Dislocation of Second and Third Carpometacarpal Joints Along with Fracture of First Metacarpal—Possible Mechanisms

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Dear Sir,

A 25 year old male sustained injury to his right hand by the motor bike handle. The radiographs showed lateral dislocation of second and third carpometacarpal joints with undisplaced comminuted fracture of the diaphysis of the 1st metacarpal. The dislocation was anterior and lateral in relation of the proximal carpal articulation. Open Reduction and Internal Fixation was done with K-wires and they were removed at 3 weeks time. The patient was given active and passive exercises to the fingers and MCP joint. The patient had full range of painless motion at all joints with good DASH score at the end of 13 month post-operative period.

Carpometacarpal joints have a complex anatomical configuration which articulates with each other with the distal row of the carpal bones in an interlocking manner. Strong volar and dorsal interosseous ligaments, spanning the bases of the metacarpals and the carpometacarpal joints, reinforce this bony architecture. The long extensors and flexors, along with the intrinsic muscles of the hand, provide dynamic stabilization of the carpometacarpal joints. As a result, a great deal of energy and force is required to dislocate these joints anteriorly then posteriorly.[1, 2] We had postulated the possible mechanism of

injury which could have caused a rare combination of dislocation as in our case.

Carpel Movement Theory

Backward force on the first metacarpal along with carpal bone (both row) by the now stationary accelerator grip of the motor cycle caused the comminuted undisplaced fracture of the metacarpal when the metacarpal continued to move forward. The force transmitted posteriorly through the 1st carpometacarpal joint moves the carpal bones posterior and supinates in relation to proximal ends of metacarpals. This supinating force was sufficient enough to dislocate radial two Carpometacarpal joints and could dislocate 3 and 4th Carpometacarpal joints if the force continues. The axis of supination is in the 5th Carpometacarpal joint which makes it to dislocate last.. The theory is also supported by the fact that the 1st joint is more displaced than the 2nd joint. (Fig. 1a)

Metacarpal Movement Theory

Handle of bike pushes the head of 2nd metacarpal backward and ulnarward. The handle of the bike acts a fulcrum causing the metacarpal base to move palmar and radialward dislocating from CMC joints. Fracture of 1st metacarpal cannot be explained by this hypothesis. (Fig. 1b) It is important to diagnose and treat the Carpometacarpal joint dislocation to avoid considerable morbidity associated with it. The Carpal Movement and the Metacarpal movement theory could have possibly caused the rare combination of dislocations and thus the hypothesis was discussed

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Fig. 1 a Carpal Movement Theory: Bike handle hit fractures the first metacarpal forcing the forearm into supination in relation to hand with proximal ends of 2nd 3rd metacarpals stationary. Further supination will progressively dislocate the 3rd and subsequently the 4th Carpometacarpal joint. **b Metacarpal Movement theory:** Handle H produces force F1 to result in displacement D1 on fulcrum F

References

1. Howard MB, Edmunds I (2003) Lateral fracture dislocation of the second and third carpometacarpal joints. *Hand Surg* 8(1):93–95
2. Henderson JJ, Arafa MA (1987) Carpometacarpal dislocation. An easily missed diagnosis. *J Bone Joint Surg Br* 69(2):212–214