

What doctors want patients to know about Tommy John surgery

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In the high-stakes world of baseball, a torn ulnar collateral ligament (UCL) can spell disaster for a pitcher's career. Enter Tommy John surgery—a groundbreaking procedure that has turned countless career-ending injuries into mere setbacks.

Named after the pioneering pitcher who first underwent this procedure, Tommy John surgery—aka UCL reconstruction—has become a beacon of hope, offering athletes a second chance to reclaim their place on the mound.

More than 1,000 professional pitchers have had the ulnar collateral ligament in their pitching elbow reconstructed since Frank Jobe, MD, operated on Tommy John in 1974. The share of active major-league pitchers who had undergone Tommy John surgery hit 35.3% in 2023, a 29% rise since 2016.

The AMA's What Doctors Want Patients to Know™ series gives physicians a platform to share what they want patients to understand about today's health care headlines.

In this installment, two physicians from Henry Ford Health took time to discuss what patients need to know about Tommy John surgery.

- Eric C Makhni, MD, a sports medicine orthopaedic surgeon at Henry Ford Health and team physician for the Detroit Lions, Oakland University and Cranbrook Kingswood Schools.
- Vasilios Moutzouros, MD, an orthopaedic surgeon and chief of sports medicine at Henry Ford Health. He is also a team physician for the Detroit Pistons, Wayne State University, Oakland University and Detroit Country Day.

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Tommy John surgery changed baseball

“The amount of people who’ve had this done, the number of pitchers whose careers have been saved, now we’re in a period of time where it’s happening more and more often,” Dr. Moutzouros said. “If we didn’t have this type of solution, you wonder what baseball would look like at this time.

“It changed a sport and there are very few surgeries or innovations that do that,” he added.

It is not an easy procedure

“Tommy John surgery is a reconstruction, meaning you’re making a new ligament of the ulnar collateral ligament of the elbow. So that’s the inside portion of the elbow, or the medial side of the elbow,” Dr. Moutzouros said. Over time, pitchers “typically injure this ligament. They stretch it out or completely tear it and that requires us to remake it.”

“In any ligament reconstruction you take a ligament or a tendon or a graft from somewhere else in the body,” said Dr. Makhni. “Often we use a ligament from the wrist—called the palmaris longus or a hamstring tendon—and we weave it into the two bones to where that UCL used to be, and we hold it in place through drill tunnels and sutures and we recreate that tendon.”

“It’s not the easiest surgery because the elbow is a really difficult joint to operate on,” Dr. Moutzouros said.

Pitch velocity increases risk

“Our group has done a lot of research in this area. We did several years of studies around some of these motion analyses and wearable sensors where we looked at torque in the

elbow,” said Dr. Makhni. “There was one theme that kept coming back over and over and over again. And it was velocity.

“The harder you throw, the more torque and stress there is on the elbow, and it's been validated in other types of studies as well,” he added. “Where there's really high risk are kids who are throwing too hard.”

“We weren't made to throw a baseball 100 miles an hour and that's what differentiates the great pitchers versus those who just can't throw that hard,” Dr. Moutzouros said.

Prevalence among kids is rising

While Tommy John surgery is well-known in the big leagues, more school-aged athletes are undergoing the procedure. By 2014, 67.4% of UCL reconstruction surgeries were [performed on athletes 16–20 years old](#) according to research. Some were even in Little League.

Throwing faster is one big reason why this is happening, but there are others, Dr. Makhni said. For example, “kids who will pitch and then, on their off days, play catcher—where they're throwing the whole time—or those who pitch all year and don't take a season off.”

“If you're playing a sport, we try not to do single-sport specialization. What that means is that if you play the same sport year in, year out, season in, season out, you start to get overuse of those areas,” he said, noting it also has to do with proper training.

“The most glaring example is weighted baseballs. It's the first question I ask any kid seeing me,” Dr. Makhni said, noting “the point of weighted baseballs is to increase velocity quickly. They're marketed very heavily by the manufacturers that there's no injury risk. We all know there is.”

“There's not a single sports surgeon who deals with these injuries that would advocate for using them,” he said. “You end up putting overload stress on the elbow and what you compromise is injury risk.”

It can happen in other athletes

“Over the last couple of years, and if not longer, we’ve seen more nonpitchers having surgery,” Dr. Makhni said. For example, “I’ve operated on catchers, infielders and softball players, and so we don’t have as much data and research on return to play.”

“We also see a lot of UCL injuries in defensive linemen and offensive linemen and they tend to rehab through it,” Dr. Moutzouros said. “So, it is something to note that it’s happening a little bit more in football, but nowhere near the amount of incidents that we see in a baseball player.”

Know when surgery is needed

While it depends on how long a person has had symptoms, the location, if they have been through this before and if it’s a complete tear, “it really is the entirety of the patient’s story such as what their goals are in throwing,” Dr. Moutzouros said. “The other part is they may not want to throw long-term. They may just be throwing for their high school team, and they’re done. Well, those individuals don’t need surgery.”

“The individuals who need surgery are the ones who want to competitively pitch moving forward. That’s the biggest take home for everybody,” he said. “You only want to do it on people who are going to keep playing baseball and want to be competitive at it.”

Recovery takes time

“A common protocol will be a period of rest and working on range of motion. That can be anywhere up to six weeks and players are typically in a brace and they’re just slowly getting their motion back,” Dr. Makhni said. “Week six to 12 involves a little more strengthening of the arm, especially the forearm muscles and making sure that motion is nice and fluid.”

“After that point, the strengthening will start to increase and players can start tossing a ball as early as four months after surgery,” he said. “That is where things diverge. If you’ve had a primary repair, you’re rehabbing your repaired ligament, so you can get back to doing things like pitching a little earlier than if you have a reconstruction where you need that ligament to grow in and become the new ligament.”

“Baseball pitchers who have a repair can get back to a game situation hopefully in that seven-to-10-month range. For pitchers who have had a reconstruction, it could be nine to 16 months, but the target is 10 to 12 months.”

The success rate is high

“It’s pretty predictable that these individuals are going to get back to competitive throwing,” Dr. Moutzouros said, adding that “90% of individuals are going to get back to throw.”

“Now, the level for which they get back to throwing is where we always debate on whether they get back to throwing as hard and as accurate as they did before,” he said. “We have data that shows that they do, but there are these fallacies where people think that they actually throw harder after we do this surgery, which is not accurate.”

“If they do throw harder, it’s because the surgery went well. But it’s also because they did such good rehabilitation and trained and almost relearned to pitch that they’re getting this type of success,” said Dr. Moutzouros. “It’s not that we’re making something much better. It is that their focus in return and their rehab has set them up for success.”

Outcomes are worse with each surgery

“If you have a second and third Tommy John surgery, your outcomes are worse. It’s a longer return to play. It’s a lower likelihood of return to play,” Dr. Makhni said. “If we have to go back and there’s a loose piece of bone or fragment, it’s a lot of scar tissue and it’s much harder for the surgeon, the patient and the recovery.”

Of major-league pitchers who have undergone Tommy John surgery, Jason Isringhausen and Jonny Venters are on a short list: They each had the procedure three times and returned to play in the big leagues.

But no pitcher had ever won a Cy Young Award after undergoing Tommy John surgery until Jacob deGrom, who went on to have back-to-back Cy Young-winning seasons with the New York Mets. Justin Verlander became the second pitcher to win the Cy Young Award after undergoing Tommy John surgery when he was with the Houston Astros.

Know how to prevent injury

“You really have to get the arm ready, so you’ve got to warm it up properly,” said Dr. Makhni. “That’s where some of the concern is about this pitch clock because they’re being rushed to throw when their arm isn’t at least relaxed and recovered from the pitch beforehand.”

“The take home for being healthy is you want to warm up appropriately. You want to throw without overthrowing, meaning you don’t want to change your mechanics, you want to be consistent,” Dr. Moutzouros said, adding cool downs are also key to prevention.

It is also important to have “adequate rest—both between outings and between seasons,” Dr. Makhni said. “We always say, go and play baseball in the spring, football in the fall, basketball in the winter or whatever you choose, but change sports to give your body a period of rest.”

“There’s a rhythm to how we pitch, meaning if we have an active session, the next day is usually a rest day going into a light day, going into maybe more of a bullpen day and then a real day,” said Dr. Moutzouros. “That’s why pitchers—especially starting pitchers who are throwing over 60 pitches an outing at minimum—tend to take four days off between sessions.”

“The most important thing is having a safe place where you can say that your arm is hurting and that you need to take a step back,” Dr. Makhni said. “There’s still more education to be had, but most people I encounter are generally very good intentioned at making sure that any time there is pain, that they put the brakes on things.”