

ACL Reconstruction along with Outcomes in Early and Late Presentation

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Abstract Background: The anterior cruciate ligament (ACL) is an important structure for maintaining stability of the knee joint, particularly in activities involving weaving, pivoting or kicking, which is the normal biomechanics of the knee. It is the most commonly injured knee ligament. The purpose of this study is to find out the commonest cause of ACL injury and the age group involved in our community. Whether the time gap between injury and treatment has any impact in the prognosis after ACL reconstruction. The knee becomes unstable with a ruptured ACL and the joint may become more damaged over time. ACL reconstruction is the surgical treatment of choice. **Methods:** This was a prospective observational study conducted at the department of orthopaedics in North East Medical College Hospital over a period of 8 years. About 200 admitted patients had ACL reconstruction done during this time. Data were collected in respect to patient's profile, diagnosis and ACL rupture records. All patients were stratified by primary and secondary tears, age, sex, side of injury, activity level and graft type of reconstruction. **Results:** The study showed that about 67% of male and 33% female patients had ACL reconstruction and rehabilitation. The study also represented that ACL rupture patients were more in 2013 but it is reduced in 2018 due to increase individual's awareness. From 2012 to 2019, the 200 individual ACL reconstructions were done by two specialist surgeons. The age group was between 16 to 51 yrs. Most of the injuries were sports related. Many of them were household injuries. Only few accounted for accidental injuries. **Conclusion:** The incidence of ACL tears in orthopaedics patients increased over the last 8 years. Females were at higher risk except in the 17 to 18-year-old group. Peak incidence is noted during high school years. Allografts continued to be associated with a greater risk of secondary ACL injuries. Nonoperative treatment carried more risk of contralateral tears than ACLR. These data help target the most at-risk patients for ACL prevention programs.

Keywords Anterior Cruciate Ligament (ACL), Graft tear, Incidence, Secondary

1. Introduction

At present anterior cruciate ligament (ACL) is among the most commonly performed procedures in knee surgery, which tears are understood to transpire with growing regularity in early patients [1]. Previously it reflects the efforts to start a feasible, dependably positive reconstruction techniques, but in the 20th century we all witness a collective cognizance of interest in the ligament and its lesions. A number of 200 ACL rupture was recorded in our study period within 2012 to 2019, while more than 150000 new ACL ruptures annually in USA [42]. Types of injury were variable. Diagnosis, treatment and recovery was affected by various factors [2,3,10,5,6,7]. Patients presented early had better

outcome than late group. ACL is important for maintaining stability of the knee joint [59], particularly in activities involving weaving, pivoting and kicking [8,9,10,11]. The knee becomes unstable with a ruptured ACL [12] and the joint may become more damaged over time [13,14,15,16]. ACL reconstruction is the surgical treatment of choice [17,18,19,20]. General principle of ACL reconstruction restores functional anatomy of a knee joint [21,22,23]. The therapeutic response after ACL rupture is deprived of patients and without surgical reconstruction, the ACL lacking knee is inadequate [41]. For this reason, these are the patient's happenings and such ACL deficiency can lead to future progressive changes [43,44,45,46].

The aim of this study is to evaluate the cause of ACL rupture [24] with outcomes in early and late presentation in injured patients at the department of Orthopaedics at North east Medical college Hospital.

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2. Methodology

The prospective observational study conducted at the department of Orthopaedics in North East Medical College Hospital (NEMCH) in Sylhet, Bangladesh over a period of 8 years from 2012 to 2019. Sample size was 200 in number both male and female patients.

Data collection

Primary data collected from the NEMCH pertaining on anterior cruciate ligament (ACL) injury causing rupture with primary tears and secondary tears including accidental, sports, households and others from the existing ward. Meanwhile secondary data were collected from diverse sources government hospitals, private health centres, clinics, NEMCH central library, journals, daily news, books and relevant websites.

Informal Discussion

Informal discussion is integrated with the patient's guardian like father, mother or relative at NEMCH. Other data were collected through informal counselling with them to observe patient's complication or major problems. This informal discussion was also used to be aware with them to recover from ACL rupture.

Inclusion criteria

Age group patients between 16 to 51 years with students, players, households, businessman and other profession. Some of them require non-operative treatment, who have no or minimal anterior tibial subluxation and no additional intra-articular injury. Those who have the marked anterior tibial subluxation and additional intra-articular damage.

Exclusion criteria

Patients were included the occurrences of ACL rupture diagnosis [25,26,27]. Total 200 patients were selected

recorded careful history through physical examinations and their diagnoses were performed. Among 200 patients, males were 133 and 67 of female's patients.

Data Compilation

All general information regarding ACL rupture's history, clinical examination, investigation, diagnosis, management and follow up data were compiled according research objective.

Data Analysis and Interpretation

Compiled data were integrated for analysis and interpretation findings through standard data analysis software like SPSS version 26, MS Excel 2019 and R programming version 3.6.

3. Results

During the study period, 200 patients were included at the department of Orthopaedics in North East Medical College Hospital. ACL presentation were recorded in respect to history, clinical examination, ACL tears between male and female with different years. The study shows that 67% male and 33% female were treated as ACL reconstruction rehabilitation from 2012 to 2019, which as shown in Figure 1. In 2013 maximum patients were 35 males but minimal 3 female patients in 2019.

ACL rupture were due to accidental, sports, households and other type of injuries. According to mechanism of injuries presentation, signs and symptoms, and associated injuries were different ACL ruptures. The study represents 85 (44%) sports injury related patients, which is the highest among four categories and 53 accidental injury patients, which as shown in Figure 2.

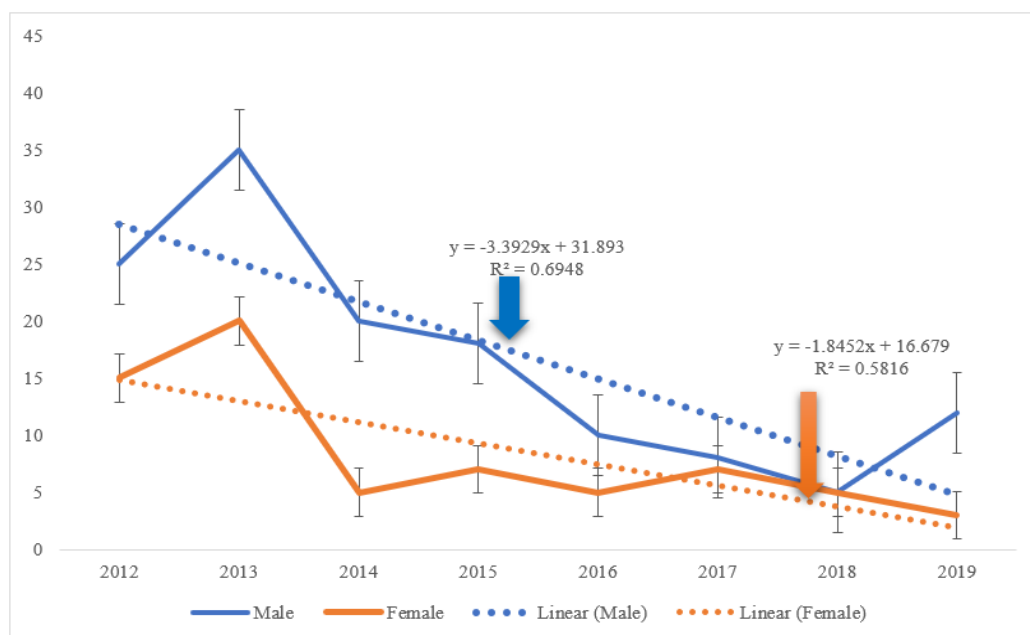


Figure 1. ACL reconstruction rehabilitation among male and female

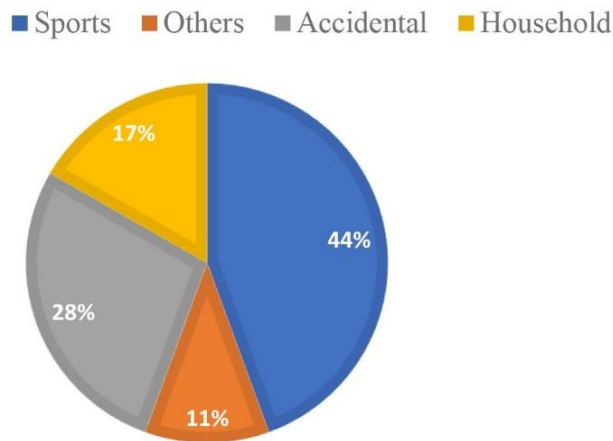


Figure 2. Types of injury causing ACL rupture

Table 1. ACL rupture

	Accidental	Others	Sports	Household
East	20.4	5.261925603	37.17174181	13.1821645
West	30.6	38.6	34.6	31.6
North	45.9	46.9	45	43.9

The study also represents different ACL ruptures, which as shown in Table 1. Average presentation time was 6 months to 2yrs years. Knee injuries initially presents to general practitioner where many cases settle down with analgesia and rest. Very few patients attend specialists on the first instance. In our study the time gap between initial injury and specialists review was significant. In some occasion ACL rupture was diagnosed after 2yrs. 55 patients were diagnosed in 2013, which is maximum, but 10 patients were minimally diagnosed in 2018 as shown in Figure 3.

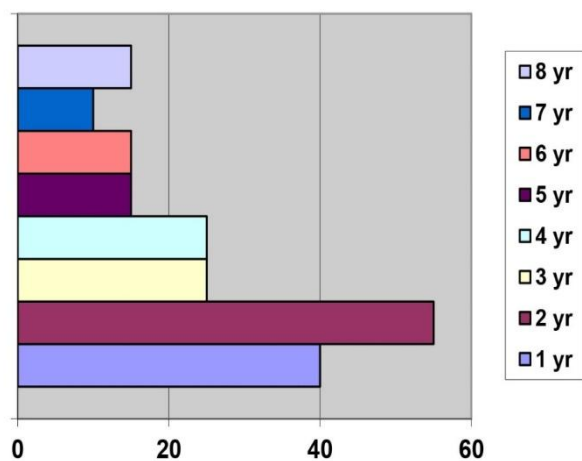


Figure 3. Number of patients diagnosed in time

Symptoms found in our patients were pain, instability and weakness. For patients with delayed presentation pain was less of an issue. Over cautiousness may have submerge instability for some time. But majority of patients experienced and attended specialists for the same. Limb unused for long duration ultimately presented with weakness. Many cases were found with gross muscle wasting. 7

After clinical review MRI scan was done in all cases. 20 cases had associated meniscal injury and 25 cases had bone bruising. Per-operative gross synovitis was evident in fresh cases. Intra-articular debri was present in old cases. Ruptured meniscal margin was clean and even in fresh cases, while uneven and the red in old cases.

We categories our patients in two groups. Patients managed within 6 months of injury were put in Group A. In group B, patients were managed after 6 months of their injury. We had 80 patients in group A and 120 patients in group B. Follow up outcome was measured by operating surgeons. Per operative stability was recorded. A prognostic chart was recorded during follow up sessions.

Table 2. Different stages with grade of movement

Post op period	Grade of movement
(4-6) weeks	Walks comfortably on flat surface
(6-8) weeks	Climb stairs comfortably
(8-10) weeks	Paddle cycle comfortably
(10- 12) weeks	Walks on uneven surface
(12-14) weeks	Runs comfortably

Patients in group A walked comfortably on flat surfaces with in (4-6) weeks. Majority of them climbed stairs with in (6-8) weeks. Most of them started paddling their cycle with in (8-10) weeks. Many of them walked comfortably on uneven surfaces with in (10-12) weeks. Almost all of them started running comfortably within (12-14) weeks in Table 2.

Patients in group B took a little longer to reach that target. On an average it was (2-3) weeks longer in each step, which as shown in Table 3 linking with Table 4. Both groups were functionally rehabilitated comfortably.

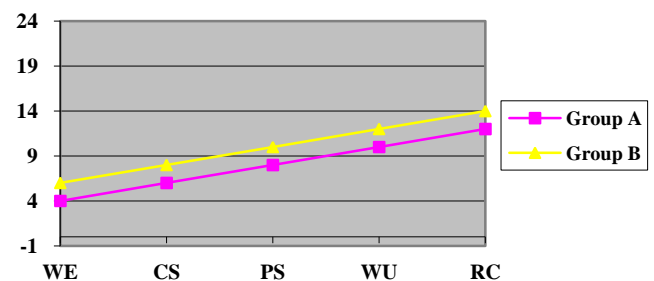


Figure 4. Time difference in recovery for both groups

Table 3. Different functions with comfortable period

	WE	CS	PS	WU	RC		WE	CS	PS
Group A	4	6	8	10	12	Group A	4	6	8
Group B	6	8	10	12	14	Group B	6	8	10

Table 4. Different stages with comfortable remarks

Symbol	Functions	Time Remarks
WE	Walks comfortably on flat/even surface	Group A < Group B
CS	Climb stairs comfortably	Group A < Group B
PS	Paddle cycle comfortably	Group A < Group B
WU	Walks on uneven surface	Group A < Group B
RC	Runs comfortably	Group A < Group B

For graphical presentation above mentioned codes were used.

The reported rate of secondary anterior cruciate ligament (ACL) injuries (20%-30%), including graft failure and contralateral ACL tears, after ACL reconstruction (ACLR) or nonoperative therapy indicates that multiple factors may predispose patients to subsequent ACL injuries. Anterior cruciate ligament (ACL) tears are thought to occur with increasing frequency in young patients. No study has shown increased incidence over time. The study hypothesized the incidence of ACL tears in young patients has increased over the past 10 years.

4. Discussion

ACL rupture is one of the commonest sports injuries in this region. Usually occurs in young age group. So far presentation to a specialist is delayed [28,29]. This delayed presentation causes further structural damage to the knee [30,31,32,33,58]. Outcome was quicker and expected in patients who presented early [34]. ACL reconstruction is an excellent operation in terms of alleviating symptoms and getting patients back to their functional state [35,36]. Early diagnosis, early treatment is less destructive to the knee [37]. The primary outcomes of an ACL tear should be contingent upon in making the diagnosis [59,60]. Through analysis of NEMCH data on a captured population of patients, we were able to calculate true incidence numbers for a large metropolitan population of orthopaedics patients. We also found that the percentage of ACL injuries surgically reconstructed increased, and the average time from injury to surgery increased significantly over our study period [38]. In earlier, the importance of ACL reconstruction technique was documented by Fick [48]. Modifications of this technique have been described by a number of authors [52,53,54,55,56,57].

This study is the first of its kind to identify an increase in the incidence of ACL tears in young patients over the last 8 years. These data are novel in that they report incidence of ACL injury within a known, closed cohort. Data were obtained on a yearly basis, so the admitted indoor database allows for correction of patients entering and leaving the operative and non-operation plans [39]. These measures should add to a more complete understanding of what we have suspected in terms of increases in orthopaedics ACL injury over time. Ligament purpose and instruments of rupture was determined by Cadaver studies, who encouraged

repair for the acute injury and conventional treatment for chronic ruptures [49]. Enduring follow-up evaluations do not validate the hope that anatomic repositioning of the residual ligament would result healing. The study advised to evade the later development of a painful, disturbed joint with recurrent effusions, following arthritis fluctuations and the attendant enduring infirmity [51]. Research into ACL reconstruction area remains, while many medical practitioners now practice variations of this technique. Research and innovation prosper in this field with advances in clinical outcomes being accomplished continuously. Knowledge of the evolution of ACL reconstruction is helpful to those who continue to try to progress the outcomes of the technique in order to additional the changes previously completed, but also to lessen the risk of reiterating the faults of the historical.

5. Challenges

The study has some challenges due to misusing of cutting-edge technology in developing countries including expertise and application. The data were collected from a specific regional private medical institution in Sylhet. Therefore, the injury and surgical treatment rates may reflect regional differences and thus may not be representative of other areas of Bangladesh and in other countries. The people covered under this presentation plan also probably represent people of a certain socioeconomic class. Patients with a different quality of age may have more or less exposure to at-risk activities and higher barriers to access of care, which may affect the overall incidence rate [37,40]. The presentation database itself has limitations. We attempted to identify repeat injuries in patients who have a new diagnosis code after 4 months, and this assumption fails to include new injuries that occur in the first 4 months after return to sport [21]. For patients with multiple injuries, we were unable to distinguish between primary tear of the contralateral knee and a recurrent tear of the originally injured knee. In addition, patients with ACL injuries could have been missed by entering or leaving the health insurance plan before getting the health codes required for inclusion, so the incidence may actually be higher than that which is reported here. Despite these limitations [37], this is the first study quantifying and showing an increase in the incidence of ACL tears in young aged sport players [50].

6. Conclusions

This study is the first to show that the incidence of ACL tears in orthopaedics patients has significantly steadily increased in stipulated time. Both male and female adolescents have a peak incidence during high school years. ACL reconstruction is an excellent operation in terms of alleviating symptoms and getting patients back to their functional state. Early diagnosis, early treatment is less destructive to the knee. The presented ACL reconstruction is

a main area of research wide-reaching [41]. Future studies identifying the mechanism of injury in young patients will be helpful for proposing prevention training.

Disclosure

Data Availability

The data are being used to support the findings of this research work are available from the corresponding author upon request.

Competing Interests

The authors declare no potential conflict of interests in this research work.

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