Ulnar Collateral Ligament Injured Too Often In Game

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DANBURY, Conn. — Recent advances in the diagnosis and treatment of pitcher's arm injuries has led the medical community to understand the ulnar collateral ligament (UCL) of the elbow is more commonly injured than originally thought.

Research suggests overuse as the principle risk factor, with the risk of elbow pain correlated with the number of pitches thrown in a game (and in a season).

Pitchers who competitively pitch more than 80-pitches per game, more than 8-months a year, or with arm fatigue are several times more likely to require elbow surgery.

Baseball is one of the safest sports available for today's young players; however, many of the serious injuries suffered by adult baseball pitchers today may have begun to develop during their early years of baseball.

While the rate of traumatic injury in youth baseball is low, several studies indicate a high incidence of chronic elbow and shoulder injuries in young pitchers.

A staggering 58 percent of young pitchers today experience elbow injuries during or after pitching.

Whereas the causes of most arm injuries have been identified (Table 1) and effort made to establish a systematic approach to minimize the risk, prevalence and incidence of elbow injuries continues to rise to epidemic proportions.

A retrospective study of high school pitchers with UCL injury and reparative surgery from a single sports orthopedic surgical center further validated that overuse is the predominant risk factor for UCL injury.

Subsequent studies have also demonstrated that high school pitchers with velocity in excess of 85-mph and pitching while fatigued are also risk factors for UCL injury.

This is not surprising as a high school pitcher, whose velocity is in excess of 85-mph, will in most cases dominate opposing high school hitters, hence be used more frequently, which subjects the pitcher to overuse and subsequent arm injury.

In addition, and not surprisingly, a number of other evidence-based studies emphasize that suboptimal pitching mechanics, which should be learned at the youth level during the early stages of instruction, are also responsible for an increased risk of a debilitating injury.

It is for this reason, qualified and experienced coaching should be a requirement for young players who demonstrate an interest in pitching.

With current data demonstrating an increasing prevalence and incidence of elbow injuries, a case control study was performed comparing pitchers, ages 14 to 20 years, who developed a pitching related injury (elbow or shoulder injury with subsequent surgical repair in the dominant arm) to active high school and college pitchers with no history of injury.

Compared to the controls, the group that required reconstructive surgery did indeed pitch more months, games, innings, pitches per game and pitches per year. In addition, the injured group pitched with higher velocity and more often with arm pain and fatigue.

Based on the outcome of these studies, a multivariate analysis identified the most significant risk factors for high school and college pitcher injury, and need for surgery as: an increased risk of 500 percent for pitching greater than 8-months per year, 400 percent for pitching greater than 80-pitches per game, and over 250 percent for a fastball greater than 85-mph.

When regularly pitching, despite arm fatigue, the risk for injury requiring surgery increased 3,600 percent. This one factor - fatigue - had the strongest correlation with subsequent arm surgery (Table 2).

USA Baseball, the governing body for all of amateur baseball in the United States, has identified risk reduction factors (Table 3), that when applied have greatly diminished the risk of injury.

Whereas these steps to reduce and minimize the risk have been accepted by the greater baseball and medical communities, acceptance at the youth and high school levels of play have yet to be fully embraced.

This is particularly alarming since the genesis of many injuries can be traced back to these levels of play, and it is at these levels the greatest controls to prevent injuries can be applied.

Conclusion

Whereas it is clear scientific evidence has established arm injuries are more common than initially thought, as witness to prevalence and incidence being on the rise, and the causes and risk factors well established, the fact remains the grass roots of the baseball community, i.e., youth and high school programs must fully embrace this reality and address this issue in a systemic fashion.

At some point, when quality of life, mental anguish and/or economic loss, e.g., scholarship, become factors in the equation, failure to comply with accepted standards of care may suggest neglect and eventually lead from the baseball field to the court room.

Recommendations:

There are no assurances injury can or will be avoided, however, every effort must be made by an organization, whether a team, youth organization or high school athletic department, to minimize risk.

One possible step moving forward is to establish a program consisting of accepted standards and incorporating them into an endorsed and/or sanctioned certification program, to be administered by the liable body. *USA Baseball* offers viable resources (*www.usabaseball.com*).

Another avenue for consideration is the incorporation of a comprehensive pitching program that will address the causes and risk factors, and better prepare young pitchers.

Many professionals, both in the arena of healthcare and baseball have dedicated their careers to creating a platform of safety and optimal performance.

See **MINIMIZE RISK,** Page 34

Table 1: Common Causes of Pitching Arm Injuries

1. Overload is the result of throwing too many pitches during one outing. Maximum pitch counts for various age groups, or for an individual pitcher's normal strength and stamina, are effective in preventing overload.
2. Overuse is the result of pitching too often and not having an adequate recovery time or a good arm maintenance program (stretching, running, strengthening, throwing) between pitching assignments. Coaches and trainers should be aware that each individual pitcher varies in arm strength, arm fatigue, arm tightness and soreness and require different recovery time needs. Make certain you provide your pitcher with a good active recovery program between pitching assignments.
3. Proper conditioning involves the entire body — the legs and core muscles as well as the throwing arm. Coaches should supervise a proper stretching and warm-up procedure that is performed daily before throwing a ball.
4. Pre-season is one of the most frequent times for arm injuries. Pitchers throw too much and too hard, too early. Also, they have not ingrained their normal rhythm and often are attempting to learn new techniques or new pitches.
5. Another major factor of injury during pre-season is that pitchers are not working with a normal in-season rotation schedule and do not get enough recovery time from a lot of necessary drill work that involves throwing (pick-offs, defensive plays, etc.).
6. Improper throwing mechanics. If a pitcher has improper throwing techniques, with the body or arm, there is a great chance of early fatigue of the throwing mechanism, and of course injury. The more power and force generated, the greater the chance of injury.

Table 2. Most Significant Risks for H.S., College Pitchers

Factor	Increased Injury Risk (%)
Pitching more than 8-months per year	500%
Pitching more than 80-pitches per game	400%
Fastball greater than 85-mph	250%
Pitching with fatigue	3,600%

Source: Olsen SJ II, Fleisig GS, Dun S, et al. Risk factors for shoulder and elbow injuries in adolescent baseball pitchers. Am J Sports Med 2006; 34: 905-912.

Table 3: Risk Reduction Factors

1. Pitch Counts
2. Pitch Types
3. Pitching Mechanics and Physical Conditioning
4. Multiple Appearances
5. Showcases
6. Multiple Leagues
7. Year-Round Baseball

Minimize Risk When It Comes To Injuring Ulnar Collateral Ligament

Continued From Page 31

Based on the literature, Mark Calvi (University of South Alabama), Tom House (National Pitching Association), Bob Humphreys, Ken Knutson (Arizona State University), Karl Kuhn (University of Virginia) and Wayne Mazzoni (Sacred Heart University) are just a few of the global experts who are innovators in the design and development of comprehensive strength and conditioning programs and pitching mechanics.

Calvi's pitching staff at the University of South Carolina was No. 1 in the nation in 2010, while Kuhn's University of Virginia staff claimed that honor in 2011.

House, while at the University of Southern California, and Humphreys, during his tenure at Virginia Tech, also produced ranked (and healthy) staffs.

Knutson's staff at the University of Washington led the nation in ERA (2.80) in 1985, and Mazzoni has led pitching innovation in the Northeast for the past 10-years.

When you consider the history of healthy arms, production and longevity of pitchers who have trained under or in alignment with their philosophies, these models may serve as the foundation on which to build a comprehensive pitching program for any age.

Another integral component of any program is the trainer.

Having a board certified trainer, with an expertise in the physiological and bio-mechanic aspects of pitching is priceless.

With pitching involving 'the entire body,' the luxury of having a professional trainer to institute and monitor a rigorous broad spectrum conditioning program will further minimize the risk of injury while optimizing performance outcome.

In addition to the conditioning aspect, a good trainer also has the capabilities and resources of establishing a proper hydration and nutrition program, both of which are essential in optimal pitching health and performance.

Complementing the efforts of expert coaching and conditioning, one can't discount the importance of comprehensive medical support.

Whereas the goal is to reduce the risk of injury, unfortunately, injuries will still occur.

If that day comes, knowing the right healthcare professionals will be essential to optimal recovery. Sports medicine trained orthopedic surgeons are available throughout the country.

Listings are available at *www.AOSSM.org*.

The best course of action however, is well-informed adults who accept the accountability and responsibility to do the right thing and help young pitchers avoid fatigue, overuse, and improper mechanics.

In short, if elbow pain develops, a pitcher should discontinue pitching (and throwing) immediately, and be evaluated by a sports medicine physician.

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