

## Performance and Return-to-Sport after Tommy John Surgery in Major League Baseball Pitchers

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**Objectives:** Ulnar collateral ligament reconstruction (UCLR) is a common procedure performed in Major League Baseball (MLB) pitchers with symptomatic UCL deficiencies. The purpose of this study was to determine: 1) the rate of return to pitching in the MLB following UCLR, 2) performance after return to pitching, and 3) the difference in return to pitching and performance between pitchers who underwent UCLR and matched controls who did not.

**Methods:** MLB pitchers with symptomatic UCL deficiency that underwent UCLR between 1986 and 2012 were evaluated. Players' data was extracted from MLB team websites, injury reports, player profiles/biographies, press releases and cross-referenced with the MLB injury database (MLB411). All player, elbow, and surgical demographic data were analyzed. Age, body mass index (BMI), position, handedness, and MLB experience-matched controls were selected from the MLB during the same years as those undergoing UCLR. An "index year" was designated for controls, analogous to UCLR year in cases. Return to pitching and performance measures in MLB was compared between cases and controls. Student's t-tests were performed for analysis of within-group and between-group variables, respectively.

**Results:** One hundred forty-eight pitchers (83%) were able to return to pitching in MLB. Length of career in MLB following UCLR was 3.9 +/- 2.84 years. Revision rate was 3.9%. In the year prior to UCLR (or index year in controls), cases were significantly ( $p < 0.05$ ) worse than controls with regard to number of innings pitched, games played, wins, and winning percentage and were not significantly different than controls in all remaining parameters. Pitchers undergoing UCLR had significantly ( $p < 0.05$ ) fewer losses, a lower losing percentage, and lower earned run average (ERA) following surgery (versus pre-surgery). In addition, cases threw significantly ( $p < 0.05$ ) fewer walks and allowed fewer hits, runs, and home runs following surgery. Comparisons between cases and controls for the timeframe following UCLR (cases) or index year (controls) demonstrated that cases had significantly ( $p < 0.05$ ) fewer losses per season and a lower losing percentage. In addition, cases had a significantly lower ERA and fewer walks and hits allowed per inning pitched (WHIP) (Table 1).

**Conclusion:** There is a high rate of return to pitching in the MLB following UCLR. Performance declined prior to surgery and improved following surgery. When comparing to demographic-matched controls, UCLR had better results in multiple performance measures. Ulnar collateral ligament reconstruction allows for a predictable and successful return to professional-level baseball.

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## Pre-and post- UCLR outcome data vs. Demographic-matched controls

Before and after UCLR		P Value
ERA	5.7 (pre) vs 4.2 (post)	<.001
WHIP	1.6 (pre) vs 1.4 (post)	<.001
Losses/season	4.4 (pre) vs 3.1 (post)	<.001
Losing percentage	19% (pre) vs 14% (post)	.001
Hits given up/season	77 (pre) vs 58 (post)	.001
Runs given up/season	39 (pre) vs 30 (post)	.002
Home runs given up/season	8.7 (pre) vs 6.7 (post)	.002
Walks thrown/season	30 (pre) vs 22 (post)	<.001
Year one prior to UCLR (or index year)		
Innings pitched	54 (cases) vs 90 (controls);	<.001
Games played	21 (cases) vs 30 (controls);	<.001
Number of wins	2.7 (cases) vs 5.4 (controls);	<.001
Winning percentage	14% (cases) vs 21% (controls)	.003
After UCLR (or index year)		
ERA	4.2 (cases) vs 6.4 (controls);	<.001
WHIP	1.4 (cases) vs 1.7 (controls);	<.001
Losses/season	3.1 (cases) vs 4.3 (controls);	.003
Losing percentage	14% (cases) vs 23% (controls);	<.001
Hits given up/IP	1.01 (cases) vs 1.17 (controls)	<.001