

# Ulnar Collateral Ligament Reconstruction Does Not Improve Fastball Statistics in Major League Baseball Pitchers

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## INTRODUCTION:

Ulnar collateral ligament reconstruction (UCLR), also known as Tommy John Surgery, continues to serve as a popular procedure for Major League Baseball (MLB) pitchers and other throwing-sport athletes. Despite its popularity, the performance of athletes returning to sport is not clear. Studies suggest that coaches, players, and even players' families believe UCLR can be performed on uninjured athletes to enhance performance. Given the inconsistent published outcomes concerning UCLR for MLB player, we sought to compare MLB pitchers who underwent UCLR and returned to the MLB. We specifically assessed: pre- and post-UCLR (1) average fastball velocity; (2) percentage fastball pitched; and (3) other related pitching metrics.

## METHODS:

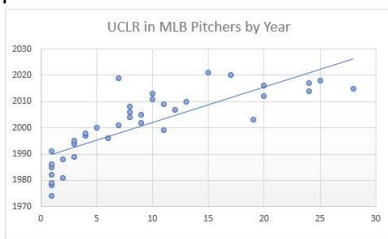
A total of 356 MLB pitchers who underwent UCLR were identified from public records from 1974 to 2021. Pitchers were excluded for unavailability of fastball statistics (i.e., average fastball velocity, fastball pitch percentage, etc.), no return to MLB, and incomplete pre- and post-UCLR statistics. A total of 276 MLB pitchers underwent UCLR and returned to the MLB. Of these, 174 pitchers had available pre- and post-UCLR statistics from 1997 to 2020. Average age at time of UCLR was 26 years and most pitchers threw right-handed (77%). Pitching statistics were drawn from the Statcast system and Fangraphs; these included: percent of pitches fastball (FB%); average fastball velocity (FBv); weighted fastball runs per 100 pitches (wFB/C); earned run average (ERA); walks and hits per inning pitched (WHIP); walks per 9-innings (BB/9); strikeouts per 9-innings (K/9); WAR: wins above replacement (WAR); and runs above replacement (RAR). *T* test comparison of means were conducted to compare pre- and post-UCLR statistics.

## RESULTS:

Of the 356 pitchers who underwent UCLR, 225 (63%) had the procedure during their MLB career. 276 (78%) returned to the MLB at an average of 19 months. 174 pitchers were evaluated for pre- and post-UCLR statistics. Following return to the MLB, pitchers experienced a trending decrease in FBv ( $92.3 \pm 2.9$  miles per hour (mph) vs.  $91.5 \pm 7.6$  mph,  $p=0.1954$ ) and a significant decrease in FB% ( $61.2 \pm 9.1\%$  vs.  $55.9 \pm 10.9\%$ ,  $p<0.0001$ ). In addition, they experienced a decrease in WAR ( $6.8 \pm 9.8$  vs.  $3.9 \pm 8.1$ ,  $p=0.0028$ ) and RAR ( $65.2 \pm 94.5$  vs.  $32.4 \pm 58.4$ ,  $p=0.0001$ ).

## DISCUSSION AND CONCLUSION:

Many MLB pitchers who underwent UCLR returned to MLB play within a reasonable timeframe (78% in 19 months). Upon return, average fastball velocity slowed, as well as proportion of fastball pitches thrown. These results are contrary to multiple, single-center and anecdotal support for UCLR due to its association with improved fastball velocity. Further evaluation is warranted to understand the specific impact of graft type utilized as well as how timing of return influences post-return pitching performance.



**Table 1. Baseline Demographics and Characteristics**

Variable	UCLR and return to MLB (n=276)
Age (years)	26.1
Height (cm)	188.9
Weight (kg)	95.4
R handed	213 (77%)

UCLR during MLB career	225 (63%)
UCLR before MLB career	67 (19%)
Return to MLB after UCLR	276 (78%)
Time to Return (months)	$18.9 \pm 7.0$
Repeat UCLR	75 (21%)

UCLR: ulnar collateral ligament repair

**Table 2. Pre- vs. Post-UCLR statistics of 174 MLB pitchers**

Variable	Pre-UCLR	Post-UCLR	P value
G	$147.8 \pm 151.9$	$102.2 \pm 123.3$	0.0032
IP	$471.8 \pm 586.3$	$281.8 \pm 381.9$	0.0004
FB%	$61.2 \pm 9.1$	$55.0 \pm 10.9$	<0.0001
FBv (mph)	$92.3 \pm 2.9$	$91.5 \pm 7.6$	0.1954
wFB/C	$-0.1 \pm 0.9$	$-0.5 \pm 2.2$	0.0271
ERA	$4.2 \pm 1.7$	$4.4 \pm 2.0$	0.3156
WHIP	$1.4 \pm 0.3$	$1.4 \pm 0.4$	0.9999
BB/9	$3.5 \pm 1.2$	$3.9 \pm 2.3$	0.0427
K/9	$8.1 \pm 1.9$	$8.3 \pm 2.3$	0.3771
WAR	$6.8 \pm 9.8$	$3.9 \pm 8.1$	0.0028
RAR	$65.2 \pm 94.5$	$32.4 \pm 58.4$	0.0001

UCLR: ulnar collateral ligament repair; G: games played; IP: innings pitched; FB%: % of pitches fastball; FBv: average fastball velocity; wFB/C: weighted fastball runs per 100 pitches; ERA: earned run average; WHIP: walks and hits per inning pitched; BB/9: walks per 9-innings; K/9: strikeouts per 9-innings; WAR: wins above replacement; RAR: runs above replacement