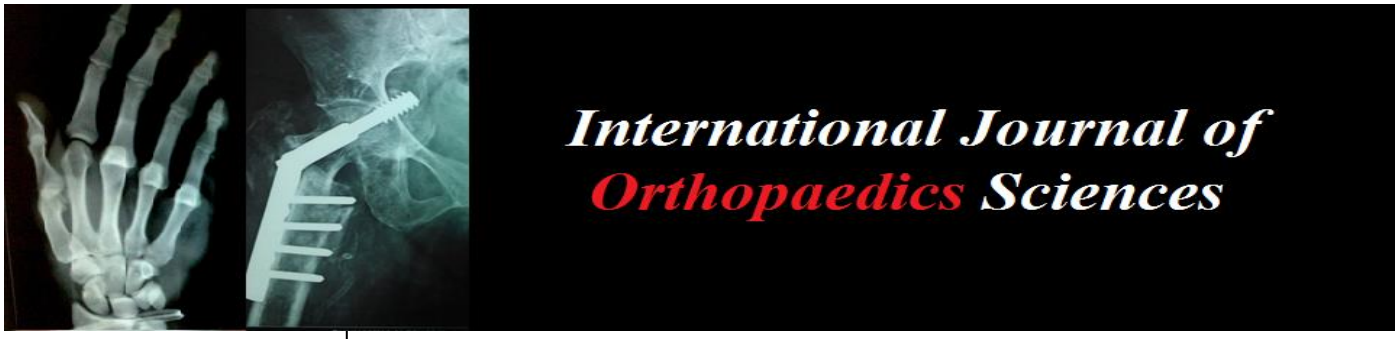

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Results of meniscus repair over menisectomy in bucket handle tear of medial meniscus: Study of 30 cases

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Abstract
Background and Aim: Meniscus plays an important role in the knee, and thus, is being an important research topic for years. There are three different methods available for the treatment of Bucket handle meniscal tears, which are meniscectomy, meniscal repair with or without the uses of augmentation technique and the meniscal reconstruction. The aim of the research paper is to compare the results of meniscus repair over meniscectomy in bucket handle tear of medial meniscus.
Materials and methods: It was a retrospective review of the prospectively collected data between January 2015 and December 2016 on the patients having bucket handle tear of medial meniscus, undergoing the ACL reconstruction. For this study, 30 patients were selected on the basis of the exclusion and inclusion criteria, who were equally distributed in Group A (Meniscus repair) and Group B (Menisectomy).
Results: In the present study it is found that the mean age of the patient was 25.38years, majority of the patients were male participants and sports injury is found to be the major reason for the meniscal tear. Further, there is no significant difference in the mean of tunnel diameter, Lachman test, overall grades and radiographic grades between Group A and Group B.
Conclusion: The study concluded that the results of the tunnel widening were found to be higher when the patient is treated with meniscectomy, and the results of Lachman test shows that meniscal repair is effective. On comparing the after results of both the meniscal repair and meniscectomy with the help of applying the radiological analysing, it is being found that meniscal repair offers better outcomes as compared to the meniscectomy.

Keywords: Meniscus repair, menisectomy, bucket handle tear, medial meniscus

Introduction
Meniscus plays an important role in the knee, and thus, is being an important research topic for years. Bucket handle meniscal tears is one of the most common conditions which is being defined as the vertical longitudinal tears of the meniscus, and the displacement of the torn inner fragment or the torn of the meniscus flip similar to the bucket handle. Management of Bucket handle meniscal tears is very important, and there are different methods which can be used for this [1].

There are three different methods available for the treatment of Bucket handle meniscal tears, which are meniscectomy, meniscal repair with or without the uses of augmentation technique and the meniscal reconstruction. The present study discusses two of the methods, namely; meniscectomy and meniscal repair. Meniscectomy is an effective surgical method in which the meniscus is being removed for the treatment of meniscal tear [2]. The recovery is better if this method is using for the treatment of meniscal tear. Repair of the meniscal is another method which can be used for the treatment of meniscal tear. In this method, the meniscus is not removed, instead, the meniscus is being repaired, and it aims at achieving the meniscal healing [3, 4].

Both methods are being used for the treatment of meniscal tear, but there are several advantages and disadvantages associated with both of them. For instance, if the meniscus tear is being treated with the repair method, which involves a delicate surgery, then it will take more time to recover as compared to the meniscectomy [5]. However, there are several other

factors which need to be considered while comparing both the treatment methods. In the present study, the outcomes of both the methods are compared for analysing the effectiveness of both the surgical methods for the treatment of meniscus repair. The aim of the research paper is to compare the results of meniscus repair over meniscectomy in bucket handle tear of medial meniscus.

Materials and Methods

It was a retrospective review of the prospectively collected data between January 2015 and December 2016 on the patients having bucket handle tear of medial meniscus, undergoing the ACL reconstruction. For this study, 30 patients were selected on the basis of the exclusion and inclusion criteria, who were equally distributed in Group A (Meniscus repair) and Group B (Menisectomy). Fisher's exact test was used to determine whether there was a statistically significant difference between groups for overall grade and radiographic sub scores. The Mann-Whitney Wilcoxon test was used to determine whether there was a statistically significant difference between groups for the total subjective score. Statistical significance was determined at $P<0.05$.

Inclusion Criteria

- Patients who are willingly giving concern
- Patients belonging to the age group of 18 to 50 years are selected for the study.
- Patients with medial meniscus tear are selected included in the study.

Exclusion Criteria

- Patients ageing more than 50 years are excluded from the study.
- Patients were having revision ACL reconstruction.
- Patients not giving the concern

Results

In the present study, it is found that the mean age of the patient was 25.38years.

Table 1: Gender wise distribution of study participants

Gender	Frequency	Percentage
Male	25	84%
Female	5	16%

In the present study, it was being found that majority of the patients were male.

Table 2: Side of Injury

Side of Injury	Frequency	Percentage
Left Side	12	40%
Right Side	18	60%

The results revealed that majority of the patients hadan injury on the right side as 60% of the patients had meniscus tear on the right knee, and 40% of the patients had the meniscus tear on the left knee.

Table 3: Reason for injury

Reason for injury	Frequency	Percentage
Sports-related injury	17	57%
Domestic fall/road accident	13	43%

As per the results, the majority of the patients (57%) had the meniscus injury because of the sports activity and 43% of the patients had the knee injury due to domestic fall or road accident.

Table 4: Tunnel Diameter

Group	No. of patients	Mean	Standard deviation	P-value
Group A (Meniscus repair)	15	11.97	1.09	Not significant
Group B (Menisectomy)	15	12.14	1.64	

In the present study, the tunnel diameter is being calculated for the patients belonging to both the groups so that the effectiveness of the two treatments can be evaluated. The mean tunnel diameter of the patients belonging to group A was 11.97±1.09 and that of the patients belonging to group B was 12.14±1.64. There was no significant difference between the mean of tunnel diameter of the patients belonging to group A and group B.

Table 5: Lachman Test

Group	Lachman Test		P-value
	Grade 1	Grade 2	
Group A	12 (80%)	3 (20%)	Not significant
Group B	9(60%)	6(40%)	

In the present study, the Lachman test is being applied to patients belonging to both group A and group B so that the outcomes of the treatment methods can be evaluated. The results of the Lachman test shown that in Group A, 80% of the patients hadGrade 1 and 20% of the patients hadGrade 2. On the other hand, in Group B, 60% of the patients hadGrade 1 and 40% of the patients hadGrade 2.

Table 6: IKDC Overall Grades

Group	IKDC Overall Grades				P-value
	Normal	Nearly Normal	Abnormal	Severely Abnormal	
Group A	10 (66.6%)	4 (26.6%)	1 (6.6%)	0 (0%)	Not significant
Group B	8(53.3%)	6 (40%)	1(6.6%)	0 (0%)	

There was no statistically significant difference in overall grades between the two groups.

Table 7: IKDC Radiographic Grades

Group	IKDC Radiographic Grades				P-value
	Normal	Nearly Normal	Abnormal	Severely Abnormal	
Group A	12 (80%)	2 (13.3%)	1 (6.6%)	0(0%)	Not significant
Group B	10(66.6%)	4 (26.6%)	1(6.6%)	0 (0%)	

There was no statistically significant difference in radiographic grades between the two groups.

Table 8: Mean Noyes Score

Group	No. of patients	Mean Noyes Score	Standard deviation	P-value
Group A (Meniscus repair)	15	90.9	11.6	Not significant
Group B (Menisectomy)	15	90.9	16.7	

Further, mean subjective Noyes score was 89.9±11.6 points in the repair group and 90.6±16.7 in the meniscectomy group (P>0.05).

Discussion

In the present study, it is being found that the majority of the patients were male participants. On comparing this with the study of Kramer, *et al*., (2019) [6] it is being found that in their study also most of the patients were male (63%).

In the current study, it is being identified that the major reason for the meniscus tear was the sport injury as the knee injuries occur mostly at the time of playing the sports. On comparing this with the study of Deore, *et al*., (2017) [7] it is being found that they had also identified sports as a major reason for the meniscus tear.

Among all the different methods which can be used for evaluating the effectiveness of the treatment methods of the bucket handle tear of medial meniscus, the present study had focused on evaluating the effectiveness by calculating the tunnel diameter, Lachman test, Noyes Score, IKDC overll grades and radiographic grades. Also in the study of Deore, *et al*., (2017) [7] radiological tunnel widening and the Lachman test was being calculate for comparing the effect of meniscus repair and meniscectomy in patients undergoing to ACL reconstruction.

In the current study on calculating the tunnel diameter for the patients belonging to both the groups, it was found that the mean of tunnel diameter of the patients belonging to group A was 11.97±1.09 and the mean of tunnel diameter of the patients belonging to group B was 12.14±1.64. Further, there was no significant difference in the mean of tunnel diameter between the patients belonging to group A and group B. On comparing this with the study of Deore *et al*., (2017) [7] it is being found that in the study of Deore *et al*., (2017) [7] the results of the calculation of tunnel diameter had shown that that the mean of tunnel diameter of the patients belonging to Group 1 was 11.86±1.11 and the mean of tunnel diameter of the patients belonging to Group 2 was 12.28±1.52.There was no statistically significant difference found between the tunnel widening among the patients belonging to group 1 and group 2.

On the basis of this comparison, it can be said that there is no significant difference in tunnel diameter of the patients belonging to the two groups; meniscus repair and meniscectomy, for the treatment of meniscus tear. Also, the study of Shelbourne and Carr, (2003) [8] had identified the radiographic scoring for the treatment of unstable bucket-handle tears of the medial meniscus, and it is being found that there is no statistically significant difference in the radiological scoring of the patients who have undergone meniscal repair and meniscectomy, but the meniscal repair had shown better outcomes. On comparing these results with the present study, it can be said that meniscal repair is a better option for the treatment of meniscal tear.

In the present study, the results of the Lachman test shown that in the Group A, 80% of the patients are hadGrade 1 and 20% of the patients hadGrade 2. Along with this, for Group B, 60% of the patients hadGrade 1 and 40% of the patients hadGrade 2. On comparing this with the study of Deore, *et al*. (2017) [7] it is being found that among the patients of group 1, 14% of the patients had the Grade 1 and 86% of the patients hadGrade 2. On the other hand, for the group 2,62% of the patients had grade 1 and 38% of the patients hadGrade 2. On the basis of this comparison it can be said that the repair method gives better results in comparison to the meniscectomy.

Conclusion

For the treatment of meniscal tear in the ACL reconstruction, the meniscal repair is the preferred method over meniscectomy. The study concluded that the results of the tunnel widening were found to be higher when the patient is treated with meniscectomy, and also the results of the Lachman test shows that meniscal repair is effective. On comparing the after results of both the meniscal repair and meniscectomy with the help of applying the radiological analysing, it is being found that meniscal treatment offers better outcomes as compared to the meniscectomy.

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