Return to Play and Performance Outcomes of Elbow Medial Ulnar Collateral Ligament Reconstruction in Baseball Players: A Systematic Review and Meta-Analysis

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INTRODUCTION: Elbow medial ulnar collateral ligament injuries (UCL) have become increasingly common in the throwing athlete. Return to play (RTP) and return-to-same level of play (RTSP) rates and effects on performance remain of interest. This systematic review and meta-analysis sought to review RTP, RTSP, and in-game performance after UCL reconstruction (UCLR), secondarily comparing primary versus revision UCLR and based on competitive levels.

METHODS: A systematic review was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. We queried PubMed/MEDLINE, Embase, Web of Science, and Cochrane databases to identify all articles that included UCL injuries between January 2002 and October 2022. We included baseball players that underwent primary or revision UCLR. In addition to evaluating RTP and RTSP, performance metrics assessed included earned run average (ERA), innings pitched (IP), walks and hits per inning pitched (WHIP), batting average against (BAA), strikeouts per 9 innings (SO/9), walks per 9 innings (BB/9), percentage of fastballs thrown (FB%), and average fastball velocity (FBv). In addition to calculating weighted means, meta-analysis was performed to compare improvement in performance metrics between strata.

RESULTS: Our review included 37 articles reporting on 4,782 elbows (average age = 25 years, follow up = 36 months). There were 4,503 primary UCLR and 279 revision UCLR. After primary UCLR, weighted mean time to RTP and RTSP were 457 days (83% achieved RTP) and 516 days (75% RTSP), respectively. For revision UCLR, the weighted mean time to RTP and RTSP was 484 days (82%) and 526 days (58%), respectively. There was a smaller pre- to postoperative change in SO/9 in primary compared revision UCLR, although the pre- to postoperative increase in BB/9 was significantly less in primary UCLR. Pre- to postoperative changes in ERA, FB%, FBv, IP, and WHIP were not significantly different in primary versus revision UCLR. When stratifying primary UCLR outcomes by performance level, the weighted mean RTP (% RTP) and RTSP was 463 days (84%) and 522 days (77%) for Major League Baseball (MLB) only, 458 days (82%) and 520 days (75%) for MLB + Minor League Baseball (MiLB), and 467 days (81%) and 330 days (65%) for college + high school. The pre- to postoperative decrease in ERA was significantly greater in MLB compared to MLB + MiLB level players that underwent primary UCLR. There were no significant differences between MLB and MLB + MiLB level players with respect to pre- to postoperative changes in IP, WHIP, SO/9, or BB/9.

DISCUSSION AND CONCLUSION: UCLR is effective in returning baseball players to sport without decreasing postoperative performance following primary and revision UCLR. Most in-game metrics remain similar postoperatively in primary UCLR across competitive levels and in revision UCLR. However, RTSP rates appear to be lower after revision UCLR. Thus, if an athlete does RTP, it is likely that their statistical performance will be acceptable.