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Arthroscopic Evaluation of Incidence of Meniscal Injuries in Anterior Cruciate Ligament Deficient Knee Joints

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ABSTRACT
Anterior Cruciate Ligament (ACL) is the most commonly injured ligament in the knee joint. The incidence of meniscal injuries associated with ACL tears has been reported to be very high. The aim of this study was to determine the incidence of meniscal injuries in ACL deficient knee joints and to analyze the site of meniscal tear in acute versus chronic ACL deficient knees. 50 patients in the age group of 18-50 years with internal derangement of knee, who underwent arthroscopic ACL reconstruction in our institute during the period May 2012 - July 2014were included in the study. The incidence of meniscal tears was assessed and related to the time from injury to surgery. We divided the patients into an early group (surgery within 6 months of injury) and a late group (surgery more than 6 months after injury). There was a significantly higher incidence of meniscal tears in patients undergoing ACL reconstruction in the late group as compared to those in the early group (59% vs 94%). There was also a significant difference in the site of meniscal tear in both the groups. This was due to a large increase in medial meniscal tears in the late group. We concluded that the incidence of meniscal tears in ACL deficient knees increases with time and that lateral meniscal tear occurs more frequently in acute ACL injury while the incidence of medial meniscal tear increases with time due to instability.
Keywords: *ACL injury. Meniscal tear, Arthroscopy.*

INTRODUCTION

Knee instability is a disabling clinical problem, especially in the athletic individual[1]. Of all the knee ligaments, ACL is the most frequently injured[2,3]. Meniscal lesions are strongly associated with ACL injuries but the exact relationship between the two is not established[4,5,6]. Studies have shown that delayed reconstruction of ACL was associated with a higher incidence of medial meniscal tears[7,8]. Other studies examined the different patterns of meniscal tears in acute and chronic ACL ruptures and showed an increased incidence of medial meniscal injuries in ACL deficient knees[9,10,11]. It has also been noticed that chronic ACL injuries are associated with more complex and less repairable meniscal tears[12,13,14].

It has been suggested that reconstruction of the ACL reduces the incidence of meniscal tears[15]. Hence, while reconstructing the ACL, apart from stabilizing the knee joint, the aim is also to reduce secondary damage to the intra articular structures[16]. The incidence of meniscal injuries associated with tears of the ACL has been reported to be as high as 62% [17].

A study by Church and Keating showed a highly significant increase in meniscal tears and degeneration of the knee in patients undergoing ACL reconstruction more than 12 months after the injury[18]. Another study showed that delayed reconstruction of the ACL in the young was associated with a higher risk of medial meniscal tears[7]. Nicholas and Stevenson found a 10.3% in the incidence of meniscal tears in the delay period between diagnostic arthroscopy and ACL reconstruction[19].

It was recommended that a patient with a torn ACL should be diagnosed early whether there is an associated meniscal injury or not, the reason being that the patient can be properly and promptly treated to prevent early degeneration of the knee joint[20].

AIM OF THE STUDY

In this study we recorded the incidence of meniscal tears in ACL deficient knee joints and related our findings to the time elapsed since injury. Aim of the study was to assess the the incidence of meniscal injuries in ACL deficient knee joints and to determine the relation between meniscal tears and the time from injury to surgery. We also analyzed the site of meniscal tears, whether medial or lateral, in acute and chronic ACL deficient knees.

MATERIALS AND METHODS

It is a prospective study of patients who underwent arthroscopic ACL reconstruction in Mahatma Gandhi Medical College & Research Institute, Pondicherry, with both the menisci being visualized during the procedure. Over a period of 27 months (May 2012 – July 2014), 50 patients fulfilled the criteria and were included in the study.

Sex, side, and age of the patient at the time of surgery were noted. The interval between injury and the time of surgery was recorded and the patients were divided into two groups: those undergoing ACL reconstruction within 6 months after injury were included in the early group and those undergoing surgery after 6 months of injury were included in the late group. The presence and type of meniscal tears, if any, was noted. All clinical records were reviewed to evaluate the incidence of meniscal tears at the time of surgery. The location of meniscal tears was studied. The incidence was then compared to the time since injury. The relationship between the meniscal tears and the time since injury was analyzed to determine if a delay in surgery resulted in an increased incidence in meniscal tears.

PROCEDURE

Arthroscopy instrumentation and monitor were kept ready (Fig.1,2,3). Patient was given spinal or epidural anaesthesia, under tourniquet control positioned supine with the unaffected limb in lithotomy and the affected limb hanging down with knee flexed at 90 degrees, parts prepared sterile and draped (Fig.4). Through the standard anteromedial and anterolateral portals scope introduced and diagnostic arthroscopy performed (Fig.5). Intra-articular structures visualized and the lesions clearly identified and recorded. Partial meniscectomy of the affected meniscus done and the remnant of the torn ACL debrided using shaver. Joint wash given. Semitendinosus (ST) graft harvested from the ipsilateral limb and prepared appropriately. Appropriate tibial and femoral tunnels created. Graft introduced by arthroscopic guidance and fixed both in the femoral and tibial sites using (bioabsorbable / titanium interference screws or endobutton and suture wheel). Joint wash given, wound closed in layers.

RESULTS

Of the 50 patients, 45 (90%) were males and 5 (10%) were females with 28 patients injuring the right knee and 22 injuring the left knee. The mean age during ACL reconstruction was 28.78 years (range 18 – 50 years). Most of the patients were in the 20-30 years age group (64%) (Table 1). There were 34 patients in the early group and 16 in the late group. The commonest mode of injury was

road traffic accidents (46%), followed by sports injury (38%).

The overall incidence of meniscal tears in ACL deficient knees was 35 out of 50 patients (70%). 20 out of the 34 patients in the early group (58.8%) had meniscal injuries as compared to 15 out of 16 patients (93.75%) in the late group (Table 2). In the early group, there were 5 cases of medial meniscus injury (14.7 %) as compared to 13 cases of lateral meniscus injury (38.2%). In the late group, there were 11 cases of medial meniscus injury (68.75%) as compared to 2 cases of lateral meniscus injury (12.5%). 14 patients in the early group (41.1%) and 1 patient in the late group (6.25%) had both meniscal injury (Table 3).

Figure 1 : Monitor and equipments

Figure 2 : Arthroscopy instruments

Figure 3 : Arthroscopy instruments

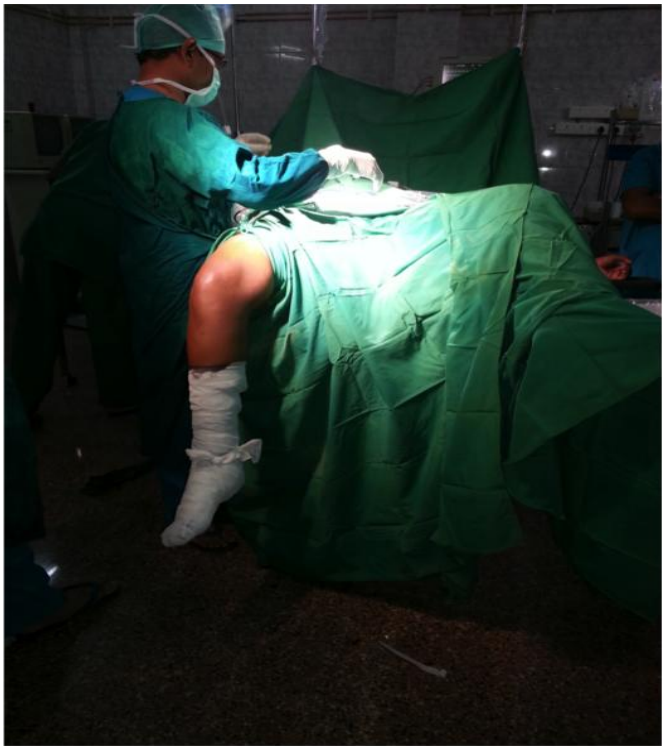

Figure 4 : Patient positioning

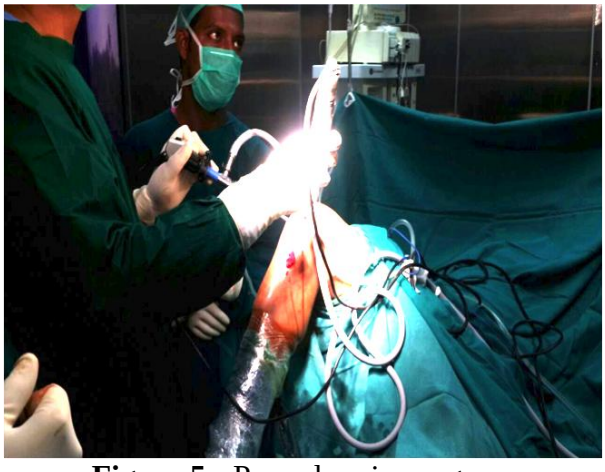

Figure 5 : Procedure in progress

Table 1 : Age Distribution

AGE	PATIENTS	PERCENTAGE
18-20 YRS	3	6%
21-30 YRS	32	64%
31-40 YRS	12	24%
41-50 YRS	3	6%
TOTAL	50	100%

Table 2 : Incidence of meniscal injury

	EARLY GROUP	LATE GROUP	TOTAL
PATIENTS	34	16	50
MENISCAL INJURY	20 (58.8%)	15 (93.75%)	35 (70%)
MEDIAL MENISCUS	5 (14.7%)	11 (68.75%)	16 (32%)
LATERALMENISCUS	13 (38.2%)	2 (12.5%)	15 (30%)
BOTHMENISCUS	2 (5.9%)	2 (12.5%)	4 (8%)

Table 3 : Comparison of the incidence and side of meniscal tears in early and late group

	EARLY GROUP	LATE GROUP
PATIENTS	34	16
MEDIAL MENISCALTEAR	5 (14.7%)	11 (68.75%)
LATERAL MENISCALTEAR	13 (38.2%)	2 (12.5%)
BOTH MENISCALTEAR	2 (5.9%)	2 (12.5%)
NO MENISCAL TEAR	14 (41.1%)	1 (6.25%)

DISCUSSION

We reviewed 50 patients who underwent ACL reconstruction in the period between May 2012 – July 2014. The incidence of meniscal tears was assessed and related to the time from injury to ligament repair. The relationship between meniscal tears and the time since injury was analyzed to determine if a delay in surgery resulted in an increased incidence of meniscal tears.

The study comprised of 45 males and 5 females with the male to female ratio of 9:1. The youngest patient in the study was 18 years and the oldest was 48 years. Most of the patients (64%) were in the 21- 30 years age group. The patients were divided into an early (surgery within 6 months of injury) and a late group (surgery more than 6 months after injury). 68% of the patients belonged to the early group and 32% belonged to the late group. The commonest mode of injury was road traffic accidents (46%), closely followed by sports injury (38%).

Noyes et al had suggested that meniscal tears are common following ACL disruption and that the patients showed functional deterioration with time [4]. In our study 35 out of 50 patients had meniscal tears (70%) following ACL deficiency, the incidence of meniscal tears was more common in patients who presented 6 months after injury (late group) 93.75%.

In our study, out of 50 patients with torn anterior cruciate ligament only 58.8% had meniscal tears who presented within 6 months of injury, compared with 93.75% presented after 6 months of injury. These are similar to the results of McDaniel and Dameron[5].

Church and Keating reviewed 183 patients who underwent ACL reconstruction between 1996 and 2002 at the Edinburgh Royal Infirmary[18]. Their findings showed a highly significant increase in meniscal tears in patients undergoing ACL reconstruction more than 12 months after injury as compared to those in the early group (72% vs 42%). In our study also we found a significant increase in meniscal tears in the late group as compared to the early group (94% vs 59%).

Studies have shown that the medial meniscus is more commonly injured as compared to the lateral meniscus. Robert Bray and David Dandy studied 47 patients with ACL injury and found medial meniscal tear in 30% of the patients, while lateral meniscal tear was seen in only 11%[6]. In Church and Keating's study 29% of the patients with ACL deficient knee had medial meniscal tears while only 19% had lateral meniscal tears[18]. Our study

also shows a higher incidence of medial meniscal tears in the late group, as compared to lateral meniscal tears (68.75% vs 12.5%).

The greater number of tears of the medial meniscus may reflect the fact that it is relatively immobile, being firmly attached to the tibial plateau; unlike the lateral meniscus, it acts as a restraint to anterior tibial translation in the cruciate deficient knee (Levy, Torzilli and Warren 1982)[21].

Studies have also shown a difference between acute and chronic ACL deficient knees with regard to the site of meniscal tear. In Church and Keating's studythe incidence of medial meniscal tears was 20.4% in the early group as compared to 40% in the late group[18]. The incidence of lateral meniscal tears was similar in both the groups; 17.5% in the early group versus 20% in the late group. In our study, the incidence of lateral meniscal tears did show a significant difference in both groups. The incidence was 38.2% in the early group and 12.5% in the late group. However the incidence of medial meniscal tears showed a significant increase as the time since injury progressed. It was 14.7% in the early group as compared to 68.75% in the late group.

In acute injuries, lateral meniscal tears were more common (38.2% vs 14.7%) whereas in chronic ACL injuries, the medial meniscus was more commonly involved (68.75% vs 12.5%). Our findings support the views of Fowler, Woods and Chapman who stated that lateral meniscal injury occurs more frequently in acute ACL tears, while the incidence of medial meniscal injury increases with time[22,23].

This indicates that lateral meniscal tear occurs more commonly at the time of ACL injury or soon after, whereas medial meniscal injuries are mostly acquired after the knee has been ACL deficient for more than 6 months. This may be due to the derangement in ACL deficient knee which undergoes recurrent sub clinical injury.

The distribution of meniscal tears in chronic ACL insufficiency can be explained by anatomic and biomechanical factors. Medial meniscus is less mobile due to its secure attachment to the tibial surface and medial collateral ligament. In ACL deficient knee, anterior tibial translation causes the posterior horn of medial meniscus to wedge against the medial femoral condyle, restraining further anterior tibial translation. Higher forces result in medial meniscal tears, especially of the posterior horn.

The lateral meniscus is more mobile and is able to translate more freely, therefore it plays less significant role in stabilzing the ACL deficient knee. Hence it is not subjected to recurrent shear loads[21]. Whereas the medial meniscus is less mobile due to its secure attachment to the tibial surface and medial collateral ligament. The mechanical factors contribute for and explain why there is an increased incidence of medial meniscal tears in a chronic ACL deficient knee[24].

CONCLUSION

The incidence of meniscal tears in ACL deficient knees increases significantly with time. The medial meniscus is more commonly injured than the lateral meniscus. The incidence of medial meniscal injuries increased significantly when the knee remained ACL deficient for a long time due to the deformed biomechanics. Therefore a delay in the ACL reconstruction leads to wear and tear in the knee joint which results in early osteoarthrosis. In order to minimize the risk of meniscal injury and for better surgical outcome, we recommend ACL reconstruction be performed as early as possible, ideally within 6 months of injury.

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