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THE EFFICACY OF EARLY PROPRIOCEPTIVE NEUROMUSCULAR TRAINING AND MYOFASCIAL RELEASE TECHNIQUE FOLLOWING ARTHROSCOPIC MEDIAL MENISCAL REPAIR, A PILOT STUDY

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Abstract

Background: There has been no consensus in literature as to what an ideal rehabilitation protocol would be for patients who have undergone arthroscopic meniscal repairs. Recently the focus has shifted from the traditional restrictive protocols to accelerated rehabilitation protocols indented at early return to full functional status and sporting activities. We aim to conduct a pilot study to examine the efficacy of an accelerated protocol incorporating principles of myofascial release and proprioceptive neuromuscular training after arthroscopic medial meniscal repair. **Materials and Methods:** A total of 8 patients who underwent isolated arthroscopic medial meniscus repair were included in the study. They were randomized equally into the control group (traditional protective protocol) and the experimental group (accelerated protocol with myofascial release and proprioceptive neuromuscular training). Rehabilitation was started 1 week after surgery. Baseline visual analogue score (VAS) and knee extension lag (KEL) measurements were done. The goal was to achieve 900 knee flexion, no knee extension lag and no pain at 12 weeks post-surgery. At 6- and 12-weeks follow-up, VAS and KEL measurements and Knee Osteoarthritis Outcome Score (KOOS) subsets at 12 weeks were used to evaluate outcomes. **Results:** Both groups showed significant improvement in pain score, knee extension lag but the mean difference and level of significance was higher in the accelerated protocol group. The KOOS subset scores were higher in the accelerated protocol group compared to the protective group. **Conclusions:** The accelerated protocol incorporating myofascial release and neuromuscular proprioceptive training can be considered as a feasible option for rehabilitation after arthroscopic medial meniscus repairs. Larger studies, ideally, a prospective randomized studies with large sample sizes are required to assess whether the long-term outcomes are statistically significant.

INTRODUCTION

Meniscus tears are one of the most common knee pathologies. With numerous studies demonstrating early progression to degeneration due to altered biomechanics after partial or complete meniscectomy, the focus has shifted to ‘save the meniscus’ when possible. From a biomechanical point of view, the menisci serve different functions - load distribution, shock absorption, cartilage nutrition, stability and friction lowering across the joint by increasing its congruency.[1] The shock absorption and load distribution functions depend on the unique macro-geometry (two different orientations of the collagen fibers, namely circumferential and radial) and the micro-structure of the meniscal tissues (72% water content and 28% extracellular matrix with type 1 collagen content). The circumferential fibers convert the compressive forces across the joint and create a ‘hoop stress effect’. The radial fibers counter the longitudinal splitting forces of the circumferential fibers and maintain the structural integrity of the meniscus. It was also noted that the inner third of the meniscus deals with the compressive forces while the outer two-third counteracts the radial tension forces.[1] In case of a vertical longitudinal tear of the inner third or half of the meniscus, the peripheral circumferential fibers (and hoop stresses) are maintained, allowing early post-operative weight bearing and unrestricted range of motion (ROM). However, if a radial tear disrupts the hoop stress effect, a more conservative approach with non-weight bearing protocol and restricted ROM would be the path forwards.[2]

Currently, there is no consensus or clear evidence for a standardized post-operative rehabilitation protocol after meniscal repair.[3] The literature is conflicting regarding the timing of weight-bearing, the period at which the ROM is allowed and the timing of return to sport. [4,5] The early literature on meniscal repair recommended a restrictive rehabilitation approach until the meniscus was fully healed. However, concerns about rapid muscle atrophy and the development of strength deficits promoted the use of accelerated rehabilitation protocols with early weight-bearing and unrestricted ROM, regardless of the tear configuration. [4-7] Recent studies suggest that early or immediate weight-bearing does not have any biomechanical disadvantages.[7]

Biomechanical evidence from a few cadaveric studies showed that a high degree of flexion (90°) and early weight-bearing could be safe for certain types of meniscal repairs. Using porcine models, Richards et al.[8] demonstrated that weight-bearing could reduce and stabilize longitudinal vertical meniscal repairs and potentially dislocate radial tear repairs. This finding is consistent with the principle of hoop stresses described above. Additionally, Ganley et al.[9] used Computed Tomography (CT) scans and metal markers embedded in meniscal lesions to evaluate the effect of knee flexion and loading (100 lbs) on meniscal healing. They did not find any significant gapping. Lin et al.[10] conducted a similar study on porcine cadavers to evaluate the effect of ROM on meniscal repairs by creating a 2.5 cm posteromedial tear and repairing it with inside-out sutures. The researchers took the knee through 90°, 110° and 135° of flexion and measured the ensuing displacement. They found that neither the meniscal tear nor the meniscal repair showed significant gapping. McCulloch et al.[11] performed a similar cadaveric study on eight knees: 1 mm beads were implanted in the menisci and pneumatic actuators delivered muscle loads and forces on each knee, simulating the stance phase of gait. The meniscal motion was measured using biplanar radiography and radiostereometric analysis at loading response, midstance, and toe-off positions in knees with (a) intact, (b) posterior longitudinal tear and (c) after inside-out repair. They found that the tissue spanning the longitudinal tear site underwent compression rather than gapping open in all states (a, b and c).

Lind et al.[12] conducted the one prospective randomized trial in the literature. They compared the effect of an accelerated program with 2 weeks of toe touch weightbearing (WB) and immediate 0-90° ROM (32 patients) versus restricted rehabilitation with 6 weeks toe-touch WB, hinged brace and gradual ROM (28 patients) in a total of 60 patients. At 2-year follow-up, they had 28% failure rates with the accelerated cohort and 36% with the restricted one. They found no difference in the functional outcome score and healing rates at the 2-year mark. They concluded that a free accelerated rehabilitation protocol was safe with a low failure rate. Mariani et al.[7] in a non-randomized cohort study (level 3) study on 22 patients who underwent outside-in sutures for posterior horn longitudinal medial meniscus tears (the most common pattern in practice) promoted immediate WB as tolerated and unrestricted ROM. On MRI examination at the final follow-up, only three patients (9%) had a re-tear with 1-mm gaping (considered a failure). Barber et al.[6] prospectively evaluated 41 patients who underwent an all-inside meniscal repair with FastFix sutures and followed an accelerated rehabilitation with full WB without brace and allowance of knee flexion to 90°. The average length of follow-up was 31 months. They had a 17% (7 patients) failure rate - a second look arthroscopy showed a failure of healing. They concluded that their protocol of all-inside repair and accelerated rehab had an 83% success rate.

Good results have been reported with restricted rehabilitation protocols too. Noyes et al.[13] in a non-randomized cohort of 29 patients (level 3) who underwent partial WB for 4-6 weeks and graduated ROM from 0-135° over 6 weeks reported excellent results with only a 25% failure rate at 51 months. Logan et al.[14] in a cases series of 42 patients on protected WB for 6 weeks and graduated ROM reported failure rates of only 24% at 102 months follow-up. Haklar et al 15, subjected five patients to strict non-WB for 6-8 weeks and reported a 0% failure rate at 31 months follow-up (level 3 evidence).

Stecco et al.[16] emphasized the concept of myofascial unit (MFU), which includes all the motor units responsible for moving a joint in a specific direction and the overlying muscular fascia. All the forces generated by an MFU are considered to converge in one point, called the center of coordination (CC); each CC has a precise anatomical location within the muscular fascia. If the fascia in this specific area is altered, or ‘‘densified’’, then the entire MFU contracts anomalously, resulting in non-physiological movement of the corresponding joint, which can cause joint pain. According to the Fascial Manipulation model, the area where the patient perceives pain is called the center of perception (CP), thus, for each MFU one CP is described.

Myofascial release (MFR) is a manual therapy technique or a hands-on technique that uses applied pressure and stretching to muscles and fascia to improve the movement of the muscles and the surrounding fascia. It does this by releasing the bonds between muscles, integuments, and fascia to eliminate pain, improve motion and maintain myofascial balance within the body. The effectiveness of MFR in treating structural imbalances, acute and chronic pain, muscle spasms, muscle, trigger points, post-operative treatment of ligament reconstructions and replacements has been validated in the literature.[17,18]

Proprioception plays a vital role in postoperative rehabilitation. The inputs from the sensory organs are processed in the brain and integrated with visual and vestibular information to generate a position and movement through space. Proprioceptive training can stimulate the sensory organs to relay specific signals to control the relevant muscles to maintain stability through specific dynamic movement exercises such as repetitions in balancing, positioning, gait, flexibility and agility.[19,20]

Proprioceptors are located in the outer one-third of the meniscus. They sense the condition of the movement from the knee joint and their surrounding muscles and play an important role in the maintenance of knee stability by regulating the knee muscle tone through proprioceptive feedback. Al Dadah et al.[21] showed that patients with isolated meniscal tears had a significant proprioceptive deficit when compared to healthy subjects with an uninjured knee.

Considering several studies on early WB importance following meniscal repair and lack of evidence on post-operative meniscal repair, early proprioceptive neuromuscular training (PNT) and myofascial release (MFR) technique, this study is proposed to investigate the efficacy of early PNT and FR technique following a meniscal repair of the knee.

MATERIALS AND METHODS

Study Design

Pilot study and pre and post analysis

Period of Study

12 weeks

Protocol of intervention used is as below.

Type of intervention	Accelerated Intervention	Conservative Intervention
1-3 weeks	1st week patients were taught on static quadriceps exercise at multi angle, glutei, Straight leg raise. The above exercise was given only, following Myofascial release technique applied it on quadriceps, hamstring and gastrocnemius and soleus muscle. The above prescribed exercised progressed slowly by increasing range by active knee flexion with hinge brace at different angle till 3 weeks	Patient were instructed to do multiangle static quadriceps and gluteal exercise. Active knee flexion within pain limit, 0-to-30-degree range supported by hinge brace. Interferential Therapy, cryotherapy treatment given to modulate pain.
3-6 weeks	The same exercise continued but range limited to 90-degree flexion with more repetition and slowly assisting last degree active knee extension. Myofascial release technique applied it on quadriceps, hamstring and gastrocnemius and soleus muscle prior to do Therapeutic exercise. Core stabilization exercise are introduced- plank- retraining of transverse abdominal and multifidus	The above exercise and protocol continued with progression on Range of motion, quadriceps facilitation training, core stabilization exercise up to 6 weeks.
6-12 weeks	Patient progressed his strengthening of quadriceps by adding more resistance. Affected single leg standing proprioceptive neuromuscular facilitation exercise progressed by changing centre of mass, moving upper body forward, side ward giving more challenging proximal and distal segment of knee muscle to activate in coordinated manner.	Active knee flexion range of motion exercises, progressive quadriceps strengthening exercise with resistance TheraBand, weights in open kinetic chain continued
Orthotic usage	1-3 weeks: Patient were instructed to apply Ice following exercise and was kept in hinged knee brace locked in full extension rest of day.	Knee immobilizer and crutches for 12 weeks
Ambulation Progression	Week 1-3: Subjects were taught non-weight bearing gait with axillary crutches Week 4: Partial weight bearing – on exercise mat in front of mirror with hinged knee support were taught to the patient to facilitate proprioception Week 5: Progressed to 50 % weight bearing or weight bearing tolerance Week 6: Progressed to full weight bearing on with heel to toe pattern on exercise mat.	Week 1-6 : Patients was on knee immobilizer and were taught on non-weight bearing gait with axillary crutches. Week 6-12: partial weight bearing started and progressed towards to full weight bearing gait pattern without axillary crutches by 12th week

Eight patients (four females and four males) of mean age group 31 and 31.4 years, respectively, had a history of medial meniscus injury and underwent medial meniscal repair. Techniques used were the all-inside repair for the posterior horn, inside-out repair for the middle horn and outside-in repair for anterior horn tears. The patients were referred by the orthopedic surgeon for physical therapy rehabilitation. Out of the four female patients, two were housewives and the other two were recreational athletes. Two of the male subjects were recreational athletes, and the other two were recreational football players.

Exclusion Criteria

1. Concomitant anterior cruciate ligament reconstruction and meniscal repair
2. Radial or flap tear of the meniscus
3. Lateral meniscal repair

Subjects are randomly divided into two groups and enrolled in one of the two protocols proposed -

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accelerated protocol (AP) and protective protocol (PP). Details of the study and protocol were explained to each subject, and they signed an informed written consent obtained prior to enrolment in the trial.

Goal was to achieve 90° knee flexion, maintain muscle strength and no knee extension lag (KEL) at 12 weeks post-operative.

Outcome Measures

1. Visual analogue scale (VAS)
2. Knee extension lag (KEL)
3. ROM at the end of 1, 6 and 12 weeks for all subjects.
4. Knee injury and Osteoarthritis Outcome Score (KOOS) at 12th week.

Data of outcome measures was statistically analyzed with SPSS software using the 't'-Test and one-way ANOVA. The mean differences of the pain scores and the knee extension lag of the Accelerated protocol group were compared with the control group treated with the PP, and the actual pattern of variation in all the categories was observed. The main statistical tool used in this analysis was the one-way ANOVA to find the significance between the groups based on the week 1, 6 and 12 measurements of the outcome variables.

An alpha level of $P<0.05$ was the level of significance for the test.

A dependent t-test was performed to analyze the efficacy of treatments within the groups individually. The baseline measurements of both groups were tested for homogeneity using Leven's Test prior to the group comparisons. The values of the KOOS (both total and subset scores) were also analyzed using the independent t-test to obtain the significance between the groups in terms of their improvement.

Findings

Out of the eight patients selected for the study following meniscal repair of the knee, four were subject to the accelerated protocol (AP) to assess for the possible advantages of proprioceptive neuromuscular training (PNT) and Myofascial release (MFR) whereas four of the patents were subject to the traditional Protective protocol (PP). The mean age was 31 and 31.34 years, respectively, in the accelerated and PP groups, respectively. Out of the four patients in the AP group, the two males were recreational athletes, and the two females were housewives. Out of the four patients in the PP group, two males were recreational football players and the two females were recreational athletes.

RESULTS

Figure 1: Partial weight bearing on exercise mat in front of a mirror

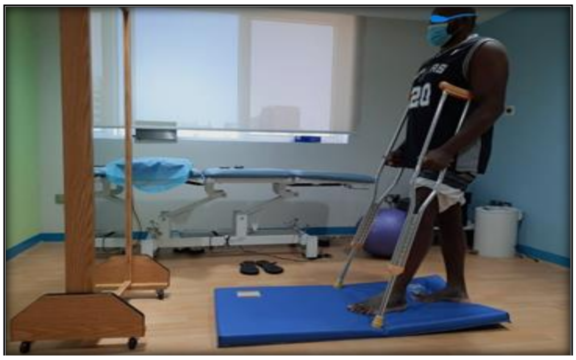

Figure 2: Progression from partial weight to full weight bearing with two crutches

Figure 3: Progression from partial weight bearing to full weight bearing with a single crutch

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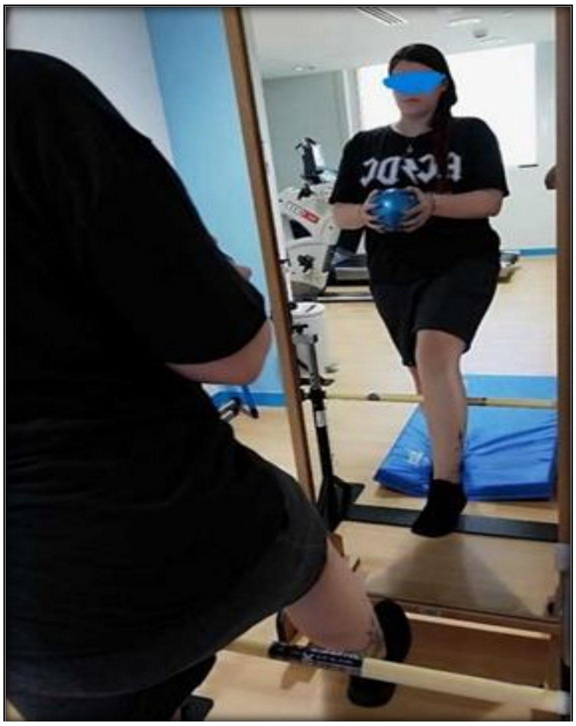

Figure 4: Proprioceptive neuromuscular training progression (on mat, in front of a mirror)
Right knee rehabilitation: Static-to-dynamic progression

Single leg stance in front of mirror on a mat
Patient was then asked to do single leg stance and move the other leg over the obstacle cane, dropping the foot down and bringing it back.
Progress to the above with a ball in hand.
Progress to holding a ball in hand and moving the ball forward and backward, as well as stepping over the bar with the left leg and bringing it back.

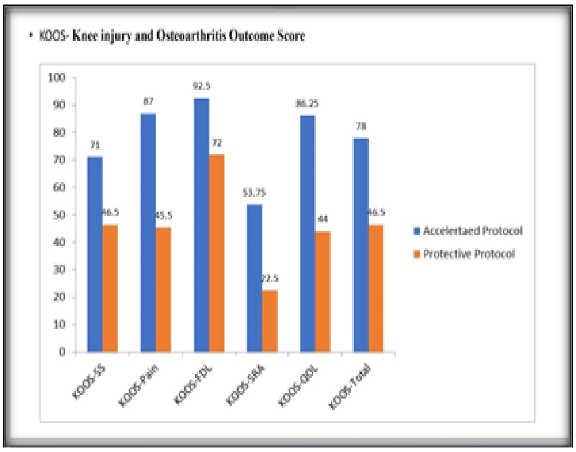

Figure 5: KOOS subsets Scores at 12 weeks

Table 1: Descriptive statistics of all the outcome variables among both groups

Variables	AP with PNT and MFR		Controls with PP	
	Mean	SD	Mean	SD
Pain Score in Week 1	8.25	0.95	9.25	0.50
Pain Score in Week 6	5.75	0.50	7.50	0.57
Pain Score in Week 12	3.50	0.57	5.50	0.57
KEL in Week 1	4.50	0.57	8.00	0.81
KEL in Week 6	0.75	0.95	5.75	0.95
KEL in Week 12	0.25	0.50	3.50	1.00
KOOS for SS	71.00	0.00	46.50	4.04
KOOS for Pain Status	87.00	4.00	45.50	1.73
KOOS for FDL	92.50	1.00	72.00	0.00
KOOS for SRA	53.75	4.78	22.50	2.88
KOOS for QOL	86.25	3.50	44.00	0.00
KOOS Total Score	78.00	1.63	46.50	1.73

SS -Symptoms and stiffness, FDL – Functional daily living, SRA – sports and recreational activity, QOL – Quality of life

Table 2: Levene's test results with week-1 measures for homogeneity between groups

Variables measured in Week 1	Leven's Test for Equality of Variance	'p' value*
Pain Score (VAS)	2.455	0.168
Knee Extension lag (in degrees)	0.000	1.000

This indicates that the tests of homogeneity executed with all the baseline measures (pain scores and knee extension lag [KEL]) using the Levene's Test for equality of variance were not significant at $p<0.05$, indicating that both groups had similar pain scores and KEL at the start of rehabilitation.

Table 3: Pre and post-test analysis of pain scores (vas) using dependent 't' test in AP group

Pain Scores (VAS)	Mean + SD	't' value	'p' value*
Week-1 Value	8.25 + 0.95	19.000	0.000*
Week-12 Value	3.5 + 0.57		

Table 4: Pre and post-test analysis of pain scores (VAS) using dependent 't' test in PP group

Pain Scores (VAS)	Mean + SD	't' value	'p' value*

Week-1 Value	9.25 + 0.50	15.000	0.001*
Week-12 Value	5.5 + 0.57		

Tables 3 and 4 show the results of dependent 't' test with 'p' values 0.000 for AP & PP groups respectively for the initial and final values of pain scores measured using VAS indicating that both groups had significant improvement. Hence, both the accelerated protocol using PNT and MFR techniques and the protective protocol were effective in reducing the pain of patients in their respective groups following meniscal repair of knee.

Table 5: Pre and post-test analysis of knee extension lag using dependent 't' test in AP group

KEL in Degrees	Mean + SD	't' value	'p' value*
Week-1 Value	4.5 + 0.57	17.000	0.000*
Week-12 Value	0.25 + 0.50		

Table 6: Pre and post-test analysis of knee extension lag using dependent 't' test in PP group

KEL in Degrees	Mean + SD	't' value	'p' value*
Week-1 Value	8.00 + 0.81	15.588	0.001*
Week-12 Value	3.5 + 1.00		

Table 5 and 6 show the results of dependent 't' test with 'p' values 0.000 for AP & PP groups respectively for the initial and final values of knee extension lag measured indicating that both groups had significant improvement. Hence, both the AP using PNT and MFR techniques and the protective protocols were effective in reducing the knee extension lag in their respective groups following meniscal repair of knee.

Table 7: One-way Anova using pain scores for both groups treated with AP and PP

Outcome Variables	Group Analysis	df	Mean Squares	'F' value	'p' value*
Pain Scores (Week 6)	Between Groups	1	6.125	21.00	0.004*
	Within Groups	6	0.292		
Pain Scores (Week 12)	Between Groups	1	8.000	24.00	0.003*
	Within Groups	6	0.333		

The above table shows the results of one-way ANOVA executed with the pain scores measured using VAS in the weeks 1, 6 & 12 for both between and within groups. It shows significant difference with the p values of 0.004 and 0.003 respectively. Hence, the experimental group treated using AP (with PNT and MFR) and the control group treated with PP had significant differences in their early effects for reducing the pain of the patients following meniscal repair of knee.

Table 8: One-way Anova using knee extension lag values for both groups treated with AP and PP

Outcome Variables	Group Analysis	df	Mean Squares	'F' value	'p' value*
KEL values (Week 6)	Between Groups	1	50.00	54.545	0.000*
	Within Groups	6	0.917		
KEL values (Week 12)	Between Groups	1	21.12	33.800	0.001*
	Within Groups	6	0.625		

This shows the results of one-way ANOVA executed with the knee extension values measured in the weeks 1, 6 & 12 for both between and within groups. It shows significant difference with the p values of 0.000 and 0.001 respectively. Hence, the experimental group treated using AP (with PNT and MFR) and the control group treated with PP had significant differences in the early effects for reducing the knee extension lag of the patients following meniscal repair of knee.

Table 9: Pre and post-test analysis of KOOS outcome using independent 't' test for between group analysis

KOOS Outcome	Mean Difference + SD	't' value	'p' value*
KOOS for SS	24.50 + 2.02	12.124	0.000*
KOOS for Pain Status	41.50 + 2.17	19.042	0.000*
KOOS for FDL	20.50 + 0.50	41.000	0.000*
KOOS for SRA	31.25 + 2.79	11.180	0.000*
KOOS for QOL	42.25 + 1.75	24.143	0.000*
KOOS Total Score	31.50 + 1.19	26.465	0.000*

This shows the results of independent 't' test with 'p' value as significant for the mean difference values of both the groups treated with AP (with PNT & MFR) and PP for the KOOS outcome measured at week 12 indicating that both groups had significant difference between them. Hence, the experimental group treated with Accelerated protocol using PNT and MFR had a significant improvement in the KOOS outcomes (both total and subsets) of the patients following meniscal knee repair.

DISCUSSION

Because of the variations and advances in surgical techniques for the repair of meniscal tears over the last few decades, strong recommendations for an ideal rehabilitation program remain difficult. Early studies on a restrictive rehabilitation program reported good results, but in hindsight, they did not utilize the latest implants or advanced techniques in repair, which we have on the market today.[6,7,18]

The available literature on the effectiveness of MFR in the treatment of orthopedic conditions is mixed in both quality and results. McKenney et al.[18] in a systemic review concluded that there is a need for future research. Several case studies indicated that MFR is effective for various orthopedic conditions. Experimental studies tend to be of higher quality and serve as a starting point for future RCTs. However, one thing was clear - there were no negative outcomes from the use of MFR.

The proprioceptive feedback mechanism is a subjective perception of knee stability.[19] After a meniscus injury, partial or complete, the neuromuscular control of the knee decreases markedly.[22,23] An impaired proprioceptive feedback mechanism would predispose to reflex joint instability and irregular postural reflexes, increasing the risk of reinjury or degenerative joint disease.[22] Postoperative proprioceptive training could effectively restore proprioceptive function and is consistent with the results of our study. Cho et al.[24] showed a significant effect on knee proprioception (joint position sense and threshold to detect passive motion -TTDPM) with closed kinetic chain exercises on a balance pad/board. Shen et al.[25] showed that backward walking, a closed kinematic chain exercise, stimulated joint/muscle receptors and sensory afferents to the CNS and augmented proprioception. They found that Ruffini and Golgi receptors, which are slow-adapting receptors, responded to a change in joint position. Pacinian receptors, which respond to low degrees of joint stress, are more sensitive to rapid changes in accelerations. Considering these above studies on the physiological importance of neuromuscular proprioceptive training, our study emphasized its early application following meniscal repair. We practically applied this principle by asking the patient to weight bear on a mat, an unstable surface in front of a mirror to give more visual, sensory and motor feedback. We advanced the PNT by changing the movement from static to dynamic [Figure 4]

Vascellari et al.[26] did a systemic review in which they compared a standard program with an accelerated rehabilitation protocol in patients who underwent Fast-Fix all-inside repairs. Eight studies were included. The failure rates were 13% for the accelerated program patients and 10% for those on the standard program. They found no statistically significant difference. Our study, in which AP with MFR and PNT underwent progressive WB from the 4th week onwards, to full WB without crutches by the 6th week favours an accelerated program. Active knee ROM exercises in both groups were kept within 90 degrees for the first 3 weeks to prevent an increased load on meniscal repair.

Numerous basic science and clinical research studies have validated the fact that hoop stresses associated with WB actually facilitate meniscus healing, especially in tears with vertical longitudinal patterns.[8-12] Mobilization after meniscal repair may, in fact, promote blood flow to the repaired site, as was demonstrated in cadaveric and animal studies.[8-11,27,28] Our study included patients with this tear morphology and support the above claims.

Kidd et al.[29] had argued that MFR can never be an evidence-based treatment as the subjectivity of this interaction cannot be removed. Hence, there may be bias if MFR was used as the sole source of intervention. However, proprioceptive training is more objective, and numerous studies have validated this claim. Combining MFR with proprioceptive training, we have attempted to reduce some of this subjective bias. Our study supports Stecco's.[16] theory that MFR intervention if applied early, prevents densification, myofascial compression, and physiological complications due to the expected lack of mobility and immobilization following meniscal repair. It also helps to maintain CC.

The results of our study found that both the groups significantly differed in their early effects for reducing pain and improving KEL but the mean difference and the significance level were more in the AP group [Table 7 and 8]. KOOS (all subsets) significantly improved in both groups [Table 1 and Figure 5], but the overall scores were better in the AP group (especially subsets SS, SRA and QOL). This could be attributed to the physiological effect of MFR on overcoming the densification and fibrosis effect due to the prolonged immobilization and its positive effect on maintaining MFU with respect to the CC. The significant effect on the above KOOS subsets may also be due to early WB and neuromuscular training application, assisting in improving the overall sensorimotor control, joint position sense, quadriceps motor control and stability.

Limitations of the study

1. Pilot study with a small sample size
2. MFR requires participation and interaction by and between both the therapist and the patient, the

subjectivity of this interaction may create bias (Kidd et al 29)

3. The outcomes measured were not blinded. This may overestimate the efficacy of one treatment method
4. No differentiation was made as to the type of repair done
5. The follow-up was short term
6. Preoperative KOOS scores were not measured.

CONCLUSION

We can conclude from this pilot study that the accelerated protocol comprising myofascial release and proprioceptive neuromuscular training with early WB is a feasible option for rehabilitation after arthroscopic medial meniscus repair. The overall scores at 12 weeks for the various KOOS subsets were better for the accelerated protocol group indicating earlier return to full function. Large scale prospective randomized studies are required to assess whether this intervention really works and whether the outcomes are statistically significant in the long term.

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