Concise Report

Manual therapy in osteoarthritis of the hip: outcome in subgroups of patients

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Objective. To investigate whether manual therapy has particular benefit in subgroups of patients defined on the basis of hip function, range of joint motion, pain and radiological deterioration.

Methods. The study was performed in the out-patient clinic of physical therapy of a large hospital. Data on 109 patients with OA of the hip (clinical ACR criteria) participating in a randomized clinical trial on the effects of manual therapy were used. The outcomes for hip function (Harris hip score), range of joint motion (ROM) and pain (VAS) were compared for specific subgroups. Subgroups were assigned by the median split method. The interaction effect between subgroup and treatment was tested using multiple regression analysis.

Results. No differences were observed in the effect of manual therapy in specific subgroups of patients defined on the basis of baseline levels of hip function, pain and ROM. On the basis of radiological grading of osteoarthritis (OA), we found that patients with severe radiological grading of OA had significantly worse outcome on ROM as a result of manual therapy than patients with mild or moderate radiological grading of OA.

Conclusion. A significant interaction effect was found for only 1 out of 12 hypotheses investigated. Therefore, we conclude that there is no evidence for the particular benefit of manual therapy in subgroups of patients.

KEY WORDS: Osteoarthritis hip, Rehabilitation, Musculoskeletal, Manipulations, Exercise.

Osteoarthritis (OA) is characterized by progressive loss of articular cartilage, sclerosis of the subchondral bone and formation of osteophytes [1]. These pathological changes often lead to loss of functional ability and decreased quality of life. Exercise therapy and manual therapy aim to improve functional ability and quality of life and are both a part of the conservative treatment of OA [2]. In a recently conducted randomized clinical trial, evidence was obtained for the efficacy of manual therapy for patients with OA of the hip [3]. In this study, manual therapy was shown to be superior to exercise therapy with respect to pain and function. However, it was not investigated whether subgroups of patients would particularly benefit from manual therapy.

Manual therapy is applied by physical therapists (or medical doctors) with special training in manual therapy. Manipulation is a localized force of high velocity and low amplitude directed at joint segments in order to improve the elasticity of the joint capsule. [4]. Two kinematic principles form the basis of manual therapy. Traction is defined as a manoeuvre to expand the joint space by moving the distal part of the joint rectilinearly in relation to the proximal part. Translation includes every form of intra-articular movement that occurs together with angular motion of the joint. Manipulation is a physiological mobilization technique that goes beyond the ranges of joint play.

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These pathological changes often lead to loss of functional ability and decreased quality of life. The pathophysiological process of OA forms the basis of the explanatory mechanism of manual therapy [2–5]. Pathological changes of the joint capsule cause high intra-articular pressure, which is associated with pain intensity [6]. Furthermore, restriction of the joint capsule reduces joint motion and hip function [1, 6]. The aim of manual therapy is to reduce intra-articular pressure by increasing mobility of the joint capsule and its surrounding soft tissue. This results in a reduction of pain and increased range of motion (ROM) and hip function [3]. Therefore, beneficial effects of manual therapy can be expected in subgroups of patients with relatively high pain intensity, strongly reduced ROM and severe limitation of hip function. Furthermore, we expected differences in efficacy between subgroups of patients with mild or moderate radiological deterioration and patients with severe radiological deterioration. In patients with severe radiological deterioration due to OA, the larger part of the hip joint has been affected by pathological changes [1]. In most cases there are irreversible changes such as total loss of articular cartilage and many (large) osteophytes. Therefore, we expected that particular patients with lower grading of radiological OA would show more beneficial effects of manual therapy than patients with severe grading of radiological OA.

The aim of the study was to determine whether manual therapy has particular benefit in specific subgroups of patients.

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Beneficial effects were expected in (i) patients with relatively severe limitation of hip function, (ii) patients with relatively strongly reduced ROM, (iii) patients with relatively high pain intensity, and (iv) patients with mild or moderate radiological deterioration.

Method

Subjects

Data on 109 patients with OA of the hip from a randomized clinical trial on the effects of manual therapy in the setting of a large hospital were used for secondary analysis. Results of this study have been published elsewhere [3]. All patients were referred by orthopaedic surgeons and rheumatologists, and suffered from primary OA of the hip according to the clinical criteria of the American College of Rheumatology (ACR) [7]. Exclusion criteria were: (i) symptoms in both hips, (ii) fear of manipulative therapy, (iii) age <60 or >85 yr, (iv) severe complaints of the lower back, (v) contraindications for manual therapy (such as osteoporosis assessments for pain, hip function and ROM) performed at 5 weeks (after treatment) and 17 and 29 weeks of follow-up.

Patient approval was obtained by written informed consent. The medical ethics committee of the Leyenburg Hospital approved our study.

Treatment

All patients were treated twice weekly for a period of 4.5 weeks with a total of nine treatments.

Manual therapy consisted of intensive stretching of shortened muscles surrounding the hip joint, and of manipulation (a high-velocity thrust technique) of the hip joint in specific limited positions [3, 4]. The standardized protocol was developed with experts in the field of manual therapy.

In the exercise treatment group, an exercise therapy programme was tailored to the individual patients' needs. Exercise therapy included exercises for the improvement of muscle strength, muscle length, joint mobility, co-ordination and walking ability. The programme was an adaptation of the exercise programme of Van Baar *et al.* [2].

Subgroups

Four subgroups were defined. High and low values within each subgroup were determined by the median split method. [8]. For the subgroups of hip function, ROM and pain, 'high' equals relatively high limitation of that particular function. For the subgroup of radiological deterioration, 'high' equals severe radiological OA.

Hip function

The first subgroup was the subgroup for hip function measured by the Harris hip score. The Harris hip score contains eight items representing pain, walking function, activities of daily living and ROM of the hip joint [9]. Final scores range from 100 (no disability) to 0 (maximum disability). The median was 52 units.

Range of motion

The second subgroup consisted of patients with relatively strong reduced ROM. ROM was assessed with a long-legged goniometer according to a standardized procedure [10–12]. All six movement directions of the hip were measured.

Overall scores of six movement directions were composed by calculating standardized scores (Z scores, mean $= 0$, S.D. $= 1$) of separate measurements and adding them up to obtain the overall score (sum score). The median overall score was 0.41.

Pain

The third subgroup consisted of patients with relative high pain intensity. Pain was evaluated with a visual analogue scale (VAS) referring to the preceding week. The median for the VAS for pain was 52 mm.

Radiological deterioration

Finally, the fourth subgroup consisted of patients with a radiological score of '3', as assessed with a modified Kellgren and Lawrence scale by a radiologist [13, 14]. This scale consists of four degrees: (0) no OA, (1) mild OA, (2) moderate OA and (3) severe OA. Forty-two per cent of all patients had a Kellgren and Lawrence score of 3 (the median), 39% a score of 2 and 19% a score of 0 or 1.

Statistical analysis

Change scores for the Harris hip score, pain and ROM, were calculated for post-treatment (5 weeks) minus baseline scores. To determine whether differences existed in the effects of manual therapy between subgroups, the interaction between subgroup and treatment was tested using multiple regression analysis. We used post-treatment data (continuous) of change scores for the Harris hip score, ROM and pain as the dependent variables (y).

For ROM change scores, standardized scores (Z scores) were used. The regression model was based on the following formula: $y =$ constant $+$ treatment b1 $+$ subgroup b2 $+$ (treatment b3 subgroup b4). Treatment 1 corresponds to manual therapy and subgroup 1 corresponds to the subgroup(s) of high values. The significance level for interaction was set at 0.05.

Results

There were no relevant differences between the studied groups in the prognostic variables age, sex, duration of complaints, radiological deterioration, hip function, pain and ROM. Mean age was relatively high (72 yr) and most patients (80%) had moderate to severe radiological OA. Manual therapy appeared to be superior to exercise therapy for hip function, ROM and pain [3]. The effect size for hip function and ROM were large and medium for pain, respectively [15]. Full details of demographic variables and the outcome of the study with regard to the effects of manual therapy and exercise therapy on hip OA can be found elsewhere [3].

In Table 1, the effects of manual therapy and exercise therapy are presented for subgroups of patients. The expected larger beneficial effects of manual therapy in patients with relatively highly limited hip function or ROM or relatively high levels of pain were not confirmed. Manual therapy seemed to be superior to exercise therapy for all outcome measures in these subgroups of patients.

We found a significant interaction effect for the subgroup of patients according to their radiological deterioration on outcome with respect to ROM (Table 1), indicating that, in comparison with exercise therapy, patients with severe radiological deterioration who were treated with manual therapy had a significantly lower outcome with respect to ROM than patients with mild or moderate radiological deterioration.

TABLE 1. Effects of manual therapy and exercise therapy according to hip function, ROM, pain and radiological deterioration

	Low		High		
	MT	ET	MT	ET	P value for interaction
Hip function	($n = 27$)	($n = 25$)	($n = 26$)	($n = 25$)	
Hip function	20.38	4.64	10.70	3.86	0.10
ROM	2.52	−2.04	2.34	1.84	0.41
Pain	−16.85	−1.64	−17.81	−16.56	0.07
ROM	($n = 28$)	($n = 25$)	($n = 25$)	($n = 25$)	
Hip function	13.78	6.00	9.04	2.59	0.27
ROM	1.07	−1.78	2.99	−2.43	0.40
Pain	−21.00	−4.30	−12.88	−10.14	0.15
Pain	($n = 28$)	($n = 25$)	($n = 25$)	($n = 25$)	
Hip function	11.37	6.65	8.56	10.84	0.27
ROM	3.04	−2.56	3.69	−1.85	0.08
Pain	−3.87	−3.53	−12.81	−16.02	0.18
Radiological degeneration	($n = 28$)	($n = 25$)	($n = 25$)	($n = 25$)	
Hip function	19.62	5.07	17.24	−4.39	0.17
ROM	1.28	−1.49	−0.38	−3.02	0.01
Pain	−23.62	−10.36	−16.01	−3.56	0.52

Discussion

In this study, four hypotheses were tested in order to investigate whether manual therapy has particular benefit in specific subgroups of patients. Beneficial effects of manual therapy were expected in (i) patients with relatively severe limitations in hip function, (ii) patients with relatively strongly reduced ROM, (iii) patients with relatively high pain intensity, and (iv) patients with mild or moderate radiological deterioration.

In the first three scenarios, our hypothesis was not confirmed. In general, the effectiveness of manual therapy was not consistently related to the baseline levels of hip function, ROM or pain. However, in the subgroup of radiological deterioration our hypothesis was confirmed: we found evidence that patients with mild or moderate radiological progression receiving manual therapy had significantly better outcome with respect to ROM than other patients. An explanation for our results may possibly be found in the pathological aspects of OA. As mentioned earlier, patients with severe OA have many structural changes in the joint. ROM could be mainly limited by these structural pathological changes, and manual therapy may therefore be less able to improve ROM. Nevertheless, even in patients with severe radiological degeneration, the outcome of manual therapy was better than that of exercise therapy.

The hypotheses of the present study were based on articular factors (range of joint motion), kinesiological factors (walking ability) and symptoms of pain. However, psychological factors are also believed to play an important role in the effectiveness of manual therapy [12]. Perhaps these psychological factors play a more important role than we expected. Future studies should focus on this issue. This could be a possible explanation for the lack of support for our hypotheses.

Treatment guidelines for OA of the hip suggest physical therapy (including manual therapy and exercise therapy) as the non-pharmacological treatment modality of first choice [16]. However, no specific criteria for referral of patients to physical therapists have been included in these criteria. Furthermore, no evidence for the presence of subgroups of patients with OA of the hip that specifically benefit from physical therapy (or manual therapy) is available in the literature. Results of our study also indicate that specified referral is not useful on the basis of the patient's hip function, pain or ROM. However, in our study, we included patients referred with rather severe OA; these patients were referred by their general practitioner to the orthopaedic out-patient clinic of our hospital. It might be possible that, in a more heterogeneous sample of OA patients, more subgroups could be identified who would benefit more from either manual therapy or exercise.

Although evidence was obtained that manual therapy is less effective with regard to ROM in patients with severe radiological deterioration, our analyses showed that manual therapy is superior to exercise therapy in these patients.

Also, manual therapy was shown to be superior to exercise therapy for hip function and pain in this subgroup of patients. Therefore, in our opinion, referral to manual therapy should be the treatment modality of first choice also for patients with severe OA.

In conclusion, we found no evidence that manual therapy has particular benefit in specific subgroups of patients: the interaction effect was found to be significant for only one out of the 12 interaction effects tested. However, in general this study indicates that manual therapy should be the treatment of first choice for all patients compared with exercise therapy.

Key messages
• Manual therapy has been proved to be effective in OA of the hip.
• Specification of the indication for manual therapy is not possible.

Rheumatology

The authors have declared no conflicts of interest.

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