

Inter- and Intrarater Reliability of the Femoral Tunnel Clock-Face Grading System During Anterior Cruciate Ligament Reconstruction

Vishal Mehta, M.D., Timothy Petsche, M.D., and Ashish M. Rawal, M.D.

Purpose: To determine the inter- and intrarater reliability of the clock-face grading system as used by 3 fellowship-trained sports medicine surgeons. **Methods:** Arthroscopic video was taken of the femoral tunnel placement during 20 consecutive anterior cruciate ligament (ACL) reconstructions performed by 2 surgeons. All femoral tunnels were created using a medial portal technique. The video was taken using a 30° arthroscope placed in the lateral portal and showed the femoral tunnel as well as the remainder of the femoral notch, the posterior cruciate ligament, and the menisci for orientation. Three fellowship-trained sports medicine surgeons were asked to review the videos and assign an o'clock position to the femoral tunnel from the 9 to the 3 o'clock positions in "half-hour" increments. They were also asked to review the videos again 6 months later to determine intrarater reliability. Inter-rater reliability was evaluated using the intraclass correlation coefficient (ICC) 2-way mixed effect model with absolute agreement. The Spearman rank-order correlation coefficient (r) was applied to evaluate intrarater reliability. **Results:** The inter-rater reliability as measured by the ICC revealed poor agreement between the 3 surgeons (ICC = 0.204, 95% confidence interval = -0.015 to 0.491, $F = 2.8$, $P = .004$). The intrarater reliability at a 6-month interval was found to be moderate (r 's = .43, $P = .004$). **Conclusions:** The inter-rater reliability of the clock-face femoral tunnel grading system was found to be poor among fellowship-trained sports medicine surgeons whereas the intrarater reliability was found to be moderate. The utility of the femoral tunnel clock-face grading system may be compromised by suboptimal inter- and intrarater reliability, making it less useful as a tool of communication between surgeons. **Level of Evidence:** Level IV, case series with poor reference standard.

Correct positioning of the femoral tunnel during anterior cruciate ligament (ACL) reconstruction is critically important to the outcome of the procedure. For this reason, many studies have attempted to determine differences in outcomes that result from varying placement of the femoral tunnel.¹⁻⁵ To make meaningful comparisons between different femoral tunnel positions,

a nomenclature must exist for describing the location of the tunnel. One such method of describing the position of the femoral tunnel is the clock-face system.

The clock-face system attempts to describe the femoral tunnel location by correlating it to the positions of hours on a clock face. The 12 o'clock position is typically defined as being the apex of the notch, whereas the 9 o'clock (right knee) or 3 o'clock position (left knee) is typically defined as being the margin of the articular cartilage or posterior border of the femoral condyles.¹ Although the clock-face system has been widely used by researchers and clinicians, its validity has been called into question.⁶ Some of the potential concerns regarding the validity of this system are that it is essentially a 2-dimensional representation of a 3-dimensional structure as well as the fact that it is a standard formula that cannot and should not be applied universally to all knees.⁷

Another potential issue with the o'clock system is whether it is universally applied between different observers. A system to describe placement of a femoral

From the Fox Valley Orthopaedic Institute (V.M., T.P.), Geneva, Illinois; and Dean Clinic/SSM Health (A.M.R.), Janesville, Wisconsin, U.S.A.

The authors report the following potential conflict of interest or source of funding: V.M. reports personal fees from Arthrex, Johnson & Johnson/Mitek, and Allosource, outside the submitted work.

This paper was presented at the Arthroscopy Association of North America 2011 annual meeting.

Received February 23, 2016; accepted July 21, 2016.

Address correspondence to Vishal Mehta, M.D., Fox Valley Orthopaedic Institute, 2525 Kaneville Rd., Geneva, IL 60134, U.S.A. E-mail: vmehta@fvortho.com

© 2016 by the Arthroscopy Association of North America
0749-8063/16121/\$36.00

<http://dx.doi.org/10.1016/j.arthro.2016.07.028>

tunnel has little value if it cannot be applied consistently between observers and between the same observer at different time points. In other words, the inter- and intrarater reliability of the system is critically important to its utility. The purpose of this study was to determine the inter- and intrarater reliability of the clock-face grading system as used by 3 fellowship-trained sports medicine surgeons. We hypothesized that the inter- and intrarater reliability of the clock-face system for ACL femoral tunnel placement as used by the authors is poor.

Methods

Before commencing this study, we obtained approval from an internal review board. Twenty consecutive single-bundle ACL reconstructions were performed by 2 fellowship-trained sports medicine surgeons between October 1, 2011, and December 21, 2011. Inclusion criteria consisted of all primary ACL reconstructions in patients older than 18 years. Patients for whom adequate video was not able to be obtained were excluded. The femoral tunnels were all created using a medial portal technique with the goal of placing the femoral tunnel at the anatomic position of the remaining ACL fibers. The femoral tunnels were reamed with an Arthrex acorn reamer and ranged from 7 to 10 mm in diameter. After creation of the femoral tunnel, arthroscopic video was taken of the femoral tunnel aperture. Video was taken using a 30° arthroscope placed in the lateral portal with the knee in 90° of flexion. The video showed the femoral tunnel as well as the remainder of the femoral notch, including the apex, the posterior cruciate ligament, the tibia, the femoral articular cartilage, and the menisci for orientation. The orientation of the camera was changed to offer multiple perspectives of the tunnel and anatomy of the notch. This was done in a consistent fashion across samples. The videos ranged in length from 30 to 60 seconds. Three fellowship-trained sports medicine surgeons were asked to review the videos and assign a position to the femoral tunnel from the 9 to the 3 o'clock position in "half-hour" increments based on the clock-face method. The surgeons at the time of review had been in sports medicine practice for at least 5 years after a sports medicine fellowship. Two of the surgeons reviewing the videos were the operating surgeons themselves. Instructions were given to the surgeons that the 12 o'clock position would represent the apex of the notch whereas the 3 or 9 o'clock position represented the junction with the femoral articular cartilage.⁸ They were also asked to review the videos again 6 months later to determine intrarater reliability. Once collected, all of the right knee results were converted to left knee results for the purposes of statistical analysis. Inter-rater reliability was evaluated using the intraclass correlation coefficient (ICC) 2-way mixed effect model

with absolute agreement. The Spearman rank-order correlation coefficient (r 's) was applied to evaluate intrarater reliability.

Results

The inter-rater reliability revealed poor agreement between the 3 surgeons (ICC = 0.204, 95% confidence interval = -0.015 to 0.491, $F = 2.8$, $P = .004$). The intrarater reliability at a 6-month interval was found to be moderate (r 's = 0.43, $P = .004$). There were no samples where the difference in clock-face ratings between observers was greater than an o'clock position. Forty percent of the time (8/20), the difference was an o'clock position; 40% of the time (8/20), the difference was 0.5 of an o'clock position, and 20% of the time, all observers gave the same clock-face rating (Table 1).

Discussion

In this study, we found the clock-face system to have poor inter-rater and moderate intrarater reliability when used to describe femoral tunnel placement. The clock-face system has been used extensively to describe femoral tunnel position during ACL reconstruction.^{6,7} It does, however, have several weaknesses.⁷ As mentioned previously, it is a 2-dimensional representation and therefore cannot describe the position of the tunnel in all the 3 dimensions in which it truly exists.⁹ In addition, many surgeons find that the best way to view the lateral wall is from a medial portal, which is more of a view of the sagittal plane than the axial plane. The clock-face system as typically applied represents a view of the axial plane (with the knee in 90° of flexion) and therefore is less useful to those accustomed to medial portal viewing.

One of the main purposes of a system to describe tunnel positions is to create a common lexicon by which clinicians and researchers can discuss and compare outcomes using different techniques. In other words, a comparative study of ACLs reconstructed using an 11 o'clock position versus a 9 o'clock position is only meaningful if these clock positions mean the same thing to all parties. This study shows that the inter-rater reliability of the clock-face grading system as used in this study is poor. More simply stated, the 3 surgeons in this study usually did not agree on the o'clock positions that they assigned to the tunnels.

The poor inter- and intrarater reliability revealed in this study call into question the utility of the clock-face grading system as the sole method of comparing results of different femoral tunnel positions during ACL reconstruction. There has been a great amount of interest recently in devising other methods of determining tunnel position during ACL reconstruction.^{8,10,11}

McConkey et al.⁹ recently studied the arthroscopic agreement of tunnel placement among surgeons. They found very poor agreement between surgeons and

Download English Version:

<https://daneshyari.com/en/article/5706806>

Download Persian Version:

<https://daneshyari.com/article/5706806>

[Daneshyari.com](https://daneshyari.com)