiological performances in a cadaveric study.

METHODS

- Cadaveric Study.
  - Anatomy Lab (Nancy Medical School – Lorraine).
  - 12 upper extremities: forearm to fingers.
  - Fresh adult cadavers.
  - Any pre-existing abnormality of the scapholunate joint.

PROCEDURE

- SUL = PROCEDURE
  - GOALS: CORRECTION OF FOR LIGAMENTOPLASTIES’ IMPERFECTIONS (3LT)
    - DCL Reconstruction: Modern biomechanical concepts
    - Dorsal technique: Palmer-Pain and STT Arthroscopy
    - PL Transplant: Respect FOR (secondarystability), Prestressed (ligament loosening)
    - Bone Blind Tunnels: No scaphoid transosseous tunnel (proximal pole necrosis)
    - Solid Bone Anchorage (palmarlock)
      - No capsular fixation

- PROTOCOL: 1° TIME
  - WRIST DISSECTION
    - 3 Palmar Tendon Units:
      - FCR
      - Flexor Digitorum
      - ECU
    - 3 Dorsal Tendon Units:
      - ECRB
      - Extensor Digitorum
      - ECU
    - Fiberwire™ 2.0 (Arthrex®)
    - 3.25 mm K wire confirms proximal pole necrosis.
    - Weight (~5 to 10 kg) to simulate different positions of the wrist.

- PROTOCOL: 2° TIME
  - STATIC SCAPHO-LUNATE DISSOCIATION
    - Dorsal Capsulotomy (= Berger’s)
    - Section of the SLIO and DIX ligaments.
    - Static Scapholunate Dissociation (SLD) Analysis
      - SUL and 3LT ligatures:
        - Static Scapholunate Gap: 1.5 mm
        - Dorsal Scapholunate Gap: 1.5 mm
        - Scapholunate Angular: 90°
        - Capitular-ulnare: 4'
      - Pathological value: SUL greater than 3 mm, SLD greater than 3° and CLA more than 15°.
      - Measurements: carpal bone angles on lateral radiographs.

PROTOCOL: 3° TIME

RESULTS

- After sectioning ligaments: Static Dissociation (SLD, DISI deformity and Posterior scaphoid subluxation)

CASE 1: After ligamentoplasty

<table>
<thead>
<tr>
<th>Radiographic Measurements</th>
<th>Pre-Ligamentoplasty</th>
<th>Post-Ligamentoplasty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Scapholunate Gap</td>
<td>3.3 mm</td>
<td>2.1 mm</td>
</tr>
<tr>
<td>Dorsal Scapholunate Gap</td>
<td>2.5 mm</td>
<td>2.6 mm</td>
</tr>
<tr>
<td>Scapholunate Angular</td>
<td>90°</td>
<td>15°</td>
</tr>
<tr>
<td>Capitular-ulnare Angular</td>
<td>5°</td>
<td>5°</td>
</tr>
<tr>
<td>Posterior subluxation</td>
<td>0°</td>
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</tbody>
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CASE 2: After ligamentoplasty

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<tr>
<td>Dorsal Scapholunate Gap</td>
<td>2.5 mm</td>
<td>2.2 mm</td>
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<tr>
<td>Scapholunate Angular</td>
<td>90°</td>
<td>12°</td>
</tr>
<tr>
<td>Capitular-ulnare Angular</td>
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CONCLUSION

Significant improvement: ScaphoLunate Gaps and Angles.
Reduced scapholunate dissociation (Posterior Scaphoid Subluxation).
Restore scapholunate joint stability and normal carpal anatomy.
Similar to 3LT in terms of restoration of carpal alinement.
Role of DCL Ligament.
Wrist movements during activities of daily living (Ligament loosening).
Prospective Clinical Study +++