Efficacy of McConnell’s taping in runner’s knee.

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ABSTRACT

Efficacy of McConnell’s taping in runner’s knee

INTRODUCTION: Patellofemoral pain is one of most common knee complaint in sports and general population. Patellofemoral syndrome is characterised by dull aching pain which is vague in location, often described as around or under patella, symptoms are aggravated with walking, running, ascending or descending stairs or prolonged sitting, leg buckling, crepitus

OBJECTIVE: To Find out the Effectiveness of McConnell’s taping approach in treating runners knee and its post Treatment effect on muscular activity of Vastus medialis oblique

METHOD: Minimum of 30 subjects both males and females were conveniently allocated in two groups A and B. In Group A choice of Treatment were VMO strengthening, Taping, TENS. In Group B choice of treatment were TENS, VMO strengthening. All subjects in both groups received treatment for three weeks five times per week for total of 15 treatment sessions. Data collection for VAS and EMG analysis for VMO was done on 1st Day pre-treatment, 5th, 10th, 15th and 20th day without tape revaluation was done.

Results: The results showed a significant reduction in pain and improvement in the VMO strength in both groups. Group A(Tape Group) shows more significant improvement in pain and strength than group B (P < 0.05). Group A showed earlier improvement in all variables under this study.

Conclusion: McConnell’s taping of knee along with VMO strengthening in patellofemoral syndrome significantly improves pain and strength of VMO in runner’s knee patients and result is maintained even after stopping the treatment. It is long term efficient treatment for runner’s knee.

Keywords: McConnell’s Taping, Transcutaneous electrical nerve stimulation, EMG of VMO, VMO Strengthening, Patellofemoral joint syndrome.

INTRODUCTION

Runners knee is one of most common knee complaints encountered in sports medicine and general population [1]. It is however thought to occur at higher incidence in athletes and females. Runners may be characterised by dull pain which is usually present anteriorly, under the patella. The symptoms are aggravated with walking, ascending or descending stairs, continuous sitting pain squatting, kneeling and there is presence of crepitus.
The causes of runner’s knee are not completely understood, but are generally secondary to patellofemoral malalignment. Possible causes of patellofemoral malalignment are numerous and include faulty lower extremity alignment, Extensor mechanism dysfunction, and flexibility and strength deficient of lower extremities. Lower extremity alignment and kinematic faults include excessive pronation [2], Genu Recurvatum, Genu valgum and Genu varum, Increased Q angle [11], femoral Anteversion and External Tibial rotation [8] and faulty patellar orientation during static and dynamic assessment [12,13]. Extensor mechanism dysfunction can result from quadriceps atrophy, particularly the VMO [14] or faulty recruitment of the Quadriceps Musculature during flexibility during Activation[15], another factor that may cause patellofemoral malalignment is faulty flexibility and muscle strength of lower extremity.

The most common muscle which lack flexibility includes illiopsoas, illiotibial band, rectus femoris, Hamstring and Gastro Solieous group [1]. Strength of Gluteus, Gluteus Maximus and Trunk Extensors are also factors that should be assessed. Usually conservative treatment is done initially which includes drugs reducing pain and inflammation, icing or heat fermentation, ultrasound, mobilisation of patella, faradic electrical stimulation of vastus medialis muscle, dynamic exercise for quadriceps and hamstrings strengthening, stretching of hamstring, cast immobilisation and walking aids. If conservative management fails surgical treatment is possible option. Radical surgery like patellectomy is a relative common procedure and having detrimental effect on knee joint mechanism, so it is rarely performed these days.

Doucette and Gobe [4] found that a comprehensive program of exercise to address deficits found on Physical Examination of Patients with Lateral compression syndrome did indeed result in decreased pain and improved Trackling. McConnell [12] has suggested the use of Patellar Taping in addition to exercise program. The suggested rationale is that Patellar Taping will improve patellar tackling, thereby decreasing the potential for pain and swelling which may cause VMO inhibition. Taping may also improve active recruitment of VMO by restoring more normal length tension ratio in VMO [12] Current study aimed to find out long term effect of McConnell’s taping.

MATERIAL AND METHODOLOGY

Study Design: Experimental in nature.

Inclusion Criteria:

1. Patients of age between 18 to 40.
2. Both males and females.
3. Patient presenting with unilateral anterior knee pain
4. Aggravations of symptoms with walking, running, ascending or descending stairs
5. Crepitus
6. Positive Compression test
7. Positive Clark test
Exclusion criteria:
1. History of knee surgery
2. History of fracture in Knee complex
3. History of Soft tissue injury to involved extremity
4. Patient with diagnosed Intra articular pathology, significant ankle problem.
5. Patient who have received treatment for knee past 6 months due to some other Problem or injury
6. Neoplasm

Data collection procedure

Variables:

Independent variables:
- TENS
- VMO Strengthening
- McConnell’s taping

Dependent variable:
- Vas Scale
- EMG of VMO

Instrumentation:
1. McConnell’s tape.
2. Transcutaneous electrical nerve stimulation
3. Electromyography machine.

Methods of collection of data

Protocol
30 subjects were included on bases of Inclusion and Exclusion Criteria. Subject were described procedural details to be followed in this study and there after Consent Form (appendix 1) was obtained. After all the examination subjects were then placed in respective experimental Group A and Group B conveniently. Both groups consisted of 15 Subjects each. In Group A choice of treatment were VMO Strengthening, TENS and Taping. In Group B choice of treatment were TENS and VMO strengthening. During the treatment phase all the Subject of Groups A and B received treatment for three weeks 5 times per week for total of 15 Treatment Session. Data collection for VAS and EMG Analysis were done on 1st day Pre Treatment, 5th, 10th, 15th day with Tape. And on 20th day without Tape Re-evaluation was done.

EMG procedure:
Electromyography recording from the belly of Vastus Medialis Oblique was collected. Hairs were shaved and skin was cleaned with alcohol Swab. A surface electrode was placed over middle of the belly of Vastus Medialis Oblique, approximately 4cm superior to and 3cm medial to supra medial Patellar Border. Oriented 55° to longitudinal Axis of patella [6]. Prior to electrode placement quadriceps muscle was contracted isometrically and the electrode was linked to an amplifier box that was connected via a fibre optic cable to a
computer. Patient was positioned supine or long sitting. Rolled towel or bolster was placed under the knee to support it in flexion and patient was instructed to extend his knee and hold it for 15 seconds. Five readings were taken at one time and after that mean of these five readings was calculated. EMG analysis was done on first day Pre Treatment, 5th, 10th, 15th and on 20th day without Tape re-evaluation was done [9].

VMO Strengthening:

1 Static Quads- Position of patient was supine and rolled towel was placed under his knee and patient was instructed to press towel with knee then Hold for 10 seconds.

2 Short Arc terminals- Position of patient was supine or long sitting. A rolled towel was placed under the Knee to support it in flexion and patient was instructed to extend his knee.

3 Step ups- Forward and backward step up and step downs. The patient was instructed to step up and down a single step.

All the exercises were performed starting with 3 sets, 10 repetitions in each set for one week. After each set 2 minutes’ rest was given and progression was done to five sets after one week.

McConnell’s taping:

The taping was done by using the medial gliding technique established by McConnell’s [13]. 15cm cover roll tape was applied directly on to the Skin, 12 cm lukotape rigid Tape was applied, starting from the lateral femoral condyle ending at the posterior Knee, leading to shifting the Patella medially. At the end of procedure of “skin crease” as a pouch of a skin was visible at the medial side of knee, the tape was pulled until a skin crease of greater than 2cm was established at the medial side of knee which confirms correct application [3].

DATA COLLECTION TOOLS:
Data was collected on the data collection form, VAS scale, electromyography were collected on
1st day - Pre-Treatment
5th day
10th day
15th day
20th day- post- Treatment

STATISTICAL ANALYSIS

Data analysis was performed using SPSS software version 13. Inter group comparison was done. Unpaired t test was used to determine significance of difference between experiment Group A and Control Group B. Post Hock were done to determine significance of difference between subjects of same Group (within group). Level of significance selected for the study was p < 0.05.
RESULTS

Table 1 Comparison of VAS between both Groups

<table>
<thead>
<tr>
<th>TREATMENT DAYS</th>
<th>MEAN+ SD(GROUPA)</th>
<th>MEAN + SD(GROUPB)</th>
<th>STAT t</th>
<th>p - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY1</td>
<td>75.00+3.91</td>
<td>73.27+3.60</td>
<td>1.26</td>
<td>0.22</td>
</tr>
<tr>
<td>DAY5</td>
<td>50.13+6.79</td>
<td>56.67+4.69</td>
<td>3.07</td>
<td>0.01</td>
</tr>
<tr>
<td>DAY10</td>
<td>16.87+11.80</td>
<td>41.80+5.67</td>
<td>7.38</td>
<td>0.00</td>
</tr>
<tr>
<td>DAY15</td>
<td>0.00+0.00</td>
<td>22.20+6.13</td>
<td>14.02</td>
<td>0.00</td>
</tr>
<tr>
<td>DAY20</td>
<td>0.00+0.0</td>
<td>1.87+5.15</td>
<td>1.40</td>
<td>0.17</td>
</tr>
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</table>

Table 2 Comparison of EMG between both Groups

<table>
<thead>
<tr>
<th></th>
<th>Mean + SD(GROUPA)</th>
<th>MEAN + SD(GROUPB)</th>
<th>STAT t</th>
<th>p- value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY 1</td>
<td>673.69+224.36</td>
<td>568.43+138.67</td>
<td>1.55</td>
<td>0.13</td>
</tr>
<tr>
<td>DAY 5</td>
<td>869.83+304.57</td>
<td>653.97+162.98</td>
<td>2.42</td>
<td>0.02</td>
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<tr>
<td>DAY 10</td>
<td>1004.84+254.82</td>
<td>748.46+191.65</td>
<td>3.11</td>
<td>0.00</td>
</tr>
<tr>
<td>DAY 15</td>
<td>1121.79+206.34</td>
<td>831.75+201.28</td>
<td>3.90</td>
<td>0.00</td>
</tr>
<tr>
<td>DAY 20</td>
<td>1212.79+319.98</td>
<td>864.74+210.19</td>
<td>3.52</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 3 Comparison within group for VAS

<table>
<thead>
<tr>
<th>DAYS</th>
<th>Group A (p - value)</th>
<th>Group B (p – value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day1/Day5</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Day1/Day10</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Day1/Day15</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Day1/Day20</td>
<td>S</td>
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<tr>
<td>Day5/Day10</td>
<td>S</td>
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<tr>
<td>Day5/Day15</td>
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<td>Day5/Day20</td>
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<tr>
<td>Day10/Day15</td>
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<tr>
<td>Day10/Day20</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Day15/Day20</td>
<td>NS</td>
<td>S</td>
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</table>
Table 4 Comparison of EMG within the Group

<table>
<thead>
<tr>
<th>DAYS</th>
<th>Group A (p-value)</th>
<th>Group B (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day1/Day5</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Day1/Day10</td>
<td>S</td>
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<td>Day1/Day15</td>
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<td>Day1/Day20</td>
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<tr>
<td>Day10/Day20</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Day15/Day20</td>
<td>NS</td>
<td>S</td>
</tr>
</tbody>
</table>

Graph 1 Comparison of VAS between both groups

![Visual Analogue Scale Graph](image)
Graph 2 Comparison of EMG between both Groups

Graph 3 comparison of VAS within Group A
The study aimed to find out the Efficacy of taping on pain, Disability and EMG of VMO in runner’s knee patients and to find out post treatment effect of Tapping on muscle activity of VMO. The study was carried out in 30 patients of patellofemoral pain syndrome. Subjects were divided into two groups conveniently. Group A and Group B. Both Groups were given VMO strengthening and High TENS for 15 days. Group A was given McConnell’s taping in addition to above treatment. The last day of treatment was taken as day 20 (follow up) to evaluate efficacy of the treatment. The results showed a significant reduction in pain and improvement in the VMO strength in both groups. Group A shows more significant improvement in pain and strength than group B (P < 0.05). Group A showed earlier improvement in all variables under this study.

Reduction in pain could be because of application of TENS, Tapping and VMO strengthening. According to Melzak and Wall theory of Pain gait. Application of High TENS causes impulses to travel along large diameter afferent nerves which can produce presynaptic inhibition of transmission of nociceptive A delta and C fibers at substantia Gelatinosa of the pain gate [5].

Cushnaghan et al in his cohort study of medial patellar tape application for four days showed a reduction in pain in patients with patellofemoral joint pain syndrome[10]. VMO strengthening contributes to relief of pain in runner’s knee subjects due to correction in patellar alignment or less tracking of patella. Docuette SA et al in his study, the effect of exercise on patellar tracking in lateral patellar compression syndrome concluded that 84% of the subjects were pain free after exercise demonstrating less patellar Maltracking [4].
Pain relief thorough tapping can take place by relieving pressure on damaged lateral facets of patellofemoral joint and which improve tracking of patella and Quadriiceps mechanism[10]. Hinman RS et al, in a similar study concluded that therapeutic knee taping is an effective in managing pain associated with knee osteoarthritis [7].

Tapping enhance VMO activity similar study exhibits this fact. Wendy L. Gilleard et al, showed that taping the patellofemoral joint changes the onset timing of VMO and VL activity which result in earlier activation of the VMO may further promote improvement patellar tracking [16].

The results of this study showed significant improvement in all variables of study undertaken. Group A showed earlier improvement in pain and strength of VMO. This is because of early medialisation of patella or improved lateral mal tracking of patella and earlier activation of VMO. Thus this study establishes the fact that McConnell’s taping improves the symptoms of patellofemoral syndrome and benefits can be maintained even after stopping the treatment. So we can say that McConnell’s taping is long term efficient treatment for patellofemoral joint pain syndrome.

CONCLUSION

This study concludes that McConnell’s taping of knee along with VMO strengthening in patellofemoral syndrome significantly improves pain and strength of Vastus medialis oblique muscle in runner’s knee patients and benefits’ continues even after stopping the treatment. It is long term efficient treatment for runner’s knee. Whereas both group showed significant improvement in pain and VMO strength, both treatments are effective in treating runners knee. Therefore, study supports the experimental hypothesis.

REFERENCES


