Return to Pitching After Tommy John Surgery: Letter to the Editor

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Dear Editor:

First, we would like to thank Erickson et al,[2] Jiang et al,[5] and Makhni et al[6] for 3 important studies recently published in *AJSM* that investigated return to sport and measures of performance for Major League Baseball (MLB) pitchers after Tommy John surgery (ulnar collateral ligament reconstruction). These studies have contributed important new data to the field of sports medicine. The finding that greater than 50% of these pitchers returned to the disabled list after Tommy John surgery is a critical point for counseling pitchers about their expected outcomes after injury.[6]

We respectfully suggest that future studies evaluating outcomes for injured pitchers include outcome measures that more directly and specifically assess the function and performance of the athlete. While they are interesting and important to consider, the outcome measures used in these and previous studies[2,4-6] (earned run average [ERA], batting average against, walks plus hits divided by innings pitched [WHIP], hits, runs, innings pitched, wins, and losses) are dependent on variables partially outside of the pitcher's control. These commonly used statistics have been shown to be affected by luck, home ballpark, league (American vs National), and team defense, among other variables.[1,7] Teammates' abilities and levels of play can influence these statistics, which are intended to measure the individual pitcher's function and performance. As such, we suggest that these statistics not be used as decisive measures of success or failure of treatments for injured pitchers.

Measures of pitching performance that are more independent of the defensive and offensive performance of the pitcher's team are available. These outcome measures can isolate pitcher-hitter interaction and can better assess pitcher function and performance. Such measures include skill-interactive ERA (SIERA),[9] fielding-independent pitching (FIP),[3] and expected FIP (xFIP).[10] These statistics are based on measures such as walks, strikeouts, home runs, hit batsmen, and intentional walks, which are largely independent from teammate performance. Even more direct measures of pitcher function and performance are pitch velocity, movement, and accuracy (location). With MLB's PITCHf/x tracking technology (Sportvision Inc), accurate measures of these variables can be determined in a standardized and repeatable manner in all MLB stadiums. This technology provides performance measures that are independent of the batter, furthering our abilities to truly assess the function of the pitcher. Importantly, the data are made public by MLB such that it is readily accessible for use in research. Jiang and Leland[5] used these publicly available data in their study, showing that this resource is possible to effectively employ.

As Dr Bruce Reider stated in his editorial "Moneyball,"[8] MLB has embraced "sabermetrics," and medical researchers must also embrace this new and enlightened perspective on historical baseball statistics. Many classic pitching statistics that have been important to baseball fans and sports writers since the origins of the game are now generally accepted to be dependent on other facets of the game that are out of the pitcher's control. Therefore, scientific studies that evaluate outcomes after injury and treatment in MLB pitchers should use primary outcome measures that optimize direct, standardized, and valid assessments of the pitcher's function and performance. This will help sports medicine physicians make appropriate base comparisons and recommendations.

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Authors' Response:

We thank Drs Gray and Cook for their thoughtful correspondence regarding the recent set of articles examining performance after ulnar collateral ligament (UCL) reconstruction in professional pitchers. These 3 articles, by Drs Erickson,[2] Jiang,[3] and our group as well,[4] all relied on publicly available pitching metrics in determining overall impact of UCL reconstruction on performance among the most elite of pitchers.

The letter by Drs Gray and Cook highlights a very important aspect of evaluating postoperative performance in mentioning some of the outcomes referenced as performance markers: earned run average (ERA), walks and hits per inning pitched (WHIP), and wins/losses. As noted by Drs Gray and Cook, these metrics are in part dependent on external factors, such as performance of teammates, performance of opponents, and even which type of league the pitcher is playing in (American vs National League).

One motivating reason for using these metrics is that, in the public press, these metrics are indeed used to determine a pitcher's performance. One major reason for conducting our study was the notion that among the public perception, pitchers undergoing Tommy John surgery often return to improved performance. In fact, we showed in a previous study[1] that players and coaches alike shared this perception, and anecdotally have met with healthy players who want to undergo this major reconstructive surgery in order to improve their own performance. Therefore, we found it important to use these same metrics in order to highlight the true impact UCL reconstruction has on pitching performance postoperatively. Additionally, in our study, we did try to include certain metrics that were less dependent on "nonpitcher" effects. These metrics included percentage of fastballs thrown, percentage of pitches thrown for strike, and average fastball velocity.

As our data collection continues to evolve, so will our ability to hone in on pure pitching metrics. This will allow us to continue to improve our ability to rate the outcomes of the surgeries we perform, so that we can provide the best counsel to patients being considered for these procedures.

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