Midcarpal Impingement: A Cause of Ulnar-sided Wrist Pain in Batters

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Introduction: Baseball in general has a low number of injuries. However, batters are at increased risk of wrist injuries due to the extreme ulnar deviation that occurs during repetitive swinging. Understanding the complex carpal anatomy, kinematics of the wrist, and the swinging mechanism is important in differentiating the different causes of injuries that occur in batters. We believe one potential cause of ulnar-sided wrist pain in batters is midcarpal impingement occurring at the triquetral-hamate joint in the bottom hand especially at the point of contact.

Methods: Fluoroscopy was utilized to evaluate one normal subject with no signs of midcarpal impingement or ulnar-sided wrist pain to look at carpal kinematics and carpal bone position in the static and dynamic positions during a baseball swing as well as in extreme ulnar deviation. We reviewed the current literature on carpal kinematics with ulnar deviation. We also reviewed the literature for midcarpal impingement and causes of ulnar-sided wrist pain in batters.

Results: The triquetral-hamate joint appears to be the main culprit involved with midcarpal impingement. Fluoroscopy did not demonstrate any signs of impingement in the normal subject. However, fluoroscopy did allow for us to evaluate the relationship of the triquetrum and the hamate during a swing at the point of contact and extreme of ulnar deviation. The motions we appreciated dynamically and the carpal bone positions we saw statically appear to be very similar to the mechanics and positioning described by Kumar et. al in relation to carpal bone mechanics during hammering which could predispose a patient to midcarpal impingement. Also with our literature review we identified several anatomic variations of the triquetrum and hamate as described by McLean et. al. We also identified variations in articulation at the triquetral-hamate joint described by Moritomo et. al based on the type of lunate. The articulation has been described in the literature as helicoidal and oval convex depending on the study. The screw-home mechanism was also reviewed which explains the triquetral motion of extension and palmar translation along the hamate during ulnar deviation. The triquetral-hamate joint is more constrained in ulnar deviation. The hamate ridge or concave portion of the hamate is believed to be the major constraint to motion of the triquetrum. The constraint can vary based on the anatomic and articular variations that have been described.

Discussion: We conclude that batters are at increased risk of midcarpal impingement at the triquetral-hamate joint due to the repetitive extreme ulnar deviation of the wrist during swinging. We also believe the concept of midcarpal impingement is multifactorial. The
combination of variables between anatomy, articulation, and motion about the triquetral-hamate joint plays a critical role in midcarpal impingement. The anatomic variations of the triquetral-hamate joint that have been described in the literature along with the screw-home mechanism may contribute to midcarpal impingement. Due to the repetitive motions of the wrist that batters undertake this may lead to ulnar-sided wrist pain, both acutely from inflammation or chronically from degenerative changes. This should be considered as a possible cause of ulnar-sided wrist pain in batters complaining of persistent wrist pain. Management of midcarpal impingement is usually conservative and includes anti-inflammatories, activity modifications and possibly injection of the triquetral-hamate joint. Surgical debridement may be necessary in refractory or chronic cases. More studies involving the kinematics of the triquetral-hamate joint during swinging are needed to help with further recognition, understanding, and management of midcarpal impingement.

References