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Retrospective Study

Demographic characteristics of patients who underwent anterior cruciate ligament reconstruction at a tertiary care hospital in India

Sai Krishna Mlv, Asjad Mahmood, Pulak Vatsya, Siva Srivastava Garika, Ravi Mittal, Manoj Nagar

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Abstract

BACKGROUND

Anterior cruciate ligament (ACL) tears are common sports-related injuries. Their incidence is not the same either for all the sports or for the same sport across various nations. This information is maintained by many sports leagues in their registries. However, very few nationwide registries exist for such injuries. This study is carried out to know the demographic characteristics of patients who underwent ACL reconstruction at our hospital in India.

AIM

To know the demographic characteristics of patients who underwent ACL reconstruction at a tertiary care hospital in India.

METHODS

All the patients who underwent ACL reconstruction from January 2020 to December 2021 were retrospectively studied. Patients with multi-ligament injuries or a history of previous knee surgery were excluded. The patients' history was obtained from the hospital records, they were interviewed telephonically, and online questionnaires were given. Their demographic data was analyzed and compared to the existing literature.

RESULTS

A total of 124 patients were operated on for ACL reconstruction during this period. The mean age of the patients was 27.97 years. One hundred and thirteen patients (91.1%) were male and 11 (8.9%) were female. The majority of the patients (47.6%) sustained this injury by road traffic accidents (RTA) followed by sports-related injuries (39.5%). The commonest presenting complaint was giving way of the knee in 118 patients (95.2%). The mean duration from the injury to the first

hospital visit among the patients was 290.1 d. The mean duration from the injury to surgery was 421.8 d.

CONCLUSION

ACL patients' demography is different in developing nations as compared to the developed world. RTA are the leading cause of ACL injuries and are followed by recreational sports as a cause. There is delayed access to healthcare leading to delayed diagnosis as well as even greater time to surgery. This, in turn, leads to poorer prognosis and longer rehabilitation. National registries for developing nations are the need of the hour due to the different demographics of ACL injuries in developing countries.

Key Words: Anterior cruciate ligament; Sports injury; Demography; Epidemiology; Knee

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Core Tip: This epidemiological study sheds light on multiple novel data points about anterior cruciate ligament (ACL) injuries in low and middle-income countries (LMICs). First, road traffic accidents are the commonest cause for an ACL injury in LMICs, making it an injury of the common man rather than being related to sports. Second, the patients have delayed presentation, prolonged symptoms, delayed reconstruction of these lesions, and a higher number of days spent with disability. Third, the majority of the patients in our cohort, belong to the low or middle-income groups. This creates another constraint for patients to get access to a healthcare facility where their injury can be diagnosed and operated upon. Fourth, we often get patients with ACL injuries with very unusual modes of injury like accidents with animals on roads. Such things are unheard of in developed regions. Fifth, contrary to the popular belief, a non-sport person would require the same level of care and treatment as a sports person, because his livelihood depends on physical labor and hard work. We suggest that any orthopedic surgeon, actively involved in treating ACL and other knee injuries in LMICs, should be aware of such trends and treat and counsel the patients accordingly.

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INTRODUCTION

Anterior cruciate ligament (ACL) injury is a common sports injury[1]. Sports can broadly be divided into collision, contact, limited contact, and noncontact sports. Collision sports are boxing, lacrosse in boys, football, handball, rugby, and wrestling. Contact sports are basketball, lacrosse in girls, judo, and soccer. Limited contact sports are baseball, fencing, Frisbee, softball, and volleyball. Noncontact sports include alpine skiing, dancing, and gymnastics. In all the above said types of sports, injuries can occur by either a contact or non-contact mechanism. Non-contact injuries constitute the bulk of ACL injuries [2].

The peak incidence of ACL injuries occurs in the age group of 20-24 years. The overall incidences of ACL injuries are commoner in males whereas sports-specific injuries are commoner in female athletes, with ratios of 2:1 to 8:1. Based on the data of people undergoing ACL reconstruction, the number of surgeries per 100000 populations is 77.4 in Australia, 52 in the United States, 37 in New Zealand, and 32 in Sweden[3,4]. In recent times, the frequency of ACL injuries is increasing in older age groups also (> 45 years), with an incidence of 40/100000 in 1994 to 72/100000 in 2005 in the United States. This is because of the increase in participation in sports and athletic activities by people of this age group[5].

The epidemiology of ACL injuries has been extensively studied in sports/athletes all over the world, but there is a dearth of the epidemiology of the same in the general population[4]. Many countries around the globe and sports associations/leagues maintain registries for knee injuries[6]. We do not have such data in India. This study was carried out to know the demographic characteristics of patients who underwent ACL reconstruction over two years.

MATERIALS AND METHODS

Study design

After getting the necessary ethical clearance from the Institute ethics committee, No. IECPG-584/28.10.2021, RT-16/25.11.2021, a retrospective study of the patients who underwent ACL reconstruction from January 2020 to December 2021 was performed. All patients with an ACL injury who underwent primary ACL reconstruction during this period were included in the study. Patients with concomitant other ligament knee injuries and those who had undergone previous knee surgery were excluded from this study.

Data collection

The data was obtained from the hospital records and all the patients who had isolated ACL injuries were included. Patients with multi-ligamentous knee injuries and previous knee surgeries were excluded. The demographic data was obtained from the hospital records and patients were called telephonically and were asked to fill out an online questionnaire. The questionnaire included details regarding age, sex, mode of injury, occupation, income, level of sports participation (competitive or recreational), date of injury, date of the first hospital visit, date of diagnosis, date of surgery, and symptoms with the number of instability episodes.

Statistical analysis

All the data generated were tabulated in Microsoft Excel and analyzed using Stata software (Stata Corp. 2019. Stata Statistical Software: Release 16. College Station, TX: Stata Corp LLC). Data are presented as percentages, means, and ranges.

RESULTS

A total of 124 patients were operated on for ACL reconstruction and included in this study. The mean age of the patients was 27.97 years (range 16-58 years). Most of the patients were in the age group of 21-25 years (34 patients, 27.4%) followed by the age group of 16-20 years (27 patients, 21.8%). Out of the 124 patients, 113 (91.1%) were male and 11 (8.9%) were female. Forty-two patients (33.9%) were students studying either in school or college, 20 (16.1%) were having their source of income from a business, 20 (16.1%) were engaged in field jobs and 16 (12.9%) in desk jobs (sedentary lifestyle), 14 (11.2%) were competitive athletes, and 8 (6.5%) were farmers by profession. The remaining patients were housewives (4 patients, 3.2%).

Twenty-seven patients (21.8%) had a monthly income of fewer than 25 thousand rupees, 46 (37.1%) had an income in the range of 25-50 thousand rupees, 13 (10.5%) had a monthly income of 50 thousand to 1 Lakh rupees, and 3 (2.4%) had their monthly income more than 1 Lakh rupees (1 Indian rupee = 0.013 United States dollars). About 41 patients (33.1%) were still dependent on their families.

The majority of the patients (59 patients, 47.6%) sustained the injury in road traffic accidents (RTAs). Among RTA, most patients (45 patients, 76.53%) had two-wheeler accidents, either as a driver or a pillion rider, which included both slip and fall from a bike or a collision with another vehicle or a stationary object. Other common types of RTAs were pedestrian getting hit by vehicle in 8 patients (13.6%), bicycle getting hit by vehicle in 4 (6.8%), and 4-wheeler accidents in 2 (3.4%). The second commonest mode of sustaining injury was a sports-related injury in 49 patients (39.5%). Thirty-five patients (71.4%) were recreational players and only 14 (28.6%) had a competitive level of sports participation. Apart from RTAs and sports-related injuries, other modes of injuries were fall while walking, fall on a slippery surface, knee getting hit by a blunt object, fall of a heavy object over the knee, and injury while dancing (16.1%).

Giving way of the knee was the commonest presenting complaint in 118 patients (95.2%). Loss of strength of the knee and pain in the knee were other common presenting complaints in 55 (44.4%) and 51 patients (41.1%), respectively. Locking of the knee was present in 35 patients (28.2%) and knee swelling was present in 17 (13.7%). Fifty-seven patients (48.3%) had more than 5 episodes of instability after the first injury, 36 (30.5%) had 1 to 5 episodes of instability, and 25 (21.1%) had too many episodes of instability and could not remember the exact number.

The mean duration from the injury to the first hospital visit was 290.1 d with a range from 1 d to 2574 d. The mean duration from the injury to the initial diagnosis was 303.7 d with a range from 5 d to 2653 d. The mean duration from the initial diagnosis to the surgery was 118.1 d with a range from 3 d to 772 d. The mean duration from the injury to surgery was 421.8 d with a range from 33 d to 2668 d.

DISCUSSION

The mean age of patients in our study was 27.97 years and it was comparable to other studies[7-13]. The

commonest symptom was giving way or buckling of the knee, which is an established symptom of an ACL-deficient knee[13-15]. ACL has traditionally been considered an injury of young female athletes[7-10]. Although this gender-based propensity has been on a decline in the recent past, the intimate relation of ACL injuries with noncontact or contact sports remains. Our study had only 11 female patients who sustained ACL injury with only 3 playing competitive level sports, the rest sustained injuries during RTA, fall at home, dancing activities, and recreational sports.

Our cohort of patients showed a predominance in males. Such male predominance has also been seen in contact sports, given the higher male participation in such sports compared to females. In our population, contact injury *via* RTA was the commonest cause and explains the male predominance since they are involved in higher risk-taking activities and more active lifestyles. In India, the male members of the family are usually the bread earners and hence, are involved in more outward travel and high-impact tasks, compared to the female counterpart, who manages the house. This explains the skewed male-to-female ratio in this study. Forty-seven-point six percent of the patients had RTAs as the cause of their ACL injuries. Similar risk-taking behavior and higher participation by men are also seen in certain recreational sports, such as alpine skiing where the high-risk nature of the activity leads to a higher number of male ACL injuries than females. Females had ACL sprains more commonly in such sports [16].

In LMICs, the proportion of the population that engages in competitive sports is minute as compared to that in the Western world[12,13]. Furthermore, even involvement in leisure sports is minimal. In our study only 10% of these patients were athletes. Of these, only 28.6% were competitive athletes whereas the rest majority about 70%, sustained injuries during recreational sports. Most of these sports-related injuries were seen in recreational players in sports like cricket, badminton, football, and basketball. This high propensity of injuries in recreational players has been shown in multiple other publications[17]. These recreational players, often referred to as weekend warriors, have minimal practice or physical exercises and have higher risks of injuries[18].

In our study, the commonest mode of RTA was two-wheeler accidents. Although RTAs are rampant all over the globe, they are commoner in LMICs due to their higher number and proportion on roads, poor road conditions, and high population densities[19]. Pedestrian injuries are also higher in economically developing and underdeveloped countries (55% mortality) and Southeast Asian regions compared to the developed nations (America-11% mortality)[20-23]. In developed nations, the percentage of injuries involving 4-wheelers is higher, whereas in developing countries like ours, motorbikes or other two-wheeler-related RTAs are commoner[20-23]. We also observed a high proportion of two-wheeler accidents in our study. A couple of patients in our cohort sustained injuries because of very unusual reasons. For example, one patient's two-wheeler was hit by a stray dog, and another patient was a pedestrian hit by a cow. Such injuries in the literature are scarce but need to be made note of. This low proportion of athletes compared to an enormous percentage of RTA victims suffering from ACL injuries is a unique takeaway from populations in LMICs and has been shown in other studies too[12].

Ballet and folk dancers are also prone to ACL injuries. The mechanism of injury is non-traumatic overuse, insufficient muscle strength, and incorrect technique rather than acute trauma[24]. Our study population had a couple of ACL tears during dancing. Both patients were dancing for recreational purposes and had a non-contact mechanism of injury.

The majority of the patients belonged to low or middle socio-economic strata and the majority were without any form of social or private medical insurance. This is in stark contrast to the Western literature where most of ACL injuries occur in athletes, who are fully covered under insurance[25].

The mean duration from injury to first hospital visit as well as from injury to surgery was very long. It was due to multiple reasons and included the lack of streamlined referral systems, the inability to clinch the diagnosis at the right time, and non-availability of surgeons or facilities to operate in peripheral areas. Since most of the patients were from low-income groups, they had difficulty arranging funds through their sources or government agencies, which contributed significantly to the delay in surgery[26]. This is in contrast to the plethora of literature mentioning the repair of ACL injuries in the acute setting or within 6 wk which was not done for almost any of our patients. Our patients presented to us at an average of 40 wk after their injury and their reconstruction was done at roughly 60 wk after injury. This delayed reconstruction in our setting led to a very high incidence of meniscus tears (approximately 75%). This led to increased operating time and increased cost of the surgery. This also affected the rehabilitation program and the overall prognosis of the case[27].

This epidemiological study sheds light on multiple novel data points about ACL injuries in LMICs. First, RTAs are the commonest cause for an ACL injury in LMICs, making it an injury of the common man rather than being related to sports. Second, the patients have delayed presentation, prolonged symptoms, delayed reconstruction of these lesions, and a higher number of days spent with disability. Third, the majority of the patients in our cohort, belong to the low or middle-income groups. This creates another constraint for patients to get access to a healthcare facility where their injury can be diagnosed and operated upon. Fourth, we often get patients with ACL injuries with very unusual modes of injury like accidents with animals on roads. Such things are unheard of in developed regions. Fifth, contrary to the popular belief, a non-sport person would require the same level of care and treatment as a sports person, because his livelihood depends on physical labor and hard work. We suggest that any orthopedic surgeon, actively involved in treating ACL and other knee injuries in

LMICs, should be aware of such trends and treat and counsel the patients accordingly. This also shows the need for national registries for ACL and knee injuries in our region as the epidemiology and patient presentation to the hospital are drastically different from those in the Western world.

The limitations of our study include that there was a lower sample size, we have not considered the intrinsic factors in patients that might be predisposing for ACL injury, and we have also not enumerated the associated meniscus tears.

CONCLUSION

ACL patients' demography is different in developing nations as compared to the developed world. RTA is the leading cause of ACL injuries and is followed by recreational sports as a cause. There is delayed access to healthcare leading to delayed diagnosis as well as even greater time to surgery. This, in turn, leads to poorer prognosis and longer rehabilitation. National registries for developing nations are the need of the hour due to the different demographics of ACL injuries in developing countries.

ARTICLE HIGHLIGHTS

Research background

Anterior cruciate ligament (ACL) tears are common sports-related injuries. Their incidence is not the same either for all the sports or for the same sport across various nations.

Research motivation

If we know the common modes of injury of anterior cruciate ligament, it can help in devising ways to prevent it by education and awareness programs.

Research objectives

To know the common modes of anterior cruciate ligament injury in our patients who underwent ACL reconstruction and also to know their demographic characteristics. To know the time frame at which they presented and got operated since injury and their causal factors for delay in presentation.

Research methods

We reviewed the hospital records and telephonically interviewed the patients.

Research results

RTAs were the commonest cause of anterior cruciate ligament injury in our patients, which is different from that in the Western population. Many of our patients came late to us for treatment because of ignorance, remote location, and socioeconomic issues.

Research conclusions

Anterior cruciate ligament injury is a common injury in our patients but the majority of them are not due to sports injury unlike the Western population.

Research perspectives

This epidemiological study sheds light on multiple novel data points about ACL injuries in low and middle-income countries (LMICs). First, RTAs are the commonest cause for an ACL injury in LMICs, making it an injury of the common man rather than being related to sports. Second, the patients have delayed presentation, prolonged symptoms, delayed reconstruction of these lesions, and a higher number of days spent with disability. Third, the majority of the patients in our cohort, belong to the low or middle-income groups. Fourth, we often get patients with ACL injuries with very unusual modes of injury like accidents with animals on roads. We suggest that any orthopedic surgeon, actively involved in treating ACL and other knee injuries in LMICs, should be aware of such trends and treat and counsel the patients accordingly.

FOOTNOTES

Author contributions: Mlv SK and Mehmood A wrote the manuscript; Vatsya P and Garika SS collected the data; Nagar M and Mittal R planned this study; Mittal R corrected the manuscript.

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