

This item is the archived peer-reviewed author-version of:

Balancing hands-on with hands-off physical therapy interventions for the treatment of central sensitization pain in osteoarthritis

Reference:

Lluch-Girbés E., Meeus Mira, Baert Isabel, Nijs Jo.- Balancing hands-on with hands-off physical therapy interventions for the treatment of central sensitization pain in osteoarthritis
Manual therapy / Manipulation Association of Chartered Physiotherapists - ISSN 1356-689X - 20:2(2015), p. 349-352
DOI: <http://dx.doi.org/doi:10.1016/j.math.2014.07.017>

Balancing “hands-on” with “hands-off “ physiotherapeutic interventions for the treatment of central sensitization pain in osteoarthritis

Lluch Girbés, E^{1,2,5}; Meeus M^{2,3,4}; Baert I^{2,3}; Nijs J^{2,5}

¹Department of Physical Therapy, University of Valencia, Valencia, Spain

²Pain in Motion Research Group, www.paininmotion.be

³Department of Rehabilitation Sciences and Physiotherapy, Faculty of Medicine and Health Sciences, University of Antwerp, Belgium

⁴Department of Rehabilitation Sciences and Physiotherapy, Ghent University, Ghent, Belgium

⁵Departments of Human Physiology and & Rehabilitation Sciences, Faculty of Physical Education & Physiotherapy, Vrije Universiteit Brussel, Belgium

Corresponding author

Enrique Lluch Girbés - Department of Physical Therapy, University of Valencia

Gascó Oliag 5, 46010 Valencia, Spain

Tel +34 398 38 53, Fax: +34 398 38 52

Enrique.lluch@uv.es

Abstract

Traditional understanding of osteoarthritis-related pain has recently been challenged in light of evidence supporting a key role of central sensitization in a subgroup of this population. This fact may erroneously lead musculoskeletal therapists to conclude that hands-on interventions have no place in OA management, and that hands-off interventions must be applied exclusively. The aim of this paper is to encourage clinicians in finding an equilibrium between hands-on and hands-off interventions in patients with osteoarthritis-related pain dominated by central sensitization. The theoretical rationale for simultaneous application of manual therapy and pain neuroscience education is presented. Practical problems when combining these interventions are also addressed. Future studies should explore the combined effects of these treatment strategies to examine whether they increase therapeutic outcomes against current approaches for chronic osteoarthritis-related pain.

Introduction

Osteoarthritis (OA) is the main cause of pain, disability and loss of quality of life in the elderly (Ma et al., 2014). Traditional management for OA mainly involves a combination of pharmacological and non-pharmacological interventions, such as physical therapy (Hochberg et al., 2012). As a consequence of their training and education, the majority of musculoskeletal therapists are educated in the biomedical model of pain (Nijs et al., 2013). This traditional model of pain assumes that there is a direct link between the amount of local tissue damage (i.e. structural joint degeneration) and the pain experienced by the patient (Haldeman, 1990).

According to this biomedical model, addressing the underlying pathology should result in a reduction or (complete) resolution of symptoms and subsequent recovery of normal function. However, chronic OA-related pain does not always adhere to this biomedical model of pain. It is common to observe a discordance between the degree of structural joint damage and the amount of symptoms experienced by the patient (Bedson and Croft, 2008; Baert et al., 2013, 2014). In addition, local application of different modalities of treatment, including prosthetic substitution, is not always followed by an amelioration or complete resolution of symptoms (Skou et al., 2013a, 2013b).

Recent evidence has established that central sensitization (CS) is the dominant pain mechanism in a subgroup of patients with chronic OA-related pain (Lluch et al., 2014). Recognition of subsets of OA patients with different pain mechanisms, including those with CS, has been suggested in order to tailor applied interventions and thus improve outcomes (Malfait and Schnitzer, 2013). Hence, in those OA patients with CS

as their dominant pain mechanism, a broader therapeutic approach aiming to desensitize the central nervous system (CNS) should be adapted (Nijs et al., 2011a; Lluch Girbés et al., 2013).

The question arises which CNS “desensitizing” strategies are available and how they can be applied when treating patients with chronic OA-related pain. These issues will be further discussed below and practical guidelines provided.

Targeting the brain without ignoring the joints for treating central sensitization pain in patients with osteoarthritis

In light of evidence regarding the role CS plays in a subgroup of patients with chronic OA-related pain (Lluch et al., 2014), musculoskeletal therapists might “swing the pendulum” too much away from the biomedical model of pain (Jull and Moore, 2012). Likewise, as psychosocial factors are of importance in OA (Somers et al., 2009), chronic OA-related pain might be envisioned as a merely psychosocial issue. One would then erroneously assume that management advocated for this subgroup of OA patients with CS as their dominant pain mechanism should radically be turned into psychosocial aspects and “hands-off” interventions, with little or no regard to biological features. However, CS in OA seems to be driven by ongoing peripheral joint pathology (Graven-Nielsen et al., 2012), which stresses the importance of reducing peripheral nociceptive input by means of locally applied interventions such as manual therapy (Moss et al., 2007; Courtney et al., 2010) or surgery (Aranda-Villalobos et al., 2013).

Therefore, the authors propose not to completely abandon the “hands-on” approach for patients with chronic OA-related pain and CS, but to find an equilibrium between hands-on treatments and other interventions addressing CS (Jull and Moore, 2012). Musculoskeletal therapists are probably in the best position to deliver such an individualized and combined approach to patients with chronic OA-related pain (Bennell et al., 2012; Hunt et al., 2013), because they are cognizant of both locally-applied physical and non-physical centrally-oriented interventions (Louw et al., 2011; Nijs et al., 2011b).

In order to inform clinicians about new avenues on combining different treatment strategies for chronic OA-related pain management, an example of the theoretical rationale for *simultaneous* application of an approach aiming to desensitize the CNS [here represented by pain neuroscience education (PNE) (Louw et al., 2011; Nijs et al., 2011b)] and a local intervention (here represented by manual therapy), will be presented.

Combining pain neuroscience education with manual therapy in patients with chronic OA pain and CS as their dominant pain mechanism

Patient education is recommended by most of the current evidence-based guidelines for management of OA (Larmer et al., 2014). However, education by healthcare professionals is usually focused on biomedical information. This kind of education not only has shown limited efficacy in decreasing pain and disability (McDonald et al., 2004; Louw et al., 2013), but also can induce fear, reinforce the

patient's belief on a patho-anatomical source of pain and consequently result in more pain (Greene et al., 2005).

A more advantageous way to educate patients with chronic OA-related pain might be PNE (Louw et al., 2011; Nijs et al., 2001b). PNE is a cognitive-based educational intervention performed by musculoskeletal therapists that aims to desensitize the CNS and consequently reduce pain and disability, through a reconceptualization of pain (Louw et al., 2011). PNE is therapeutic on its own, with level A evidence (evidence from meta-analysis of randomized controlled trials) supporting its use for changing pain beliefs and improving health status in patients with CS pain (Louw et al., 2011). Evidence supporting the capacity of PNE to desensitize the CNS comes from a recent trial in patients with fibromyalgia (Van Oosterwijck et al., 2013).

Though sometimes provided separately, PNE seems to be more effective when administered in conjunction with other physical therapy interventions (Louw et al., 2011). Likewise, manual therapy is more beneficial for patients with OA if not used as a stand-alone treatment (Page et al., 2011). However, clinicians may encounter several practical problems when trying to combine PNE and manual therapy in the context of a patient with chronic OA-related pain.

The problem of the “conflicting” messages or “contradictory” messages

Manual therapy is often presented to a patient with chronic OA-related pain within a biomedical model of pain. Traditionally, the main objective of manual therapy has been to find the structure at fault, reproduce the patient's pain if possible and fix

that pain thorough joint mobilization/manipulation techniques (Bialosky et al., 2008). However, this “find it and fix it” model could perpetuate the notion of the joint as a single fault for OA-related pain, fueling the biomedical beliefs (Nijs et al., 2013) and contradicting (when applied together) the PNE message that de-emphasizes a specific tissue as the solely cause of pain. To make the message provided during the combined application of manual therapy and PNE more consistent, musculoskeletal therapists may want to consider the following recommendations.

Instead of “fixing a structure”, OA patients should be educated about manual therapy according to the current understanding of its mechanisms of action (Bialosky et al., 2009). Besides peripheral effects (i.e. increase in range of motion), joint mobilization has shown to generate (temporal) activation of descending inhibitory pain mechanisms (Schmid et al., 2008). Hence, manual therapy should be presented to OA patients as a transient technique used to gain movement and activate endogenous analgesia found to be dysfunctional in chronic OA-related pain (Kosek and Ordeberg, 2000). Manual therapy might be a priori capable of restoring one of the mechanisms related to CS in chronic OA pain, namely the impaired descending inhibition, although this hypothesis has not been formally tested.

Still, it is important for OA patients to understand that the central analgesic effects of manual therapy are short-lived. CS is a complex mechanism unlikely to be resolved by a single modality of treatment (Nijs et al., 2011a), so other “desensitizing” techniques such as exercise therapy may be required (Uthman et al., 2013) or PNE. That’s why the combination of manual therapy and PNE, which potentially targets CS

through modulation of enhanced descending facilitatory mechanisms [i.e. inappropriate beliefs (Zusman, 2002)], could be worthwhile.

Moreover, several types of manual therapy interventions applied for chronic OA patients rely on pain relief as a guide for application and treatment outcome (Takasaki et al., 2013). Repetitive use of the word “pain” during the manual treatment may again come into conflict with the PNE message, where achieving functional gains is advocated over resolution of symptoms. A solution to this conflict may be to replace the use of threatening words such as “pain” during the application of manual therapy techniques by other less frightening terms such as “symptoms” or “loss of function”. This might improve the uniformity of the message provided and avoid confusion in patients. It is therefore crucial not to increase vigilance by a priori asking the patient to report any pain experienced (or aggravated) during the hands-on treatment. Relying on the joint end-feel or the baseline outcome of the joint examination (e.g. joint mobility tests) for guiding the hands-on treatment is preferred for patients with CS as a dominant pain mechanism.

The problem of the order of interventions: should manual therapy precede PNE or vice versa?

The question that may arise in the musculoskeletal therapists’ clinical reasoning when combining both interventions (i.e. manual therapy and PNE) is: What should I apply first?

From the previous section on conflicting messages, maybe keen readers familiarized with both interventions have already deduced that PNE should be logically applied before manual therapy. Both explanation of the impaired descending pain inhibition and enhanced facilitatory mechanisms potentially addressed with this combined approach (with manual therapy and PNE, respectively), are part of the typical PNE message (Louw et al., 2011). Therefore, it would seem logical to first explain to chronic OA patients that their pain system has become sensitized before presenting them desensitizing techniques, such as manual therapy, as potentially helpful.

In addition, there are other reasons why the message from PNE should be introduced first. Unlike education focused on the biomedical model (Eschaliere et al., 2013), PNE is beneficial in changing patients' cognition regarding their pain state resulting in decreased fear and, consequently, promoting better adherence to subsequent movement-based approaches such as manual therapy (Louw et al., 2011). In line with this, the seemingly most logical choice when dealing with patients affected by chronic OA-related pain would be to implement manual therapy after having educated the patient about modern pain neuroscience. Moreover, the occasional reproduction of symptoms when applying joint mobilizations (and the consequent "danger messages" arriving to the brain), would be interpreted differently by the patient if PNE was applied first. As one of the key messages of PNE is that in a chronic pain situation (like chronic OA-related pain) pain is not a true reflection of what's happening at the tissues, but is more related to hyperexcitability of the CNS and deconditioning of the tissues (Louw et al., 2011), the threatening value of pain is decreased.

The problem of cognitive and educational barriers when applying PNE to elderly people affected by chronic OA-related pain

One of the factors associated with reporting more symptoms and responding less to treatment in people with chronic OA-related pain is the socioeconomic status, including low educational attainment (Callahan et al., 2010). In that sense, musculoskeletal therapists can encounter some problems when conveying the key messages of PNE to elderly patients, mostly due to cognitive and/or educational barriers. In addition, as on average clinicians underestimate the ability of patients to understand the PNE message (Moseley, 2003), this may be more evident when dealing with elderly people affected by OA. Some elderly people with OA have blind faith in (bio)medical information, which often makes it more difficult to reconceptualize pain through PNE. This should be taken into consideration and clinicians are encouraged to adapt the information provided during the PNE to these patients, in order to make it more easily understood.

An example of a musculoskeletal therapist discussing the patient's perceptions about OA pain as part of a PNE session and the rationale of the combination of PNE with manual therapy can be found online at <http://www.paininmotion.be> (Table 1).

Conclusion

The aim of this paper is to present a sound scientific rationale and practical guidelines for the application of a combined manual therapy and PNE approach in patients with chronic OA-related pain and CS as their dominant pain mechanism.

Musculoskeletal therapists may find some practical problems when combining these two interventions in a clinical setting. Future studies should test these promising avenues for the treatment of chronic OA-related pain against current approaches, in order to determine if they can increase therapeutic outcomes.

References

- Aranda-Villalobos P, Fernández-de-Las-Peñas C, Navarro-Espigares JL, Hernández-Torres E, Villalobos M, Arendt-Nielsen L, Arroyo-Morales M. Normalization of widespread pressure pain hypersensitivity after total hip replacement in patients with hip osteoarthritis is associated with clinical and functional improvements. *Arthritis Rheum.* 2013;65(5):1262-70.
- Baert IA, Staes F, Truijien S, Mahmoudian A, Noppe N, Vanderschueren G, et al. Weak associations between structural changes on mri and symptoms, function and muscle strength in relation to knee osteoarthritis. *Knee Surg Sports Traumatol Arthrosc.* 2013 Feb 2. [Epub ahead of print]
- Baert IA, Nijs J, Meeus M, Lluch E, Struyf F. The effect of lateral wedge insoles in patients with medial compartment knee osteoarthritis: balancing biomechanics with pain neuroscience. *Clin Rheumatol.* 2014 May 21. [Epub ahead of print]
- Bedson J, Croft PR. The discordance between clinical and radiographic knee osteoarthritis: a systematic search and summary of the literature. *BMC Musculoskelet Disord.* 2008;9:116.
- Bennell KL, Ahamed Y, Bryant C, Jull G, Hunt MA, Kenardy J, Forbes A, Harris A, Nicholas M, Metcalf B, Egerton T, Keefe FJ. A physiotherapist-delivered integrated exercise and pain coping skills training intervention for individuals with knee osteoarthritis: a randomised controlled trial protocol. *BMC Musculoskelet Disord.* 2012;13:129.
- Bialosky JE, George SZ, Bishop MD. How spinal manipulative therapy works: why ask why? *J Orthop Sports Phys Ther.* 2008;38(6):293-5.
- Bialosky JE, Bishop MD, Price DD, Robinson ME, George SZ. The mechanisms of manual therapy in the treatment of musculoskeletal pain: a comprehensive model. *Man Ther.* 2009;14(5):531-8.
- Callahan LF, Shreffler J, Siaton BC, Helmick CG, Schoster B, Schwartz TA, Chen JC, Renner JB, Jordan JM. Limited educational attainment and radiographic and symptomatic knee osteoarthritis: a cross-sectional analysis using data from the Johnston County (North Carolina) Osteoarthritis Project. *Arthritis Res Ther.* 2010;12(2):R46.
- Courtney CA, Witte PO, Chmell SJ, Hornby TG. Heightened flexor withdrawal response in individuals with knee osteoarthritis is modulated by joint compression and joint mobilization. *J Pain.* 2010;11(2):179-85.
- Eschaliier B, Descamps S, Boisgard S, Pereira B, Lefevre-Colau MM, Claus D, Coudeyre E. Validation of an educational booklet targeted to patients candidate for total knee arthroplasty. *Orthop Traumatol Surg Res.* 2013;99(3):313-9.
- Graven-Nielsen T, Wodehouse T, Langford RM, Arendt-Nielsen L, Kidd BL. Normalization of widespread hyperesthesia and facilitated spatial summation of deep-tissue pain in knee osteoarthritis patients after knee replacement. *Arthritis Rheum.* 2012;64(9):2907-16.
- Greene DL, Appel AJ, Reinert SE, Palumbo MA. Lumbar disc herniation: evaluation of information on the internet. *Spine (Phila Pa 1976).* 2005;30(7):826-9.

- Haldeman S. North American Spine Society: failure of the pathology model to predict back pain. *Spine (Phila Pa 1976)*. 1990;15(7):718-24.
- Hochberg MC, Altman RD, April KT, Benkhalti M, Guyatt G, McGowan J, Towheed T, Welch V, Wells G, Tugwell P; American College of Rheumatology. American College of Rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee. *Arthritis Care Res (Hoboken)*. 2012;64(4):465-74.
- Hunt MA, Keefe FJ, Bryant C, Metcalf BR, Ahamed Y, Nicholas MK, Bennell KL. A physiotherapist-delivered, combined exercise and pain coping skills training intervention for individuals with knee osteoarthritis: a pilot study. *Knee*. 2013;20(2):106-12.
- Jull G, Moore A. Hands on, hands off? The swings in musculoskeletal physiotherapy practice. *Man Ther*. 2012;17(3):199-200.
- Kosek E, Ordeberg G. Lack of pressure pain modulation by heterotopic noxious conditioning stimulation in patients with painful osteoarthritis before, but not following, surgical pain relief. *Pain*. 2000; 88(1):69-78.
- Larmer PJ, Reay ND, Aubert ER, Kersten P. A systematic review of guidelines for the physical management of osteoarthritis. *Arch Phys Med Rehabil*. 2014;95(2):375-89.
- Lluch Girbés E, Nijs J, Torres-Cueco R, López Cubas C. Pain treatment for patients with osteoarthritis and central sensitization. *Phys Ther*. 2013;93(6):842-51.
- Lluch E, Torres R, Nijs J, Van Oosterwijck J. Evidence for central sensitization in patients with osteoarthritis pain: A systematic literature review. *Eur J Pain*. 2014 Apr 3. doi: 10.1002/j.1532-2149.2014.499.x. [Epub ahead of print]
- Louw A, Diener I, Butler DS, Puentedura EJ. The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain. *Arch Phys Med Rehabil*. 2011;92(12):2041-56.
- Louw A, Diener I, Butler DS, Puentedura EJ. Preoperative education addressing postoperative pain in total joint arthroplasty: review of content and educational delivery methods. *Physiother Theory Pract*. 2013;29(3):175-94.
- Ma VY, Chan L, Carruthers KJ. The Incidence, Prevalence, Costs and Impact on Disability of Common Conditions Requiring Rehabilitation in the US: Stroke, Spinal Cord Injury, Traumatic Brain Injury, Multiple Sclerosis, Osteoarthritis, Rheumatoid Arthritis, Limb Loss, and Back Pain. *Arch Phys Med Rehabil*. 2014 Jan 21. pii: S0003-9993(14)00031-8. doi: 10.1016/j.apmr.2013.10.032. [Epub ahead of print]
- Malfait AM, Schnitzer TJ. Towards a mechanism-based approach to pain management in osteoarthritis. *Nat Rev Rheumatol*. 2013;9(11):654-64.
- McDonald S, Hetrick S, Green S. Pre-operative education for hip or knee replacement. *Cochrane Database Syst Rev*. 2004;(1):CD003526.
- Moseley L. Unraveling the barriers to reconceptualization of the problem in chronic pain: the actual and perceived ability of patients and health professionals to understand the neurophysiology. *J Pain*. 2003;4(4):184-9.
- Moss P, Sluka K, Wright A. The initial effects of knee joint mobilization on osteoarthritic hyperalgesia. *Man Ther*. 2007;12(2):109-18.

- Nijs J, Meeus M, Van Oosterwijck J, Roussel N, De Kooning M, Ickmans K, Matic M. Treatment of central sensitization in patients with 'unexplained' chronic pain: what options do we have? *Expert Opin Pharmacother*. 2011a;12(7):1087-98.
- Nijs J, Paul van Wilgen C, Van Oosterwijck J, van Ittersum M, Meeus M. How to explain central sensitization to patients with 'unexplained' chronic musculoskeletal pain: practice guidelines. *Man Ther*. 2011b;16(5):413-8.
- Nijs J, Roussel N, Paul van Wilgen C, Köke A, Smeets R. Thinking beyond muscles and joints: therapists' and patients' attitudes and beliefs regarding chronic musculoskeletal pain are key to applying effective treatment. *Man Ther*. 2013;18(2):96-102.
- Page CJ, Hinman RS, Bennell KL. Physiotherapy management of knee osteoarthritis. *Int J Rheum Dis*. 2011;14(2):145-51.
- Schmid A, Brunner F, Wright A, Bachmann LM. Paradigm shift in manual therapy? Evidence for a central nervous system component in the response to passive cervical joint mobilisation. *Man Ther*. 2008;13(5):387-96.
- Skou ST, Graven-Nielsen T, Rasmussen S, Simonsen OH, Laursen MB, Arendt-Nielsen L. Facilitation of pain sensitization in knee osteoarthritis and persistent post-operative pain: A cross-sectional study. *Eur J Pain*. 2013a Dec 24. doi: 10.1002/j.1532-2149.2013.00447.x. [Epub ahead of print]
- Skou ST, Graven-Nielsen T, Rasmussen S, Simonsen OH, Laursen MB, Arendt-Nielsen L. Widespread sensitization in patients with chronic pain after revision total knee arthroplasty. *Pain*. 2013b;154(9):1588-94.
- Somers TJ, Keefe FJ, Godiwala N, Hoyler GH. Psychosocial factors and the pain experience of osteoarthritis patients: new findings and new directions. *Curr Opin Rheumatol*. 2009;21(5):501-6.
- Takasaki H, Hall T, Jull G. Immediate and short-term effects of Mulligan's mobilization with movement on knee pain and disability associated with knee osteoarthritis--a prospective case series. *Physiother Theory Pract*. 2013;29(2):87-95.
- Uthman OA, van der Windt DA, Jordan JL, Dziedzic KS, Healey EL, Peat GM, Foster NE. Exercise for lower limb osteoarthritis: systematic review incorporating trial sequential analysis and network meta-analysis. *BMJ*. 2013;347:f5555.
- Van Oosterwijck J, Meeus M, Paul L, De Schryver M, Pascal A, Lambrecht L, Nijs J. Pain physiology education improves health status and endogenous pain inhibition in fibromyalgia: a double-blind randomized controlled trial. *Clin J Pain*. 2013;29(10):873-82.
- Zusman M. Forebrain-mediated sensitization of central pain pathways: 'non-specific' pain and a new image for MT. *Man Ther*. 2002;7(2):80-8.