The Effectiveness of Postoperative Physical Therapy Treatment in Patients Who Have Undergone Arthroscopic Partial Meniscectomy: Systematic Review With Meta-analysis

Meniscal surgery is among the most common orthopaedic procedures performed today. The American Academy of Orthopaedic Surgeons estimates that about 636,000 knee arthroscopy procedures are performed every year in the United States, and that up to 80% of magnetic resonance imaging scans performed in this country identify the presence of meniscal tears. Many studies have confirmed the importance of the meniscus to the knee joint, and its loss is associated with instability and degeneration of the joint.

There are 2 main groups of patients with meniscus injuries who undergo arthroscopy: those with acute injuries and those with degenerative injuries. Acute lesions generally occur when an axial load is transmitted directly to the flexed knee associated with rotation. In contrast, degenerative lesions are typical of the elderly and accompanied by degenerative changes in cartilage. When injured, the meniscus has little regenerative capacity, mainly due to its vascular system. Middle-aged patients with degenerative meniscal lesions usually present pain and disability and have impairments in quadriceps muscle strength and lower extremity performance.

Despite the minimally invasive nature, studies have shown that patients undergoing arthroscopic meniscectomy have pain, effusion, loss of range of motion (ROM), functional changes, neumuscular and biomechanical changes, loss of quadriceps muscle strength, and a reduced quality of life.

Herrlin et al showed that for middle-aged patients with simple lesions in the meniscus, physical therapy has yielded...
results as favorable as those of arthroscopy, whereas other authors have pointed out that exercise has been shown to be effective in improving the quality of cartilage after meniscectomy. When the treatment option is surgery, physical therapy is typically initiated in the early postoperative phase and progressed as tolerated to restore function to preoperative levels. Although there are many studies on this topic, there is no consensus on which interventions and outcomes should be evaluated. This lack of standardization complicates the comparison of studies and thus the determination of which treatment is best suited for this type of patient.

There are 2 narrative literature reviews published on this subject: the first was written by Goodyear-Smith and Arroll in 2001 and the second by Goodwin and Morrissey in 2003. Both reviews have notable limitations due to lack of assessment of risk of bias, inclusion of non-randomized clinical trials, lack of clarity in explaining the search and retrieval of studies, and lack of quantitative analysis, thus not allowing reproducibility and applicability.

The importance of the matter, the lack of consensus on the treatment, and the publication of new randomized controlled trials (RCTs) justify a systematic review that contains only RCTs, is conducted in the Cochrane Collaboration precepts, and can provide a summary of the evidence for use in clinical decision making. Thus, the objective of this study was to evaluate the effectiveness of postoperative physical therapy treatment on patient-reported knee function, ROM, effusion, and other outcomes of patients undergoing arthroscopic partial meniscectomy.

METHODS

Type of Study

This study is a systematic review of RCTs, with meta-analysis. A systematic review requires standardization; therefore, this study followed the recommendations of the PRISMA statement and the Cochrane Collaboration.

Eligibility Criteria

Studies were included that evaluated the effectiveness of postoperative physical therapy treatment on patients with a diagnosis of meniscal tears who had undergone arthroscopic partial meniscectomy for either degenerative or traumatic injuries. Comparisons were made between the different physical therapy contexts or their frequency, and physical therapy versus the isolated use of specific modalities.

According to the recommendations of the Cochrane Collaboration, only RCTs were accepted. There were no restrictions as to the age of the participants.

Types of Intervention

Interventions in the included studies were a mix of specific interventions—such as aerobic, flexibility, and strengthening exercise; sensory motor training; muscle activation (electromyographic [EMG] biofeedback, electrical stimulation); joint mobility exercise; thermotherapy; gait training; and use of plaster or compressive bandage—and patient information and educational programs. Interventions are listed in Table 1.

Outcome Types

The outcomes evaluated were patient-reported function, ROM, effusion, functional tests, quadriceps isokinetic strength, thigh circumference, pain, muscle activity, functional activities, gait, quality of life, muscle histological analyses, time to return to work, and satisfaction.

Information Sources and Search

The search strategy was formulated by 2 of the authors, assisted by a specialist librarian, in the following databases: MEDLINE (1950-March 2013), Embase (1980-March 2013), CINAHL (1982-March 2013), LILACS (1982-March 2013), SciELO (1998-March 2013), Web of Science, PEDro, Academic Search Premier, and the Cochrane Central Register of Controlled Trials, IBECs, and Scopus. The search included the following key words: physical therapy, physical therapy modalities, [EMG] biofeedback, electrical stimulation, joint mobility exercise, thermotherapy, gait training, and use of plaster or compressive bandage.
exercise therapy, rehabilitation, knee, placebo, groups, tibial meniscus, meniscectomy, arthroscopy, meniscectomy, partial meniscectomy, randomized controlled trial, controlled clinical trial, randomized, systematic review, and meta-analysis.

Knee-injury experts were also consulted for information about additional trials that might not have appeared in the databases. The search was not restricted to any specific language. The search strategy is demonstrated in FIGURE 1 and the flow chart in FIGURE 2.

### Study Selection and Data-Collection Process

Studies were independently assessed for eligibility by 2 researchers. After concluding the preliminary search findings, each of the studies was examined for relevance to the topic as well as for additional references of interest that were not revealed in the original search.

Seven comparison categories were created based on the methodologies of the included studies: outpatient physical therapy plus home exercise versus home exercise, outpatient physical therapy versus home exercise, outpatient physical therapy versus control group, outpatient physical therapy versus modalities alone, ward treatment versus ward plus outpatient treatment, routine physical therapy versus intensive physical therapy, and early versus delayed treatment.

### Assessment of Risk of Bias

The studies were evaluated for risk of bias by 2 independent reviewers. When there were disagreements, a third experienced reviewer was consulted to rule on the decision. For evaluation, we adopted items in accordance with the handbook of the Cochrane Collaboration.

The risk-of-bias items evaluated were the method of randomization, allocation concealed, patient blinding, care provider blinding, outcome assessor blinding, dropout rate, intention-to-treat analysis, reports on the study free of suggestion, change to baseline similarity of participants, cointerventions avoided, compliance, timing of the outcome assessment, and follow-up.

These items were evaluated as yes, no, or unclear, according to the recommendations of Furlan et al. More information is provided in TABLE 2.

The system described by the Centre for Evidence-based Medicine (Oxford, UK) was used to classify the evidence in this review. The complete table of criteria and details of the grading can be found on the web at http://www.cebm.net. An abbreviated version of the grading system is as follows: level 1, evidence obtained from high-quality diagnostic studies, RCTs; level 2, evidence obtained from lesser-quality RCTs (eg, improper randomization, no blinding, less than 80% follow-up); level 3, case-controlled studies or retrospective studies; level 4, case series; level 5, expert opinion. The grades of recommendations follow the following criteria: grade A, a preponderance of level 1 and/or level 2 studies support the recommendation (this must include at least 1 level 1 study [strong evidence]); grade B, a single high-quality RCT or a preponderance of level 2 studies support the recommendation (moderate evidence); grade C, a single level 2 study or a preponderance of level 3 and 4 studies including statements of consensus by content experts support the recommendation (weak evidence); grade D, high-quality studies conducted on this topic disagree with respect to their conclusions (the recommendation is based on these conflicting studies [conflicting evidence]).

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FIGURE 2. Flow chart.
Data Analysis

Information from the included studies was presented descriptively. To evaluate the percentage of agreement of the results of the risk of bias of the studies analyzed between the 2 raters, the kappa coefficient was used. When the result was greater than 0.81, the agreement was considered excellent; for a kappa between 0.61 and 0.80, the agreement was considered good; a kappa between 0.41 and 0.60 was considered moderate; and, for a result below 0.40, agreement was considered poor. The 95% confidence intervals (CIs) were calculated for kappa values.

For the analysis of dichotomous data, the results were expressed as an odds ratio with a 95% CI. The mean difference was used for analysis of continuous data, with a 95% CI. For all analyses, a fixed-effects model was used if the results were homogeneous (P > .10), and a random-effects model was used if heterogeneity was present (P < .10). All analyses were performed using RevMan 5.1.4 software (The Nordic Cochrane Centre, Copenhagen, Denmark).

RESULTS

The database search identified 1028 articles. Of these, 25 were read in full, and 7 were excluded because they did not meet the inclusion criteria (4 were nonrandomized, 1 was quasi-randomized, and in 2 studies the control group did not undergo arthroscopic partial meniscectomy).1,2,7,18,20,26,37,41 Eighteen RCTs were included in the review, only 6 of which were included in the meta-analysis due to methodological issues. The others were presented descriptively. The characteristics of included studies are shown in TABLES 3 through 9.

The agreement between the 2 reviewers assessing the risk of bias was η = 1.0 (95% CI: 1, 1) for the method of randomization, η = 0.43 (95% CI: 0.04, 0.82) for allocation concealment, η = 1.0 (95% CI: 1, 1) for patient blinding, η = 1.0 (95% CI: 1, 1) for care provider blinding, η =

### TABLE 2

<table>
<thead>
<tr>
<th>Criteria for a Judgment of “Yes” for the Sources of Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Adequate sequence generation</td>
</tr>
<tr>
<td>2. Allocation concealment</td>
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<tr>
<td>3. Patient blinded</td>
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<tr>
<td>4. Care provider blinded</td>
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<tr>
<td>5. Assessor blinded</td>
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<tr>
<td>6. Dropout rate acceptable</td>
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<td>7. Intention-to-treat analysis performed</td>
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<td>8. Free of selective reporting</td>
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<tr>
<td>9. Groups similar at baseline</td>
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<tr>
<td>10. Cointerventions avoided</td>
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<tr>
<td>11. Compliance acceptable</td>
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<tr>
<td>12. Timing of the outcome assessment similar</td>
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<tr>
<td>13. Follow-up</td>
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</table>
0.87 (95% CI: 0.64, 1.1) for outcome assessment, and κ = 0.34 (95% CI: 0.03, 0.65) for follow-up. The risks of bias are presented in FIGURES 3 and 4.

### Outpatient Physical Therapy Plus Home Exercise Versus Home Exercise

Six studies were evaluated in this category, which included a total of 326 patients and a duration of treatment between 2 weeks and 6 weeks. Both groups performed exercises as described in the study methods. The difference between the groups was that the outpatient physical therapy group was supervised by a physical therapist and the home exercise group received only an exercise program and information.

Birch et al studied 120 patients randomized into 3 groups. There were 47 patients in the home exercise group (mean age, 31.6 years), 52 in the nonsteroidal anti-inflammatory drug group (mean age, 36.5 years), and 21 in the physical therapy group (mean age, 36.7 years). The last one had a mean of 3.1 (range,
TABLE 3  
CHARACTERISTICS OF INCLUDED STUDIES OF THE GROUP OUTPATIENT  
PHYSICAL THERAPY PLUS HOME EXERCISE VERSUS HOME EXERCISE (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Interventions</th>
<th>Study Outcomes</th>
<th>Results*</th>
</tr>
</thead>
</table>
| Kimap et al<sup>a</sup> | Home exercise group: 20 participants; mean ± SD age, 34.5 ± 10.3 y; 20 male  
Experimental group: 20 participants; mean ± SD age, 34.5 ± 10.3 y; 20 male | Home exercise group: home exercise (5 times per wk for 2 wk)  
Experimental group: physical therapy with EMG-B plus home exercise (5 times per wk for 2 wk) | Assessment times: pre, post 3 d, 2 wk, and 6 wk  
Measures: thigh and knee circumference, knee flexion ROM (deg), Lysholm questionnaire, maximum contraction and mean contraction values of VMO and VL | Home exercise group:  
• Thigh and knee circumference: NA  
• Knee flexion ROM: pre, 130.2 ± 8.8; 6 wk, 129.2 ± 7.4  
• Lysholm questionnaire: pre, 691 ± 22.9; 6 wk, 796 ± 101  
• Maximum contraction and mean contraction values of VMO and VL: NA  
Experimental group:  
• Thigh and knee circumference: NA  
• Knee flexion ROM: pre, 124.3 ± 9.3; 6 wk, 1271 ± 6.5  
• Lysholm questionnaire: pre, 70.3 ± 14.3; 6 wk, 95.4 ± 3.7  
• Maximum contraction and mean contraction values of VMO and VL: NA |
| Moffet et al<sup>a</sup> | Home exercise group: 16 participants; mean ± SD age, 38 ± 7 y; 16 male  
Treatment group: 15 participants; mean ± SD age, 42 ± 9 y; 15 male | Home exercise group: home exercise (3 times per wk for 3 wk)  
Treatment group: physical therapy plus home exercise (3 times per wk for 3 wk) | Assessment times: pre, post 3 wk, 3 mo, and 6 mo  
Measures: ROM, effusion, thigh atrophy, strength test (isokinetic), Lysholm questionnaire, Gillquist questionnaire | Home exercise group:  
• ROM: NA  
• Effusion: NA  
• Thigh atrophy: NA  
• Strength test (isokinetic): NA  
• Lysholm questionnaire: pre, 74 ± 23; 6 mo, 89 ± 16  
• Gillquist questionnaire: NA  
Treatment group:  
• ROM: NA  
• Effusion: NA  
• Thigh atrophy: NA  
• Strength test (isokinetic): NA  
• Lysholm questionnaire: pre, 70 ± 19; 6 mo, 91 ± 14  
• Gillquist questionnaire: NA |
| Vervest et al<sup>a</sup> | Group A: 10 participants; mean ± SD age, 35.7 ± 5.7 y; 2 female, 8 male  
Group B: 10 participants; mean ± SD age, 31.1 ± 10.9 y; 4 female, 6 male | Group A: home exercise (3 times per wk for 30 min for 3 wk)  
Group B: physical therapy according to a dynamic protocol plus home exercise (3 times per wk for 30 min for 3 wk) | Assessment times: post 1 wk, 2 wk, 3 wk, and 4 wk  
Measures: height of 1-leg jump (cm), distance of 1-leg jump (cm), Tegner score, Lysholm questionnaire, sports activity rating scale, FORS, pain (VAS in mm), satisfaction with function (1-10), satisfaction with treatment (1-10)  
Group A:  
• Height of 1-leg jump: 1 wk, 18.6 ± 78; 4 wk, 20.1 ± 9.3  
• Distance of 1-leg jump: 1 wk, 87.3 ± 38.5; 4 wk, 94.7 ± 46.7  
• Tegner score: 1 wk, 0.1 ± 0.7; 2 wk, 2.1 ± 1.4  
• Lysholm questionnaire: 1 wk, 65.1 ± 21.3; 4 wk, 79.4 ± 18.8  
• Sports activity rating scale: FORS, pain (VAS in mm), satisfaction with function (1-10), satisfaction with treatment (1-10)  
Group B:  
• Height of 1-leg jump: 1 wk, 11.1 ± 73; 4 wk, 22.5 ± 5.0  
• Distance of 1-leg jump: 1 wk, 57.3 ± 37.8; 4 wk, 113.8 ± 18.9  
• Tegner score: 1 wk, 10 ± 0.8; 2 wk, 2.8 ± 1.8  
• Lysholm questionnaire: 1 wk, 65.4 ± 22.6; 4 wk, 88.7 ± 13.9  
• Sports activity rating scale: FORS, pain (VAS in mm), satisfaction with function (1-10), satisfaction with treatment (1-10)  
• Pain: 1 wk, 26.0 ± 27.3; 4 wk, 6.5 ± 7.3  
• Satisfaction with function: 1 wk, 6.8 ± 14; 4 wk, 78 ± 11  
• Satisfaction with treatment: 1 wk, 78 ± 15; 6 wk, 8.3 ± 0.9 | Goodwin et al<sup>c</sup> evaluated the effectiveness of supervised physical therapy in the early period after arthroscopic partial meniscectomy. Forty-one patients were allocated to the home exercise group (mean ± SD age, 41 ± 9 years) and 45 to the treatment group (outpatient physical therapy plus home exercise) (mean ± |---|---|---|---|

**Abbreviations:** CI, confidence interval; EMG-B, electromyography biofeedback; EQ-5D, European Quality of Life-5 Dimensions; FORS, Factor Occupational Rating Scale; IKDC, International Knee Documentation Committee; NA, not available; NSAID, nonsteroidal anti-inflammatory drug; post, postoperative; pre, preoperative; ROM, range of motion; SF-36, Medical Outcomes Study 36-Item Short-Form Health Survey; VAS, visual analog scale; VL, vastus lateralis; VMO, vastus medialis oblique.  
*Values are mean ± SD unless otherwise indicated.*
TABLE 4

Characteristics of Included Study of the Group Outpatient Physical Therapy Versus Home Exercise

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Interventions</th>
<th>Study Outcomes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joek et al.61</td>
<td>Group 1: 15 participants; mean ± SD age, 30.7 ± 13.9 y; 3 female, 12 male</td>
<td>Group 1: physical therapy (3 times per wk for 45 min for 4 wk)</td>
<td>Assessment times: post 2 wk, 4 wk, and 8 wk</td>
<td>Group 1:</td>
</tr>
<tr>
<td></td>
<td>Group 2: 15 participants; mean ± SD age, 33.5 ± 6.8 y; 4 female, 11 male</td>
<td>Group 2: home exercises (3 times per wk for 45 min for 4 wk)</td>
<td>Measures: overall knee function, degrees of knee pain, isokinetic muscle strength (mean percent deficit); quadriceps and hamstrings, qualitative evaluation of knee functions</td>
<td>• Overall knee function: 8 wk: excellent, 9; good, 4; fair, 0; poor, 0</td>
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<td>• Degrees of knee pain: 2 wk: severe, 1; moderate, 4; mild, 4; none, 4, 8 wk: severe, 0; moderate, 0; mild, 3; none, 11</td>
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<td>• Isokinetic muscle strength: quadriceps: 2 wk, 40.1; 8 wk, 11.9</td>
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<td></td>
<td>• Isokinetic muscle strength: hamstrings: 2 wk, 22.3; 8 wk, 4.1</td>
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<td>• Qualitative evaluation of knee functions: NA</td>
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</tbody>
</table>

Abbreviations: NA, not available; post, postoperative.

TABLE 5

Characteristics of Included Study of the Group Outpatient Physical Therapy Versus Control Group

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Interventions</th>
<th>Study Outcomes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ericsson et al.62</td>
<td>Control group: 23 participants; mean ± SD age, 45.9 ± 3.2 y; 9 female, 14 male</td>
<td>Control group: no treatment (physiotherapy group: physical therapy with emphasis on neuromuscular training (3 times per wk for 1 h for 4 mo)</td>
<td>Assessment times: pre, post 4 mo</td>
<td>Control group:</td>
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<td></td>
<td>Exercise therapy group: 22 participants; mean ± SD age, 45.4 ± 3.2 y; 7 female, 15 male</td>
<td>Exercise therapy group: physical therapy with emphasis on neuromuscular training (3 times per wk for 1 h for 4 mo)</td>
<td>Measures: 1-leg hop for distance (cm), 1-leg rise (n), square hop (n), isokinetic muscle strength testing; quadriceps strength, isokinetic muscle strength testing; quadriceps endurance, isokinetic muscle strength testing; hamstrings strength, isokinetic muscle strength testing; hamstrings endurance, KOOS</td>
<td>• 1-leg hop for distance: pre, 108 ± 37; 4 mo, 111 ± 37</td>
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<td>• 1-leg rise: pre, 10 ± 8; 4 mo, 13 ± 14</td>
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<td></td>
<td></td>
<td>• Square hop: pre, 6 ± 5; 4 mo, 7 ± 4</td>
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<td></td>
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<td></td>
<td></td>
<td>• Isokinetic muscle strength testing:</td>
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<td>• Quadriceps strength: pre, 169 ± 53; 4 mo, 171 ± 48</td>
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<td>• Quadriceps endurance: pre, 2443 ± 642; 4 mo, 2403 ± 623</td>
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<td>• Hamstrings strength: pre, 90 ± 20; 4 mo, 90 ± 28</td>
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<td>• Hamstrings endurance: pre, 1283 ± 450; 4 mo, 1282 ± 474</td>
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<td>• KOOS: NA</td>
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<td>Exercise therapy group:</td>
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<td></td>
<td></td>
<td>• 1-leg hop for distance: pre, 106 ± 29; 4 mo, 114 ± 30</td>
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<td></td>
<td>• 1-leg rise: pre, 13 ± 11; 4 mo, 20 ± 23</td>
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<td></td>
<td>• Square hop: pre, 5 ± 2; 4 mo, 8 ± 4</td>
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<td></td>
<td>• Isokinetic muscle strength testing:</td>
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<td></td>
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<td>• Quadriceps strength: pre, 152 ± 44; 4 mo, 154 ± 42</td>
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<td></td>
<td>• Quadriceps endurance: pre, 2122 ± 480; 4 mo, 2277 ± 605</td>
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<td>• Hamstrings strength: pre, 81 ± 26; 4 mo, 89 ± 28</td>
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<td>• Hamstrings endurance: pre, 1174 ± 336; 4 mo, 1251 ± 398</td>
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<td></td>
<td></td>
<td></td>
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<td>• KOOS: NA</td>
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</tbody>
</table>

Abbreviations: KOOS, Knee injury and Osteoarthritis Outcome Score; NA, not available; post, postoperative; pre, preoperative.

*Values are mean ± SD unless otherwise indicated.

SD age, 38 ± 8 years). The average number of sessions for the physical therapy group was 12. Both groups showed improvements compared to the initial assessment, but there were no significant between-group differences.

In the Kella et al. study, the treatment group was composed of 16 patients who underwent outpatient physical therapy on a stationary bike plus home exercise. The comparison group consisted of 15 patients treated with home exercise. The mean ± SD age of the participants was 47.1 ± 12.4 years. There were no statistically significant differences between the groups, but both groups showed improvement throughout the study. The outcomes patient-reported knee function (assessed by International Knee Documentation Committee [IKDC] Subjective Knee Evaluation Form), knee flexion ROM, and knee circumference showed high values for the effect size (0.97, 0.71, and 0.86, respectively). Results of the knee
### TABLE 6

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Interventions</th>
<th>Study Outcomes</th>
<th>Results*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akkaya et al</td>
<td>Home exercise group: 15 participants; mean ± SD age, 49.8 ± 11.6 y; 7 female, 8 male</td>
<td>Home exercise group: home exercise (5 times per wk for 4 wk)</td>
<td>Assessment times: pre, post 2 wk and 6 wk</td>
<td>Home exercise group:</td>
</tr>
<tr>
<td></td>
<td>EMG biofeedback group: EMG biofeedback (5 times per wk for 2 wk) plus home exercise (5 times per wk for 4 wk)</td>
<td>Measures: pain (VAS), velocity of gait, time using a walking aid, functionality (Lysholm), ROM of the knee, thigh and knee circumference, muscle power (VMO and VL)</td>
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<tr>
<td></td>
<td>Electrical stimulation group: 15 participants; mean ± SD age, 48.3 ± 9.3 y; 10 female, 5 male</td>
<td>Electrical stimulation group: electrical stimulation (5 times per wk for 2 wk) plus home exercise (5 times per wk for 4 wk)</td>
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<tr>
<td></td>
<td>Home exercise group: home exercise (5 times per wk for 4 wk)</td>
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<tr>
<td>Felicetti et al</td>
<td>Group 1: 15 participants; age range, 20-40 y; 7 female, 8 male</td>
<td>Group 1: isometric and isotonic exercises (5 times per wk for 45 min for 3 wk)</td>
<td>Assessment times: pre, post 3 wk and 4 wk</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Group 2: 15 participants; age range, 20-40 y; 6 female, 9 male</td>
<td>Group 2: isometric exercise (5 times per wk for 45 min for 3 wk)</td>
<td>Measures: muscle strength (knee flexor and extensor muscles), muscle power (knee flexor and extensor muscles)</td>
<td></td>
</tr>
<tr>
<td>Krebs</td>
<td>EMG biofeedback group: 28 participants; mean ± SD age, 35.5 ± 3.4 y; 5 female, 23 male</td>
<td>EMG biofeedback group: isometric quadriceps muscle exercise with feedback plus SLR plus crutch walking</td>
<td>Assessment times: pre, post 3 d</td>
<td>EMG biofeedback group:</td>
</tr>
<tr>
<td></td>
<td>Physical therapy group: 31 participants; mean ± SD age, 35.9 ± 19 y; 9 female, 22 male</td>
<td>Physical therapy group: isometric quadriceps muscle exercise plus SLR plus crutch walking</td>
<td>Measures: change in resting EMG, posttest maximum EMG, change in maximum EMG, change in manual muscle test, weight-bearing tolerance</td>
<td>Change in resting EMG: 3 d, 0.0 ± 0.0</td>
</tr>
<tr>
<td>Williams et al</td>
<td>Outpatient physical therapy group: 8 participants; age range, 22-46 y; 3 female, 5 male</td>
<td>Outpatient physical therapy group: physical therapy (3 times per wk for 3 wk)</td>
<td>Assessment times: pre, post 3 wk</td>
<td>Outpatient physical therapy group:</td>
</tr>
<tr>
<td></td>
<td>Experimental group: 13 participants; age range, 18-44 y; 13 male</td>
<td>Experimental group: electrical stimulation to the quadriceps (5 times per wk for 10 min for 3 wk) plus physical therapy (3 times per wk for 3 wk)</td>
<td>Measures: thigh circumference, torque production: isokinetic (extension and flexion)</td>
<td>Thigh circumference: pre, 55.2 ± 3 wk, 56.6</td>
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<td>Torque production: isokinetic: pre, 59.8 ± 29.8; 3 wk, 66.7 ± 29</td>
</tr>
</tbody>
</table>

Abbreviations: EMG, electromyography; NA, not available; post, postoperative; pre, preoperative; ROM, range of motion; SLR, straight leg raise; VAS, visual analog scale; VLO, vastus lateralis; VMO, vastus medialis oblique.

*Values are mean ± SD unless otherwise indicated.

*Values are mean ± standard error of mean.

*Value is median.
RESULTS
25 Participants
Study Outcomes
Group A: 35 participants
Characteristics of Included Studies of the Group Inpatient Treatment Versus Inpatient Plus Outpatient Treatment

<table>
<thead>
<tr>
<th>Study and Participants</th>
<th>Interventions</th>
<th>Study Outcomes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forster and Frost$^{1}$</td>
<td>Control group: treatment in the inpatient (12 d); Test group: treatment in the inpatient (12 d) plus outpatient physical therapy (3 times per wk for 12 wk)</td>
<td>Assessment times: pre, post 10 d, 4 wk, 6 wk, 10 wk, 14 wk, and 26 wk</td>
<td>Control group:</td>
</tr>
<tr>
<td></td>
<td>Control group: age range, 16-45 y; 42 male; Test group: age range, 16-45 y; 44 male</td>
<td>Measures: quadriceps circumference (cm), range of knee movement (deg), effusion (%)</td>
<td>• Quadriceps circumference: pre, 46.3; 26 wk, 46.3</td>
</tr>
<tr>
<td></td>
<td>Control group: treatment in the inpatient (10 d); Test group: treatment in the inpatient plus outpatient physical therapy (3 times per wk for 6 wk)</td>
<td>Measures: quadriceps circumference (cm), range of knee movement (deg), effusion (%)</td>
<td>• Range of knee movement: pre, 124.3; 26 wk, 139.6</td>
</tr>
<tr>
<td>Seymour$^{40}$</td>
<td>Group A: 35 participants; Group B: 35 participants</td>
<td>Assessment times: pre, post 10 d, 3 wk, 4 wk, 6 wk, and 3 mo</td>
<td>• Effusion: pre, 20.5; 26 wk, 6.8</td>
</tr>
<tr>
<td></td>
<td>Group A: treatment in the inpatient (10 d); Group B: treatment in the inpatient plus outpatient physical therapy (3 times per wk for 6 wk)</td>
<td>Measures: effusion present (participants, n), ROM (average deg), wasting of the thigh (participants, n), time to return to work and full activity</td>
<td>• Knee gives way: pre, 45.1; 26 wk, 15.9</td>
</tr>
<tr>
<td></td>
<td>Test group: 44 participants; Control group: 42 participants; age range, 16-45 y; 44 male</td>
<td></td>
<td>• Ability to crouch impaired: pre, 68.2; 26 wk, 34.9</td>
</tr>
<tr>
<td></td>
<td>Test group: treatment in the inpatient (10 d) plus outpatient physical therapy (3 times per wk for 12 wk)</td>
<td></td>
<td>• Gait impaired: pre, 36.4; 26 wk, 2.3</td>
</tr>
<tr>
<td></td>
<td>Test group: age range, 16-45 y; 42 male; Control group: age range, 16-45 y; 44 male</td>
<td></td>
<td>• Gait ascending impaired: pre, 9.1; 26 wk, 2.3</td>
</tr>
<tr>
<td></td>
<td>Test group: treatment in the inpatient plus outpatient physical therapy (3 times per wk for 12 wk)</td>
<td></td>
<td>• Gait descending impaired: pre, 15.9; 26 wk, 0</td>
</tr>
<tr>
<td></td>
<td>Test group: age range, 16-45 y; 44 male</td>
<td></td>
<td>• Running down stairs impaired: pre, 61.4; 26 wk, 4.7</td>
</tr>
<tr>
<td></td>
<td>Test group: treatment in the inpatient plus outpatient physical therapy (3 times per wk for 12 wk)</td>
<td></td>
<td>• Wound not healed: pre, NA; 26 wk, 0</td>
</tr>
</tbody>
</table>

Abbreviations: NA, not available; post, postoperative; pre, preoperative; ROM, range of motion.

In the gait assessment, the chi-square test showed a statistical difference between groups: 2 weeks postsurgery for antalgic gait, $P = .046$; 1 week, 2 weeks, and 1 month postsurgery for hobble, $P = .008$, $P = .003$, and $P = .025$, respectively. All results were in favor of the outpatient physical therapy plus home exercise group. For the quadriceps control outcome, patients in the home exercise group showed a delay in knee extension greater than patients in the outpatient physical therapy plus home exercise group ($P = .032$).

Kirnap et al$^{32}$ compared the effect of EMG biofeedback on quadriceps muscle strength after meniscectomy. The mean ± SD age of the participants was 34.5 ± 10.3 years. There were 20 patients in the home exercise group and 20 in the experimental group (outpatient physical therapy with EMG biofeedback plus home exercise). Results showed a statistically significant difference in favor of the intervention group for the outcomes ROM of knee flexion, patient-reported knee function (evaluated by the Lysholm questionnaire), and the maximum and average activation of the vastus medialis oblique and vastus lateralis at 2 and 6 weeks postsurgery.

Moffet et al$^{34}$ studied 15 patients in the outpatient physical therapy plus home exercise group (mean ± SD age, 42 ± 9 years) and 16 in the home exercise group (mean ± SD age, 38 ± 7 years). Results showed that the outpatient physical therapy group obtained a larger recovery of knee extension deficits when compared with the home exercise group. In the evaluation of clinical symptoms, such as pain and patient-reported knee function, no differences were found between the groups.

In the study by Vervest et al$^{40}$ a comparison of outpatient physical therapy plus home exercise (mean ± SD age, 31.1 ± 7.1 years) versus home exercise (mean ± SD age, 35.7 ± 5.7 years) showed that...
for the outcomes single-leg vertical and horizontal hop test and for the sports activity rating scale questionnaire, there was a statistical difference in favor of the first group. For other outcomes, there were no differences between groups.

**FIGURES 5 and 6** refer to the meta-analyses of studies that evaluated patient-reported knee function through the Lysholm questionnaire and ROM of knee flexion. For patient-reported knee function evaluated at 4 weeks postsurgery, comparing the outpatient physical therapy plus home exercise versus home exercise groups, a statistically significant difference was found in favor of the first group (mean difference, 10.35; 95% CI: 1.33, 19.36; *P* = .02) (**FIGURE 5**). The average treatment time of the studies included in this meta-analysis was 2.6 weeks. For the outcome of knee flexion, a statistically significant difference in favor of the first group was found (mean difference, 9.13; 95% CI: 3.74, 14.53; *P* = .0009) (**FIGURE 6**). The average treatment time of the studies included in this meta-analysis was 2 weeks.

**Outpatient Physical Therapy Versus Home Exercise**

Jokl et al evaluated 30 patients with traumatic lesions. The treatment duration was 4.5 weeks. The home exercise group consisted of 15 patients (mean ± SD age, 33.5 ± 6.8 years) who received only an exercise program and information, and the outpatient physical therapy group consisted of 15 patients (mean ± SD age, 30.7 ± 13.9 years) who were supervised by a physical therapist. Both groups performed exercises as described

---

**TABLE 8**

**Characteristics of Included Studies of the Group Routine Physical Therapy Versus Intensive Physical Therapy**

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Interventions</th>
<th>Study Outcomes</th>
<th>Results*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karumo et al</td>
<td>Group A: 27 participants; mean ± SD age, 36.26 ± 12.34 y; 4 female, 23 male</td>
<td>Group A: routine physical therapy (7 times per wk, once per d, for 1 wk)</td>
<td>Assessment times: pre, post 1 wk, 2 wk, and 4 wk</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Group B: 29 participants; mean ± SD age, 34 ± 9.21 y; 5 female, 24 male</td>
<td>Group B: intensive physical therapy (7 times per wk, twice per d, for 1 wk)</td>
<td>Measures: isokinetic and isotonic muscle strength of quadriceps, knee ROM (deg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group C: 15 participants; mean ± SD age, 28.6 ± 6.2 y; 3 female, 12 male</td>
<td>Group C: healthy volunteer controls</td>
<td>Assessment times: pre, post 4 wk</td>
<td></td>
</tr>
</tbody>
</table>

**Abbreviations:** kp, kilopound; NA, not available; post, postoperative; pre, preoperative; ROM, range of motion.

*Values are mean ± SD unless otherwise indicated.
Research Report

Characteristics of Included Studies of the Group Early Versus Delayed Treatment

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Interventions</th>
<th>Study Outcomes</th>
<th>Results</th>
</tr>
</thead>
</table>
| Leonard‡              | Early treatment group: 53 participants; mean age (range), 34.4 y (13-68 y) | Early treatment group: physical therapy plus plaster and weight bearing within 3 d post | Assessment time: post 6 mo | Early treatment group*:  
  • Average d to full weight bearing: 4 (2-21)  
  • Bed occupancy: 5.9 (3-11)  
  • Average d to full ROM: 71 (22-120)  
  • Average duration of effusion post d: 49.4  
  • Patients with effusion: 75  
  • Average d of physical therapy: 32  
  • Average d off work: 51 (7-140)  
|                        | Delayed treatment group: 47 participants; mean age (range), 35.2 y (16-56 y) | Delayed treatment group: physical therapy plus compression bandage and weight bearing within 10 d post | Measures: average d to full weight bearing, bed occupancy (d), average d to full ROM, average duration of effusion post d, patients with effusion (%), average d of physical therapy, average d off work | Delayed treatment group*:  
  • Average d to full weight bearing: 13.4 (10-42)  
  • Bed occupancy: 14.7 (10-31)  
  • Average d to full ROM: 75 (20-112)  
  • Average duration of effusion post: 51  
  • Patients with effusion: 77  
  • Average d of physical therapy: 28  
  • Average d off work: 53.5 (12-101) |
| St-Pierre et al†       | Early training group: 7 participants; mean ± SD age, 35.8 ± 6.7 y; 7 male | Early training group: physical therapy within 2 wk post plus home exercise (3 times per wk for 4-8 wk) | Assessment times: pre, post 2 wk, 6 wk, and 10 wk | Early training group*:  
  • Quadriceps and hamstrings peak torques: NA  
  • Torques developed by the quadriceps and hamstrings: NA  
  • Fatigue of the quadriceps:  
    - Total work: pre, 1330.6 ± 326.3; 10 wk, 1565.8 ± 384.1  
    - Average power: pre, 158.2 ± 52.7; 10 wk, 177 ± 52  
    - Fatigue index: pre, 78.3 ± 13.9; 10 wk, 82.7 ± 10.1  
  • Fatigue of the hamstrings:  
    - Total work: pre, 741.1 ± 237.8; 10 wk, 935.3 ± 366.9  
    - Average power: pre, 851 ± 24.2; 10 wk, 1049 ± 42.9  
    - Fatigue index: pre, 74.5 ± 24; 10 wk, 75.3 ± 10.4  
|                        | Delayed training group: 9 participants; mean ± SD age, 35.8 ± 12.9 y; 3 female, 6 male | Delayed training group: physical therapy within 6 wk post plus home exercise (3 times per wk for 4-8 wk) | Measures: quadriceps and hamstrings peak torques, torques developed by the quadriceps and hamstrings, fatigue of the quadriceps, total work (J), average power (W), fatigue index, fatigue of the hamstrings, total work (J), average power (W), fatigue index | Delayed training group*:  
  • Quadriceps and hamstrings peak torques: NA  
  • Torques developed by the quadriceps and hamstrings: NA  
  • Fatigue of the quadriceps:  
    - Total work: pre, 1548.2 ± 526; 10 wk, 1839.9 ± 637.3  
    - Average power: pre, 1874 ± 61.5; 10 wk, 2094 ± 699  
    - Fatigue index: pre, 81.5 ± 18.2; 10 wk, 77.4 ± 4.4  
  • Fatigue of the hamstrings:  
    - Total work: pre, 938.5 ± 493.4; 10 wk, 1311 ± 490.8  
    - Average power: pre, 1056 ± 561.1; 10 wk, 148 ± 54.6  
    - Fatigue index: pre, 79.8 ± 17.5; 10 wk, 73.6 ± 6.3 |

Abbreviations: NA, not available; post, postoperative; pre, preoperative; ROM, range of motion.
*Values are mean (range).
†Values are mean ± SD.

in the study methods. There were no statistically significant differences between the 2 groups. At 4 weeks postsurgery, the mean percent deficit in torque between the affected and unaffected limbs was 22.1% in the supervised rehabilitation group and 22% in the home exercise group. The percent deficit in terms of endurance was 7.7% in the supervised group and 3.6% in the home group. Similar results were noted in the subjective evaluation of knee function and the ability to resume work and recreational activities.

Outpatient Physical Therapy Versus Control Group

Ericsson et al§ evaluated the effect of exercise on functional performance and muscle strength after partial meniscectomy. Forty-five participants were randomized (22 in the intervention group and 23 in the control group). The patients in the intervention group (mean ± SD age, 45.4 ± 3.2 years) underwent supervised physical therapy for 4 months, with a frequency of 3 times per week. Patients in the control group received no treatment (mean ± SD age, 45.9 ± 3.2 years). The exercise program comprised postural stability training and functional strength and endurance exercises for leg and trunk muscles. Statistically significant differences were found in favor of the intervention
refers to the meta-analysis
Akkaya et al
7/19/2013 3:47:52 PM

Figure 3

Outpatient Physical Therapy Versus
Modalities Alone

Four studies compared the benefits of outpatient physical therapy (mix of specific interventions) and the use of modalities alone. Outpatient physical therapy consisted of aerobic, flexibility, joint mobility, and strengthening exercises and gait training; the modalities alone were EMG biofeedback, electrical stimulation, and isokinetic training.

Akkaya et al compared the effectiveness of EMG biofeedback training and electrical stimulation therapy. Forty-five patients were evaluated (15 in the home exercise group, 15 in the EMG biofeedback group, and 15 in the electrical stimulation group). The mean age was 46.9 years. There was a statistically significant difference in favor of the EMG biofeed-

Inpatient Treatment Versus Inpatient
Plus Outpatient Treatment

Two studies fit this category by comparing treatment given only during the period of hospitalization to receiving both inpatient and outpatient treatment. The results from both studies showed no statistical differences between the groups. The age of the participants ranged from 18 to 46 years.

Figure 7 refers to the meta-analysis that evaluated effusion in these studies. Comparing the inpatient physical therapy group to the inpatient physical therapy plus outpatient physical therapy group, a statistically significant difference was found in favor of the inpatient physical therapy group (odds ratio = 0.25; 95% CI: 0.10, 0.61; P = .003). This means that the inpatient group showed a 75% lower risk of effusion. In the studies, the inpatient group had a mean treatment time of 10.4 ± 3.4 years. The results showed that both groups showed improvement; however, no comparisons were made between groups.
10 days and the inpatient plus outpatient physical therapy group had a mean treatment time of 5 weeks.

**Routine Physical Therapy Versus Intensive Physical Therapy**

Karumbo evaluated 56 patients and compared the effects of a treatment performed twice a day (intensive; mean ± SD age, 34 ± 9.2 years) versus once daily (routine; mean ± SD age, 36.2 ± 12.3 years). Clinical findings showed no differences between the groups. With respect to the strength of the knee flexors, the routine physical therapy group showed more improvement than the intensive physical therapy group ($P<0.0001$). As for the outcome ability to walk, when evaluated at 2 weeks postsurgery, the intensive group was better than the routine group; however, this difference disappeared in the evaluation at 4 weeks.

**Early Versus Delayed Treatment**

Two studies compared early versus delayed treatment. Leonard evaluated 100 patients divided into 2 groups. The standard regime (delayed) consisted of physical therapy, compression bandage, and weight bearing at 10 days postsurgery (mean age, 35.2 years). The plaster regime (early) consisted of physical therapy plus plaster and weight bearing at 3 days postsurgery (mean age, 34.4 years). The results did not show significant differences between groups. St-Pierre et al. evaluated 16 patients divided into an early training group (physical therapy at 2 weeks postsurgery plus home exercise; mean ± SD age, 35.8 ± 6 years) and a delayed training group (physical therapy at 6 weeks postsurgery plus home exercise; mean ± SD age, 35.8 ± 12.9 years). The authors concluded that training in the early stages following arthroscopic meniscectomy did not appear to improve the recovery of strength, and the importance of timing of the training stimulus was suggested.

**DISCUSSION**

This study evaluated the effectiveness of modalities alone, such as EMG biofeedback, electrical stimulation, and isokinetic training, and the effectiveness of using different contexts for physical therapy interventions on the recovery of patients who have undergone arthroscopic partial meniscectomy. Patients who have undergone arthroscopic meniscectomy report various symptoms, such as pain, decreased ROM, and muscle atrophy. There are a wide range of interventions described for the treatment of these symptoms; however, there are few high-quality RCTs demonstrating the benefits of physical therapy for these patients.

For studies comparing outpatient physical therapy with home exercise to home exercise alone, there were some disagreements among the individual studies. In 3 RCTs, differences were found in favor of using outpatient physical therapy for the outcomes of ROM, patient-reported knee function, and functional tests. However, the other 3 RCTs found no differences between the groups. In meta-analysis, a significant improvement was found in favor of the outpatient physical therapy group for the outcome of patient-reported knee function (Figure 5) on the Lysholm questionnaire. Studies have reported that the use of EMG biofeedback as a resource in the treatment of patients with an unstable knee promotes stability and a decrease in muscle inhibition. However, other studies have found no differences with the use of EMG for the outcome of patient-reported knee function. These authors reported that a small sample size might have influenced their results, and others have reported that the Lysholm questionnaire may not be sensitive enough to evaluate clinical changes in patients post-partial meniscectomy.

The second meta-analysis, comparing outpatient physical therapy with home exercise versus home exercise alone for the outcome of knee ROM, used 2 studies. When analyzed together in the meta-analysis, a significant difference in knee flexion ROM for the interven-
The traditional treatment of arthroscopic partial meniscectomy does not result in worse outcomes. This suggests that the early physical therapy treatment is effective for this type of patient. The author suggested that physical therapy should be initiated at least 3 days after the surgery for the outcome of effusion present. In these studies, the initial approach was to keep the patient in compressive bandages for at least 10 days, which may explain the absence of effusion at this stage of treatment. The authors suggested that for this type of patient, treatment during hospitalization alone is enough. However, the surgical procedures nowadays are minimally invasive, and patients are typically discharged home on the same day, making this suggestion impractical for clinical practice.

The quality of the RCTs included in this review, according to the Cochrane Collaboration classification, was as follows: 13 studies were categorized as high risk of bias, 5 as moderate risk of bias, and no study as low risk of bias. In the analysis of 5 RCTs with better methodologic quality, 4 studies were categorized as high risk of bias, and 1 as moderate risk of bias. The results of studies evaluating modalities alone have indicated that isokinetic training, EMG biofeedback, and electrical stimulation as adjuvants are effective for this type of patient. As for early physical therapy, the results of 1 study do not appear to apply to current clinical practice because the group initiated the early physical therapy treatment only at 2 weeks postsurgery. Leonard showed that early physical therapy did not result in worse outcomes. This suggests that the traditional treatment of delayed time could be replaced by a safe and simple method that encourages the patient to walk and be discharged rapidly without causing harm to the final results.

<table>
<thead>
<tr>
<th>Study</th>
<th>Mean ± SD</th>
<th>Total, n</th>
<th>Mean ± SD</th>
<th>Total, n</th>
<th>Weight</th>
<th>Mean Difference IV, Fixed (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirnap et al 25</td>
<td>95.4 ± 3.7</td>
<td>20</td>
<td>79.6 ± 10.1</td>
<td>20</td>
<td>48.4%</td>
<td>15.80 (11.09, 20.51)</td>
</tr>
<tr>
<td>Moffet et al 23</td>
<td>80.0 ± 14</td>
<td>15</td>
<td>78 ± 14</td>
<td>16</td>
<td>28.8%</td>
<td>2.00 (-0.70, 13.70)</td>
</tr>
<tr>
<td>Vervest et al 22</td>
<td>88.7 ± 13.9</td>
<td>10</td>
<td>79.4 ± 18.8</td>
<td>10</td>
<td>22.8%</td>
<td>9.30 (-5.19, 23.79)</td>
</tr>
<tr>
<td>Total</td>
<td>121.3 ± 11.0</td>
<td>45</td>
<td>100.0%</td>
<td>46</td>
<td>100.0%</td>
<td>10.35 (3.33, 19.36)</td>
</tr>
</tbody>
</table>

**FIGURE 5.** Meta-analysis of the outcome patient-reported knee function.

<table>
<thead>
<tr>
<th>Study</th>
<th>Mean ± SD</th>
<th>Total, n</th>
<th>Mean ± SD</th>
<th>Total, n</th>
<th>Weight</th>
<th>Mean Difference IV, Fixed (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kelin et al 24</td>
<td>1276 ± 12.3</td>
<td>15</td>
<td>121.3 ± 12.5</td>
<td>15</td>
<td>37.0%</td>
<td>6.30 (-5.57, 15.17)</td>
</tr>
<tr>
<td>Kirnap et al 25</td>
<td>129 ± 10.2</td>
<td>20</td>
<td>118.2 ± 11.7</td>
<td>20</td>
<td>63.0%</td>
<td>10.80 (4.00, 17.60)</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>35</td>
<td>100.0%</td>
<td>9.13 (3.74, 14.53)</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

**FIGURE 6.** Meta-analysis of the outcome range of motion of knee flexion.

**Summary:**

- Early physical therapy is effective for patients who have undergone arthroscopic partial meniscectomy.
- Outpatient physical therapy plus home exercise is superior to home exercise alone.
- Early physical therapy should be initiated at least 3 days after surgery.
- Physical therapy is a safe and simple method that encourages patients to walk and be discharged rapidly.
- Further studies are needed to evaluate the role of early physical therapy in minimizing the risk of effusion.

**Abbreviations:** CI, confidence interval; IV, instrumental variables estimation; PT, physical therapy.
### Table: Meta-analysis of the Outcome Effusion Present

<table>
<thead>
<tr>
<th>Study</th>
<th>Inpatient Treatment</th>
<th>Inpatient Plus Outpatient Physical Therapy</th>
<th>OR Peto, Fixed (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forster and Frost</td>
<td>2 Events, 41 Total</td>
<td>3 Events, 43 Total</td>
<td>0.69 (0.11, 4.17)</td>
</tr>
<tr>
<td>Seymour</td>
<td>3 Events, 35 Total</td>
<td>15 Events, 35 Total</td>
<td>0.17 (0.06, 0.49)</td>
</tr>
<tr>
<td>Total</td>
<td>5 Events, 76 Total</td>
<td>18 Events, 78 Total</td>
<td>0.25 (0.10, 0.61)</td>
</tr>
</tbody>
</table>

**Abbreviations:** CI, confidence interval; OR, odds ratio; PT, physical therapy.

### Figures

**Figure 7:** The figure illustrates the meta-analysis of the outcome effusion present.

---

This review had some limitations.

### Implications for Practice

**From a practical point of view, some suggestions can be made.**

- **Knee pain, lack of mobility, effusion, and thigh atrophy are the most common clinical findings after a partial arthroscopic meniscectomy procedure.**
- The treatment should include outpatient care and a well-planned home exercise program. It should be performed at least 3 times a week and start as soon as possible.
- The treatment may contain the following interventions: early weight bearing, progressive knee mobilization exercises, quadriceps and hamstrings strengthening exercises, sensory motor training, thermotherapy, and an early return to activities. It may use adjutants such as neuromuscular electrical stimulation, EMG biofeedback, and isokinetics.

### Implications for Research

**The present review revealed some methodological flaws in the RCTs evaluated.**

**The poor methodological quality found in the RCTs should be avoided and was due to factors such as small sample size, lack of standard outcome measures, and not using guidelines such as the CONSORT statement.**

---

**Conclusion**

**This review found that outpatient physical therapy associated with a home exercise program improved patient-reported knee function and ROM and reduced effusion in patients who had undergone partial arthroscopic meniscectomy.** However, the results presented in this review are based on studies of moderate to high risk and should be interpreted with caution.
**KEY POINTS**

**FINDINGS:** The results of this review indicate that carrying out outpatient physical therapy associated with a home exercise program results in greater improvement in patient-reported knee function and ROM than just outpatient physical therapy. Furthermore, inpatient physical therapy alone reduces the likelihood of effusion.

**IMPLICATIONS:** For clinical practice, the treatment should include outpatient care and a well-planned home exercise program. It should be performed at least 3 times a week and start as soon as possible.

**CAUTION:** The studies included in this review were classified with a high to moderate risk of bias, so their results should be interpreted with caution.

---

**REFERENCES**