

Patellar Resurfacing Compared with No Resurfacing in Total Knee Arthroplasty

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Abstract

Background: This is a prospective comparative study to evaluate the functional outcomes in Patellar Resurfacing Compared with non Resurfacing in Total Knee Arthroplasty.

Aim of Study: The aim of this study was to compare clinical and radiographic outcomes of TKA with and without patellar resurfacing using a patella-friendly prosthetic design. This study was focused on clinical outcomes and complications related to the patellofemoral joint. Two groups in the first half of the study, the patella was resurfaced in all patients, while it was retained in all patients in the second half of the study. The selection nature was not based on age, comorbidities, patella morphology, obesity, or pre-operative radiographs.

Patients and Methods: In the period between December 2015 and September 2017, a prospective RCT was conducted involving 40 patients having knee osteoarthritis (20 cases had Resurfacing Patella 20 cases had non Resurfacing Patella).

Results: We identified 40 eligible TKRs, including 20 RP. Compared to 20 No R P. The knee society scoring system used for pre- and post-operative assessment. The mean pre-operative knee score in R P knee was 39 and the mean pre-operative functional score was 56.25 while in No RP knee group the mean pre-operative knee score was 38 and the mean pre-operative functional score was 55.75. In R P knee group the mean post-operative knee score was 94.70 which is considered excellent result. And the mean post-operative functional score was 76 which are considered good result while in No RP knee group the mean post-operative knee society score was 98.90 which is considered excellent result and the post-operative functional score was 74.75 which also considered good results.

Conclusion: We founded that there was no significant difference between both groups with post-operative improvement in all cases.

Key Words: Osteoarthritis – Resurfacing Patella – Non Resurfacing Patella – Arthroplasty knee – Functional outcomes.

Introduction

TOTAL knee arthroplasty (TKA) is an effective surgery for patients with end-stage refractory knee osteoarthritis. It is associated with significant improvement in pain, function and quality of life [1,2]. The most common underlying diagnoses for primary TKA are osteoarthritis [3,4]. Most literature to date has focused on surgical and implant factors affecting implant outcomes (such as the risk of revision) after TKA, and in a systematic review of 40 studies, revision, infection rates after total joint arthroplasty were lower in OA [5]. There is an emerging literature related to factors associated with patient-reported outcomes (PROs) (pain, function, quality of life) after TKA [6-9]. However, fewer studies have assessed the association of underlying diagnosis with PROs after TKA.

Material and Methods

In the period between December 2015 and September 2017, a prospective RCT was conducted involving 40 patients having knee osteoarthritis (20 cases had Resurfacing Patella and 20 cases had non Resurfacing Patella). These patients were 20 males (50%) and 20 females (50%). The post-operative follow up of these cases was 1 year.

The Patient Demographics study group included 40 patients; Ages ranged from 45 years to 75 years with mean age 56.10 (SD \pm 11.62) years. Weight ranged from 67Kg to 110kg with mean 79.42 (SD \pm 10.35) Kg. Height ranged from 159 cm to 180cm with mean cm 168.75 (SD \pm 4.66) cm. BMI ranged from 23 to 38.90 with mean 28.16 (SD \pm 3.87).

23 patients had TKA on the right side and 17 patients on the left side.

All patients were followed at 2 months, 6 months, 1 year postoperatively. A joint replacement

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database was used to examine Knee Society scores (KSS) [10], knee function scores, knee alignment, and range of motion both preoperatively and post-operatively. Failure rates were also examined. Statistics were performed using SPSS (Statistical Package for Scientific Studies).

Results

Results of this study were assessed in the guidance of the Knee Society Scoring System. The results are described as found at the last follow-up which ranged for 1 year.

The knee society scoring system used for pre- and post-operative assessment. The mean pre-operative knee score in RP knee was 39 and the mean pre-operative functional score was 56.25 while in No RP knee group the mean pre-operative knee score was 38.6 and the mean pre-operative functional score was 55.75. In RP knee group the mean post-operative knee score was 94.70 which is considered excellent result. And the mean post-operative functional score was 76 which are considered good result while in No RP knee group the mean post-operative knee society score was 98.90

Table (1): Comparison of other knee scores preoperatively between two groups of the study (n=40).

Preop. mean Knee score	Group RP	Group No RP	p-value
Ant. post. stability	9.20	8.45	0.004
Med. lat. stability	11.75	10.25	0.040
ROM	19.15	18.60	<0.001
Stairs. pain KSS	5	4.45	0.044
Walk. pain KSS	10.50	10	0.061
Ext. lag	-2.40	-2	<0.001
F.deduction	5.25	-5	<0.001
Flexion. cont.	-3.35	-3	0.419
Malalignment	-1.35	-1.25	0.173
Pain at rest	-4.25	-4	0.664
Stairs FS	32	31	<0.001
Walking FS	30	29.25	<0.001

which is considered excellent result and the post-operative functional score was 74.75 which also considered good results.

There was statistically significant increase in preoperative mean scores of Ant. post. stability, Med. Lat. stability, ROM, Stairs. pain KSS, Ext.lag, F. deduction, Stairs FS and Walking FS in group RP in comparison to group No RP ($p<0.05$). (Fig. 1).

There was statistically insignificant increase of mean preoperative scores of Walk. Pain KSS, Flexion. cont., Malalignment and Pain at rest in group RP in comparison to group No RP ($p>0.05$).

There was statistically insignificant difference of mean postoperative KSS scores between group RP & No RP ($p>0.05$), except Walk pain KSS score in which there is increase in mean postoperative score of group No RP in comparison to group RP ($p<0.05$). (Fig. 2).

These results indicate no significant difference between both groups with post-operative improvement in all cases.

Table (2): Comparison of other knee scores postoperatively between two groups of the study (n=40).

Postop. mean Knee score	Group RP	Group No RP	p-value
Ant. post. stability	9.80	9.90	0.560
Med. lat. stability	14.75	15.0	0.324
ROM	25	25	
Stairs. pain KSS	13.75	14.25	0.442
Walk. pain KSS	33	34.75	0.007
Ext. lag	0	0.50	0.324
F.deduction	-4	-3	0.225
Flexion. cont.	0	0	
Malalignment	-0.10	0	0.336
Pain at rest	1.50	0	0.470
Stairs FS	40	38	0.095
Walking FS	40.50	38.50	0.105

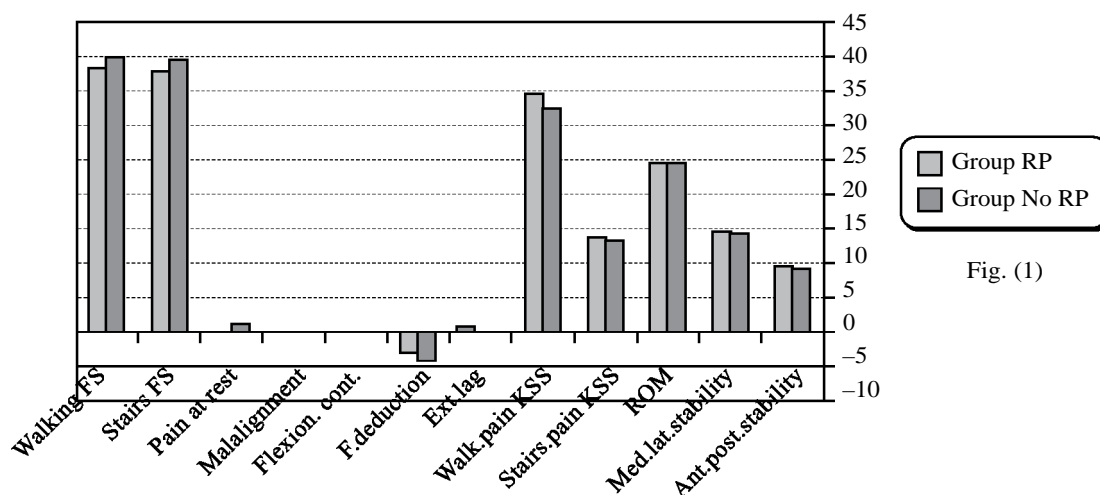


Fig. (1)

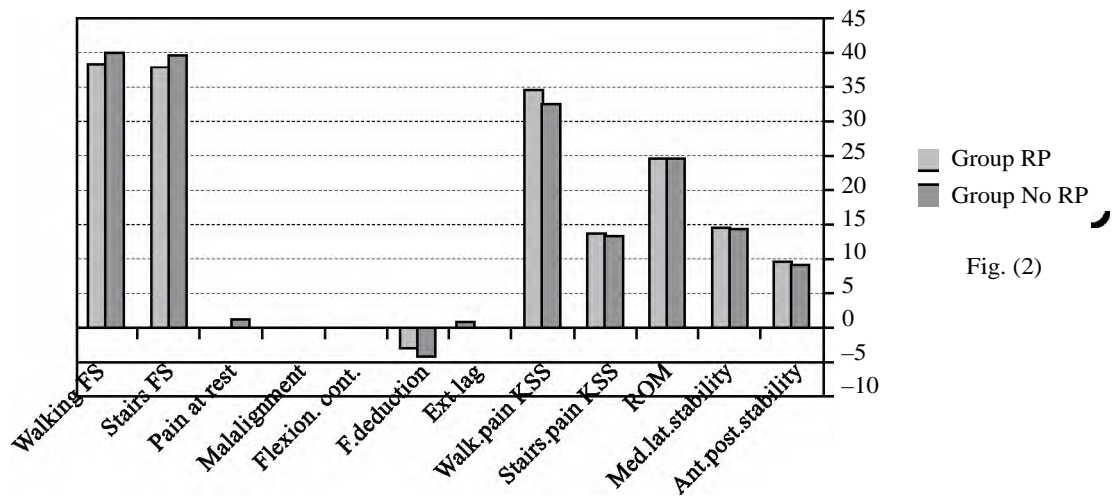


Fig. (2)

Case presentation:

Case RP:

Age: 61y. Sex: Male. Site: Lt. BMI: 25.8.

Knee Society Scoring (KSS): Table

Item	Pre-operative	Post-operative
1- Pain:		
A- Walking	0	30
B- Stairs	7	20
2- ROM:		
	15	25
3- Stability:		
A- Med/Lat	15	15
B- Ant/Post	15	10
4- Deduction:		
A- Ext. lag	-2	0
B- Flex. cont	-4	0
5- Mal-alignment:		
	0	0
6- Pain at rest:		
	-15	0
Total	31	100



Fig. (3-A): Pre-operative X-ray AP & Lateral view left side.



Fig. (3-B): Post-operative X-ray AP & Lateral view left side.



Fig. (3-C): Three month post-operative X-ray AP & lat view.



Fig. (3-D): Six month post-operative X-ray lat & AP view.

Age: 64y. Sex: Female. Site: Lt. BMI: 31.9.

Knee Society Scoring (KSS): Table

Item	Pre-operative	Post-operative
1- Pain:		
A- Walking	5	30
B- Stairs	5	15
2- ROM:	20	30
3- Stability:		
A- Med/Lat	10	15
B- Ant/Post	10	10
4- Deduction:		
A- Ext. lag	-10	0
B- Flex. cont	0	0
5- Mal-alignment:	0	0
6- Pain at rest:	0	0
Total	40	100
Functional score:		
1- Walking	15	45
2- Stairs	20	45
3- Functional deductions	-20	-
Total	15	85



Fig. (4-A): Pre-operative X-ray AP & Lateral view.



Fig. (4-B): One month post-operative X-ray AP and Lateral view.

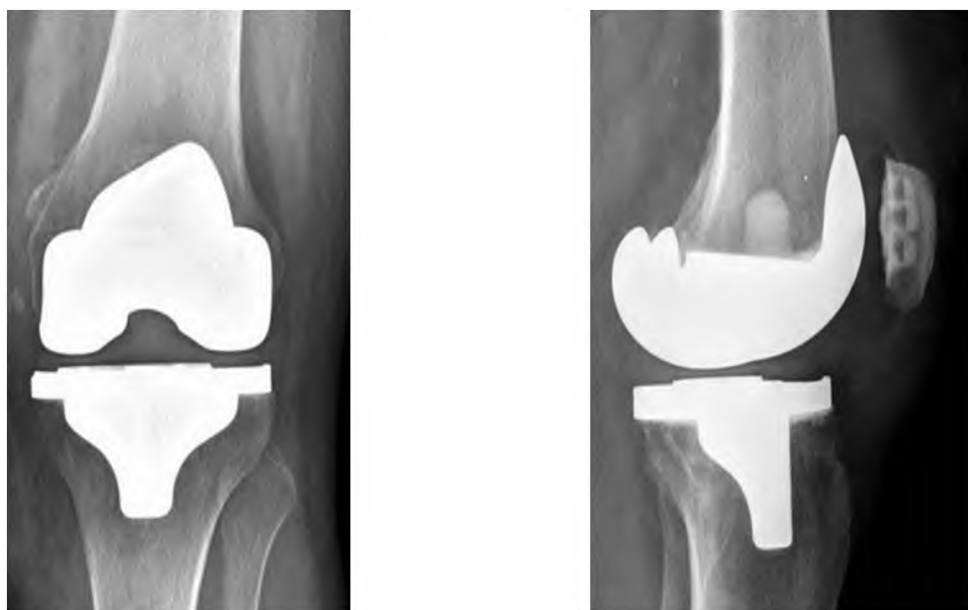


Fig. (4-C): Two months post-operative X-ray AP and Lateral view.



Fig. (4-D): Three months post-operative X-ray AP and Lateral & view.

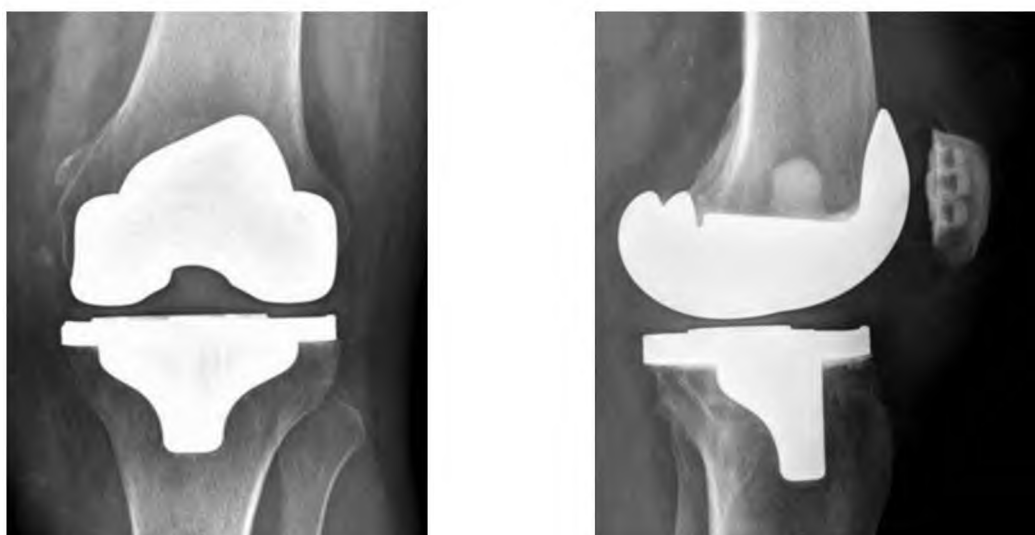


Fig. (4-E): Six months post-operative X-ray AP and Lateral view.

Discussion

In this study, we compared patients receiving TKA based on RP versus No RP.

In our cohort, we used TKA with a FB design which has yielded a good long-term result [11].

The most important finding of this study was that there is no statistically significant difference postoperative in KSS scores between group RP & No RP at 1 year follow-up. Our study documented also gratifying results of TKA.

We focused on good cementing technique, correct flexion and extension gaps balancing, correct deformity and well-balanced ligaments to achieve a high success rate.

The KSS changed in post-operative compared to pre-operative KSS. The mean pre-operative knee score in RP knee was 39 and the mean pre-operative functional score was 56.25 while in No RP knee group the mean pre-operative knee score was 38.6 and the mean pre-operative functional score was 55.75. In RP knee group the mean post-operative knee score was 94.70 which is considered excellent result and the mean post-operative functional score was 76 which are considered good result while in No RP knee group the mean post-operative knee score was 98.90 which is considered excellent result and the post-operative functional score was 74.75 which also considered good results.

Our results are actually consistent with results reported in previous research. In short-term follow up was reported greater improvements in pain and function in RP patients compared to No RP patients.

Overall moderate-severe ADL limitation was less frequent in RP versus No RP patients at 1st year (100).

On the other hand, we found no significant differences in pain KSS scores except Walk pain KSS score in which there is increase in mean postoperative score of group No RP in comparison to group RP.

These findings add to the current literature, which consists of mostly small studies and somewhat contradictory findings.

Kirwan et al., [18] studied 293 patients at 2.5 years had 335 operations (RP, knee 76; No RP, knee 54). A few patients showed deterioration in pain and function 1 year after surgery, but the remainder showed improvements which took 1 year or more to reach maximum and were main-

tained for at least 3 year. Reported greater improvements in pain and function in RP patients compared to No RP patients.

Judge et al., [13] studied 1991 patients receiving primary TKR in south-west London from 2005 to 2008. The primary outcome is the 6-month post-operative Oxford Knee Score (OKS). To classify whether patients had a clinically important outcome, he calculated a patient acceptable symptom state (PASS) for the 6-month OKS related to satisfaction with surgery. The strongest determinants of outcome include pre-operative pain/function those with less severe pre-operative disease obtain the best outcomes; diagnosis in relation to pain outcome-patients with No RP did better than those with RP. Deprivation those living in poorer areas.

Had worse outcome and pre-operative anxiety/depression led to worse pain. Differences were observed between predictors of pain and functional outcomes. But in our study we found that there is no difference in pain and functional outcomes in RP versus No RP.

Jasvinder et al., [14] for the 2-year cohort, the mean age was 68 years, 56% were women, and 18% were ages <60 years. BMI was >30kg/m² in 52% of patients and ASA score was class III/IV in 42%. The 5-year cohort had similar characteristics. The survey response rates were 65% (7,139 of 10,957 TKAs) at 2 years and 57% (4,234 of 7,404 TKAs) at the 5-year follow-up. He found that patients with RP who underwent primary TKA had better ADL outcomes compared to patients with No RP at 2 and 5 years. On the other hand, the pain outcomes after primary TKA did not differ in RP versus No RP. But in our study we found that there is no difference in functional and ADL outcomes in RP versus No RP.

Kennedy et al., [15] studied 2,032 patients over 3 decades from 1974 that had a 40% response rate, better composite pain and function outcome in RP versus No RP at 5 years post- TKA was shown.

Merrill et al. [16] studied 207 patients eligible TKR, including 161 RP compared to 96 No RP. In the Resurfacing group, the average KSS changed from 48.7 preoperatively to 92.2 postoperatively. The Resurfacing group knee function scores improved from 43.6 to 83.0. The knee range of motion increased from 105.5° to 111.4° and the alignment changed from .3° of varus to 3.9° of valgus. In the non Resurfacing group, the KSS average improved from 57.2 preoperatively to 87.2 postoperatively. The knee function scores changed from 39.3 to

77.2. The range of motion increased from 93.1° to 103.2° and alignment changed from 7.4° of valgus to 5.4° of valgus. Founding there were some minor variations in the outcome of (Resurfacing vs. non Resurfacing).

But in our study in the Resurfacing group, the average KSS changed from 39 preoperatively to 94.7 postoperatively. The Resurfacing group knee function scores improved from 56.25 to 76. The knee range of motion change from 19.15±2.64 to 25 and the alignment changed from -1.35±1.46 to

-0.10±0.44. In the non Resurfacing group, the KSS average improved from 18.6 preoperatively to 98.9 postoperatively. The knee function scores changed from 16.75 to 74.75. The knee range of motion change from 12.60±3.03 to 25 and the alignment changed from -2.75±4.26 to 0. Founding that there is no difference in pain and functional outcome in RP versus No RP.

Susan M. et al., [17] studied 4,456 eligible TKRs, including 136 No RP.

Table (5): Comparison between the result of this study and other similar study.

	Our study	Merril et al. [99]	Jasvinder et al. [100]	Judge et al. [96]	Susan M. et al.
Number of patients	40 Patients (20 RP&20 No RP)	207 Patients (161 RP&46 No RP)	7,139 patients	1991 patients	4456 Patients (4320 RP&136 No RP)
Type of study	RCT	RCT	RCT	RCT	RCT
Outcome parameters	KSS	KSS	OR,CI	OKS	WOMAC
Follow-up duration	1 years	2 years	2 years	6 months	2 years
KSS Knee score RP	94.7	92.2		-	
KSS Knee score No RP	98.9	87.2	-	-	-
KSS Function score RP	76	83	-	-	-
KSS Function score No RP	74.75	77.2	-	-	-
Odds ratios OR	-	-	ADL Pain RP: 21.7% 7.1 No 34.3% 9.1	-	-
95% Confidence interval CI	-	-	RP: RP: 0.5 0.8 No 1 RP: 1	-	-
Oxford Knee Score OSK	-	-	-	Pain Function RP: 0 0 No 1.68 1.23 RP:	-
WOMAC	-	-	-	-	Pain Function RP: 13.3 17.4 No 12.7 14.7 RP:
Result	No statistical difference	Some minor difference	No statistical difference	Observe some difference	No statistical difference

During 2 year follow-up data was available on 94.7% of patients. For RP patients, there were minimal differences between those who completed the 2 year follow-up survey (n=4220) and those who did not (n=236). And for No RP, 108 (79%) of patients had 2-year data. There was no significant difference between patients who responded to the 2-year questionnaire and those who did not for age (63.0 vs. 65.4; *p*-value=0.24), BMI (28.4 vs. 29.0; *p*-value=0.75), gender (female 90% vs. 93%; *p*-

value=1.00), or race (Caucasian 74% vs. 79%; *p*-value=0.62). However, those without 2 year data had less educational achievement. 96% of those without 2 year data had no college education compared to 56% of those with 2 year data (*p*-value <0.0001). In No RP cases WOMAC Baseline Pain 55.9 vs. WOMAC 2-year Pain 13.3 and WOMAC Baseline Function 58.7 vs. WOMAC 2-year Function 17.4. In cases RP WOMAC Baseline Pain 46.6 vs. WOMAC 2-year Pain 12.7 and WOMAC Base-

line Function 47.3 vs. WOMAC 2-year Function 14.7. He included all patients with No RP regardless of 2-year data, in order to maximize the size of the No RP cohort. Found that No RP patients undergoing primary TKR have excellent 2-year outcomes, comparable to RP, in spite of worse pre-operative pain and function. In this contemporary cohort, No RP is not an independent risk factor for poor outcomes.

The results highlight a number of important issues in relation to the effectiveness of TKR. Previous quantitative work suggests that TKRs relieve pain and improve mobility, with a 'good' or 'excellent' outcome in approximately 90% of patients [18].

The table below compares between this study and another study that is similar in design and functional assessment tools. We were not able to identify any difference between this study and other similar studies.

The main strength of our study is the fact that we examined outcomes using knee society scoring systems, which represent the most widely, used scoring systems for assessment of knee function following TKA. The used scoring systems include both patient filled and clinician filled questionnaires. The used common outcome measures aimed to report data in a standardized way to enable inclusion of the data in future meta-analyses.

The main limitation was the short follow-up duration. However, the main interests of the study were pain, active flexion and extension, alignment, stability and functional outcomes, which is clinically relevant within the first year postoperatively. It has been shown by Heck et al. (101) that most improvement in knee function following TKA occurs in the first year. Accordingly we believe that our study reliably compared these functional outcomes.

Long term outcome is also important. It was thought at the end of this study that long term analysis would lead to more valid conclusions.

Conclusion:

In this study, we tried to compare between the functional outcomes in Resurfacing compared to non Resurfacing after primary total knee arthroplasty, especially pain relief, stability, well aligned knee and restore range of motion, and improved function especially patient who can walk an unlimited distance and go up and down stairs normally which actually reveal no significant difference

between both groups while implant durability study need long term follow-up.

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المقارنة بين سطح الرضفة وعدم تسطحها في حالات استبدال مفصل الركبة بمفصل صناعي كامل

أجريت هذه الدراسة على ٤٠ مفصل ركبة في ٤٠ مريض مصاب بالتهاب مفصل مع الأم مبرحة تؤثر على أداء الواجبات اليومية الضرورية. وكان الهدف هو دراسة نتائج تغيير مفصل الركبة الكامل في هذه الحالات مع تغيير سطح عظمة الرضفة في ٢٠ ركبة (المجموعة الأولى) بمقابلة عدم تغيير سطح عظمة الرضفة في الـ ٢٠ ركبة الأخرى (المجموعة الثانية) من حيث تخفيف الآلام وتحسين وظيفة الركبة.

قسمت الـ ٤٠ ركبة المصابة إلى مجموعتين بالتناوب حسب طريقة معالجة السطح الغضروفي لعظمة الرضفة. المجموعة الأولى شملت ٢٠ ركبة حيث عولج سطح عظمة الرضفة الغضروفي بتغييره برضفة صناعية من مادة البولي إيثيلين وشملت المجموعة الثانية ٢٠ ركبة حيث عولج سطح عظمة الرضفة بإزالة الزوائد العظمية الطرفية والأنسجة الغضروفية المتراكمة وتنقيب سطح الرضفة في الأماكن التي لا تغطيها أنسجة غضروفية مع عدم إضافة رضفة صناعية.

– في المجموعة الأولى كانت الـ ٢٠ ركبة في ٢٠ مريض موجودون في هذه المجموعة.

– في المجموعة الثانية كانت الـ ٢٠ ركبة في ٢٠ مريض موجودون في هذه المجموعة.

في هذه الدراسة كانت نسبة الرجال إلى السيدات ٣/٣:١ في المجموعة الأولى، وفي المجموعة الثانية كانت النسبة ١:٠.٧ تراوحت أعمار المرضى الذين عولجوا في المجموعة الأولى ما بين ٥٠ إلى ٧٠ عاماً (متوسط العمر ٦٠ عاماً) وفي المجموعة الثانية تراوحت أعمارهم ما بين ٥٠ إلى ٧٢ عام (متوسط العمر ٦٠ عاماً).

كان المرض المتسبب في شكوى المريض في المجموعة الأولى هو الإلتهاب العظمي الغضروفي في ٢٠ ركبة وفي المجموعة الثانية أيضاً كان الإلتهاب العظمي الغضروفي هو المتسبب في شكوى ٢٠ ركبة.

تراوحت أوزان المرضى في المجموعة الأولى من ٦٨ إلى ١٠٠ كيلو جرام (متوسط الوزن ٨٣.٥٧ كيلو جرام) وفي المجموعة الثانية من ٥٥ إلى ١٠٥ كيلو جرام (متوسط الوزن ٨٢.٤٣ كيلو جرام).

اشتملت المجموعة الأولى على ١٠ ركب اليمنى و ١٠ ركبة يسرى، واشتملت المجموعة الثانية على ١١ ركبة اليمنى و ٩ ركبة يسرى.

تم علاج كل الحالات بتغيير كامل لمفصل الركبة في الفترة ما بين يوليو ٢٠١٤ حتى أبريل ٢٠١٨، وذلك باستعمال مفصل الركبة الثابت.

تم تغيير سطح عظمة الرضفة في كل حالات المجموعة الأولى (٢٠ ركبة) وعدم تغييره في كل حالات المجموعة الثانية (٢٠ ركبة) مع إجراء عملية تجميلية لسطح عظمة الرضفة وشملت هذه العملية إزالة الزوائد العظمية الطرفية لها وإزالة النسيج الغضروفي المتآكل وإجراء ثقب بسطح عظمة الرضفة في الأماكن التي لا يغطيها النسيج الغضروفي.

حالتان (١٠٪) في المجموعة الأولى و ٤ حالات (٢٠٪) في المجموعة الثانية احتاجت رقعة عظمية لأعلى عظمة القصبية من الناحية الأنسية أثناء الجراحة وقد تم التأم هذه الرقعة العظمية مع العظام المحيطة بها أثناء المتابعة بالفحص بالأشعة.

تراوح وقت إجراء الجراحة في المجموعة الأولى من ١٠٠ إلى ١٦٥ دقيقة (متوسط وقت الجراحة ١٢٧.١ دقيقة) وفي المجموعة الثانية تراوح الوقت من ٨٠ إلى ١٣٥ دقيقة متوسط وقت الجراحة ١١٠.٨ دقيقة.

تم تقييم نتائج الحالات قبل وبعد الجراحة بواسطة نظام التقييم الإكلينيكي والإشعاع بالمجموعة الركبة (١١٣، ١١٢) وتقييم نتائج المفصل ما بين عظمة الرضفة ومجراها بعظمة الفخذ بواسطة التقييم المعد بواسطة فيلر وزملائه (١٤٤).

فى المجموعة الأولى كان متوسط تقييم الحالات قبل إجراء الجراحة ٦٨.٨١ نقطة المعدل : من ٢٢ إلى ١٢٣ نقطة) وبعد الجراحة تحسن إلى ١٥٣.٧٦ نقطة (المعدل : من ١٠٤ إلى ١٩٥ نقطة). وكان التقييم الرضى قبل إجراء الجراحة ١٢.٤٨ نقطة (المعدل : من ٤ إلى ٢٣ نقطة) وبعد الجراحة تحسن إلى ٢٥.٨٦ نقطة (المعدل : من ١٣ إلى ٣٠ نقطة).

وفى المجموعة الثانية كان متوسط تقييم الحالات قبل إجراء الجراحة ٦١.٥٧ نقطة المعدل : من ١٧ إلى ١١٤ نقطة وبعد الجراحة تحسن إلى ١٥٩.٤٣ نقطة (المعدل من ١٢٣ إلى ١٩٧ نقطة). وكان التقييم الرضى قبل الجراحة ١١ نقطة (المعدل : من ٣ إلى ١٨ نقطة) وبعد الجراحة تحسن إلى ٢٦.٥٢ نقطة (المعدل : من ١٨ إلى ٣٠ نقطة).

ولم نجد فرق مهم من الناحية الإحصائية فيما يخص التقييم الإكلينيكي والرضى بعد الجراحة بين المجموعة الأولى والثانية (حيث كان معامل الإحتمال ٠.٤١ و ٠.٤٧) بالترتيب.

وكان التحسن فى تخفيف الآلام كبيراً حيث كان متوسط تقييم الام الركبة فى المجموعة الأولى قد تحسن من ٤.٧٦ نقطة (المعدل : من ٢ إلى ١٠ نقط) قبل الجراحة إلى ٤٦.٦٧ نقطة (المعدل : من ٢٠ إلى ٥٠ نقطة) بعد الجراحة، وفى المجموعة الثانية تحسن من ٤.٧٦ نقطة (المعدل : من ٢ إلى ١٠ نقط) قبل الجراحة إلى ٤٩.٢٩ نقطة (المعدل : من ٤٠ إلى ٥٠ نقطة) بعد الجراحة وقد ساعد تحسين الآلام إلى تحسين وظيفة الركبة وقدرة المريض على أداء واجباته اليومية بصورة جيدة.

كان التقييم الكلى فى المجموعة الأولى مرضى فى ١٧ مفصل ركبة (٨٥٪) وغير مرضى ٣ مفاصل (١٥٪) وفى المجموعة الثانية كان التقييم الكلى مرضى فى ١٨ مفصل ركبة (٩٠٪) وغير مرضى فى ٢ مفاصل (١٠٪).

وقد وجد أن تحسن الألم، اعتدال استقامة الركبة، تحسن حركة مفصل الركبة، ثبات الركبة، المسافة التى يستطيع المريض أن يسيرها، المقدرة على صعود وهبوط السلم وعلى النهوض من على الكرسي، قوة العضلة الرباعية، وألم أمام الركبة كلها قد تحسنت فى كلتا المجموعتين وفى هذه الدراسة لم نجد فرق مهم يميز أى من المجموعتين على الأخرى فيما يخص كل هذه النقاط.

أيضاً من هذه الدراسة وجد أن سبب حدوث المرض وجود ألم بمقدمة الركبة قبل الجراحة ودرجة تأكل السطح الغضروفى لعظمة الرضفة والسمنة وتسليك الأربطة الخارجية العظمة الرضفة وحدث ميل خارجى لعظمة الرضفة أثناء حركة مفصلاً لركبة بعد الجراحة وتغيير السطح الغضروفى لعظمة الرضفة أو عدم تغييرها يمكن اعتبارها مؤشراً أو يتنبأ بها لحدوث ألم أمامى للركبة بمنطقة ما بين عظمة الرضفة ومجرها بين لقمى عظمة الفخذ بعد الجراحة.

وقد حدثت مضاعفات لها علاقة بعملية تغيير مفصل الركبة فى حالتين (١٠٪) فى المجموعة الأولى وفى ٥ حالات (٢٥٪) فى المجموعة الثانية وشملت هذه المضاعفات رشع من مكان الشق الجراحى للجلد أمام الركبة، مشاكل فى التأم الشق الجراحى، جلطة بالأوردة الداخلية للساق.