



Foot orthoses in the management of chronic subtalar and talo crural joint pain in rheumatoid arthritis



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HIGHLIGHTS

- Chronic ankle joint complex disease causes significant pain, functional limitation and disability.
- Both orthoses significantly reduced pain, disability and functional limitations.
- Either type of orthoses should be considered as a treatment of painful chronic ankles in RA.

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ABSTRACT

Background: This pilot study investigated whether semi-rigid and soft orthoses had an effect on pain, disability and functional limitation in participants with chronic rheumatoid hindfoot involvement.

Methods: Participants with chronic hindfoot pain were randomly assigned to 2 groups, commencing either with semi-rigid Subortholene orthoses or soft EVA orthoses. The Foot Function Index and the Ritchie Articular Index were administered pre- and post-intervention, which lasted for 3 months. Following a 2 week washout period, each group was switched over to the other type of orthoses.

Results: Nine female participants (mean age 52.2 years (SD 9.1); mean weight 71 kg (SD 12.64); mean height 160 cm (SD 5.18)) with a mean RA duration of 11.7 years (SD 7.83), and a mean ankle/subtalar joint pain duration of 5.7 years (SD 2.62), completed the programme. Mean improvement in FFI score for both orthoses resulted in the same statistical significance ($p = 0.001$). Statistically significant reduction in pain, disability and functional limitation was observed for both interventions, together with improvement in the Ritchie Articular Index score.

Conclusion: Both Subortholene and EVA orthoses significantly reduced pain, disability and functional limitations in participants with chronic ankle/subtalar joint pain in rheumatoid arthritis.

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1. Introduction

Rheumatoid arthritis (RA) is a chronic systemic disease affecting predominantly synovial joints, often resulting in their progressive destruction through joint erosion and subsequent deformity [1]. RA affects around 90% of afflicted sufferers' feet, which have been found to be the most common reason for incapacity in patients with this disease [2], leaving a severe negative impact on mobility and functional capacity when this disease process begins to affect their feet [3]. Synovitis, with ingrowth of pannus and cytokines,

causes destruction of joint cartilage that can lead to erosions [4] and resultant pain, which has a strong influence on functional ability [5].

In RA, involvement of the hindfoot has been quoted as being between 17% [6] and 40% [7]. The resultant pain, functional loss and disability are difficult to manage [8], becoming in many instances significant sources of morbidity [9]. It appears likely that the subtalar and ankle joints are affected in the most severe form of the disease, with the subtalar joint being involved approximately 5–7 years prior to the talocrural joint [10]. The talus, a component common to both joints, is the single bone through which the whole body weight is channelled during walking (Laude, 2001). Abnormal alignment of the subtalar joint and mechanical stress has been attributed for many of the changes in the ankle in arthritis [11].

Patients living with RA need to be managed with drugs that carry potential risks of significant side effects in order to reduce

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joint destruction and consequent pain. However, in spite of the best medical management, significant foot problems persist, even when treated with biological therapies [12]. Unfortunately, besides drug therapy, there are not many options for the management of painful ankles in RA except for surgical intervention. While arthrodesis reduces pain, it does not improve function since the addressed joint is surgically locked. Furthermore, results can often be disappointing [9], besides possible complications such as infection and non-union [13].

In arthritis, orthoses are indicated for a variety of reasons such as resting and stabilization of joints, reduction of pain and inflammation, to improve function and prevent deformity [14], being nowadays more widely accepted [15]. However, even though orthoses are used quite extensively in the management of the rheumatoid foot, there are few trials which investigate directly their effect on the RA hindfoot. In fact, studies have concentrated more on forefoot-related conditions [16]. This could possibly be due to the inherent problems in studying the hindfoot. It is quite difficult to identify subjects purely with hindfoot disease, because the forefoot is normally affected first. In a critical review of foot orthoses in the rheumatoid arthritic foot, Clark et al. [17] argued that, although there is strong evidence that foot orthoses do reduce pain and improve functional ability, there is no consensus on the choice of foot orthoses used for the management of rheumatoid foot pathology, with types of orthoses ranging from rigid devices to simple cushioned insoles. Hennessy et al. [18] report weak evidence for custom orthoses reducing pain and forefoot plantar pressures, while evidence was inconclusive for foot function and other gait parameters. They concluded that although custom orthoses may be beneficial, more definitive research is required in this area.

Foot orthoses can be assessed utilizing several methodologies, including patient satisfaction, pain and deformity, plantar pressure, position and motion, muscle activity and oxygen consumption [19]. Pain is used as a primary outcome measure in many such studies because it is the reason most patients seek treatment and for which practitioners prescribe orthoses [20]. The Foot Function Index (FFI) is indicated for the assessment of treatment outcomes in rheumatology [21] and has been used in a number of trials involving the assessment of orthoses in rheumatoid feet. SooHoo et al. [22] performed a study which demonstrated increased responsiveness of foot and ankle specific outcomes tools compared to the SF-36. Magalhaes et al. [23] utilized the FFI to evaluate the effectiveness of foot orthoses in a group of patients with RA over a period of 6 months, concluding that foot orthoses were effective as an adjuvant in the management of the rheumatoid foot.

Woodburn et al. [15] utilized the Foot Function Index and 3D kinematics, kinetics and plantar pressure distribution to establish that custom-manufactured foot orthoses are indicated in *early* hindfoot deformity in RA. The orthoses lessened foot-related pain, disability and functional limitation. Cameron-Fiddes concluded that patients diagnosed with early RA may benefit from using off-the-shelf foot orthoses with the majority of their pain reduction occurring within the first 3 months of use [24]. However, following an extensive literature search, there is a clear paucity of information regarding trials aimed at investigating advanced hindfoot disease.

Subtalar and ankle joint alignment and stress are determinant factors in hindfoot disease. It is possible that the reduction of stress and possibly the realignment of these joints, whenever possible, through the use of orthoses, would be beneficial in reducing pain, disability and functional limitation for the afflicted patients. Hence the aim of this study was to determine whether two types of orthoses – semi-rigid Subortholene and soft Ethylene Vinyl Acetate (EVA) – are effective in reducing pain, disability and functional limitation in patients with chronic ankle joint complex involvement in RA. This study would additionally provide information about

two types of orthoses that may be used for the management of the painful hindfoot in RA.

2. Method

Ethical approval was sought and obtained from the University Ethics Committee. A prospective, experimental crossover design was employed for this study, in which two interventions (semi-rigid and soft orthoses) were applied sequentially to the same participants in random order. This had the advantage that each participant acted as his own control, thus a smaller sample size would be required [25].

Adult participants (aged 18 years and over) living with chronic rheumatoid arthritis diagnosed by a consultant rheumatologist were included. The chronicity factor was a common feature amongst participants since hindfoot involvement is known to occur in advanced disease. As inclusion criteria, all participants exhibited subtalar and/or ankle joint pain of at least 6 months' duration and required orthoses for biomechanical mal-alignment of the feet as per clinical practice. Participants were also required to have the ability to read unhindered in order to be able to independently complete the presented questionnaire.

Participants were excluded if they had foot pain other than subtalar/ankle pain, were in a flare, had a change of treatment during the trial period, were unable to read, had a history of foot surgery or had trauma to the foot during the trial period.

Twenty-one patients attending a Rheumatology Outpatient clinic at a General Hospital, medically confirmed to be suffering with RA and who presented with subtalar and/or ankle joint pain were identified as potential participants for the trial. These were reduced to 10 because of the exclusion criteria adopted, the main criteria of which was that they only had to suffer from hindfoot pain without coexisting forefoot involvement. Thus eleven patients were excluded mainly because they presented with such concurrent foot pain.

Out of the remaining ten who started the trial, another participant had to be excluded half way through the trial because she developed a rheumatoid flare, for which she was prescribed steroid and Disease Modifying Anti-Rheumatic Drug Therapy, thus invalidating her as a participant.

3. Casting

In order to ensure consistency, all the casts were taken and then modified by the same investigator (AG), who had fifteen years' experience in this method of casting and orthotic manufacture.

A standard plaster of Paris suspension cast was taken with the patient prone and the feet over the edge of the couch. Where necessary, a towel was placed under the hip on the side of the foot which was being casted to ensure that the foot was maintained in a straight position by rotating it internally. The manufacture of the orthoses followed normal procedures as would be employed in the clinic. These were constructed following a detailed biomechanical examination in which the range of motion of the joints of the foot, most notably that of the subtalar joint, were assessed and measurements at Neutral Calcaneal Stance Position and Resting Calcaneal Stance Position determined the amount of rearfoot posting that was incorporated into the orthoses.

Since the majority of participants were in an advanced state of RA, with limited range of motion of the joints, a pronated cast was taken [26,27]. This has often been quoted as being the best method for managing the arthritides since, if the foot is rigid, it is inappropriate to attempt to position it in any particular orientation [27].

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