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F. Goodyear-Smith · B. Arroll

Rehabilitation after arthroscopic meniscectomy: a critical review of the clinical trials

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Abstract We reviewed the literature on patient management following arthroscopic meniscal surgery. A critical appraisal of the literature produced 8 randomized controlled trials evaluating the use of non-steroidal anti-inflammatory drugs or various forms of physiotherapy and pain control. Different treatments and outcome measures precluded meta-analysis. The limited evidence suggests that this is a relatively pain-free procedure with rapid recovery, and that in most cases simple analgesia in the first 1–2 days following surgery and a well-planned home-based exercise program should be sufficient. It is possible that routine daily non-steroidal anti-inflammatory drugs post-operatively for 3–6 weeks may enhance recovery rates. One study found that physiotherapy was beneficial for regaining muscle strength and on pain assessment but this did not translate into functional improvement. Descriptive studies are required to ascertain the types and duration of treatments being offered to patients after arthroscopic meniscectomy. Further research is needed to perform well-designed studies of current treatments that take into account predisposing factors and their impact on outcome, including use of pre-randomization and real-life functional outcome measures.

Résumé Nous avons revu la littérature concernant les traitements après une chirurgie méniscale arthroscopique. Une évaluation critique de la littérature a produit 8 essais contrôlés de patients randomisés, qui évaluaient l'usage post-opératoire de médicaments anti-inflammatoires non stéro, les différentes formes de kinésithérapie et le contrôle de la douleur. Les différents traitements et moyens de mesurer les résultats ont exclu la meta-analyse. Les différentes études suggèrent qu'il s'agit d'un procédé relativement sans douleur à récupération rapide et que, dans la plupart des cas, une analgésie simple les 2 premiers jours, accompagnée d'un programme d'exercices choisis à bon escient à domicile devrait suffire. Il est possible que l'administration post-opératoire routinière et quotidienne de médicaments anti-inflammatoires dépourvus de stéro, pris pendant 3 à 6 semaines, puisse améliorer la récupération. Une des études démontre le bénéfice de la kinésithérapie sur la puissance musculaire et l'évaluation de la douleur, mais sans amélioration fonctionnelle. Des études descriptives sont requises pour établir les types et durées de traitements offerts après une meniscectomie arthroscopique. Les futurs travaux de recherche sur les traitements actuels devront être dessinés de façon telle qu'ils tiennent compte des facteurs prédisposants et de leur cause et effet sur les résultats, utilisant la méthode de pré-randomisation et mesurant les résultats selon la fonction réelle.

F. Goodyear-Smith · B. Arroll
Royal New Zealand College of General Practitioners Research Unit, Division of General Practice and Primary Health Care,
School of Medicine, University of Auckland, Private Bag 92019, Auckland, New Zealand

Introduction

The goals of postoperative rehabilitation following arthroscopic meniscal surgery are to resolve symptoms, restore function and prevent further injury [16]. Postoperative rehabilitation generally follows a progressive phasic approach although there does not appear to be a standard protocol. The use of a wide range of therapies and the lack of a standardized protocol suggests there is little consensus on which treatment, if any, is best. The aim of this review was to assess all the clinical trial evidence for rehabilitation following arthroscopic meniscal surgery according to evidence-based medicine guidelines.

Materials and methods

We searched the relevant databases including Medline, Embase, SPORTDiscus, CINAHL, the National Research Registry Projects, York Health Research, UK Chartered Society of Physiotherapy research and the Controlled Trial Register of the Cochrane Library 1999 Issue 2. Other papers were accessed by hand searching and contacting key authors from published papers or other accessed sources.

This review uses criteria established by the evidence-based medicine group [4, 5, 6]. Randomized controlled trials (RCT) are believed to be the best way of assessing a particular therapy or rehabilitation in order to minimize selection bias and subsequent confounding. While observational studies can help to determine causal factors and therapy prognosis, they may not always account for confounding by patients and/or care providers. Our criteria for inclusion to undergo an evidence-based critique were: RCT using human subjects, published in English and related to rehabilitation following arthroscopic meniscectomy. The studies accessed included trials of postoperative pharmaceutical and physiotherapy rehabilitation and comparative outcomes of different surgical approaches.

Results

Eight papers met our inclusion criteria (Table 1) [2, 7, 8, 10, 12, 13, 14, 17]. Birch and colleagues [2] conducted a prospective RCT of the effect of either a non-steroid anti-inflammatory drug (NSAID) (Diclofenac sodium) or physiotherapy on the recovery of knee function following surgery. The findings at surgery were classified as normal, meniscal tear or 'other'. Meniscal tears were treated with partial meniscectomy. Clinical assessment at 42 days post-surgery by examiners blind to the patients' treatment groups found no significant difference in either form of treatment compared to control subjects. Nearly 10% of those receiving NSAIDs reported side-effects. The authors concluded that neither the use of NSAIDs nor physiotherapy is justified routinely after arthroscopy of the knee. The sample size (n=120) in this study may have been too small to show a difference.

In contrast, Oglivie-Harris et al. [12] reported a more rapid recovery of function and earlier return to work and sport when an NSAID was used. They conducted a prospective double-blind, RCT of 139 patients randomly allocated to either placebo or active treatment groups. The latter received 550 mg Naproxen for 6 weeks. Both groups were also given an analgesic (30 mg Paracetamol plus Codeine) to take if needed. Follow-up assessments were made at 1, 3, 6 and 12 weeks after the operation. The study does not specify whether these assessments were conducted by examiners blinded to the randomization of subjects. Patients in the treatment group were reported to have had significantly less pain at rest for up to 21 days after operation, and less pain during activity at all follow-up periods. They also used significantly less analgesia than the control subjects.

St-Pierre et al. [14] studied 16 subjects randomly assigned to early (2 week) or delayed (6 weeks) isokinetic muscle strength training programs. They found both early and delayed (control) groups had recovered to their preoperative muscle strength by week 6. Both groups underwent training from 6 weeks to 10 weeks at which time similar strength gains were noted in both groups. Again, this study suffered from a small sample size, which could cause type 2 statistical errors. With a larger sample a difference might have been found.

A study by Williams et al. [17] randomly assigned 21 patients to either experimental or control groups. The period from surgery to initiation into the study ranged from 16 to 88 days. All subjects underwent a 3-week training program consisting of isometric and isotonic muscle ex-

Table 1 Types of therapy and methodological issues. (*NSAID* non-steroidal anti-inflammatory drug, *Physio* physiotherapy, *NR* not reported, *SIT* stress inoculation training sessions)

Author	Randomized	Controlled	Intervention	*n*	Mean age (years)	% women	Intervention duration	Blinded intervention	Blinded outcome	Compliance	Overall result
Birch et al. 1993 [2]	Yes	No NSAID or Physio	NSAID Physio	68	34.6	14.2%	7 days; 1–11 days	No	Yes	51/52	Negative
Ogilvie-Harris et al. 1985 [12]	Yes	Placebo	Naproxen	139	NR	NR	6 weeks	Yes	NR	NR	Positive
St-Pierre et al. 1991 [14]	Yes	Delayed therapy	Isokinetic strengthening exercises	16	35.8	18.8%	8 weeks	No	NR	NR	Negative
Williams et al. 1986 [17]	Yes	No electric stimulation	Electric stimulation quadriceps	21	33	14.3%	3 weeks	No	NR	NR	Positive
Jensen et al. 1985 [7]	Yes	No unit or placebo unit	TNS	90	38	NR	1 week	Yes with respect to placebo	No	NR	Positive
Moffet et al. 1994 [10]	Yes	No therapy	Physio × 9 sessions	31	39.9	0%	3 weeks	No	Yes	14/15 for therapy NR for control	Positive
Jokl et al. 1989 [8]	Yes	Home exercise	Physio average × 13.5 sessions	30	32.1	23.3%	Average 4.5 weeks	No	No	NR	Negative
Ross et al. 1996 [13]	No*	Physio/No therapy	Physio + 2 SIT sessions	60	28.9	0%	3 weeks	No	Yes	NR	Positive

*Alternately allocated

ercises 3 times weekly. The experimental group also received electrical stimulation to the quadriceps 5 times a week. Following the program, both groups demonstrated significant increase in thigh girth and quadriceps strength compared to preoperative measurements. There was no difference in thigh girth between groups. Both groups showed significant increases in quadriceps torque at slower contraction speeds, but the group that had undergone electrical stimulation also demonstrated significant increases at faster speeds.

A prospective study of 90 consecutive patients [7] were divided into 3 groups of 30 patients each to assess the analgesic effect of transcutaneous neural stimulation (TNS) postoperatively. One group received active TNS units (experimental group); one received non-working units (placebo) and the third received no units (control). The subjects' postoperative pain levels were recorded for the first week following surgery. Most subjects had discontinued their TNS use by day 4. The investigators found that the control group required the most medication for pain control and the TNS group the least. A definite placebo effect was also noted. The study may have been unblinded as therapists were instructed not to replace batteries in placebo units.

An RCT by Moffett et al. [10] of an early, intensive supervised rehabilitation program to strengthen muscles during the first 3 weeks after arthroscopic meniscectomy was conducted on 31 men. The subjects were randomly allocated to either a control or treatment group, and were assessed preoperatively and at 3 weeks post-surgery by a blinded investigator. Maximal isokinetic strength was measured by using a computer-controlled dynamometer, and the strength deficit of the involved leg relative to the healthy leg was calculated. Both groups were prescribed home exercises. The treatment group also received 9 supervised physiotherapy treatments between surgery and 3-week assessment. Significantly better knee extensor strength recovery was found in the treatment group compared to control group, but no differences were noted in a functional activity questionnaire.

Jokl et al. [8] conducted a prospective study of 30 patients randomly assigned either to a home exercise program or to supervised outpatient physiotherapy. Knee function was assessed by using isokinetic analysis and subjective questionnaires at 2, 4 and 8 weeks. At each evaluation there was no significant difference between the groups, nor any difference in their ability to return to work and resume sporting activities. The authors concluded that a well-planned unsupervised home exercise rehabilitation program can produce equally good results when compared to a supervised physiotherapy program. However, the small numbers and lack of blinded assessor weaken this study.

In the final paper we examined, Ross and Berger [13] studied the effect of a cognitive-behavioral psychological intervention, stress inoculation training (SIT) introduced prior to physiotherapy sessions. Sixty male athletes were alternatively assigned to either the treatment or control group 3 days postoperatively. The treatment group received two 1 h stress inoculation training sessions (before first and second physiotherapy sessions). Both groups received 10 physiotherapy sessions at 3 day intervals. The specific modalities used are not reported. Post-surgical anxiety, pain, and physical rehabilitation were measured using the State-Trait Anxiety Inventory; the Pain Visual Analogue scale and isokinetic dynamometer muscle strength testing at a pre-test session and at all physiotherapy sessions thereafter. The treatment group demonstrated significantly less post-surgical pain and anxiety during the rehabilitation process and required fewer days to return to criterion physical functioning, compared with control subjects.

Discussion

Of 8 RCTs of rehabilitation modalities outcomes, 5 yielded significant and positive outcomes. Different treatments and outcome measures made meta-analysis impossible to perform. Studies suffered from small sample size, with the possibility of type 2 errors with negative findings.

Although proprioception training protocols may be considered important in post-meniscectomy rehabilitation, there appear to be no studies that assess whether these are effective [15].

The clinical significance of the outcome of studies depends on the type of measures used. While an understanding of biomechanics can help develop therapeutic strategies, it is important that rehabilitation therapies can be shown to be of value with respect to patients' functioning. Birch et al. [2] used the Noyes scoring system, measuring subjective aspects of rehabilitation including resumption of activities of daily living and return to work and sport [11]. Moffet et al. [10] looked at both biomechanical (isokinetic muscle testing) and functional measures. The latter utilized the Lysholm and Quilqist scoring scale [9], which involves a clinical assessment looking at factors such as limp; weight-bearing; stair-climbing; atrophy of the thigh; and instability, pain and swelling with walking, running and jumping activities. While the study found significant changes in isokinetic measures, no improved functioning was demonstrated. Care must be taken not to give too much weight to machine-based data if there appears to be no measurable benefits to the patient with respect to their everyday functioning.

A strength of this review is that the literature search was systemic and wide reaching. However, the small number of RCTs and the methodological weaknesses in each study limits the conclusions that can be drawn. The literature on physical therapy for musculoskeletal conditions generally demonstrates methodological weakness [1]. The studies are typically characterized by small sample size, lack of standardization with respect to outcome measures and absence of blinding. Small sample numbers means that negative findings might represent type 2 statistical errors, where real benefits of an intervention fail to be detected.

No analysis of intention to treat (ITT) and no pre-randomization, was a weakness of all the studies. ITT analyses each patient in the group to which they are initially allocated regardless of any subsequent cross-over. If there is an effect ITT will under-estimate it and hence is a conservation evaluation [5]. Pre-randomization entails allocating patients to the intervention or control group before consent is given. Patients then consent to treatment (or being in the control group) without knowing there is another arm to the study. This keeps each group blind to the other intervention – a useful approach when it is not possible to blind patients to an intervention (as in physical therapies) [3]. The risk with this approach is that an excess of patients may decline being involved in one or other arm of the trial.

The importance of clinical management decisions being evidence based rather than relying on anecdotal evidence cannot be over-emphasized. The dearth of clinical trials on post-meniscectomy rehabilitation means that orthopaedic surgeons have limited evidence on which to base their clinical decisions. There is insufficient evidence to advocate routine physiotherapy for all patients.

The cost effectiveness of rehabilitation interventions need to be considered. Jokl et al. [8] found average cost of $850 (US) for rehabilitation physiotherapy compared to the $40 cost for their home-based knee exercise program. Given the cost of physiotherapy, including possible time off work to attend for treatment, it is important that its use should be demonstrated to be clinically useful and cost effective.

There may be a subgroup of patients for whom some form of rehabilitation involving out-patient physiotherapy is warranted, especially in the longer-term (after the first 2 or 3 weeks post-surgery). This group might include the older patient, the less-highly motivated to rehabilitate; the patient with co-existing pathology such as anterior cruciate ligament damage or degenerative change; or the athlete anxious to return to full sporting activities as soon as possible. Ideally, this should be evaluated in an RCT.

Descriptive studies are required to ascertain the types and duration of treatments being offered to patients after arthroscopic meniscectomy. Well-designed studies of current treatments that take into account predisposing factors and their impact on outcome need to be performed. Patients should be pre-randomized to the trials. Outcome measures should involve standardized measures of real-life function rather than biomechanical differences, which may not translate to practical considerations such as the ability to resume normal life activities, work and sports.

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