

PATIENT-SPECIFIC ANALYSIS OF SHOULDER KINEMATICS AND IMPINGEMENT IN TENNIS PLAYERS

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Instability and impingement of the shoulder are commonly described causes of shoulder pain in the overhead athlete, particularly in tennis players (prevalence of 50% for middle-aged players). During tennis movements, several impingements could occur: subcoracoid and anterosuperior impingements at the follow-through phase of forehand and the backhand preparation phase; subacromial and posterosuperior impingements at the cocking phase of serve when the arm is in extreme abduction and external rotation. The precise causes for these impingements remain unclear, but it is believed that repetitive contact, glenohumeral instability, etc., may play a role in the development of symptomatic impingement.

To verify these hypotheses, we developed a patient-specific measurement technique based on optical motion capture and Magnetic Resonance Imaging (MRI) to accurately determine glenohumeral kinematics and to evaluate impingement and stability in tennis. Our results showed that anterosuperior and subacromial impingements were less frequent in this population compared to posterosuperior impingements that often occurred during serving. No shoulder instability could be noted. Tennis players presented frequent radiographic signs of structural lesions which seem to be mainly related to posterosuperior impingement due to repetitive abnormal motion contacts. Our methodology combining motion capture and medical imaging offers novel insights into the analysis of shoulder impingement and instability that could, with future studies, be generalized to other shoulder pathologies and sports.