

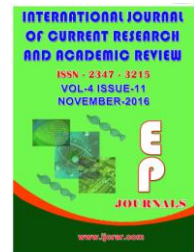


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Mucoid Degeneration of Anterior Cruciate Ligament – Management and Functional Outcome of 18 Cases

Amit Srivastava¹, Subhash Pateliya², Harjoban Singh³, Shekhar Aggarwal⁴ and Shekhar Srivastava⁵

¹Clinical Fellow, ²Junior resident, ³Consultant, ⁴Senior Consultant and Head, ⁵Senior Consultant, Department of Orthopaedics, Sant Parmanand hospital, Delhi, India

**Corresponding author*

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Anterior cruciate ligament, mucoid degeneration, cyst

A B S T R A C T

Mucoid degeneration of anterior cruciate ligament (ACL) is a rare pathology. It causes terminal restriction of knee flexion and posterior knee pain. The lesion is usually described in degenerative knees. We present here a series of eighteen patients managed with partial resection of ACL with good functional outcome. Eighteen patients were enrolled and followed up in the study over a period of 36 months (12-59 months). All complained of restriction of terminal knee flexion with associated knee pain. The diagnosis was made on the basis of clinical suspicion, MRI and histopathology. Debridement and partial resection of ACL was done and the tissue was sent for histopathology. At final follow up none of the patient complained of knee instability. Five males and thirteen females with mean age of 41 years (27-60 years) were included. All cases complained of knee pain with median duration of 8 months. MRI and arthroscopy revealed features suggestive of mucoid degeneration of ACL. There was associated grade 2, 3 degenerative changes in 10 patients and medial meniscal tear in 4 patients. Partial ACL resection was done in all and histopathology was sent, none required notchplasty. At the mean follow up of 36 months (12-59 months), all patients regained flexion at knee with no complain of instability. Great deal of suspicion and good MRI is diagnosis is required for the diagnosis. Partial resection of ACL can be done with no risk of instability.

Introduction

ACL cyst is relatively rare pathology, it is characterized by infiltration of mucoid within the substance of ACL (Kim *et al.*, 2008; Makino *et al.*, 2011; Melloni *et al.*, 2004; Narvekar *et al.*, 2004; Kumar *et al.*,

1999). All lesions are not symptomatic and are always diagnosed on MRI (McIntyre *et al.*, 2001; Bergin *et al.*, 2004). The clinical symptoms is posterior knee pain and restricted terminal flexion of knee

(Chudasama *et al.*, 2012; Fealy *et al.*, 2001). The mucoid degeneration of ACL was first described by Kumar *et al.*, in 1999. Since then, many authors have identified and described their experiences and suggested their own guidelines for management (Fernandes *et al.*, 2008; Lancaster *et al.*, 2004; Salvati *et al.*, 2004). Its prevalence on MRI is 1.8-5.3%, although it was considered rare as it was previously diagnosed as partial or complete tear of ACL.

The treatment for such symptomatic lesion is debulking or partial resection of ACL. The objective of this study is to discuss the clinical, radiological, arthroscopic features, treatment and outcome in eighteen such patients.

Materials and Methods

Eighteen patients with average age of 40.9 years (27-60) were included in this retrospective study conducted between January 2012 and December 2015. All patients complaint of pain on terminal flexion of knee without instability. All of them presented to us after the trial of conservative management of at least 2 months. MRI was done in all patients, it showed inhomogenous T1 and T2 weighted signals with expansile ACL ligament found in continuity between tibia and femur (fig 1). Degenerative changes were seen on plain radiographs and MRI of knee in eight patients. Thorough medical history was taken and following points were documented: duration of pain, history of trauma, instability of knee, knee range of motion and location of pain.

All the patients underwent diagnostic arthroscopy of the knee under tourniquet and spinal anaesthesia. On arthroscopy of the knee, the ACL appeared hypertrophied, bulbous and occupying most of the notch

with absent synovial lining over ACL and ligamentum mucosum in all cases (fig 2a). The meniscal tear was seen in 22% of cases (4 cases) and chondromalacic changes of variable grades were seen in 50% of cases, they were treated as per standard protocol through anteromedial portal. The bulky ACL was debrided judiciously, removing mucinous material as much and carefully saving normal fibers (fig 2b). Mostly, the fibers that impinge upon lateral femoral condyle are posterolateral group of fibers. Care was taken to save normal fibers with intact femoral and tibial attachment. Occasionally, small amount of mucoid material was left behind to protect normal ACL fibers as it is impossible to remove all mucinous material without sacrificing remaining normal ACL. Notchplasty was not performed in any of the patients. The degenerated ACL and mucinous material was sent for histopathology examination, it was suggestive of mucinous degeneration of ACL (fig3). Postoperatively all patients were allowed immediate weight bearing and muscle strengthening exercises. All patients were followed up for 36 months (12-58 months) and functional outcome was assessed by Lysholm Score.

Results and Discussion

Five males and thirteen females were the part of the study. Median age of patients was 40.9 years (range 27-60 years) with mean 8 months (range 2-24 months) of pain. All patients presented with knee pain and difficulty in knee flexion while extension was not affected. Six patients (30%) reported trivial trauma prior to the onset of symptoms. Four patients had medial joint line tenderness. All patients presented with restricted terminal flexion associated with pain on flexion beyond 100° with mean flexion range of 102 degrees (90-130). (Table 1)

Plain radiographs of knee showed early degenerative changes in eight patients. MRI revealed bulky expansile ACL in all the patients had associated medial meniscus tear in four patients. Arthroscopy revealed features suggestive of mucoid degeneration in eighteen, there was associated medial meniscus tear in four cases and degenerative cartilage changes in medial compartment in ten patients (grade 2 changes in 8 cases, grade 3 changes in 2 cases).

The bulky ACL was partially debrided and histopathology was done of the tissue, which confirmed mucoid degeneration. All patients were allowed full weight bearing immediate postoperatively and knee strengthening exercises, they were followed for the average period of 36 months (12-59 months). All patients regained complete flexion and none of them complained of any instability, five patients complaint of occasional pain on prolonged walking and climbing stairs till final follow up. Mean postoperative Lysholm scores were 87.22 (range: 85-95).

In our study the mucoid degeneration (MD) of ACL was diagnosed in the mean age of 41 years and the pathology was seen more commonly in females than males. Similar results were reported by previous authors as well. The pathology is considered to be seen more in degenerated knees but in our study 50 % of the patients had variable grade of degeneration of knee. Mucoid degeneration is a rare pathology and effects both younger and elderly populations. Kim *et al.*, has found it to be more common in the elderly (mean age: 61 years) with degenerative knees.

Since mucoid degeneration of ACL ligament is a rare pathology, hence various theories have been put forward for its pathogenesis. Some authors suggest that it could be due to

accumulation of synovial fluid inside the substance of ACL. The proponents of the cyst formation due to trauma suggest that after trauma, ACL fibroblasts secrete glycosamino glycans that are deposited inside the substance of ACL (Lee *et al.*, 2008). Other theories suggest subtle alterations in joint kinematics due to osteoarthritis, meniscal tears and other degenerative changes leading to stretching of cruciate ligaments.

Six of our patients (30%) of cases reported trivial trauma prior to the onset of symptom, many previous authors also came to the conclusion that there was no significant association of the lesion with trauma. However some authors reported significant association with traumatic event. Lancaster's *et al.*, and Amiel *et al.*, have postulated that injury to the synovium can result in exposure of ACL substance to the detrimental effects of haemarthrosis.

There was absence of synovial lining over ACL on diagnostic arthroscopy in all cases, other authors too reported absence of synovial lining over ACL. The loss of synovial lining could be due to microtrauma as explained by Cha *et al.*, they believed that the narrow notch predisposes the ACL to impingement and therefore resulting in microtrauma to the ACL. The notch size and its correlation with the lesion was not done in our study.

Posterior knee pain with terminal restriction of knee flexion was the consistent symptom in all our cases. There was associated medial joint line tenderness in four patients with meniscal tear. The cause of restriction in flexion could be due to impingement of PCL and posterior capsule or due to chondromalacic changes. The bulky ACL can cause intertendinous irritation leading to decreased flexion and stretch pain. Decompression of ACL relieving tension

amidst fibers supports this fact. In our patients, the nature of presentation was similar to that described in literature. All our patients had pain on deep flexion with no instability. None had extension block. Although the posterior knee pain and terminal flexion of movement is the consistent feature, there are associated meniscal tear and chondral lesion which can contribute to the pain and modify the surgical outcome.

The bulky ACL with lack of shininess was the consistent arthroscopic finding in all cases. The associated cyst formation was seen in four cases and when decompressed serous fluid came out. The characteristic

arthroscopic finding was consistent with previous studies (Lintz *et al.*, 2011, 2010).

The debrided tissue was sent for histopathology for all 18 cases, the glycosamino glycans in the tissue was readily stained by heamtoxylin and eosin. The result of pathology was definitive in 14 of the cases and inconclusive in four.

Partial debridement and debulking of ACL was done in all cases, the stability of the ligament was checked after debulking and was found to be stable. Some authors consider total removal of ACL in case of mucoid degeneration and concluded that it did not lead to instability.

Table.1

S NO.	AGE/SEX/S IDE	DIAGNOSIS	SYMPTOM DURATION (MONTHS)	PRE OP (range of motion)	POST OP (range of motion)	FOLLOW UP (MONTHS)	LYSHOLM SCORE
1	46/F/ RIGHT	ACL MD	9	0 – 100	0-120	58	85
2	45/F/RIGHT	ACL MD, MED MENISCUS TEAR	5	0-90	0-110	57	88
3	27/M/LEFT	ACL MD	3	0-110	0-130	48	95
4	30/M/LEFT	ACL MD	6	0-130	0-130	48	95
5	42/F/LEFT	ACL MD	2	0-100	0-120	46	82
6	44/F/LEFT	ACL MD	9	0-110	0-130	42	88
7	47/F/RIGHT	ACL MD	24	0-100	0-120	41	85
8	60/F/LEFT	ACL MD, MED MENISC TEAR	6	0-90	0-110	39	80
9	32/F/RIGHT	ACL MD	6	0-110	0-130	39	88
10	41/F/RIGHT	ACL MD, MED MENISCUS TEAR	2	0-100	0-120	39	85
11	32/F/RIGHT	ACL MD	5	0-100	0-120	31	83
12	27/F/RIGHT	ACL MD	18	0-130	0-130	31	90
13	51/F/LEFT	ACL MD	18	0-100	0-120	30	85
14	50/M/LEFT	ACL MD	6	0-120	0-120	30	88
15	28/M/RIGH T	ACL MD	4	0-130	0-130	29	90
16	46/M/RIGH T	ACL MD, MED MENISCUS TEAR	2	0-100	0-130	22	90
17	44/F/LEFT	ACL MD	6	0-110	0-130	14	85
18	46/F/RIGHT	ACL MD	9	0-120	0-120	12	88

Abbreviations: ACL – Anterior cruciate ligament, MD – Mucoid degeneration

Fig.1 MRI shows bulky anterior cruciate ligament with inhomogenous changes



Fig.2 a) The diagnostic arthroscopic picture shows bulky and intact ACL with lack of synovial covering and associated mucoid degeneration, b) shows partial resection of anterior cruciate ligament

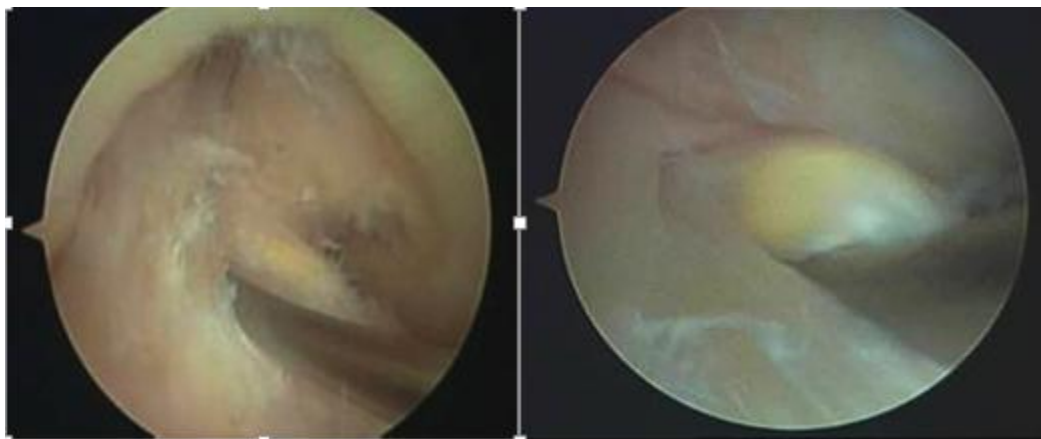
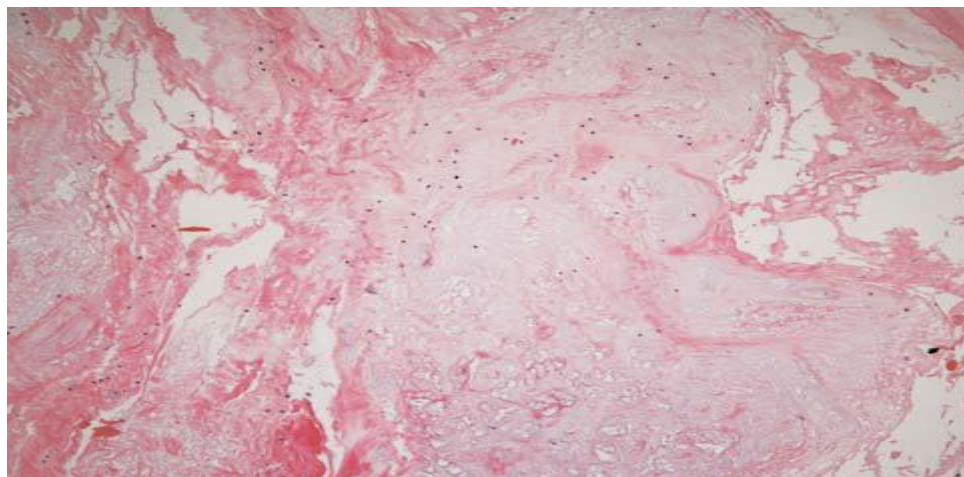


Fig.3 Histopathology shows loss of architecture of anterior cruciate fibres with mucoid infiltrates stained with alcian blue



In the opinion of most of authors partial debulking is effective and should be the modality of choice. Notchplasty was not done in any of our cases, after debulking of ACL no impingement was noticed intraoperatively. Notchplasty can be considered in patients with stenotic notch in old age patients with severe degenerative changes.

Though all patients regained full flexion after debulking mucinous ACL, some of them continued to experience mild pain while walking or climbing stairs. This could be explained probably because of concomitant lesions like cartilage damage in patellofemoral or tibiofemoral joint or meniscal tear.

None of our patients complained of instability or similar pain post -surgery till final follow up. Lachman test was positive in three patients but there was no complain of instability, the pivot shift was negative in all cases. Dejour *et al.*, demonstrated positive anterior drawer in 36% and positive pivot shift in 55% of his patients after debridement. Most of our cases had sedentary lifestyle and were not active in sports activity, which could also be the reason for lesser chances of instability post-surgery in our study.

In conclusion the anterior cruciate ligament degeneration is the diagnosis of high suspicion. Although the terminal restriction of knee flexion is the common reported problem, the site and intensity of pain can vary depending on associated chondral lesions and meniscal tears. The findings on MRI can be missed or confused with ACL tear, thus associated clinical examination is the key to diagnosis in such cases. The characteristic arthroscopic finding of bulky ACL with loss of synovial shining is consistent in all cases. The lesion is

managed by partial debulking of ACL, complete resection is not required and notchplasty is required for certain severely osteoarthritic knee.

The limitations of this study are that it is a retrospective case series, the number of cases are less and longer follow up is warranted. The cases were of varied age groups and all had sedentary lifestyle, thus a multicentric randomized study is required for definitive outcome.

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