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Case Report

Face to Face with Scapholunate Instability

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Abstract

In this paper we have attempted at proposing a new classification of scapholunate instability that in our opinion can be used in majority of cases with scapholunate complex injury. Incomplete and isolated scapholunate interosseous ligament lesions are of no clinical relevance to SL dissociation or carpal instability. We have concluded that the new classification can be used in all types of SLIL lesions and we are convinced that it will help in choosing the right type of surgery.

Introduction

The most commonly used classifications of Scapholunate (SL) instability are:

- Dynamic classification that defines different degrees of SL instability including predynamic, dynamic, static and fixed carpal instability [1,2].
- Garcia-Elias classification regarding the SL instability, which divides it into six stages starting at incomplete Scapholunate Interosseus Ligament (SLIL) injury and finishing at degenerative changes of the wrist cartilage [3].
- Geissler's classification - the first arthroscopic classification for SL instability [4].
- The latest arthroscopic classification of SL dissociation is the EWAS (European Wrist Arthroscopy Society) classification [5].

When discussing the SL instability or treatment of SLIL lesions, majority of authors stick to dynamic classification or the one by Garcia-Elias [1-3]. However, in arthroscopic treatment of SL instability [4,5] arthroscopic classifications are both mentioned and used . This implies that there is no standardized classification of SL instability. In this paper we have attempted at proposing a new classification of SL instability, which in our opinion can be used in majority of cases with SL instability, based on both wrist radiographic signs and observed during wrist arthroscopy.

Proposed classification

The proposed new classification (Figure 1) combines the possibility of coexistence of Scapholunate Interosseous Ligament (SLIL) lesions (the most important carpal intrinsic ligament) and secondary stabilizers (as extrinsic carpal ligaments) of scaphoid and lunate:

- Dorsal carpal ligaments - dorsal secondary stabilizers of scapholunate ligament complex:
  1. Dorsal Radio carpal (or radiotriquetral) Ligament (DRC): It is attached, to posterior border of lower end of the radius and fixed to dorsal surfaces of the triquetrum. It is the most important dorsal secondary stabilizer of the lunate, and detachment from the lunate may cause Dorsal Intercalated Segmental Instability – DISI deformity.
  2. Dorsal Intercarpal Ligament (DIC): It extends transversely across dorsal surfaces of the carpus (from triquetrum to scaphoid).
  3. Dorsal Capsulo-Scapholunate Septum (DCSS): It is a confluence of dorsal capsule, dorsal intercarpal ligament, and scapholunate interosseous ligament (SLIL).
- Volar carpal ligaments - volar secondary stabilizers of scapholunate ligament complex:
  1. Radio Scaphocapitate Ligament (RSC): It is attached to anterior border of radial styloid crossing of the scaphoid and fixed to the capitate. It also forms a fulcrum over which the scaphoid rotates.
  2. Long Radiolunate Ligament (LRL): The main volar secondary stabilizer of the lunate. Detachment from the lunate may cause Volar Intercalated Segmental Instability – VISI deformity.

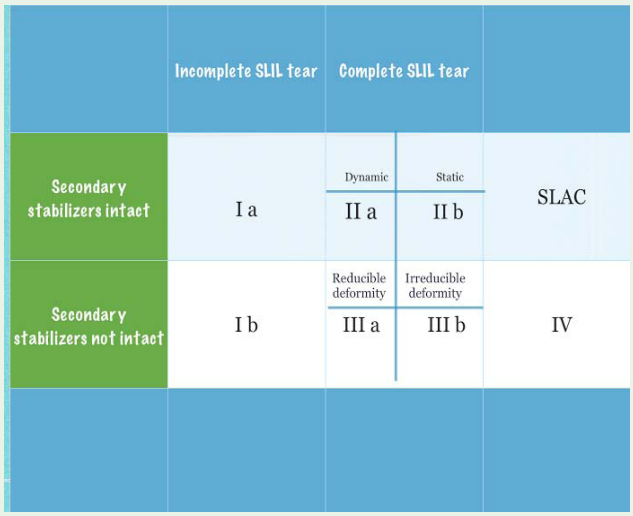

Figure 1: The proposed new classifications.

3. Scapho Trapezio Trapezoideum (STT) capsul. [6-11]

This new classification also distinguishes acute and chronic lesions, which in our opinion may be used in handling arthroscopic and open surgery. In this classification the presence of rotatory subluxation of the scaphoid doesn't exclude the possibility of good healing potential of SLIL lesion. It means that we can qualify and treat some patients with this deformity by means of less invasive procedures, such as closed reduction and internal fiation of scapholunate ligament complex, if the trauma is acute or sub acute. This is also the only classification that allows for coexistence possibility of rotatory subluxation of the scaphoid with incomplete SLIL tear.

I a - Incomplete tear of Scapholunate Interosseous Ligament (SLIL), secondary stabilizers of scapholunate ligament complex are still intact. This type of injury may not require any treatment at all, or may be treated by means of plaster immobilization alone for 4-6 weeks.

I b - Incomplete tear to ISLL, damage to any secondary stabilizer of scapholunate ligament complex that may cause rotatory subluxation of the scaphoid or DISI deformity. Our clinical findings showed that even in incomplete SLIL lesion rotatory subluxation of the scaphoid can occur (Figure 2). This situation in clinical practice is not uncommon; there isn't however any referred stage precisely in classifications recognized so far. At this stage, injury of secondary stabilizers of scapholunate complex seems to be of more clinical significance than SLIL tear. In case of acute or sub acute injury, the treatment of choice seems to be closed reduction and internal fixation of scapholunate ligament complex with "K" wires for period of 6 weeks.

II a - Complete tear of SLIL, secondary stabilizers of scapholunate complex are still intact (no signs of rotatory subluxation of scaphoid or DISI deformity, normal X-ray with no changes, only dynamic X-rays (with clenched fist or ulnar deviation more than 13°) are positive with dynamic Terry-Thomas sign - widening of scapholunate joint by more than 2 mm (Figure 3). In this situation complete SLIL lesion

Figure 2: Incomplete tear to SLIL with rotatory subluxation of the scaphoid – stage Ib.

alone will not cause a rotatory subluxation of the scaphoid, but it will show a dynamic SL dissociation at early stages (stage IIa°) and a static in chronic ones. In case of acute lesion we propose closed reduction and internal fixation of scapholunate ligament complex with "K" wires for 6 weeks, in sub acute cases dorsal wrist capsulodesis is the treatment of choice.

II b - Complete tear of SLIL, no rotatory subluxation of the scaphoid, no signs of DISI deformity, but SL gap is seen in normal X-rays as a static deformity, cartilage of the wrist is in good condition. In those cases we propose dorsal wrist capsulodesis in more mobile/reducible deformities (after checking the mobility of scaphoid and lunate intraoperatively) and intercarpal arthrodesis (lunocapitate arthrodesis if there is no sign of ulnar translation of lunate/proximal row, four - with scaphoidectomy - or three corner - with scaphoidectomy and triquetrectomy -fusion and radial styloidectomy) in fixed instabilities.

III a - Complete tear of SLIL, any damage to secondary stabilizers of SL ligament complex (rotatory subluxation of the scaphoid or DISI deformity), and the deformity is reducible, cartilage with no signs of damage. In such cases we propose new modification of Brunelli procedure [12].

III b - Complete tear of SLIL, any damage to secondary stabilizers of SL ligament complex (rotatory subluxation of the scaphoid or DISI

Figure 3: Complete tear of SLIL, secondary stabilizers of scapholunate complex are still intact – stage IIa.

deformity), and the deformity is irreducible as a fixed instability, cartilage with no signs of damage. One of the discussed above intercarpal arthrodesis shall be done.

IV - Scapholunate Advanced Collapse (SLAC) with damage to wrist cartilage. Treatment depending on the degree of cartilage degeneration [12-19].

The scaphoid will rotate volarly when additional damage to secondary stabilizers of the scaphoid occurs (dorsal capsulo-scapholunate septum, Scapho Trapezio Trapezoid [STT] capsule, Radio Scapho Capitate [RSC] and the dorsal intercarpal [DIC] ligaments), while the lunate will rotate volary/dorsally in VISI/DISI pattern (when damage of long radio lunate – LRL or dorsal radio carpal ligaments – DRCL is present) [3,5,6,8-12,20,21]as dynamic -with incomplete SL lesion (I b°), complete lesion to SL ligament (II b°) or as static deformity (III b°). The cortical ring sign will not always be a pathologic, an additional X-ray of the opposite wristin PA projection and in clenched fist of the injured wrist must be taken to ensure that this sign is pathologic. An X-ray in ulnar deviation of the injured wrist can prove helpful, too, when the wrist is deviated ulnary (min. 13° of deviation) the presence of cortical ring sign of the scaphoid may inform about static character of the deformity (III b°), however it does not exclude dynamic form of SL instability [10,11]. Should that be the case, any doubts can be cleared up by means of clinical tests (Watson's maneuver) [22]. Another significant point is the increase of SL angle (30°-60°). It shall increase not only in the situation with rotatory subluxation of the scaphoid, but also in DISI deformity [3,20,21]. SL ligament balances flexion of scaphoid and lunate extension. This is why in scapholunate instability DISI deformity alone can occur when secondary stabilizers of the lunate (LRL and DRC ligaments) are damaged. Such instances (rotatory subluxation of the scaphoid and DISI deformity) could occur together or separately (at least at first stages of the injury). That is the reason why in numerous cases of SL instability SL angle will exceed 80° [3,10,11]. For rotatory subluxation of the scaphoid the radio scaphoid angle (≤45°) will be more typical [20,21]. Finally, we speak about the last stage (IV°) when any degenerative changes occur.

Discussion

Majority of incomplete SLIL lesions without damage to secondary stabilizers of SL complex will not cause carpal instability, and so they can be observed or treated conservatively. Only those with pain and signs of carpal instability may indicate that there is a need for surgical treatment depending on the stage of SL dissociation and carpal malalignment. Every treatment aims at avoiding wrist arthritis in SLAC wrist (scapholunate advanced collapse) pattern. Not in all patients with suspicion of SLIL lesion can we confirm the injury based on radiographic examination or clinical tests only. Wrist arthroscopy is the gold standard in diagnosis of SLIL lesions to verify level of the lesion and quality of the ligament and cartilage. Drawing on these data alone with radiological and clinical findings we can decide about treatment, if any at all is required. So many patterns of surgical treatment of SL dissociation and carpal instability were described. There is no only one (or even few) surgical method that can be chosen to all SLIL lesions because of the possibility of multiple combinations of lesions. The key in SL instability is the presence or absence of rotatory subluxation of the scaphoid and DISI deformity. The second most important question to answer is whether the deformity is fixed or not [10,11,23,24].

In dynamic classification there is no separation of incomplete or complete SLIL lesions. Neither is separation of rotatory subluxation of the scaphoid and DISI deformity that not necessarily have to coexist. At early stages of SL dissociation with rotatory subluxation of the scaphoid DISI deformity can be absent. Neither will it occur in patients with incomplete SLIL lesion but with detaching of secondary stabilizers of the scaphoid. The new classification has introduced a clear division between complete and incomplete SLIL lesion. It also combines the possibility of coexistence of secondary stabilizers lesion. The increase of SL angle (>60°) can be present in both patterns. In cases when only rotatory subluxation of the scaphoid or DISI deformity are present separately the angle will exceed 60°, while in cases with coexistence of both deformities the angle will even exceed 80°. This is because of scaphoid flexion and lunate extension. Depending on type of injury (with or without rotatory subluxation of the scaphoid/with or without lunate malalignment) those deformities can be separately presented or coexisted. This was probably the reason why Garcia-Elias conditioned rotatory subluxation–of the scaphoid on radio scaphoid angle (<45°) just because of coexistence possibility with DISI deformity to separate each of these deformities. He proposed that the increase of radio scaphoid angle can be present only with complete SLIL lesion which cannot be repaired primarily but where the scaphoid malalignment is correctable. In Garcia-Elias classification this situation can be found at stage IV of SL dissociation. In our study we have found that rotatory subluxation of the scaphoid can also occur with incomplete SLIL lesion. In the new classification this injury can be present at both I b and III a (Garcia-Elias stage IV) stages, depending on the ability of primary repair of SLIL lesion [3,10-12,20,21, 24-26].

Arthroscopic classifications (Geissler's and EWAS) can be useful for surgeons who are experts in wrist arthroscopy and can handle such injuries by means of arthroscopic treatment methods. On the other hand, not every case of SL instability can be treated arthroscopically. Quite a many surgeons, not necessarily experts, are able to treat the lesions discussed in open wrist surgery, and obtain very good results. However these classifications are not useful for surgeons who are not familiar with wrist arthroscopy. What's more, Geissler's classification does not include the possibility of secondary stabilizers lesions, as it only describes the level of SLIL lesion and SL dissociation [4,5, 27,28].

The new classification goes at least one step forward since it can be useful for all groups of surgeons, regardless of the level of familiarity with wrist arthroscopy.

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