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Case Reports

Manipulative and Multimodal Therapies in the Treatment of Osteoarthritis of the Great Toe: A Case Series



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Abstract

Objective: The objective of this case series is to describe manual manipulative therapy with exercise for 3 patients with mild to moderate osteoarthritis of the great toe.

Clinical Features: Three patients, a 32-year-old man, a 55-year-old woman, and a 49-year-old woman, had great toe pain of 8, 1, and 2 years, respectively. Each had a palpable exostosis, a benign outgrowth of bone projecting outward from the bone surface, and decreased dorsiflexion with a hard end-feel.

Intervention and Outcome: Manual manipulative therapy with exercise, the Brantingham protocol, was used with patients receiving 6, 9, and 12 treatments over 6 weeks. Specific outcome measures for hallux rigidus and the foot were chosen to document the effects of this intervention including digital inclinometry, the lower extremity functional scale, the foot functional index, overall therapy effectiveness and Visual Analogue Scale (VAS). Each patient had an increase in range of motion that surpassed the minimal clinically important change, an increase in the overall therapy effectiveness and a decrease in the foot functional index that surpassed the minimally clinically important difference. Most importantly for the patients, each reported a decrease in both usual and worst pain on the VAS that exceeded the minimally clinically important difference of 20 to 30 mm.

Conclusion: The 3 patients reported decreased pain measured by the VAS, increased range of motion and minimally clinically important difference in 3 other outcome measures.

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Introduction

Osteoarthritis is the second most common great toe disorder, exceeded only by hallux valgus, and is a

leading cause of disability and chronic pain in the elderly.^{1–3} Since 1887 painful osteoarthritis (OA) of the great toe has most often been labeled hallux rigidus (HR).¹ Up to 10% of those 20 to 34, 44% over 80, and

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42.4% 62 to 94 years old show signs of OA of the great toe with men being affected at a higher rate than women.^{4,5} Multiple etiologies have been posited, but repetitive or traumatic toe-off or other severe trauma in sports is most commonly recognized for unilateral HR, and a familial history is associated with bilateral HR.^{5,6} Hallux limitus is sometimes used to denote a painful but lesser restricted motion, but the orthopedic literature more commonly uses HR for mild to severe grades of the disorder.^{1,2} Recent research suggests that the full within-normal limits of range of motion (ROM) of the great toe is unclear; however, it is universally acknowledged that loss of ROM of the great toe in dorsiflexion may be the most serious functional deficit suffered in HR.^{1,2}

Osteoarthritis is classified into 3 categories: mild – maintained joint space, minimal changes, moderate – some narrowing, cysts and sclerosis and severe – severe changes with loose bodies via radiology findings.⁷ The Kellgren-Lawrence grade (K-L system) is a scoring tool used to assess the severity of osteoarthritis on a plain radiograph.⁷ The osteoarthritis is scored 0 through 4. The scoring ranges from no radiographic features to large osteophytes, marked joint space narrowing, severe sclerosis, and definite bony deformity.⁸

Residual pain and or stiffness, after sprains such as “Turf Toe” (hyper-extension sprain) has been documented as producing symptoms five years post diagnosis.⁹ DD Palmer, the founder of chiropractic, recognized this disorder and recommended repetitive high velocity low amplitude (HVLA) thrust manipulation for great toe “ankylosis”.⁴ Interestingly, only the last decade has seen any research into conservative treatments for HR by randomized controlled or clinical trials (RCTs).^{1,2,6}

There is no conservative therapy that has been demonstrated superior to placebo in the treatment of HR.^{1,2,4,10–12} Conservative treatments such as exercise, orthotics, steroid injections, felt padding, various rocker bottom casts or shoes, braces, splinted insoles, specialized foot orthotics, or a “punched out, stretched or split” canvas or leather toe box remain traditional, empirical, untested, or failed treatments.^{1,2,10,13,14} A recently published RCT of hyaluronic acid injection was not superior to sham saline injection for HR.¹² A newly designed RCT comparing “off-the-shelf” rocker bottom shoes to an “off-the-shelf” specialized orthotic is underway but not yet complete.¹⁵

It is recommended that prior to surgery, manipulation should be tried for grades I and II HR and only after protracted, severe pain when all empirical,

traditional treatments having failed, is surgery justified; with the only supportable evidence based surgery agreed upon by all as arthrodesis.^{8,16–21} In addition to the recent Cochrane review of interventions for HR that supports only one physical therapy RCT with manual therapy, there are other reviews, case series, reports, peer reviewed papers and texts supportive of manual manipulative therapy (MMT) for HR.^{1,12,19–26}

There is a very small subset of non-OA HR in which passive MMT is contraindicated; such as ischemic or avascular necrosis. Generalized rheumatoid arthritis, systematic inflammatory arthritides, seronegative spondyloarthropathies, Reiter’s syndrome, enteropathic arthritis, psoriatic arthritis, gout, systemic lupus erythematosus (SLE), juvenile idiopathic arthritis, diabetes type 1, and infection must be ruled out.^{14,27–30} In the United States, these and similar disorders should be referred to the appropriate MD or DO. Certainly an individual can have painful HR concurrently with painful hallux abducto valgus (HAV) and other non-musculoskeletal disorders named above, but an HAV angle greater than 20° rules out treatment for HR.^{1,2,12}

The purpose of this case series is to document the reported effect specific MMT with exercise had on 3 patients with mild to moderate osteoarthritis of the great toe.

Case Series

This case series was completed at Cleveland Chiropractic College in Los Angeles with approval from the college institutional review board. Along with informed consent by participating patients regarding the proffered chiropractic care (mobilization, manipulation, exercise, advice, and education), all care was provided without charge. A diagnostic algorithm and differential diagnosis to rule out systemic disease with first ray predilection with radiology and blood tests was used to diagnose mild to moderate HR for this series.^{30,31} Specific outcome measures for HR and the foot were prospectively chosen. The full diagnostic and treatment protocol, known as the Brantingham protocol (manual and adjunctive therapy), used in this case series is published elsewhere.^{16,17} In the original paper the soft tissue treatment was open to modification based upon functional assessment, age, fitness and special needs.¹⁷ See [Tables 1 and 2](#) and [Figs 1 to 5](#).

Specific outcome measures for HR were taken at baseline and the end of treatment. Digital Inclination was used to measure ROM of the great toe. Digital inclinometry has acceptable intra-rater reliability, with

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