

## Anterior cruciate ligament tears and associated injuries



### Medical Science

**KEYWORDS :** Anterior cruciate ligament, meniscus, osteochondral defects

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### ABSTRACT

*Introduction & Aim: Anterior cruciate ligament tear is one of the most common injuries around the knee joint, causing knee instability. We reviewed 182 such patients to find out whether the associated injuries are due to primary trauma or repeated instability. Methods: All patients who underwent ACL reconstruction surgeries from Jan 2008 to Dec 2010 were evaluated. Patients were divided into 2 groups early & late. incidence of isolated tears and associated injuries with ACL tears was studied in both groups and statically analyzed. Results: A total of 182 patients with ACL deficiency were reconstructed during the study period, 93 patients were in the early group and 89 patients in the late group. Only 36.5% of the patients had associated injuries in the early group and 80.8% of patients had associated injuries in the late group. This was significant statically (p value 0.001). Conclusions: A relationship does exist between the length of time from injury to ACL reconstruction and higher incidence of associated injuries. Early reconstruction is therefore recommended to prevent osteochondral injuries and early degeneration of the joint.*

**INTRODUCTION:** Increased participation of all ages in sports and increased incidence of road traffic accidents has resulted in an increase in number of Anterior cruciate ligament(ACL) tears, ACL rupture is one of commonest injury of the knee joint. ACL tears are usually caused by Deceleration, twisting, cutting and jumping manures or hyperextension of the knee. Although Mechanism of injury dictates the type of associated injury in sporting group but may not be after road traffic accidents .

The Anterior cruciate ligament (ACL) is the primary stabilizer of the knee joint, prevents against anterior translation of the tibia on the femur and is important in counteracting rotation and valgus stress<sup>1,2</sup>. Anterior cruciate ligament tear leads to knee instability and repeated bucking or instability . This results in recurrent injuries and increased risk of intra-articular damage, especially the meniscus<sup>3</sup>.The incidence of meniscal tears is increased in the ACL deficient knee and there is some evidence to indicate that degenerative changes develop with time. Dandy and bray in their study concluded that meniscal lesions appear to be result of instability and not the cause<sup>4</sup> . It is known that reconstruction of the ACL reduces the incidence of meniscal tears. The relationship of reconstruction to the prevention of osteoarthritis is more controversial <sup>1,5</sup>.

Acute injury of the meniscus and ligaments about knee joint is often associated with accompanying bony injury, ACL tear being most frequent injury associated with occult subchondral fracture or bone bruise, it has been suggested that even in the absence of visible articular cartilage injury, a bone bruise on MR image represents a blunt injury to underlying articular cartilage and subchondral bone, that may lead to future cartilage degeneration and early degenerative osteoarthritic changes<sup>6,7</sup>.

There are a number of outcome studies which have examined the long-term results of patients who have had reconstruction of the ACL <sup>8-11</sup>. These and other studies have made observations in regard to meniscal tears in both the ACL-deficient and reconstructed knee <sup>12-15</sup>. Some studies have compared surgical with conservative treatment and have shown an improved outcome in the surgical groups even when surgery was performed late after injury <sup>16,17</sup>. Millett PJ, Willis AA, Warren RFin their study showed that delayed reconstruction in the young was associated with a higher incidence of medial meniscal tears<sup>18</sup>.Cipolla et al examined the different patterns of meniscal tear in acute, subacute, subchronic and chronic ACL ruptures and showed an increased incidence of meniscal tears in chronic ACL-deficient knees <sup>19</sup>.In general, early rather than late reconstruction has been recommended to minimize the risk of meniscal tears.The goals of the ACL reconstruction are to restore stability to the knee, allow the patient to return to normal activities, including sports and todelay the onset of osteoarthritis with associated

recurrent injuries to the articular cartilage and loss of meniscal functions.

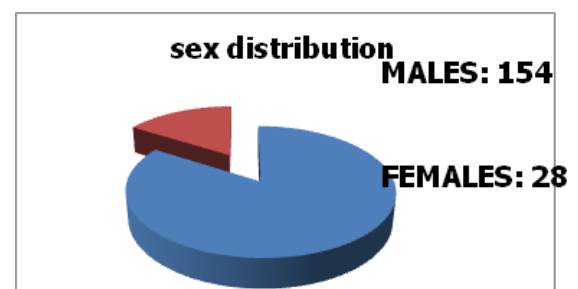
It is unclear, however, as to how long reconstruction can be delayed before meniscal tears and degenerative change begin to occur. In this study we recorded the incidence of meniscal tears and degenerative change at the time of reconstruction of the ACL and related the findings to the time elapsed since injury. Our aim was to determine the associated injuries with ACL tears.

### Materials and Methods:

182 patients younger than 50 years of age who had undergone reconstruction of the ACL between January 2008 and December 2010 at the M S Ramaiah hospitals ,Bangalore were reviwed. patients above 50 years , patients with Ostoeoarthritis of knee and previous history of knee surgery and revision ACL surgeries were excluded, There were 154 men and 28 women with a mean age of 28.74 years (22 to 50).

**Table 1: sex distribution**

Sex	Number	Percentage
Males	154	84.6%
Females	28	15.4%
Total	182	



All the surgical procedures were carried out by the senior authors who recorded the presence of associated injuries like meniscal tear, other ligament tears and the type of degenerative changes. Additional details such as age, gender, the mechanism of injury, the time to surgery, the type of graft, the operative findings and associated injuries were noted. The incidence of associated injuries was noted and compared with the time gap between injury and surgery. Meniscal injuries were noted as medial and lateral and type of tear was recorded . cartilage injuries were classified according to outerbridge classification as grade 1 to grade 4.

The patients were divided into 2 groups according to the time to surgery. The ACL reconstructions performed up to 3 months after injury were described as early group (Group 1) and those after 3 months from injury as late group (Group 2). Each group was again divided into patients having isolated ACL injury and those having associated injuries. The relationships between the time gap between injury to surgery and type of injury that is isolated or associated injury were then statistically analyzed to determine whether a delay in surgery resulted in an increased incidence of meniscal tears and/or degenerative change.

Figures; 1to 3 showing normal meniscus, torn ACL and torn Meniscus

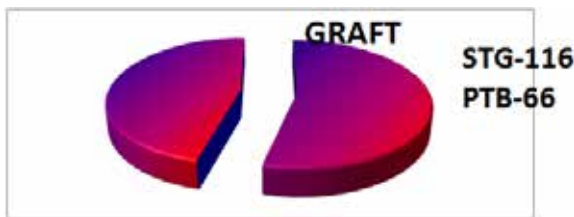


Results: 93 patients were in the early group and 89 in late ReResults: 93 patients were in the early group and 89 in late group, The average time duration from injury to surgery was 2weeks to 12 weeks in group1 and 15weeks to 1.4years in group 2. The mean time from injury to surgery was 9.8weeks in group one and 40.90 weeks in group 2. Reconstruction was carried out using a quadruple hamstring, semitendinosus gracilis(STG) graft in 116 and a middle-third bone patellar tendon bone (PTB) graft in 66 patients. Details are given below in the table2 & 3.

Table 2: Duration between injury and surgery

Duration	Number of patients	Percentage
< 3 months( early group)	93	51%
>3 months ( late group)	89	49%
	182	

chart 2



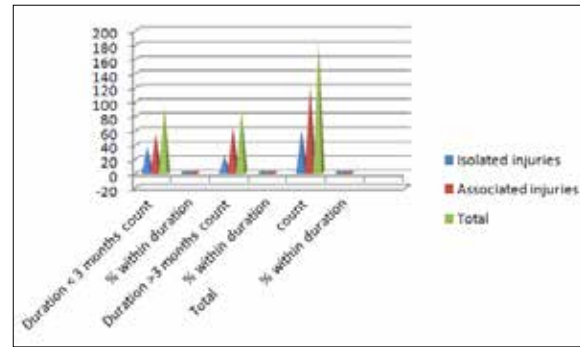
In the early group 59 out of 93 (63.4%) patients had isolated tears and 34 (36.5%) patients had associated injuries. In the late group 72 out of 89 (80.8%) had associated injuries and 17(19.1%) had isolated tears.

Statistical analysis: the time gap between injury to surgery and type of injury that is isolated or associated injury were the statistically analyzed to determine whether a delay in surgery resulted in an increased incidence of meniscal tears and/or degenerative change. Categorical data were analysed using the chi-squared test . A p value of 0.05 was considered significant. in our study p value was 0.001 which was statistically significant

Table 3: Duration Diagnosis Cross Tabulation

	Isolated injuries	Associated injuries	Total
Duration < 3 months count (% within duration)	59 (63.4%)	34 (36.5%)	93
Duration >3 months count (% within duration)	17 (19.1%)	72 (80.8%)	89
Total (% within duration)	76 (41.75%)	106 (58.24%)	182

Chart 3; showing relationship isolated and associated injuries in early and late group



Incidence of meniscal tears. The incidence of associated injuries in the early and delayed groups is shown in Table 4. There were 14 medial meniscus and 16 lateral meniscus injury in early group , compared to 31 medial meniscus and 14 lateral meniscus injuries in late group. 17 patients had both medial and lateral meniscal injuries out of which 15 were in late group and 2 in early group. meniscal tear was seen in 35%of patients in early group and 67%of patients in delayed group. Incidence of single meniscus and Bi-meniscus tears were common in delayed group.

Incidence of cartilage injuries. The incidence of degenerative changes found at surgery was noted and classified according outer-bridge classification, 5 patients grade 2 to grade 3 cartilage lesions. 7 patients had grade 4 cartilage defects out of which 5 patients had defects in the medial femoral condyle articular surface and 2 patients had lateral femoral condylar defects. The incidence of degenerative change was seen only in the delayed Surgical group.

Incidence of other ligamentous injuries. 7 patients had both combined ACL and PCL injury, out of which 5 were in the late group, 2 of them had collateral ligament injury.

**Discussion:** Our findings show a significant increase in associated injuries and degeneration of the knee in patients undergoing reconstruction of the ACL more than 3 months after injury. It has been demonstrated that the incidence of degenerative change increases when surgery is performed after 3 months from injury. Some degenerative change in a proportion of these knees would therefore be expected since ACL deficiency is well documented to be associated with the development of late degenerative change<sup>9</sup>.

Table4: Pattern of associated injuries comparing early and late group

	Early	Late
Medial menisci	14	31
Lateral menisci	16	14
Medial and lateral menisci	2	15
Osteochondral defects	0	12
ACL and PCL injury	2	5

Our findings indicate that reconstruction carried out within three months of injury is not associated with degenerative change. It remains to be seen whether a reconstruction carried out at this stage confers a longer-term benefit in the prevention of late degenerative change. Although satisfactory results can be achieved even with late reconstruction<sup>9</sup>, the results in a degenerative knee have been shown not to match those of early reconstruction in a knee with normal articular cartilage.

Cipolaa et al<sup>19</sup> has specifically evaluated the incidence of meniscal tears and osteochondral damage in acute and chronic ACL-deficient knees. In that study, MRI findings

were compared in the two groups, there was a higher incidence of medial meniscal tears in chronic ACL-deficient knees, 78% in chronic ACL tears v/ s 40% in acute ACL tears.

The study did not evaluate the effect of time from injury to reconstruction on the incidence of meniscal tears, nor was there a detailed assessment of degenerative change.

We had large number of patients for study, All operative findings were documented by the same surgeons who also performed the surgery. This minimized the observer variability in the classification of the type of meniscal tear and the degree of degenerative change. Very few studies have evaluated the incidence of ACL tears and degenerative change and related this to the timing of surgery.

There is evidence from previous evaluation of outcome after reconstruction of the ACL that early reconstruction is associated with better results than late reconstruction, often carried out in the presence of meniscal tears or degenerative change<sup>5</sup>. observations from our study suggests that meniscal tears might be the result of initial trauma or repeated instability but degenerative changes were associated with repeated instability. A relationship does exist between the length of time from injury to ACL reconstruction, and higher incidence of associated injuries.

Early reconstruction is therefore recommended to prevent meniscal injury, osteochondral injuries and early degeneration of the joint.

To verify the findings of our study a larger prospective study would be of value, A randomized study comparing early and late reconstruction and A functional follow-up incorporated into the design of the study would be ideal but there are practical and ethical difficulties in conducting such a trial in modern day practice.

**Conclusion:** Associated injuries in ACL deficient knees are common in both acute and delayed ACL reconstruction groups. Meniscal tears might be the result of initial trauma or repeated instability but osteochondral defects were associated with repeated trauma due to instability. A relationship does exist between the length of time from injury to ACL reconstruction, and higher incidence of associated injuries. Early reconstruction is therefore recommended to prevent osteochondral injuries and early degeneration of the joint

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