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Original research article

A study on clinical profile of patients with anterior cruciate ligament injury

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Abstract

The anterior cruciate ligament forms the pivot in the functional congruence and stability of the knee in association with the other ligaments, capsule, muscles and bone. The Anterior Cruciate ligament (ACL) is the primary stabilizer of the knee and prevents anterior translation of the knee. It is also important in counteracting rotational and valgus stress. Our study population included all patients on whom anterior cruciate ligament reconstruction surgery has been performed using 4 stranded hamstring autograft and preservation of hamstring graft tibial insertion operated. The estimated number would be 52 patients. Case notes would be used to establish all demographic details including mechanism of injury, time to surgery, post-operative immobilization and intra-operative details. Out of 52 cases 34(65.4%) were right sided injuries, 18 (34.6%) were left sided injuries. Mode of injury was classified according to history given by the patient into slip and fall 14 cases (26.9%), 31 cases (59.6%) of sports related injuries, 7 cases (13.5%) of RTA.

Keywords: Anterior cruciate ligament injury, RTA, post-operative immobilization

Introduction

The knee joint is the largest and probably the most complex joint within the human body. Its position between the two longest lever arms of the skeleton makes it vulnerable to injury by the tremendous moments that can be transmitted to it from applied loads [1].

Anterior cruciate ligament injury is the commonest ligament injury of the knee. After ACL injury, most patients experience recurrent episodes of instability, pain and decreased function. ACL tears have been termed in the past as the 'Beginning of the end of the knee' The anterior cruciate ligament (ACL) is injured frequently during sports participation. There is an approximately 1.6-fold greater rate of ACL tears per athletic exposure in female athletes than males. However, there is significant risk in both sexes, particularly in high-risk sports such as cricket, football and basketball [2].

The incidence of meniscal tear associated with ACL injury is higher in chronic cases; the number of medial meniscal tears is particularly high, many of which require meniscectomy or Meniscal suturing. Early ACL reconstruction is recommended also for the prevention of secondary meniscal tear [3].

The anterior cruciate ligament forms the pivot in the functional congruence and stability of the knee in association with the other ligaments, capsule, muscles and bone. The Anterior Cruciate ligament (ACL) is the primary stabilizer of the knee and prevents anterior translation of the knee. It is also important in counteracting rotational and valgus stress. The ACL has a complex fiber anatomy that can be simplified into 2 components: a posterolateral bundle and an anteromedial bundle. The posterolateral bundle provides stability when the knee is near extension whereas the anteromedial bundle provides stability when the knee is in flexion. The anteromedial bundle is nearly isometric because the length of this bundle undergoes minimal changes throughout the knee's range of motion [4].

Historically, ACL reconstruction was performed via an arthrotomy, with the goal being to reproduce the native anatomy of the ACL. However, as with most modern surgery, minimally invasive surgical techniques were introduced for the knee, which subsequently led to the development of arthroscopically assisted ACL reconstruction. Anterior cruciate ligament (ACL) reconstruction is a successful procedure capable of allowing most athletes to return to a pre-injury level. However, the failure rate remains approximately 10%. 50 Because the graft placement in the femur is so critical to functional outcome, it

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deserves particular attention.

Methodology

Study design: retrospective cum prospective observational study**.**

Study formula

Based on the published literature, the proportion of patient return to pre-injury activity is 84% (81) using regular arthroscopic technique, assuming similar proportion of returning to pre-injury activity level in our present technique.

Assuming 5% level of significance, 90% power and 10% absolute precision required sample size is 52.

Sample size: 52.

Study population

Our study population included all patients on whom anterior cruciate ligament reconstruction surgery has been performed using 4 stranded hamstring autograft and preservation of hamstring graft tibial insertion operated. The estimated number would be 52 patients. Case notes would be used to establish all demographic details including mechanism of injury, time to surgery, post-operative immobilization and intra-operative details.

Inclusion criteria

1. All the patients who have undergone arthroscopic ACL reconstruction using 4 stranded hamstring autograft and preservation of hamstring graft tibial insertion.
2. Age between 18 to 55 years.
3. Radiologically ACL deficient knee confirmed by MRI.
4. Patients with or without Associated meniscus injuries.

Exclusion criteria

1. Bilateral knee injury.
2. ACL tears associated with fractures.
3. Revision ACL reconstruction.
4. current or prior Infection.
5. Patients who were lost to follow up.
6. Patients with Associated PCL tear.
7. Patients with medical contraindication to surgery.

Results

We included patients ranging from 18-55 years, with Mean age 33.2, standard deviation 8.962, range 19-52, majority of the cases were young adults <30 years of age.

Table 1: Age distribution

Age	Frequency	Percent
<30 yrs	22	42.3
30-40 yrs	19	36.5
>40 yrs	11	21.2
Total	52	100.0

Table 2: Age distribution, Mean Standard Deveiation (SD) Range

N	Mean	SD	Median	Min.	Max.
52	33.2	8.962	33.5	19	52

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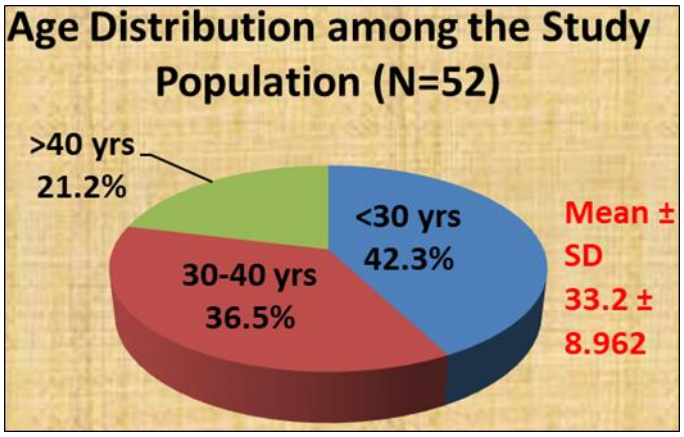
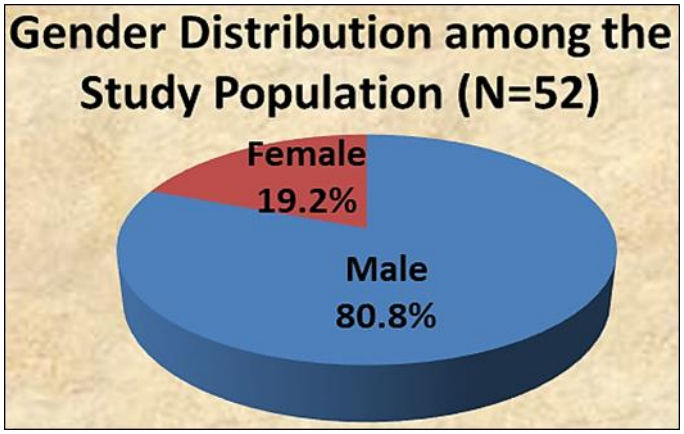


Graph 1: Age distribution

Of the 52 cases that were operated 42 (80.8%) were male and 10(19.2%) were female.

Table 3: Gender distribution

Gender	Frequency	Percent
Male	42	80.8
Female	10	19.2
Total	52	100.0



Graph 2: Gender distribution

Out of 52 cases 34(65.4%) were right sided injuries, 18 (34.6%) were left sided injuries.

Table 4: Side of injury

Side	Frequency	Percent
Right	34	65.4
Left	18	34.6
Total	52	100.0

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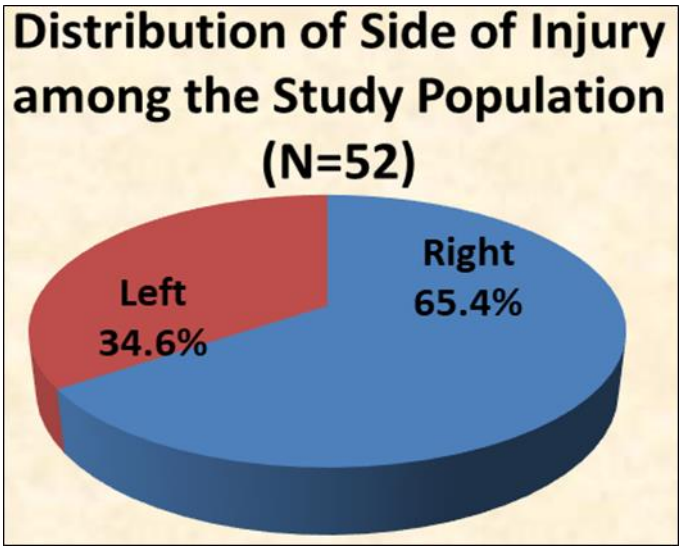
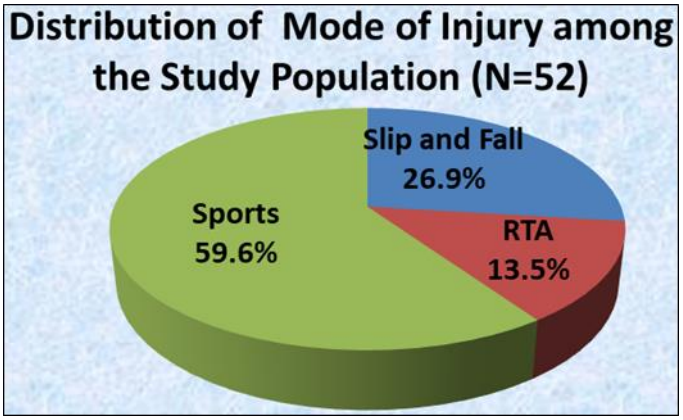


Graph 3: Side of injury

Mode of injury was classified according to history given by the patient into slip and fall 14 cases (26.9%), 31 cases (59.6%) of sports related injuries, 7 cases (13.5%) of RTA.

Table 5: Mode of injury

Mechanism of Injury	Frequency	Percent
Slip and Fall	14	26.9
RTA	7	13.5
Sports	31	59.6
Total	52	100.0



Graph 4: Mode of Injury

Diagnostic arthroscopy prior to ACL reconstruction confirmed the medial meniscal tear in 25% cases, lateral meniscal tear in 15.4% of cases and both medial and lateral meniscus injury in 7.7% of cases. The rest of the cases (51.9%) were isolated ACL injuries. Cases with PCL injury are excluded from the study as per our exclusion criteria.

Table 6: Associated injury diagnosed on arthroscopy

Diagnosis	Frequency	Percent
Isolated ACL Injury'	27	51.9
ACL + Lateral Meniscus Injury	8	15.4
ACL + Medial Meniscus Injury	13	25.0
ACL + Medial + Lateral Meniscus Injury	4	7.7
Total	52	100.0

Discussion

The knee joint is the most commonly injured of all joints and the anterior cruciate ligament is the most commonly injured ligament. The modern high-speed vehicular trauma and sporting life style has led to increased ligament injuries of the knee. The anterior cruciate ligament forms the pivot in the functional

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congruence and stability of the knee in association with the other ligaments, capsule, muscles and bone. The Anterior Cruciate ligament (ACL) is the primary stabilizer of the knee and prevents the knee against anterior translation It is also important in counteracting rotational and valgus stress. Anterior cruciate ligament injury is the commonest ligament injury of the knee, and reconstructions of the anterior cruciate ligament (ACL) are among the most frequently performed procedures in knee surgery nowadays [5].

The anterior cruciate ligament is the primary restraint to anterior tibial displacement, accounting for approximately 85% of the resistance to the anterior drawer test when the knee is at 90 degrees of flexion and neutral rotation. Selective sectioning of the anterior cruciate ligament has shown that the anteromedial band is tight in flexion, providing the primary restraint, whereas the posterolateral bulky portion of this ligament 29 is tight in extension. The posterolateral bundle provides the principal resistance for hyperextension. Tension in the anterior cruciate ligament is least at 30 to 40 degrees of knee flexion. The anterior cruciate ligament also functions as a secondary restraint on tibial rotation and varus-valgus angulation at full extension [6].

The normal anterior cruciate ligament has been shown to carry loads throughout the entire range of flexion and extension of the knee. Consequently, the anterior cruciate ligament can fail differently at different loads, depending on the position of the bones and the direction in which the loads are applied at the time of injury. Tensile testing of the anterior cruciate ligament depends on age of the specimen, angle of knee flexion, direction of tensile loading with respect to the anterior cruciate ligament, and rate of the applied load. In other words, the maximal strength of the anterior cruciate ligament should not be assumed to have one fixed value [7].

Notwithstanding this qualification, investigators have studied the biomechanical properties of the anterior cruciate ligament. Noyes, in a comprehensive biomechanical study, determined the ultimate load to be 1725 ± 269 N; the stiffness, 182 ± 33 N/mm; and the energy absorbed to failure, 12.8 ± 2.2 N-m. Woo *et al*., in younger specimens, found the ultimate load to be 2160 ± 157 N and the stiffness 242 ± 28 N/mm.[8]

Conclusion

Diagnostic arthroscopy prior to ACL reconstruction confirmed the medial meniscal tear in 25% cases, lateral meniscal tear in 15.4% of cases, and both medial and lateral meniscus injury in 7.7% of cases. The rest of the cases (51.9%) were isolated ACL injuries. Cases with PCL injury are excluded from the study as per our exclusion criteria.

References

1. Butler DL, Noyes FR, Grood ES. Ligamentous restraints to anterior-posterior drawer in the human knee. J Bone Joint Surg Am. 1980;62(2):259-70.
2. Haimes JL, Wroble RR, Grood ES, Noyes FR. Role of the medial structures in the intact and anterior cruciate ligament-deficient knee Limits of motion in the human knee. The American journal of sports medicine. 1994 Jun;22(3):402-9.
3. Markolf KL, Wascher DC, Finerman GA. Direct *in vitro* measurement of forces in the cruciate ligaments. Part II: The effect of section of the posterolateral structures. J Bone Joint Surg Am. 1993 Mar;75(3):387-94.
4. Frank CB, Jackson DW. Current concepts review-the science of reconstruction of the anterior cruciate ligament. J Bone Joint Surg Am. 1997 Oct;79(10):1556-76.
5. Kanamori A, Woo SL, Ma CB, Zeminski J, Rudy TW, Li G, *et al*. The forces in the anterior cruciate ligament and knee kinematics during a simulated pivot shift test: a human cadaveric study using robotic technology. Arthroscopy: The Journal of Arthroscopic & Related Surgery. 2000 Sep;16(6):633-9.
6. Del Pizzo W, Norwood LA, Kerlan RK, Jobe FW, Carter VS, Blazina ME, *et al*. Analysis of 100 patients with anterolateral rotatory instability of the knee. Clinical orthopaedics and related research. 1977 Jan;122:178-80.
7. Satku K, Kumar VP, Ngoi SS. Anterior cruciate ligament injuries. To counsel or to operate? Bone & Joint Journal. 1986 May;68(3):458-61.
8. Curl WW, Krome J, Gordon ES, Rushing J, Smith BP, Poehling GG. Cartilage injuries: a review of 31,516 knee arthroscopies. Arthroscopy: The Journal of Arthroscopic & Related Surgery. 1997 Aug;13(4):456-60.

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