

## HUBUNGAN ANTARA SUDUT BAGIAN BAWAH *POSTERIOR CRUCIATE LIGAMENT* YANG DINILAI DARI *MAGNETIC RESONANCE IMAGING* DENGAN ROBEKAN PARSIAL *ANTERIOR CRUCIATE LIGAMENT*

HO Presti<sup>1</sup>, A Faisal<sup>2</sup>, A Ekowati<sup>2</sup>

<sup>1</sup>Program Studi Magister Ilmu Kedokteran Klinis, Fakultas Kedokteran, Kesehatan Masyarakat, dan Keperawatan, Universitas Gadjah Mada

<sup>2</sup>Staf Pengajar, Departemen Radiologi, Fakultas Kedokteran, Kesehatan Masyarakat, dan Keperawatan, Universitas Gadjah Mada

### INTISARI

**Latar Belakang:** Cedera *anterior cruciate ligament* (ACL) merupakan salah satu cedera lutut yang paling sering terjadi, terutama pada individu dengan aktivitas fisik tinggi. Robekan parsial ACL sering sulit didiagnosis hanya dengan pemeriksaan klinis maupun tanda primer pada MRI, sehingga tanda sekunder seperti sudut bagian bawah *posterior cruciate ligament* (PCL) berpotensi menjadi indikator tambahan yang objektif.

**Metode:** Penelitian ini menggunakan desain analitik observasional *cross sectional* dengan melibatkan 50 pasien yang dicurigai mengalami robekan parsial ACL dan menjalani pemeriksaan MRI di RSUP Dr. Sardjito periode Januari 2021-Desember 2024. Sampel dipilih melalui *simple random sampling* berdasarkan kriteria inklusi dan eksklusi, dengan konfirmasi diagnosis melalui artroskopi. Pengukuran sudut  $\alpha$  dan  $\beta$  pada bagian bawah PCL dilakukan secara independen oleh dua dokter spesialis radiologi. Reliabilitas interobserver dianalisis dengan *Intraclass Correlation Coefficient* (ICC), sedangkan hubungan antara sudut PCL dengan robekan parsial ACL diuji menggunakan *Independent Sample T-test*.

**Hasil:** Sebanyak 50 pasien dianalisis dengan distribusi karakteristik dasar yang homogen. Uji reliabilitas menunjukkan kesepakatan sangat baik antara pengamat (ICC sudut  $\alpha = 1,000$ ; sudut  $\beta = 0,999$ ). Analisis bivariat memperlihatkan bahwa sudut  $\alpha$  lebih kecil ( $66,52^\circ \pm 6,6$ ) dan sudut  $\beta$  lebih besar ( $74,73^\circ \pm 7,1$ ) pada kelompok robekan parsial ACL dibandingkan kelompok negatif ( $\alpha = 74,65^\circ \pm 4,8$ ;  $\beta = 67,05^\circ \pm 6,1$ ), dengan perbedaan bermakna secara statistik ( $p < 0,001$ ).

**Kesimpulan:** Terdapat hubungan signifikan antara sudut bagian bawah PCL pada MRI dengan robekan parsial ACL. Perubahan sudut  $\alpha$  dan  $\beta$  dapat digunakan sebagai tanda sekunder kuantitatif yang membantu meningkatkan akurasi diagnosis robekan parsial ACL, terutama ketika visualisasi langsung ligamen sulit dilakukan.

**Kata kunci:** *Anterior cruciate ligament*, *posterior cruciate ligament*, robekan parsial, *magnetic resonance imaging*.

## THE RELATIONSHIP BETWEEN THE LOWER POSTERIOR CRUCIATE LIGAMENT ANGLE AS ASSESSED BY MAGNETIC RESONANCE IMAGING WITH PARTIAL ANTERIOR CRUCIATE LIGAMENT TEARS

HO Presti<sup>1</sup>, A Faisal<sup>2</sup>, A Ekowati<sup>2</sup>

<sup>1</sup>Master Program in Clinical Medicine, Faculty of Medicine, Public Health, and Nursing, Gadjah Mada University

<sup>2</sup>Lecturer, Department of Radiology, Faculty of Medicine, Public Health, and Nursing, Gadjah Mada University

### ABSTRACT

**Background:** Anterior cruciate ligament (ACL) injuries are one of the most common knee injuries, especially in individuals with high levels of physical activity. Partial ACL tears are often difficult to diagnose based solely on clinical examination or primary signs on MRI, so secondary signs such as the lower posterior cruciate ligament (PCL) angle have the potential to be additional objective indicators.

**Methods:** This study used a cross-sectional observational analytical design involving 50 patients suspected of having a partial ACL tear who underwent MRI examination at Dr. Sardjito General Hospital between January 2021 and December 2024. The sample was selected through simple random sampling based on inclusion and exclusion criteria, with diagnosis confirmed by arthroscopy. Measurements of the  $\alpha$  and  $\beta$  angles at the lower part of the PCL were performed independently by two radiologists. Interobserver reliability was analyzed using the Intraclass Correlation Coefficient (ICC), while the relationship between the PCL angle and partial ACL tear was tested using the Independent Sample T-test.

**Results:** A total of 50 patients were analyzed with a homogeneous distribution of baseline characteristics. Reliability testing showed excellent agreement between observers (ICC  $\alpha$  angle = 1.000;  $\beta$  angle = 0.999). Bivariate analysis showed that the  $\alpha$  angle was smaller ( $66.52^\circ \pm 6.6$ ) and the  $\beta$  angle was larger ( $74.73^\circ \pm 7.1$ ) in the partial ACL tear group compared to the negative group ( $\alpha = 74.65^\circ \pm 4.8$ ;  $\beta = 67.05^\circ \pm 6.1$ ), with a statistically significant difference ( $p < 0.001$ ).

**Conclusion:** There is a significant association between the inferior PCL angle on MRI and partial ACL tears. Changes in the  $\alpha$  and  $\beta$  angles can be used as secondary quantitative markers to help improve the accuracy of the diagnosis of partial ACL tears, especially when direct visualization of the ligament is difficult.

**Keywords:** Anterior cruciate ligament, posterior cruciate ligament, partial tear, magnetic resonance imaging