Chronic Scapholunate Instability

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I. Kinematics
   a. Proximal row has no direct tendinous attachment and thus is an intercalated segment
   b. Scaphoid has a tendency to flex due to trapezium, trapezoid and capitate
   c. Triquetrum has a tendency to extend due to helicoid articulation with hamate
   d. Lunate is "balanced" by normally intact SL & LT interosseous ligaments
   e. When the wrist moves from radial to ulnar deviation, the proximal row extends
   f. When the SL ligament is incompetent, the scaphoid flexes and the lunate/triquetrum extends (assuming LT ligament intact) = DISI

II. Classification of carpal instability
   a. Chronicity
      i. Acute: <1 week (optimal healing potential)
      ii. Subacute: 1-6 weeks (deformity still easily reducible but ligaments may have reduced healing potential)
      iii. Chronic: >6 weeks (possibility of achieving an acceptable reduction and primary ligament healing much less likely)
   b. Constancy
      i. Predynamic
      ii. Dynamic
      iii. Static reducible
      iv. Static irreducible
   c. Location
      i. Radiocarpal
      ii. Proximal and distal intercarpal
      iii. Metacarpal
      iv. CMC
   d. Etiology
      i. Traumatic
      ii. Atraumatic
   e. Direction
      i. DISI
      ii. VISI
      iii. Ulnar translocation
      iv. Dorsal translocation
   f. Pattern
      i. Dissociative
      ii. Non-dissociative

III. Spectrum of SL instability
   a. Stage I
      i. Partial SL ligament injury or "stretched" ligament
      ii. Intact critical dorsal SL fibers
      iii. Normal x-rays
      iv. May cause local synovitis and pain
      v. "Predynamic"
   b. Stage II
      i. Complete SL ligament injury but repairable
      ii. Typically carpal alignment is normal
      iii. "Secondary stabilizers" (ST ligament and DIC ligaments) intact
      iv. No rotatory subluxation
      v. No significant SL gap
      vi. "Dynamic" instability
   c. Stage III
      i. Complete SL injury
      ii. Non-repairable dorsal ligament and poor healing potential
      iii. Secondary stabilizers still intact
      iv. Increased SL gap under load/stress films
      v. Still considered "dynamic" instability
   d. Stage IV
      i. Complete SL injury
      ii. Secondary stabilizers NOT intact
      iii. "Rotatory subluxation" of the scaphoid
      iv. Reducible mal-alignment
      v. "Clunking" secondary to self-reduction of the subluxation common
   e. Stage V
      i. Chronic state with complete SL injury and loss of secondary stabilizers
      ii. Fibrosis results in <u>irreducible</u> carpal malalignment
      iii. Normal cartilage
   f. Stage VI
      i. Long standing carpal malalignment with irreducible scaphoid subluxation
      ii. Degenerative changes ensue (SLAC)
   g. Acute typically stage II, while chronic stages III-VI

IV. Chronic SL instability
   a. >6 weeks
   b. Static reducible vs. static irreducible
   c. Proximal row
   d. Traumatic
   e. DISI
   f. Dissociative

V. Clinical presentation
   a. Pain, especially with heavy use
   b. Weakness
   c. "Giving way"
   d. "Clunk, snap or click" with use/load
   e. Reduced motion

VI. Physical examination
   a. Swelling typically absent due to chronicity
   b. SL tenderness
   c. Watson's test (wrist passively moved from ulnar to radial deviation with dorsal directed force over scaphoid tubercle, pain + "clunk" (high false +)

VII. Diagnostic workup
   a. Bilateral clenched fist AP films (look for asymmetric SL gap), true co-linear lateral and "clenched pencil view" (taken in pronation with pencil or dowel gripped with both hands simultaneously on same xray)
   b. High resolution non-contrast MRI using a dedicated wrist coil
   c. Cine study or in office fluoroscopy with ulnar to radial deviation and wrist flexion/extension
   d. Wrist arthroscopy to evaluate cartilage and remainder of wrist joint, LT ligament and TFCC

VIII. Treatment
   a. Depends upon stage
      i. In stage II chronic cases, SL repair with or without capsulodesis with temporary kirschner wires or temporary SL screw fixation
      ii. In stage III chronic cases with non-repairable SL ligament and *dynamic* instability:
         1. Dorsal capsulodesis
         2. Soft tissue reconstruction of the dorsal SL ligament (?)
         3. Bone-ligament-bone grafts (?)
         4. "Three-ligament tenodesis" (Modified Brunelli)
      iii. In stage IV chronic cases with non-repairable SL ligament and *static (but reducible)* instability:
         1. Three-ligament tenodesis
         2. "RASL" procedure: reduction-assn. of the SL joint (?)
         3. "SLIC" screw(??)
         4. SL reconstruction using the Arthrex SL axis method (SLAM) (??)
      iv. In stage V chronic cases with non-repairable SL ligament and *static (and non-reducible)* instability with intact cartilage a salvage procedure is indicated:
         1. STT fusion
         2. SC fusion
         3. SLC fusion

4. RSL fusion + distal scaphoid excision (preserves MC joint)
5. Scaphoid excision and midcarpal fusion (SLAC with MC involvement = SLAC 3)

b. All treatment options have variable success rates, and typically result in some loss of wrist motion and grip strength

Bibliography

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