RESEARCH ARTICLE

pISSN: 0126-074X | eISSN: 2338-6223
https://doi.org/10.15395/mkb.v57.3887
Majalah Kedokteran Bandung. 2025;57(1):10–15

Majalah Kedokteran Bandung (MKB)

Received: March 21, 2024
Accepted: July 25, 2024
Available online: March 31, 2025

Characteristics of Patients with Anterior Cruciate Ligament Injury at Ulin Hospital Banjarmasin, Indonesia

Essy Dwi Damayanthi,[1] Nathania Hosea[2]
[1]Department of Orthopedic and Traumatology, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia
[2]Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Abstract

Knee injuries are one of the common injuries, especially among athletes. Many studies have concluded that the main cause of these injuries were sudden movements while doing sports. The incidence of the knee joint injury in Indonesia was 38 to 78 per 100,000 patients with the prevalence of Anterior Cruciate Ligament (ACL) injuries of 16%.1 Recently, an increasing number of ACL injury patients was observed to be treated at the Ulin Hospital, Banjarmasin, Indonesia, when compared to the number of the previous years, making it important to understand the characteristics of patients experiencing these injuries. This study aimed to explore the characteristics of patients with ACL injuries in the hospital. Data for this retrospective descriptive study were collected from medical records during the period of March 2022 to June 2023 from Ulin Hospital, Banjarmasin. The inclusion criteria were patients diagnosed with an ACL injury with or without meniscus tear. From a total of 95 patients with ACL injuries, 30 (32%) were below 20 years old, 42 (44%) were 20–30 years old, 18 (19%) were 31–40 years old, 3 (3%) were 41–50 years old, and 2 (2%) were above 50 years old. The ratio between men and women was 11:1. There were 74 patients who had sports-related injuries while the remaining 21 patients experienced the injury due to other activities. Of the total 95 cases, 59 (62%) were treated nonoperatively and 36 (38%) received arthroscopy surgery. The arthroscopy was mostly performed to patients who also experienced a meniscus injury and in the chronic phase, with an average length of stay at the hospital of 2.6 days

Keywords: Anterior cruciate ligament, arthroscopy, knee injuries

Introduction

Knee injury is among the most common injuries experienced, especially by athletes. Four ligaments in the knee stabilize knee movement; they are *anterior cruciate ligament* (ACL), *posterior cruciate ligament* (PCL), *medial collateral ligament* (MCL), and *lateral collateral ligament* (LCL).[1] ACL is the ligament that holds a crucial role in knee joint stability. In normal conditions, ACL limits the neutral-anterior movement, and functions as a major secondary restraint to internal rotation, particularly when the join is nearly fully extended.[2]

ACL injury often occurs in athletes, especially rupture of the ACL, which is sometimes accompanied by a tear in the meniscus. ACL ruptures due to noncontact mechanisms happen mostly during pivoting and jumping when the knee is slightly flexed and in valgus position, which can make anterior and rotatory instability, limiting anterior tibial translation and internal rotation thus resulting in instability of the knee joint.[3] ACL injuries are influenced by various factors that can or cannot be changed, including environmental factors, equipment used, surrounding environment, anatomy, neuromuscular, and hormonal.[4]

The incidence of knee joint injury in Indonesia was 38–78 per 100,000 patients with the prevalence of ACL injury being 16% of total patients, which is mostly caused by trauma while doing sports that include sudden stop of movements, pivoting, and jumping.[1] ACL injury commonly occurs between the ages of 16–39 years.[3] ACL injury can be treated with nonoperative treatment or operative treatment.

Corresponding Author:
Nathania Hosea
Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia
Email: nathaniahosea@gmail.com

ACL reconstruction is a procedure that attempts to restore normal joint arthrokinematics, improve the patient's potential to return to sports and decrease the likelihood of post-traumatic osteoarthritis.[5]

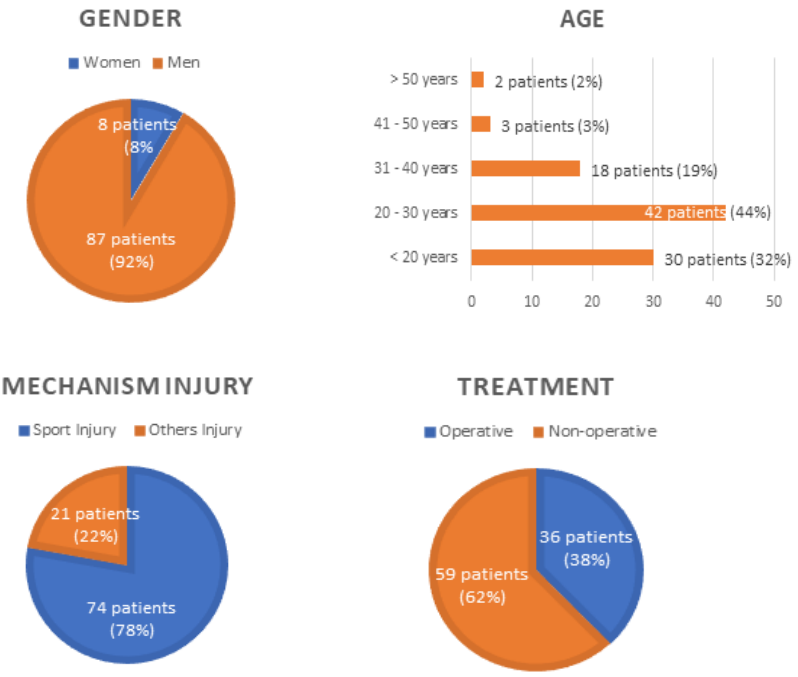
Studies on ACL injuries in Indonesia remain limited, despite the relatively high incidence of such cases across the country, including in Banjarmasin, South Borneo. Notably, there has been an increase in the number of ACL injury cases treated at Ulin General Hospital, Banjarmasin, compared to the previous year. This study aims to provide healthcare providers with a more comprehensive understanding of the characteristics of patients admitted with ACL injuries at Ulin General Hospital, in order to enhance the quality of care and improve health services through a better understanding of patient demographics and clinical profiles.

Methods

This retrospective descriptive study was conducted at Ulin General Hospital, Banjarmasin, with data collected from March 2022 to June 2023 through patient medical records. Ethical approval was obtained from the Health Research Ethics Committee, Faculty of Medicine and Health Sciences, Lambung Mangkurat University (Approval No. 021/KEPK-FKIK ULM/EC/II/2024), and permission from hospital management was also secured prior to data collection.

The study included all patients diagnosed with anterior cruciate ligament (ACL) injury under ICD-10 code S83.53 (sprain and strain of knee: tear of the anterior cruciate ligament) during the study period. Following identification, patients were contacted to obtain informed consent for the use of their data in this research. Inclusion criteria comprised patients diagnosed with ACL injury—with or without a meniscal tear—based on a clinical history, a positive anterior drawer test, and Magnetic Resonance Imaging (MRI) of the knee confirming an ACL tear. Exclusion criteria included patients diagnosed with additional ligament injuries such as posterior cruciate ligament (PCL), medial collateral ligament (MCL), or lateral collateral ligament (LCL) tears.

Collected data were categorized and analyzed using IBM SPSS Statistics version 25. Variables analyzed included gender, age, mechanism of injury, treatment approach (operative or non-operative), presence of meniscal injury based on arthroscopic findings, and the time interval between the injury and surgical intervention.



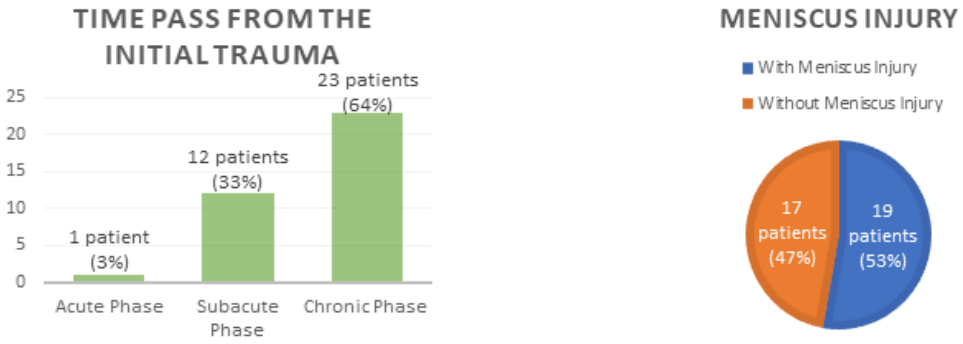


Figure 1 Prevalence of anterior cruciate ligament (ACL) injury categorized by: (a) Gender, (b) Age group, (c) Mechanism of injury, (d) Type of treatment (operative vs. non-operative), (e) Time interval between injury and surgery, (f) Presence of associated meniscal injury

Table 1 Modifiable and Non-Modifiable Risk Factors for ACL Injury[4]

Modifiable Risk Factors	Non-modifiable Risk Factors
Environmental	Environmental
Meteorological conditions (E)	Playing situation (E)
Playing surface (E)	Opponent behavior (E)
Rules (E)	Unanticipated events during play
Referees (E)	(E)
Coaching (E)	Anatomical
Equipment	Q angle (I)
Footwear (E)	Navicular drop (I)
Knee braces (E)	Structural knee valgus (I)
Anatomical	Postural alignment (I)
Foot pronation (I)	Notch size, ACL geometry and properties (I)
Body composition and body mass index (I)	Tibial slope angle (I)
Neuromuscular	Generalized joint hypermobility or laxity (I)
Dynamic knee valgus (I)	Hormonal
Muscle strength (I)	Menstrual phase (I)
Muscle strength ratios (I)	Hormone concentrations (I)
Muscle activation patterns (I)	Demographic
Muscle stiffness (I)	Age (I)
Physical fitness and muscle fatigue (I)	Maturation (I)
Skill level (I)	Previous contralateral knee ACL
Neuromuscular control (O)	injury (I)
Proprioception (I)	Familial history and genetics (I)
Psychological (I)	Sex (I)
Personality (I)	Height (I)
Stress response (I)	Race (I)
	Sports played (I)

Results

A total of 95 patients were diagnosed with anterior cruciate ligament (ACL) injury at Ulin General Hospital between March 2022 and June 2023. The majority of the patients were male, with a male-to-female ratio of 11:1, comprising 87 men (92%) and 8 women (8%).

The age of patients ranged from 15 to 66 years, with a mean age of 25.9 years. Thirty patients (32%) were under the age of 20, 42 patients (44%) were between 20 and 30 years old, 18 patients (19%) were aged 31 to 40 years, 3 patients (3%) were aged 41 to 50 years, and only 2 patients (2%) were over 50 years old. The highest incidence was observed in the 20–30 years age group.

Regarding the mechanism of injury, 74 patients (78%) sustained ACL injuries due to sports activities, while 21 patients (22%) experienced injuries from non-sport-related causes. In terms of treatment, 59 patients (62%) received non-operative management, and 36 patients (38%) underwent arthroscopic surgery. The average length of hospital stay for surgical cases was 2.6 days. Among those who underwent surgery, 1 patient (3%) was operated on during the acute phase (less than two weeks post-injury), 12 patients (33%) during the subacute phase (two weeks to three months), and 23 patients (64%) during the chronic phase (more than three months post-injury). Furthermore, of the 36 patients who underwent surgery, 19 (53%) had associated meniscal injuries, while 17 (47%) did not.

Discussion

The ligament in the knee maintains the stability of the knee joint. The most common injuries that affect knee ligaments are ACL, PCL, MCL, and LCL. Partial rupture of ACL is very rare since almost all ACL ruptures are complete or near complete tears.[1] The grade of ACL injury was based on the tears that occur. ACL injury grade 1 is when the microtears occur in the ligament, and the ligament is slightly stretched but can still help to maintain the stability of the knee joint. ACL injury grade 2 is diagnosed when the ligament is stretched to the point where it becomes loose, which can be diagnosed with partial ligament rupture. Grade 3 injuries represent a complete rupture of the ligament, which may include a full tear or an avulsion (where the ligament pulls away from the bone), resulting in significant knee joint instability.[1]

ACL injury occurs due to numerous factors, which can be categorized into modifiable and nonmodifiable risk factors and also extrinsic (E) and intrinsic (I) risk factors (Table 1).[4] In this study it was found that patients with ACL injury in Ulin Hospital were mostly men (92%) compared to women (8%). In contrast to a study by Devana et al.,[6] who reported that compared to male athletes in the same sport, female athletes are two to eight times more likely to sustain an ACL injury.[6] This is because women have a smaller *notch width index* (NWI) when compared to men. NWI is a measuring method that attempts to standardize notch width relative to the overall distal femoral and is commonly employed to define the size of the *femoral intercondylar notch*.[6] Hormonal factors also influence the incidence of ACL injury because hormones including estrogen, progesterone, and androgen receptors were found in the fibroblast and endothelial cells in the ACL.[6] However, this study was not able to describe the cause of the injury due to a lack of information in the medical record.

In this study, the majority of subjects were within the 20–30 year age range (44%), followed by those under 20 years (32%), 31–40 years (19%), 41–50 years (3%), and over 50 years (2%). These findings align with a study by Diermeier et al. (2020), which concluded that ACL injuries most commonly occur between the ages of 16 and 39.[3] Similarly, this study observed ACL injuries in patients aged 15 to 66 years, with a mean age of 25.9 years. The highest incidence was found among individuals aged 20–30 years (44%). This pattern may be attributed to the higher levels of physical activity and sports participation typically seen in this age group.

Parsons, et al.[4] in their study in 2021 stated that movements such as pivoting, decelerating, or landing for a jump often manifest as abnormal posture and alignment during the movement that can lead to ACL rupture.[4] Examples of sports that often cause an ACL injury are football and basketball. ACL injury can also be caused by other injuries but only in a small percentage. Biomechanical abnormalities that may cause ACL rupture are due to increased ACL strain. This is in line with the result of this study, which shows that ACL rupture happened mostly to sports-related injuries (78%), in comparison to injuries due to other causes (22%).

It was found that the number of patients treated with operative method is 36 patients (38%) while non-operative 59 patients (62%).

This result in line with a study conducted by Paterno[5] in 2017 which stated that ACL injury can be treated using nonoperative or operative methods.[5] ACL reconstruction was performed in an attempt to restore normal joint arthrokinematics, improve the patient's potential to return to sports, and decrease the likelihood of post-traumatic osteoarthritis.[5] However recent evidence suggests that operative methods has higher secondary ACL injury rates, lower return to sport rates, and higher incidence of osteoarthritis than previously reported, despite ACL reconstruction.[5] Nevertheless the study by Paterno also stated that systematic review also indicates weak evidence to support the superiority of ACL reconstruction over conservative management.[5]

In this study, it was found that 3% of the total sample had undergone surgery in the acute phase, 33% in the subacute phase, and 64% in the chronic phase. According to Batista et al.,[7], to ensure the result of a good quality, the ACL repair should be performed in the acute or subacute phase, between 1 week and 3 months after the injury has occurred.[7] Good quality is defined as a consistent ACL that can be grasped and simplified (can reach the footprint); by contrast, poor-quality ACL tissue is when the ligament is hypoplastic with poorly defined margins and friability, which is difficult to grasp.[7]

Of a total of 36 patients who underwent surgery, 53% (19 patients) were accompanied by meniscus injury. Meanwhile, the incidence of meniscus injury associated with ACL rupture is as high as 55–80%, with approximately 25–35% experiencing a medial meniscus injury and 31–65% experiencing a lateral meniscus injury.[8] The result of this study is in line with a study by Venkataraman et al.[9] which stated that 77% of meniscus injuries are related to ACL injury.[9] Patients with chronic ACL rupture who do not undergo repair may experience secondary meniscus injury, due to functional instability. The incidence increases as more time passes from the initial trauma (approximately 40% after 1 year, over 60% after 5 years, and over 80% after 10 years).[8] Meniscus injuries must be repaired; otherwise, the tear will become more complex and irreparable over time, especially on the lateral side.[8]

The average length of stay for patients with ACL injury in Ulin Hospital was 2.6 days. Several studies on post-operative arthroscopy patients stated that post-operative nausea and vomiting can last for up to 72 hours and they must also undergo physiotherapy, which resulted in the length of hospital stay of 3 days after surgery.[10] This result supports the result of this study which shows that good procedure and treatment during hospitalization will have a good impact on the length of hospitalization.

This study has several limitations, primarily due to the lack of detailed information in medical records, such as the type and intensity of the physical activity at the time of the injury. These factors are crucial for understanding the cause of ACL injuries. Future research could further investigate the intensity of physical activity when the injury occurred, as the longer the time elapsed from the incident, the more likely recall bias may affect the patient's memory of the event.

In conclusion, the study found that ACL injuries at Ulin Hospital in Banjarmasin were predominantly observed in men aged 20–30 years, with sports activities being the primary cause. The injuries were managed through both operative and non-operative methods, resulting in an average hospital stay of 2.6 days. These findings suggest that effective treatment protocols during hospitalization contribute to shorter hospital stays and potentially quicker recoveries.

In this study, the incidence of ACL injury at Ulin Hospital from March 2022 to June 2023 was observed in 95 patients, with a higher frequency in men (91.6%) and sports-related injuries being the leading cause (78%). However, the exact cause of the injuries could not be determined due to insufficient details in the medical records. More than 50% of patients underwent surgery, predominantly in the chronic phase, and meniscus injuries were frequently found during surgery. All patients had a hospital stay of less than 5 days, with an average hospitalization duration of 2.6 days.

References

1. Ramadan MI, Santoso TB, Maulana H. Penatalaksanaan fisioterapi pada kasus post operation anterior cruciate ligament reconstruction: case report. J Innovation Rese Knowledge. 2023;3(1):4801–10. doi: 10.53625/jirk.v3i1.5861
2. Banovetz MT, Kennedy NI, LaPrade RF, Engebretsen L, Moatshe G. Biomechanical considerations for graft choice in anterior cruciate ligament reconstruction. Annals Joint. 2023; 8(17):2–3. doi: 10.21037/aoj-22-50
3. Diermeier T, Rothrauff BB, Engebretsen

L, Lynch AD, Ayeni OR, Paterno MV, et all. Treatment after anterior cruciate ligament injury. The Orthopaedic J Sports Med. 2020;8(6):1–11.
4. Parsons JL, Coen SE, Bekker S. Anterior cruciate ligament injury: toward a gendered environmental approach. BMJ. 2021;55:984–90. doi: 10.1136/bjsports-2020-103173.
5. Paterno MV. Non-operative care of the patient with an ACL-deficient knee. Springer. 2017;10(3):322–7. doi: 10.1007/s12178-017-9431-6
6. Devana SK, Solorzano C, Nwachukwu B, Jones KJ. Disparities in ACL reconstruction: the influence of gender and race on incidence, treatment, and outcomes. Curr Rev Musculoskelet Med. 2022;15:1–9. doi: 10.1007/s12178-021-09736-1
7. Batista JP, Chahla J, Pastor MD, Maestu R, Kunze KN, Guelfi M. Arthroscopic anterior cruciate ligament repair with and without suture augmentation: technical note. ISAKOS. 2021;6:251–6. doi: 10.1136/jisakos-2020-00050
8. Roman MD, Mohon CI, Melinte PR, Chicea R, Georgeanu VA, Hasegan A, et al. Meniscal tear management associated with ACL reconstruction. Arch Orthop Trauma Surg. 2015; 135(12):1–11. doi: 10.3390/app12126175
9. Venkataraman S, Ethiraj P, Shanthappa AH, Vellingiri K. Association of meniscus injuries in patients with anterior cruciate ligament injuries. Cureus. 2022;14(6):1–6. doi: 10.7759/cureus.25878
10. Ng WG, Smith C, Ilo K, Beavis S, Terry L, Ali F, et al. Dedicated peri-operative pathway improved day case discharge rate for anterior cruciate ligament reconstructions. Eur J Orthop Surg Traumatol. 2018;29(3):642–3. doi: 10.1007/s00590-018-2326-4