e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(4); 637-643

Original Research Article

A Prospective Outcome Study and Retrospective Review of Chronic Multiligamentous Injuries around Knee Joint

Rohit Patel[1], Saurabh Singh[2], Shiv Shankar Tripathi[3], Chandra Shekhar Verma[4], Utkarsh Kumar Srivastava[5], Pankaj Verma[6], Roopal Dubey[7], Rahul Patel[8]

[1]Assistant Professor, Department of Orthopaedics G.S.V.M. Medical Collage Kanpur
[2]Assistant Professor, Department of Orthopaedics G.S.V.M. Medical Collage Kanpur
[3]Additional Professor and Head, Department of Emergency Medicine Dr. R.M.L.I.M.S. Gomtinagar Lucknow
[4]Assistant Professor, Department of Orthopaedics G.S.V.M. Medical Collage Kanpur
[5]Assistant Professor, Department of Emergency Medicine Dr. R.M.L.I.M.S. Gomtinagar Lucknow
[6]Assistant Professor, Department of General Medicine, Dr. R.M.L.I.M.S., Gomtinagar, Lucknow
[7]Junior Resident, LLR Medical Collage Meerut
[8]Junior Resident, RVRS Medical Collage & Mahatma Gandhi Hospital, Bhilwara, Rajasthan

Received: 25-01-2024 / Revised: 23-02-2024 / Accepted: 26-03-2024
Corresponding Author: Dr. Chandra Shekhar Verma
Conflict of interest: Nil

Abstract:

Introduction: Multiligament knee injuries are rare making up to less than 0.02% of all orthopedic injuries. These injuries cause significant functional impairment and have much higher rate of complications and poorer outcomes than an isolated cruciate or collateral ligament injury.

Aim and Objective: this study focuses on postoperative functional results and complications in multiligamentous knee injuries following arthroscopic and open reconstruction using autografts.

Methodology: This was a "prospective outcome study and included patients having Injury to >1 major knee ligament in 18 to 50 years age group. Patients were classified according to Schenck's knee dislocation criteria. After surgery outcome was evaluated by Lysholm Knee Score, IKDC score and Tegner activity level scale.

Results: Patients were followed to assess functional outcome at 3 months, 6 months, 1 year and 1½ years interval. Lysholm Knee Score, IKDC score and Tegner activity level scale were used. All results were statistically significant with significant p value at 3,6,12, month follow up.

Conclusion: High speed vehicular accidents are mostly responsible for multiligamentous knee injuries commonly observed in young aged individuals. Reconstruction gives excellent outcome if combined with proper physiotherapy. Knee pain and stiffness are the common complications. Long term functional outcome and complications like arthritis needs to be evaluated in future.

Keywords: Multiligament Knee Injury, Lysholm Tegner IKDC score.

Introduction

A multiligamentous knee injury is defined as an injury to two or more major ligaments of the knee including anterior cruciate ligament (ACL), posterior cruciate ligament (PCL), medial collateral ligament (MCL) and lateral collateral ligament (fibular collateral ligament). Multiligament knee injuries commonly affect a young and active population. They are commonly caused by knee dislocations (KDs) and often associated with fractures. These injuries cause significant functional impairment to the patients. Multiligamentus knee injuries are rare, making upto less than 0.02% of all orthopedic injuries.

The current literature suggests that these injuries have a much higher rate of complications and poorer outcomes than an isolated cruciate or collateral ligament injury. Various case series suggest that in addition to joint instability, popliteal artery damage is present in 20% to 40% of all multiligament injuries and the neurologic injury ranges from 16% to 40% depending on the direction of dislocation. However, this may be an under estimation because some knee dislocations may spontaneously reduce at the time of injury and go unrecognized.

The reported outcomes of multiligament knee injuries consist of small cohort studies with heterogeneous patient populations. Most multiple-ligament injury studies include patients with knee dislocations from both low and high energy injury mechanisms. Outcomes on isolated lower-velocity

sports-related multiple-ligament injuries, without knee dislocations, are still lacking. However, the magnitude of soft tissue injury, concomitant neurovascular injury and the pattern of ligament injury are highly variable according to the energy involved. Therefore in multiligament knee injuries it is important to identify that if a particular injury occurred with or without concurrent knee dislocation.

The current body of literature demonstrates inconsistent functional results and return to sports activities and work in 53% and 88% of patients, respectively. This can be attributed to multiple factors, such as (1) incorrect / incomplete diagnosis and staged [1] procedures, which can overload the reconstruction grafts and jeopardize the index surgery; (2) nonanatomic techniques that do not reproduce the native biomechanics; and (3) the improper or incorrect timing of postoperative rehabilitation protocols.

A systematic and comprehensive evaluation of all torn knee structures and the soft tissue status is fundamental for surgical planning and a subsequent successful outcome. In this regard, the timing of surgery, treatment method (operative vs nonoperative or repair vs reconstruction), availability of grafts, and postoperative rehabilitation program are the factors to be considered in the decision making.

The medial collateral ligament and medial knee stabilizers are the most commonly injured structures of the knee. Early diagnosis is crucial for both the grading of injury and treatment planning. Early diagnosis is particularly useful in isolated MCL injuries as well as in medial knee injuries with concurrent cruciate ligament injuries. The grading of medial knee ligament injuries by physical examination relies on both the patient's ability to relax and also the clinician's ability to detect an end point during the application of the valgus load at knee flexion. In addition, the presence of concurrent injuries can obscure the physical examination. This reliance on a qualitative physical examination allows for potential subjective error in the diagnosis and grading of the injury, especially in the presence of combined ligament injuries.

Materials and Methods

This is a "prospective outcome study and retrospective review of chronic multiligamentous injuries around knee joint" conducted in the department of orthopedics of G.S.V.M. Medical College Kanpur between Dec. 2018 to Oct. 2020. We analyzed the functional results and complications of treatment of multiligamentous knee injuries by multiligamentous knee reconstruction using autograft.

Study population: patients presenting with multi ligamentous injury around knee joint treated in the mentioned period.

Inclusion criteria

- Injury to >1 major knee ligament - (ACL, PCL, MCL, FCL or LCL)
- Age of patients >18 years & <50 years.

Exclusion criteria

- Age of patients < 18 years >50 years.
- Open injuries.
- Injuries with vascular deficit.
- Multi ligamentous injuries with intra articular fractures.
- Patients managed nonoperatively.

Preoperative procedure

- Overall evaluation of patient and Clinical and radiological evaluation with X-ray and MRI of ligament injuries around knee.
- All the patients were classified according to Schenck's knee dislocation criteria.

Surgical technique

- Arthroscopic ligament reconstruction for anterior cruciate ligament and posterior cruciate ligament injuries.
- Open ligament reconstruction techniques for medial collateral ligament and lateral collateral ligament using modified laprade technique.
- Arthroscopic PLC reconstruction was done by using laprade technique and Arciero technique in different patient who required.
- The ligament reconstruction was done in the following order:

PCL → FCL/PLC → ACL → MCL.

We used either Peroneus longus tendon or Semitendinosus for primary reconstruction.

Postoperative Rehabilitation: Patients were rehabilitated with goal to regain full pre-injury range of motion. Early protected range of motion, periodization, progressive weight bearing, quadriceps activation and patella mobility was done. Rehabilitation takes 9–12 months. Use of brace during first year of returning to activities and work was advocated.

Follow-up: Patients were followed up to assess functional outcome at 3 months, 6 months, 1 year and 1½ years interval. Lysholm Knee Score, IKDC score and Tegner activity level scale were used.

Results and Observation

At the start of study retrospective review of patients who have undergone multiligamentous knee reconstruction was also considered but we found

only one such patient for retrospective review in mentioned follow up period.

Sex Distribution: All the 7 pt. were male in the study.

Side Distribution: Involved knee rt. Side in 5 pt., left side in 1 pt. and bilateral in 1 pt.

Age Distribution: 2 patients between 18-20 years age, 4 between 21-30 and 1 between 31-40 years age were seen. Mean age of presentation is 24.29 ± 4.92 years in our study group. Minimum age of presentation is 18 years and maximum age of patients is 32 years.

Schenck Knee Dislocation Classification: According to it we included KD 1 – 3 knee, KD 3 M – 3 knee, KD 3 L – 1 knee, KD 4 – 1 knee.

Mode of Injury: Road traffic accident was present in all patients.

Scores: Preoperative, postoperative 3 months, postoperative 6 months, and postoperative 1year scores are shown in the below tables:

Table 1:

	Lysholm knee score	T.A.S.	IKDC
Preoperative score	68.43 ± 19.58	2.43 ± 2.15	43.6 ± 18.75
Postoperative score at 3 months	81.29 ± 16.1	2.71 ± 1.25	54.5 ± 15.56
Postoperative score at-6 months	90.29 ± 9.88	4.71 ± 0.95	76.39 ± 15.19
Postoperative score at 1 years	95 ± 6.14	5.43 ± 0.79	84.24 ± 11.20

Statistics of Lysholm knee score - significant relation within the group

Table 2:

Group	'T' Value	'P' Value	Inference
Preop vs postop '3' months	2.3	>0.05	Nonsignificant
Preop vs postop '6' months	3.36	<0.05	Significant
Preop vs postop '1' year	3.79	<0.05	Significant

Statistics of Tegner activity score (T.A.S.) - significant relation within the group

Table 3:

Group	'T' Value	'P' Value	Inference
Preop vs postop '3' months	4.51	<0.05	Significant
Preop vs postop '6' months	3.4	<0.05	Significant
Preop vs postop '1' year	3.6	<0.05	Significant

Statistics of IKDC (international knee documentation committee) score- significant relation within the group

Table 4:

Group	'T' Value	'P' Value	Inference
Pre op vs post op 3 months	3.4	<0.05	Significant
Pre op vs post op 6 months	3.84	<0.05	Significant
Pre op vs post op 1 year	4.27	<0.05	Significant

Case-1

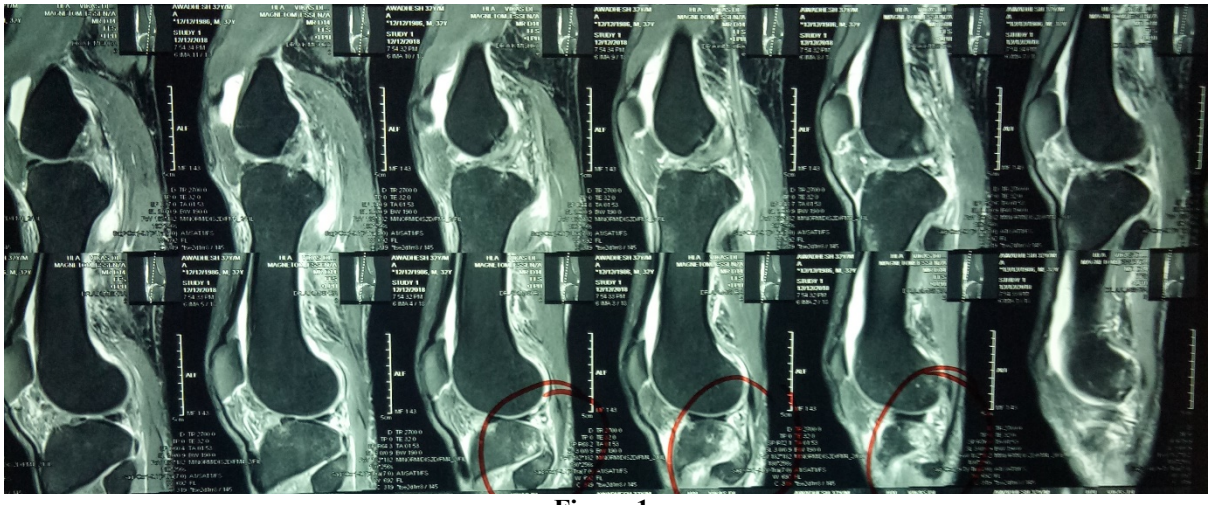

Figure 1:

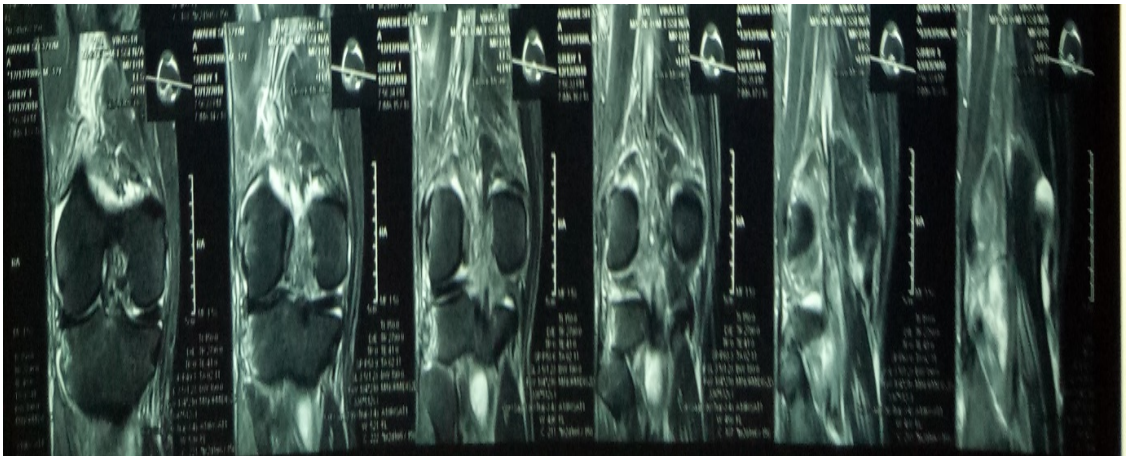

Figure 2:

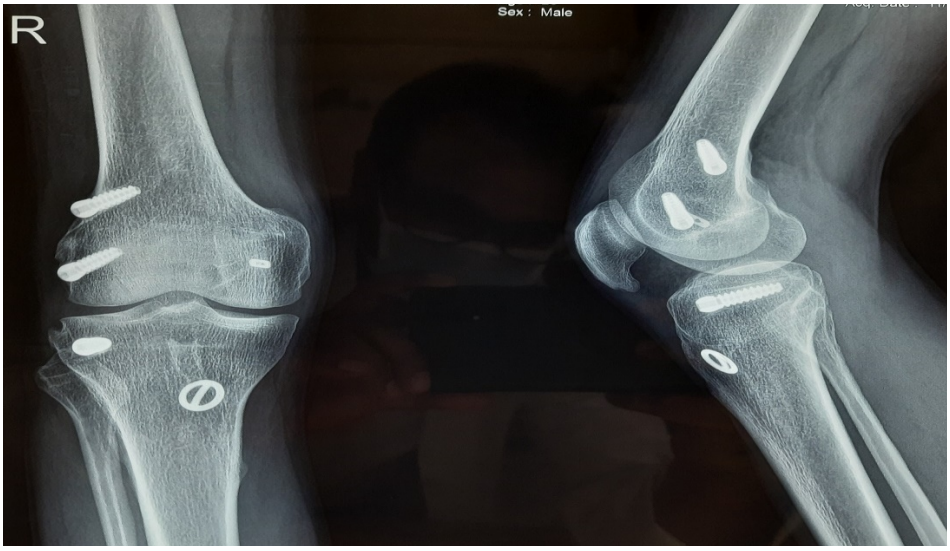

Figure 3: Postop X-Ray (1 Year Follow Up)

Figure 4:

Case-2

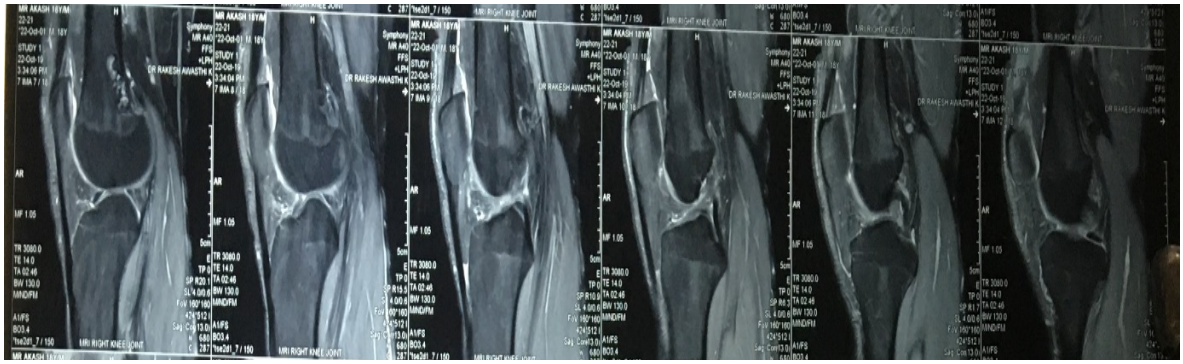

Figure 5:

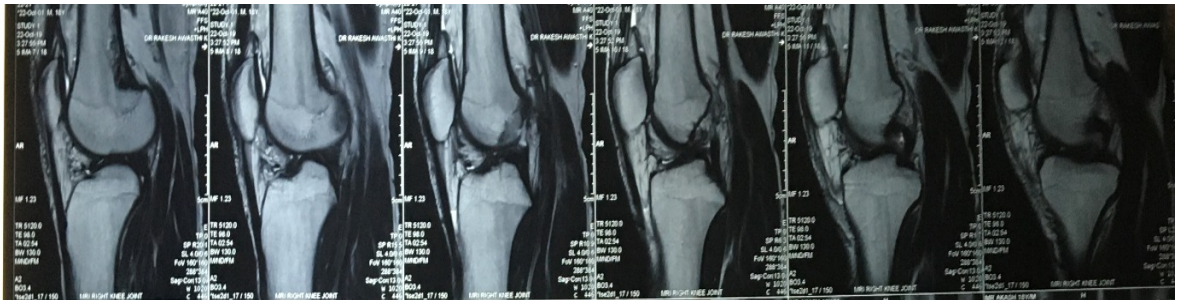

Figure 6:

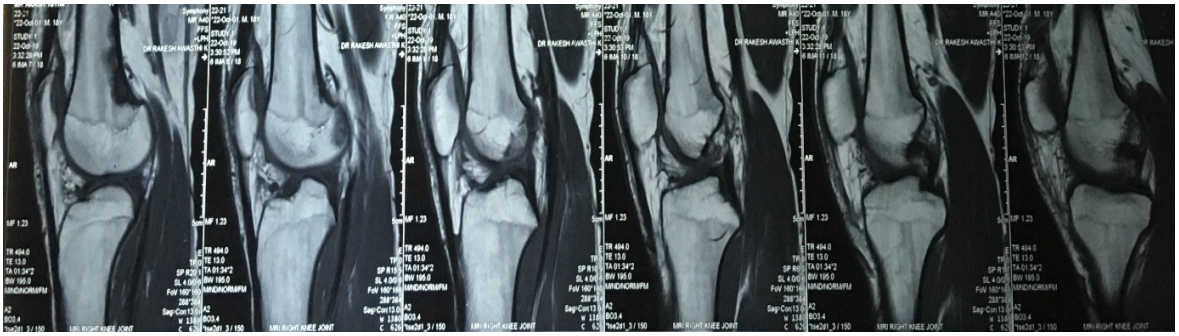

Figure 7: MRI Scan Finding

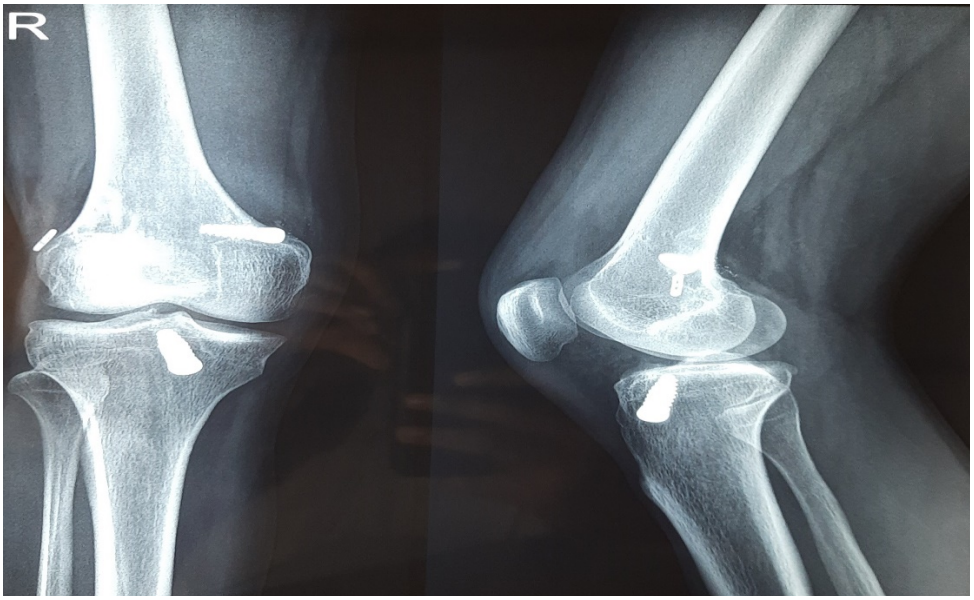

Figure 8: Postop X-Ray (1 Year Follow Up)

Figure 9: Range of Motion

Discussion

In our study we have done 1 year follow up in 4 patients and 1-1/2 years in 3 patients, which is comparable to Jessica M. Hanley [2] et al (2017) study in which they done the follow up for mean 6 years (range 2-11 years) and Jonathan A. Godin [3] et al (2017) done 2 years follow up study. An 2-5 years follow up study done by Robert G. Marx [4] et al found that pre injury activity level in recreational athletes can be achieved by doing MCL with primary ACL reconstruction. In our study patient satisfaction was excellent, but longer follow-up in a larger numbers of patients is required to determine the long-term benefits of multiligament reconstruction, as done in Jessica M. Hanley [2] et al (2017) study. We have done study on 7 patients and our results are comparable to Jonathan A. Godin [3] et al (2017) study, which was done on 20 patients. Jessica M. Hanley [2] et al (2017) study was done on 68 patients; in it patients were over a 10-year period and followed up. Another study done by Robert G. Marx 4 et al on 14 patients showed comparable results.

In our study we found that mean preoperative lysholm knee score was 68.43 ± 19.58, 3 months postoperative score was 81.29 ± 16.1, 6 months postoperative scoring was 90.29 ± 9.88 and 1year postoperative scoring was 95 ± 6.14. This improvement in patient outcome and sport activity is comparable to Robert G. Marx [4] et al study in which mean lysholm score was 92 ± 6 and also comparable to Jonathan A. Godin [3] et al (2017) study where preoperative lysholm knee score was 49.5 and postoperative score was 86. Like lysholm scoring we have also taken tegner's activity scale and international knee documentation committee scoring system.

In our study mean tegner's activity score of preoperative and postoperative 3 months, 6 months and 1 year are 2.43 ± 2.15, 2.71 ± 1.25, 4.71 ± 0.95 and 5.43 ± 0.79 respectively; and international knee documentation committee scores are 43.6 ± 18.75, 54.5 ± 15.56, 76.39 ± 15.19 and 84.24 ± 11.20 respectively. These data are comparable to Robert G. Marx [4] et al study in which mean international knee documentation committee score was 91 ± 6. In a study done by Ian J Barrett [5] et al found average IKDC score was 67.6 ± 19.9 (range 27.7-98.9) that show comparable results with our study.

In our study all the 7 patients were male (100%), comparable to study done by Ian J Barrett 5 et al in which 21 were males and 11 females (66% male and 34% female) with a mean age of 30 years (range 15-51) were followed for an average of 40 months (range 28-87 months). These data shows that multiligamentous knee injuries has male preponderance because high velocity trauma mostly seen in male population. Mean age of presentation in our study was 24.29 ± 4.92 years (18-32 years) comparable to mean age of 30 years (range 15-51)

found in a study done by Ian J Barrett 5 et al, also mean age, 17.7 years was found in a study done by Jonathan A. Godin [3] et al (2017). This shows a relatively younger population involvement which in turn can be attributed to high velocity trauma.

In our study we found that 3 patients got multiligamentous injury due to head on collision, 1 patient (pedestrian) due to hit by bike and 3 patients due to fall of bike. This shows multiligamentous knee injuries were mostly due to high velocity trauma and are comparable to study by Christopher J Tucker [6] et al (July 2017) done on military population with low velocity trauma as well as high velocity trauma . This is also comparable to a retrospective analysis of reconstructed knees of Elite Alpine Ski Racers done by Matthew J Jordan et al (July 2017).

In our study we observed that most of the patients were from low socioeconomic status and from remote areas. For them access to adequate facilities for physiotherapy and rehabilitation centres were difficult. We observed that postoperative physiotherapy is crucial and only attaining a stable fixation of graft is not adequate for excellent outcome. In this population patient education regarding regular physiotherapy was a tough job. It was seen that patient with good fixation but improper physiotherapy gave bad results in terms of functional outcome.

In our study 1 pt. not gained full flexion, had knee stiffness even after 1 year postoperatively. On the contrary patients with average or good fixation but regular exercises gave better results in term of functional outcome.

Conclusion

High speed vehicular accidents are mostly responsible for multiligamentous knee injuries commonly observed in young aged individuals. Multiligament knee reconstruction is a reliable procedure gives excellent outcome if combined with proper physiotherapy. Knee pain was the most common complication we encountered in our study. Knee stiffness is also seen in patients for whom proper physiotherapy needed. In our study there was short follow up period and lack of control group. Therefore, a long term follow up is required to access functional outcome and complications like arthritis in future.

Bibliography

1. Everhart JS, Du A, Chalasani R, Kirven JC, Magnussen RA, Flanigan DC. Return to work or sport after multiligament knee injury: a systematic review of 21 studies and 524 patients. Arthroscopy. 2018; 34(5): 1708-1716 doi: 10.1177/2325967117694818 PMCID: PMC5358815 PMID: 28357408
2. Jessica M. Hanley, MD, Christopher A. Anthony, MD, David DeMik, PharmD, Natalie Glass, PhD, Annunziato Amendola, MD, Brian R. Wolf, MD, and Matthew Bollier, MD. Patient-Reported Outcomes After Multiligament Knee Injury MCL Repair Versus Reconstruction. doi: 10.1177/2325967117727717 PMCID: PMC5613854 PMID: 28975131
3. Jonathan A. Godin, MD, MBA, Mark E. Cinque, MS, Jonas Pogorzelski, MD, MHBA, Gilbert Moatshe, MD, Jorge Chahla, MD, PhD, and Robert F. LaPrade, MD, PhD. Multiligament Knee Injuries in Older Adolescents: A 2-Year Minimum Follow-up Study. doi: 10.1007/s11999-011-1941-8 PMCID: PMC3270177 PMID: 21660595
4. Robert G. Marx, MD, MSc, FRCSC and Iftach Hetsroni, MD Short- to mid-term outcomes of anatomic MCL reconstruction with Achilles tendon allograft after multiligament knee injury Ian J Barrett, Aaron J Krych, Ayoosh Pareek, Nicholas R Johnson, Diane L Dahm, Michael J Stuart, Bruce A Levy. Surgical Technique: Medial Collateral Ligament Reconstruction Using Achilles Allograft for Combined Knee Ligament Injury. PMID: 29427218, DOI: 10.1007/s00167-018-4843-4
5. J Tucker, Eric J Cotter, Brian R Waterman, Kelly G Kilcoyne, Kenneth L Cameron, Brett D Owens. Functional Outcomes After Isolated and Combined Posterior Cruciate Ligament Reconstruction in a Military Population Christopher. PMID: 31656823 PMCID: PMC6791041, DOI: 10.1177/2325967119875 139
6. Matthew J Jordan, Patricia Doyle-Baker, Mark Heard, Per Aagaard, Walter Herzog. A Retrospective Analysis of Concurrent Pathology in ACL-Reconstructed Knees of Elite Alpine Ski Racers. PMID: 28812037 PMCID: PMC5528939, DOI: 10.1177/2325967117714756