POST TRAUMATIC LIGAMENTOUS INSTABILITY OF THE WRIST

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The wrist is a common site of sports injuries. Extreme violent dorsiflexion of the wrist while falling on the outstretched hand, or stopping a blow with the palm subjects it to trauma of various degrees. Fractures of the distal end of the radius, of the navicular bone and dislocations in the carpus are well recognised. When these are excluded on X-Ray examination, the diagnosis of wrist sprain is usually made and fast spontaneous recovery is expected. However, some of the patients continue to suffer from pain, limitation of movement, and long periods of sport incapacity. These cases of unresolving “wrist sprains” were recently related to ligamentous tears resulting in wrist instability (Dobyns et al, 1975).

The purpose of this paper is to present three cases of post traumatic wrist instability. The early diagnosis and treatment of this entity are discussed.

ILLUSTRATIVE CASE HISTORIES

CASE 1 — A 25 year old goal-keeper fell onto his outstretched hand. Severe pain, swelling and limitation of movement resulted. On X-Ray examination no fracture was diagnosed. However, both the antero-posterior and lateral views demonstrated dorsal carpal instability (Fig. 1). Closed reposition and cast immobilisation for six weeks resulted in a pain free functional wrist.

CASE 2 — A 28 year old basketball player subjected his wrist to severe injury while trying to take a rebound. On examination, marked tender swelling was noted. The X-Rays demonstrated palmar flexion wrist instability (Fig. 2). After closed reposition and immobilisation in plaster cast for six weeks, he returned to full sporting activities with a pain-free wrist.

Fig. 2: X-Ray of Case 2 demonstrates palmar wrist instability. On the lateral view the capitolunate angle is 50°. On the antero-posterior view the arc of the midcarpal joint is broken.

CASE 3 — A 50 year old amateur tennis player injured her right wrist while falling on a hard concrete tennis court. Severe swelling and limitation of movement appeared. The X-Ray examination demonstrated Colles’ fracture of the distal radius associated with dorsal carpal instability (Fig. 3). One year after the injury her wrist is still painful. X-Rays demonstrated fracture union associated with persistent dorsal wrist instability.

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Fig. 1: X-Rays of Case 1 demonstrates dorsal wrist instability. On the antero-posterior view the scapholunate gap is wider than 2 mm, and the scaphoid is foreshortened. On the lateral view the scapholunate angle is 80°.
Fig. 3: X-Rays of Case 3 demonstrate Colles’ fracture associated with dorsal instability. On the lateral view the scapholunate angle is $70^\circ$. On the antero-posterior view the scapholunate gap is wider than 2mm.

Discussion

The wrist is a three segment longitudinal link composed of the distal end of the radius and the proximal and distal rows of carpal bones. Its stability is determined by the scaphoid which bridges the two carpal rows, by the joint capsule, the tendons and the inter-carpal ligaments (Fisk, 1970; Mayfield et al, 1976). Loss of ligamentous support can result from congenital laxity (Linscheid et al, 1972) but is usually due to traumatic disruption of the radioscapolunate complex and the deltoid ligaments (Sebald et al, 1974). The wrist collapses into a deformity which Fisk called the “concertina effect” (Fisk 1970), but is more commonly referred to as the “instability pattern” (Linscheid et al, 1972).

The pathognomonic traumatic aetiology is extreme violent dorsiflexion of the wrist, while falling on the outstretched hand, or stopping a blow with the palm. The severe ligamentous injury can be an isolated one or associated with fractures about the wrist. It results in an instability pattern which is usually overlooked and when isolated is misdiagnosed as wrist sprain. The patients complain of prolonged wrist pain, weakness, impaired motion and clicking sensation with movement. Untreated, the wrist slowly deteriorates and post traumatic arthritis results (Sebald et al, 1974). At this stage the morbidity is very high and the surgical alternatives consisting of wrist arthrodesis, proximal row carpectomy, or wrist arthroplasty are disastrous for active sportsmen.

The diagnosis of wrist instability is simple if the normal X-Ray is recognised. On the antero-posterior view:

1. The mid carpal joint is described as a continuous arc which is broken in pathological conditions.

2. The normal gap between the carpal bones which is less than 2 mm remains unchanged in neutral position, radial and ulnar deviation and clenched fist position.

On the lateral neutral view:

1. The capitolunate angle is less than $30^\circ$.

2. The scapholunate angle ranges from $30^\circ$ to $60^\circ$ (Fig. 4) (Gilula and Weeks, 1978).

Fig. 4: The normal range of:

(A) The capitolunate angle.
(B) The scapholunate angle.


Linscheid et al (1972) recognised four types of instability:

1. Dorsal carpal instability is the most common one. Tear of the radioscapolunate ligamentous complex results in dissociation of the scapholunate joint and loss of its synchronous motion (Taliesnik, 1976). On the lateral X-Ray the longitudinal axis of the volar flexed scaphoid is perpendicular to the radius, while the lunate assumes a dorsiflexed position. Thus the scapholunate angle is greater than $60^\circ$. On the
antero-posterior X-Ray the scapholunate gap is wider than 2 mm. A fore-shortened appearance of the volar flexed scaphoid is noted, showing the distal pole end on as a dense circular cortical ring (Taleisnik, 1980) (Fig. 1). Case 1 and 3 demonstrate this type of instability. The first as an isolated ligamentous injury and the second is combined with fracture of the distal end of the radius.

2 Palmar flexion instability results from damage to the capitulunate deltoid ligament (Taleisnik, 1976). The lunate palmar flexes more than the scaphoid, while the capitate dorsiflexes. As a result the lateral X-Ray demonstrates increased capitulunate angle (greater than 30°) and decreased scapholunate angle (less than 30°). Case 2 demonstrates this type of instability.

Two other rare types of post traumatic instability are: ulnar translocation and dorsal subluxation (Taleisnik, 1980).

The treatment and prognosis of carpal instability are time dependent (Palmer et al, 1978). Early diagnosed cases, three to four weeks following injury, have a good prognosis. Closed reposition and cast immobilisation for eight weeks is the treatment of choice. If this fails, open reposition and Kirschner wire fixation, is a reasonable alternative.

Intermediate cases more than four weeks following injury, without evidence of degenerative post traumatic changes, are candidates for ligamentous reconstruction, with reported success rate of 50% (Palmer et al, 1978). This may be accomplished by a tendon graft passed through drill holes in the carpal bones, thus substituting for the damaged ligament (Taleisnik, 1978). Limited inter-carpal fusion is also reported as a possible alternative (Uematsu, 1979).

Late diagnosed cases with degenerative changes are poor candidates for any reconstructive surgery. The only alternatives are major surgical procedures, such as wrist fusion, proximal row carpectomy or wrist arthroplasty, which result in a pain-free joint with a considerable degree of incapacity (Sebald et al, 1974).

To conclude, ligamentous injuries of the wrist can easily be treated conservatively, with relatively short periods of immobilisation and have a good prognosis. However, most of them are diagnosed too late. This is associated with a long period of sport incapacity, leading to much more complicated surgical treatment and sometimes to early retirement.

One should note the special radiographic manifestation of wrist instability in order to enable appropriate early diagnosis and treatment.

**REFERENCES**


