

Rehabilitation Guidelines for Patients Undergoing Arthroscopic Knee Surgery for Meniscal Trimming

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Abstract: Meniscal injuries affects 60 to 70 cases per 100,000 people, In the USA, surgical procedures for the meniscus are performed on approximately 850,000 patients each year. The aims of the present study were to; assess knowledge and practice of patients undergoing knee arthroscopy for meniscal trimming, evaluate the effect of applying a rehabilitation guidelines on knowledge and practice of patients undergoing knee arthroscopy for meniscal trimming, and to examine the effect of the rehabilitation guidelines on the outcomes of patients undergoing arthroscopic knee surgery for meniscal trimming. Subjects and methods: A convenient sample of sixty adult patients (male and female) undergoing arthroscopic knee surgery for meniscal trimming were included in this study. The study was conducted at the orthopedic department and arthroscopic out-patient clinic at Assiut University Hospital. Two tools were utilized to fulfill the aims of this study; tool one patient's health needs assessment sheet and it was divided into three parts concerning; patient's sociodemographic characteristics, assessment of patient's physical status using the (modified Cincinnati knee rating scale), and part three was concerned with assessment of patient's knowledge and practices and mid thigh circumference along the four follow up appointments (pre, two weeks, one month and two months post arthroscopic surgery). Tool two represents the rehabilitation guidelines. Results showed that a high statistical significant difference was observed between the study and control groups collectively in all the study periods on the modified Cincinnati knee rating scale, knowledge and practice scores while there was no statistical significant difference in mid thigh circumference. Conclusion: providing written guidelines for patients was much more effective on the outcome of patients who have undergone arthroscopic knee surgery for meniscal trimming than those patients in the control group who received resident's oral instructions. Recommendations: a nurse rehabilitator is of great value in both the orthopedic department and the out-patient arthroscopy clinic and a rehabilitation instructions booklet is of great importance for the patients.

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1.Introduction:

The meniscus has many functions that are vital to the well-being of the knee. If the meniscus is excised, the incidence of subsequent knee arthritis is significantly increased. As a result, a torn meniscus should be repaired if possible (Thomas; 2007).

Meniscal tears are among the most common knee injuries, especially in athletically active individuals. An increased focus on sport and fitness in the general population has led to the increased incidence of meniscal injuries, making menisectomies and, more recently, meniscal repairs, some of the most frequently performed orthopedic interventions. More than 450,000 arthroscopic partial menisectomies occur annually in the United States, at a cost of several thousand dollars each year. Persistent disability can be significant after meniscal surgery (Meredith, et al., 2005).

Meniscus pathophysiology; In the United States, meniscal lesions represent the most common intra-articular knee injury, and are the most frequent cause

of surgical procedures performed by orthopedic surgeons. The mean annual incidence of meniscal lesions has been reported to be 66 per 100,000 inhabitants, 61 of which result in meniscectomy. Men are more prone to such injuries than women, with a male to female incidence ratio between 2.5:1 and 4:1, and overall incidence peaking at 20 - 29 years of age for both sexes. Meniscal lesions are most commonly found in the right knee and occur in all age groups, with the main etiological and pathophysiological factors varying and being highly dependent upon the patient's age (Eleftherios et al., 2011). Incidence of knee arthroscopy performed for meniscal tear from 1-11-2013 to 30-4-2013 was 41 cases according to knee arthroscopy unit records (Arthroscopy unit of Assiut University Hospital records 2013).

Diagnosing meniscal malfunction is greatly dependent upon both the experience and insight of a physician. A detailed patient history, a thorough physical exam, and modern imaging techniques can help guide the process toward reaching diagnostic

consensus. Starting from the patient's history, an accurate description of the injury's acquisition can set the ground for suspected meniscal tearing. Patient complaints concerning pain, swelling, or locking, and diagnostic characteristics during physical examination (joint effusion, joint line tenderness). The main tests are joint line palpation, the McMurray test, Lachman test and anterior drawer test. Imaging modalities that need to be applied when diagnosing such injuries are X-ray and MRI (**Greis et al., 2002**).

Complications of meniscal surgery include minor and major complications; minor complications as broken retrieved instrumentation, superficial portal drainage, swelling, ecchymoses, venous injury, post operative stiffness, etc..... (**Kline and Miller; 2003**). While major complications of meniscal surgery include; broken retained instrumentation, infection/sepsis, thrombophlebitis, pulmonary embolism, arterial injury, compartment syndrome, postoperative hematoma, arthrofibrosis, etc..... (**Sports medicine and arthroscopy review; 2004**).

Arthroscopy is a procedure that allows direct visualization of a joint to diagnose joint disorders (**Buckwalter; 2000**). Arthroscopy is used to examine joint structures, primarily the knee (**Sue and Patricia; 2002**).

Rehabilitation is a problem-solving and educational process aimed at reducing the disability experienced by someone (with physical impairment) as a result of a disease, but always within the limitations imposed by available resources and by the underlying disease (**Wade; 2005**).

Aims of the rehabilitation process are to maximize the participation of the patient in his or her social setting, minimize patient's pain and distress, and minimize the distress of and stress on the patient's family and/or his care-takers (**John and Jesse; 2007**).

Patients are educated before surgery on specific instructions regarding the postoperative rehabilitation protocol so they have a thorough understanding of what is expected after surgery. The patient is instructed to maintain elevation of the lower limb as often as possible during the first week after surgery, etc.... (**Arnoczky and Bullough; 2001 and Journal of orthopedic sports physical therapy; 2006**).

2. Subjects and methods:

Study design:

Quasi experimental research design was utilized to fulfill the aims of this work. This design is used to explain relationships, clarify certain events happened or both. This design is also a mean of examining causal relationships. Quasi experimental design has insufficient control when compared to experimental design in at least one of three areas; manipulation of

the treatment variables, manipulation of the setting, or selection of the subjects.

Study population:

The study included a convenience sample of 60 adult patients (51 males and 9 females) who underwent knee arthroscopy for meniscal trimming from time of admission in the department (pre operatively), those patients were followed up in their first visit in the arthroscopic out-patient clinic; two weeks post operatively, one month as well as after two months after surgery. Their ages ranged from 18 to 60 years (mean 30.15 ± 8.948 years). This sample was divided into two equal groups; the study and the control groups (30 patients for each). The control group who received the orthopaedic resident's pre discharge routine instructions and the study group with whom the rehabilitation guidelines were applied by the researcher.

Setting:

The study was conducted at the orthopedic department and the arthroscopic out-patient clinic of Assiut University Hospital.

Exclusion criteria:

- Patients who have an associated ACL injury.
- Patients having an advanced osteoarthritis.
- Poliomyelitis.
- Lower limb paralysis.
- Patients unwilling to participate in the study.

Tools:

Tool I: Patient's health needs assessment sheet:

This tool consists of three parts:

Part 1: Sociodemographic patient characteristics

Part 2: Assessment of patient's physical status:

(Modified Cincinnati Rating System Questionnaire): This questionnaire has been designed to give information as to how patient's knee pain has affected his/her ability to manage in everyday life.

This scale includes 8 sections:

1. Pain intensity
2. Swelling
3. Giving way
4. Overall activity level
5. Walking
6. Stairs
7. Running activity
8. Jumping or twisting

Section 1-Pain intensity: consisted of 6 items

Section 2-Swelling: consisted of 6 items

Section 3 - Giving Way: consisted of 6 items

Section 4 - Overall activity level: consisted of 6 items

Section 5 – Walking: consisted of 5 items

Section 6 – Stairs: consisted of 5 items

Section 7 - Running activity: consisted of 5 items

Section 8 - Jumping or Twisting: consisted of 5 items

Grading the Modified Cincinnati Rating System Questionnaire: (Bentley, Biant, Carrington, Akmal, Goldberg, Williams, Skinner and Pringle; 2003).

- | | |
|-----------------|-------|
| 1. Poor | <30 |
| 2. 2. Fair | 30-54 |
| 3. Good | 55-79 |
| 4. 4. Excellent | >80 |

Part 3: Assessment of patient's knowledge, practices and mid-thigh circumference

Tool II: Rehabilitation guidelines:

This tool was developed based around the content of the best practice statement for post arthroscopic knee surgery for meniscal trimming; it was applied by the researcher

The study was conducted through:

- Data were collected at the orthopaedic surgery department and the out-patient arthroscopy unit at Assiut University hospital during the period from September 2011 to September 2012.
- The content validity was done by 5 expertise in the medical surgical nursing field and orthopedic field.
- An official permission was obtained from the head of orthopedic department, and the head of the arthroscopy unit.
- Patient's agreement for voluntary participation was obtained after the purpose and nature of the study were explained.
- Data were assured confidentiality and anonymity and were collected using the pre-mentioned study tools.
- A pilot study was conducted on 10% (6) of patients to examine the feasibility of the study and clarity of the tools.

Limitations of the study:

1. Patients who does not comply with the scheduled follow up visits were excluded from the study.
2. As this study was utilizing a quasi experimental research design; there was no randomization in the study sample so there was no equality between study and control group regarding their educational level which could be one of the factors affecting the study results.
3. The two month follow up period was not long enough to make a difference in mid thigh circumference of patients who have a quadriceps muscle wasting.

3. Results:

Table (1) shows that the highest percentage of both the study and control groups were between the age 18–30 years old, they were male; the highest group in the control group were illiterate (66.7 %) while in the study

group they were highly educated (36.7 %). The highest percentage were machinery workers. Highest percentage of patient diagnosis in was medial meniscus injury representing (70 %). Finally as regards activity at injury; the highest percentage in the control group (63.6 %) was at work, while in the study group it was related to sports (36.3 %).

Table (2) shows a high statistical significant difference between the study and control groups collectively in all the study periods regarding pain intensity, swelling, giving way, overall activity, walking, climbing stairs, and running, while there was no statistical difference in jumping or twisting.

Table (3) shows a highly statistical significant difference between the control and study groups regarding their knowledge pre, two weeks, one month and two months post arthroscopic knee surgery for meniscal trimming. The mean knowledge scores pre surgery were 3.10 and 4.73 in the control and study groups respectively while these scores after two months have improved significantly to be 6.00 and 8.93 in the control and study groups respectively.

Table (4) shows a high significant statistical difference between the control and study groups regarding their practice pre, two weeks, one month and two months post meniscal trimming, the mean practice scores pre surgery were 1.20 and 2.47 in the control and study groups respectively while this mean score has improved significantly two months post meniscal trimming to be 4.87 and 6.10 in the control and study groups respectively.

Table (5) shows that there was no statistical significant difference between the control and study groups regarding their mid thigh circumference pre, two weeks, one month, and two months post arthroscopic knee surgery for meniscal trimming.

4. Discussion

The aims of the present study are four folds; to assess knowledge and practice of patients undergoing knee arthroscopy for meniscal trimming, to evaluate the effect of applying a rehabilitation guidelines on knowledge and practice of patients undergoing knee arthroscopy for meniscal trimming, to attempt to examine the effect of the rehabilitation guidelines on the outcomes of patients undergoing arthroscopic knee surgery for meniscal trimming, and to assess satisfaction of patients who will undergo arthroscopic knee surgery for meniscal trimming with medical care received in the out-patient arthroscopy clinic.

Magnitude of the problem; Meniscal injuries are likely to be the most common type of knee injury that requires surgical intervention. In the USA, surgical procedures for the meniscus are performed on approximately 850,000 patients each year, according to the American Academy of Orthopedic Surgeons research department (**American Academy of**

Orthopedic Surgeons: Research Department 2008).

Table (1): Comparison between the control and study group as regards socio-demographic characteristics, medical diagnosis and activity at injury

Item	Control group (N=30)		Study group (N=30)	
	No.	%	No.	%
Age:				
- 18 – 30	20	66.7	21	70
- 31 – 45	6	20	7	23.3
- 46 and more	4	13	2	6.7
Mean age ± standard deviation	31.13 ± 10.030		29.17 ± 7.764	
Sex:				
- Male	27	90	24	80
- Female	3	10	6	20
Level of education:				
- Illiterate	20	66.7	7	23.3
- Read & write	6	20	8	26.7
- Secondary education	1	3.3	4	13.3
- High education	3	10	11	36.7
P value	0.0005			
Occupation:				
- Office work	3	10	6	20
- Machinery work	18	60	9	30
- Farmer	6	20	3	10
- House wife	3	10	5	16.7
-Sport trainer	---	---	1	3.3
-Student	---	---	3	10
-Not working	---	---	3	10
P value	0.145			
Patient diagnosis:				
-LMI	5	16.7	8	26.7
-MMI	21	70	21	70
-L & M MI	2	6.7	1	3.3
-Degenerative MI	2	6.7	---	---
Involved knee:				
-Right	15	50	14	46.7
-Left	14	26.7	16	53.3
-Both	1	3.3	---	---
Activity at injury:				
-ADLs	3	10	3	10
-Sports	7	23.3	11	36.6
-Traffic	1	3.3	6	20
-Work	19	63.3	10	33.3

Table (2): Comparison between the study and control group of the Cincinnati knee rating scale regarding all periods of follow up.

Source	Physical Status	df	F	P value
Between Periods of the two Groups	Pain Intensity	3	11.029	0.001
	Swelling	3	18.615	0.001
	Giving Way	3	3.871	0.010
	Overall activity level	3	11.804	0.001
	Walking	3	3.879	0.010
	Stairs	3	10.393	0.001
	Running activity	3	5.382	0.001
	Jumping or Twisting	3	0.056	0.983

Table (3): Comparison between the control and study group regarding their knowledge pre, two weeks, one month and two months post arthroscopic meniscal trimming.

	Group	Mean \pm St. deviation	P value
Knowledge pre	Control	3.10 \pm 2.187	0.0005
	Study	4.73 \pm 4.331	
Knowledge two weeks	Control	5.73 \pm 2.149	
	Study	7.73 \pm 4.616	
Knowledge one month	Control	5.97 \pm 1.974	
	Study	8.33 \pm 4.172	
Knowledge two months	Control	6.00 \pm 2.068	
	Study	8.93 \pm 4.177	

Table (4): Comparison between the control and study group regarding their practice pre, two weeks, one month and two months post arthroscopic meniscal trimming.

	Group	Mean \pm St. deviation	P value
Practice pre	Control	1.20 \pm 1.562	0.0005
	Study	2.47 \pm 1.479	
Practice two weeks	Control	6.10 \pm 1.647	
	Study	6.70 \pm 2.336	
Practice one month	Control	6.10 \pm 1.647	
	Study	6.37 \pm 2.025	
Practice two months	Control	4.87 \pm 0.571	
	Study	6.10 \pm 1.647	

Table (5): Comparison between the control and study group regarding mid-thigh circumference pre, two weeks, one month and two months post arthroscopic meniscal trimming.

Mid-thigh circumference	Group	Mean \pm St. deviation	P value
Pre-surgery	Control	49.01 \pm 9.352	0.067
	Study	50.32 \pm 3.429	
Two weeks post surgery	Control	49.04 \pm 9.361	
	Study	50.33 \pm 3.442	
One month post surgery	Control	49.03 \pm 9.353	
	Study	50.32 \pm 3.429	
Two months post surgery	Control	49.07 \pm 9.353	
	Study	50.32 \pm 3.435	

The present study included 60 patients, their mean age was (30.64) years. All patients participated in the study their ages ranged from (18 : 56) years. Great male predominance was observed in the studied groups (85 %). As regard the educational level, the majority of the patients were illiterate or received basic education (68.33 %). Regarding their occupation; about half of the studied group were machinery workers.

The present study also revealed that there was a significant relation between patient's age and their injury, the majority of the studied sample their ages ranged from 18 to 30 years of age.

In a study that was conducted by Zarko Dasic and Dragan Radoicic (2011) the mean patient age was 36.6 years (range from 15 to 81 years). While Domino and Frank (2008) found that the predominant age for meniscal tear for both males and females was as follows; males 31–40 years and females 11–20

years. However in a recent study that was conducted in (2008) by Englund, Guermazi, and Gale they found an increased prevalence of meniscal damage with increasing age, although, the majority of individuals were asymptomatic.

As regard male to female ratio; the present study found that the majority of the studied sample in both the study and the control groups were male (80 % and 90 %) respectively. Out of the 60 patients enrolled in the present study there were 51 male patients and only 9 patients were female.

In accordance with this study result; a study that was carried out by Zarko Dasic and Dragan Radoicic (2011), on 213 patients in the orthopedics and Traumatology clinic (68 patients in the Clinical Center in Podgorica, Montenegro, and 145 patients in the Medical Academy in Belgrade, Serbia) in a 24-month period, from 2006 to 2008; the study revealed that meniscal tears are more common in males. There

were 171 men (80.28%) and 42 women (19.72%). The male : female ratio ranges from 2.5 : 1 to 4 : 1.

In the same line with these results Kocabey , Nyland , Isbell , and Caborn (2004) in a retrospective study on meniscal repair they found that; out of the fifty-two patients who participated in this study (35 patients were males and 17 patients were females).

The present study revealed that there was a statistical significant difference between the study and control group regarding their educational level, this is because there was no randomization in the type of research utilized in this study but it was a benefit in that those patients who received the rehabilitation guideline booklet so they were more able to get use of each and every point in it regarding the theoretical part concerning the surgery and its instructions.

Regarding patient occupation in the present study there was no statistical significant difference between the study and control group and this is also a benefit as that half of the studied sample in both the study and control group their injury was related directly to their work.

As regard patient's diagnosis; the present study revealed that the majority of the studied sample in both the study and control groups were having a medial meniscus tear, while involvement of the lateral meniscus represents about fifth of the studied sample in both the study and the control group.

As regard medial to lateral meniscus tear; Kalliakmanis et al., (2008), in their study that was conducted from 2001 to 2006, on 265 patients who underwent 280 meniscal repairs. There were 181 medial meniscus tears and 99 lateral meniscus tears.

In the same line; A recent study published by Logan and colleagues (2009), this study investigated the long-term outcomes of meniscal repairs. Forty-two athletes underwent 45 meniscal repairs, Thirty-three percent of the meniscal repairs were to the lateral meniscus and 67% to the medial meniscus.

Regarding knee involved in the present study there was an increased incidence of left knee affection than right knee. Half of the studied samples were having a left knee injury, less than half were having a right knee injury and only one case was having both knees affected.

In the same line with this study result; in the same study that was conducted by Zarko Dasic and Dragan Radoicic (2011), their results revealed that meniscus lesions that arthroscopically treated were 119 left knees and 94 right knees.

Looking at the activity at injury; the results of the present study revealed that the majority of the studied sample their injury was related to work. This may be related to the nature of their work as the majority of the studied sample were machinery

workers. While about one third of the cases were having a sport injury.

In the same line with this result; Widuchowski et al., (2007) in their study of articular cartilage defects, which involved 25,124 knee arthroscopies, they found that Thirty-two percent to 58% of articular cartilage lesions are the result of a traumatic, noncontact mechanism of injury.

In the same context; Szczodry et al., (2009) and Bhosale, and Richardson (2008); their study results declared that injuries to the articular cartilage can be the result of major trauma or repetitive minor trauma.

The results of the present study revealed that there was a high statistical significant difference between the study and control group regarding scores of the Cincinnati knee rating scale collectively in the four follow up periods, there were a statistical difference in the pain level, swelling, giving way, overall activity, walking, climbing stairs, and running. While there was no statistical difference in jumping or twisting that might be related to that activity is so much strenuous and the duration of follow up was not long enough for patients to return to that activity.

The results of the present study revealed that there was a significant statistical difference between the control and study groups regarding their knowledge pre, two weeks, one month and two months post meniscal trimming surgery (P value = 0.0005).

There was a significant statistical difference between the control and study groups regarding their practice scores pre, two weeks, one month and two months post meniscal trimming surgery (P value = 0.0005).

And finally the results of the present study revealed that there was no statistical significant difference between the study and control group regarding their mid-thigh circumference and this may be related to that; the duration of follow up was not long enough to make a great difference in the mid-thigh circumference, or that patients with a meniscal tear does not have a noticeable quadriceps muscle wasting.

References:

1. **American Academy of Orthopedic Surgeons:** Research Department (2008).
2. **Arnoczky SP and Bullough PG. (2001):** Healing of knee ligaments and menisci. In: Insall JN, Scott WN, eds. Surgery of the Knee. Philadelphia, PA: W.B. Saunders Company; 457-471.
3. **Arthroscopy unit of Assiut University Hospital records 2013.**

4. **Bentley G, Biant LC, Carrington RW, Akmal M, Goldberg A, Williams AM, Skinner JA and Pringle J. (2003):** A prospective, randomized comparison of autologous chondrocyte implantation versus mosaicplasty for osteochondral defects in the knee. *J Bone Joint Surg Br.*;85(2):223-30.
5. **Bhosale AM and Richardson JB. (2008):** Articular cartilage: structure, injuries and review of management. *Br Med Bull.* 87:77–95. <http://dx.doi.org/10.1093/bmb/ldn025>.
6. **Buckwalter, J. (2000):** Orthopaedic basic science: Biology and biomechanics of the musculoskeletal system (2nd ed.). Rosemont, IL: American Academy of Orthopaedic Surgeons.
7. **Domino and Frank J. (2008):** 5-Minute Clinical Consult, (17th Edition). Lippincott Williams & Wilkins.
8. **Eleftherios A. Makris, Pasha Hadidi and Kyriacos A. Athanasiou (2011):** The knee meniscus: Structure, function, pathophysiology, current repair techniques, and prospects for regeneration. Department of Biomedical Engineering, University of California. www.elsevier.com.
9. **Englund M, Guermazi A, Gale D, (2008):** Incidental meniscal findings on knee MRI in middle-aged and elderly persons. *N Engl J Med.*; 359:1108–1115. <http://dx.doi.org/10.1056/NEJMoa0800777>.
10. **Greis PE, Bardana DD, Holmstrom MC and Burks RT. (2002):** Meniscal injury: Basic science and evaluation. *J Am Acad Orthop Surg*;10:168e76.
11. **John C.Y. Leong and Jesse Jupiter (2007):** Orthopedic Rehabilitation, Assessment, and Enablement, by Springer-Verlag Berlin.
12. **Journal of orthopedic sports physical therapy (2006):** Volume 36. Number 10.
13. **Kalliakmanis A, Zourntos S, Bousgas D, Nikolaou P. (2008):** Comparison of arthroscopic meniscal repair results using 3 different meniscal repair devices in anterior cruciate ligament reconstruction patients. Department of Sports Medicine, Medical Centre, Athens, Greece.
14. **Kline A, Miller M. (2003):** Complications in meniscal surgery. *Operative Techniques in Sports Medicine*; 11:134–143.
15. **Kocabey Y, Nyland J, Isbell WM, Caborn DN. (2004):** Patient outcomes following T-Fix meniscal repair and a modifiable, progressive rehabilitation program, a retrospective study.
16. **Logan M, Watts M, Owen J, Myers P. (2009):** Meniscal repair in the elite athlete: results of 45 repairs with a minimum 5-year follow-up. *Am J Sports Med.* 37:1131–1134. <http://dx.doi.org/10.1177/0363546508330138>.
17. **Meredith DS, Losina E and Mohamed NN, (2005):** Factors predicting functional and radiographic outcomes after arthroscopic partial meniscectomy: a review of the literature. *Arthroscopy.* 21:211–223.
18. **Noyes FR, Barber SD and Mooar LA. (1989):** A rationale for assessing sports activity levels and limitations in knee disorders. (246):238-49.
19. **Sports medicine and arthroscopy review (2004):** 12 (3): 148-159.
20. **Sue C. DeLaune and Patricia K. Ladner (2002):** Fundamentals of Nursing: Standards & Practice, Second Edition, Chapter 28 Diagnostic Testing p.p. 668.
21. **Szczodry M, Coyle CH, Kramer SJ, Smolinski P and Chu CR. (2009):** Progressive chondrocyte death after impact injury indicates a need for chondroprotective therapy. *Am J Sports Med.* 37:2318– 2322. <http://dx.doi.org/10.1177/0363546509348840>.
22. **Thomas R. Carter (2007):** Meniscus repair in 2007, Lippincott Williams and Wilkins, Philadelphia.
23. **Wade DT (2005):** Clinical Rehabilitation, 16(6):579–581.
24. **Widuchowski W, Widuchowski J, Trzaska T. (2007):** Articular cartilage defects: study of 25,124 knee arthroscopies. *Knee.* 2007; 14:177–182. <http://dx.doi.org/10.1016/j.knee.02.001>.
25. **Zarko Dasic and Dragan Radoicic (2011):** Arthroscopic partial medial meniscectomy. *Orthopedics and Traumatology Clinic.*

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