Study identifies steep learning curve for surgeons who perform ACL reconstructions

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Patients who have their anterior cruciate ligament (ACL) reconstructed by surgeons who have performed less than 60 surgeries are roughly four to five times more likely to undergo a subsequent ACL reconstruction, according to a study by researchers at Hospital for Special Surgery. The study also showed that participating in a subspecialty orthopedic fellowship-training program did not improve the learning curve of young surgeons performing ACL reconstructions. The research was presented at the annual meeting of the American Academy of Orthopedic Surgeons, held Feb 7-11.

"Conventional wisdom is that a trained surgeon should have excellent results once they have completed their training, but there is a learning curve to ACL surgery and what we have found is that in the early career volume or learning curve, surgeons' outcomes are not as good as later outcomes for ACL reconstruction," said Robert Marx, M.D., an orthopedic surgeon in the Sports Medicine and Shoulder Service at Hospital for Special Surgery (HSS) in New York City, who was a co-author of the study. "Maybe we need to rethink how we train our surgeons in light of this."

Stephen Lyman, Ph.D., director of Epidemiology and Biostatistics at HSS who presented the study, agrees. "We may not be training our sports medicine specialists well enough to perform this complex procedure if the learning curve is still this steep after finishing their fellowship," he said.

The ACL is one of the most commonly injured ligaments of the knee, with approximately 100,000 ACL reconstructions performed each year in the United States. For years, doctors have known that outcomes in surgery are related to volume. For example, the more ACL reconstructions a surgeon performs, the more proficient they become with fewer patients having to undergo a re-operation. But until this study, doctors hadn't investigated what the learning curve actually looked like. "The question was, on the upswing, how long does it take for you to become proficient?" said Dr. Marx. In addition, in recent years, an increasing number of doctors have pursued subspecialty sports medicine fellowship training programs after their orthopedic surgery training, and little is known about how these programs impact the learning curve of ACL reconstruction.

To fill these two knowledge gaps, HSS investigators turned to a database from the New York State Department of Health that includes information on all hospital admissions and ambulatory surgical procedures within the state of the New York. They identified all ACL reconstructions performed between 1997 and 2006 by surgeons who performed their first ACL reconstruction in 1997 or later. They then examined medical records to determine which patients had subsequent ACL surgery. The investigators controlled for case-mix factors, such as age, sex, insurance type, comorbidities and concomitant surgery.

The researchers identified 12,778 ACL reconstructions performed by 320 surgeons during the study period. They then compared the likelihood that a patient would have a subsequent ACL reconstruction if they had the procedure after the surgeon had performed 150 cases versus if the patient fell in the first 10 cases of a surgeon's career, between 11 and 60 cases, between 61 and 120, or between 121 and 150. "For several non-orthopedic surgical procedures 10 cases are considered necessary to obtain clinical competence," said Dr. Lyman.

The researchers found that if a patient was one of the first 10 cases of a surgeon's career, they were roughly five times as likely to have to undergo a subsequent ACL reconstruction than if they fell in the career cases over 150. If a patient was case 11 to 60, they were 3.7 times more likely to have a subsequent ACL reconstruction. The risk continued to fall with 3.0 for patients in the 61 to 120 group and 1.4 for patients in the 121-150 group. Overall, the frequency of a subsequent ACL reconstruction within one year was 1.7%.

The researchers were surprised to find there was no significant association with sports fellowship training and subsequent ACL reconstruction.

"Ultimately, the true learning is in practice. That is why they call it practice," said Dr. Marx. "ACL reconstruction is a complex procedure, with many surgical steps, that may be more technically difficult at the beginning of one's career compared to certain other procedures that are less demanding and don't require quite as much practice to get good at. This study shows that our training for ACL might not be adequate."

Dr. Marx suggested a number of possible avenues that educators can explore to improve surgical outcomes at the beginning of a surgeon's career. "Perhaps doctors should have a little more autonomy at the end of their training or they should be evaluated differently," said Dr. Marx. Using medical simulators in training is another option.

The study was funded through the Agency for Healthcare Research and Quality's Center for Education and Research in Therapeutics.

Dr. Marx, an orthopedic surgeon who specializes in ACL surgery at HSS, is professor of Orthopedic Surgery and professor of Public Health at Weill Cornell Medical College and also director of the Foster Center for Clinical Outcome Research at HSS.

Provided by Hospital for Special Surgery