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Original Articles

Manipulation under anaesthesia and steroid injection for pain and stiffness after surgery to the first metatarsophalangeal joint

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ABSTRACT

Aim: To determine the effectiveness of manipulation under anaesthesia and local steroid injection to treat stiffness of the first metatarsophalangeal joint following surgery for hallux rigidus or hallux valgus.

Methods: Patients were identified who had undergone surgery for hallux rigidus or hallux valgus and subsequently were treated with manipulation and steroid injection for stiffness of their joint. Patient records were reviewed to determine the range of movement of the joint pre-operatively, immediately following the procedure and at subsequent follow up. Manchester–Oxford foot questionnaires (MOXFQ) were sent to patients to evaluate symptoms post-operatively.

Results: In total 35 patients were analysed, which included a total of 38 foot operations. Twenty seven had prior surgery for hallux rigidus and 11 for hallux valgus correction. The total range of movement of the joint improved following manipulation by an overall mean of 44.7° ($p < 0.0001$). At subsequent follow up, the total range of movement of the joint was still improved by 22.2° ($p < 0.0001$) overall. The mean post-operative MOXFQ score was 24.8 but no correlation was found between MOXFQ scores and range of movement.

Conclusions: Manipulation under anaesthesia and local steroid injection is an effective way of treating stiffness following first ray surgery. Treatment results in an improved range of movement of the joint and patients report good function post-operatively.

1. Introduction

The two most common diseases affecting the first metatarsophalangeal joint (MTPJ) of the foot are hallux rigidus and hallux valgus. Hallux rigidus patients usually present with painful rubbing of bony prominences whilst wearing footwear, with restricted dorsiflexion due to dorsal osteophyte formation [1–4]. Similarly, hallux valgus can also have a significant impact on quality of life with footwear problems a common patient complaint due to prominent bunion deformity.

A myriad of different operations have been described for these first MTPJ disorders. The majority of patients that undergo these types of procedures have a good overall outcome in terms of range of movement and patient satisfaction. The most common treatment for hallux rigidus is a cheilectomy, which involves removal of the dorsal osteophytes and up to one third of the dorsal metatarsal articular surface [4,5]. This procedure can be used for all levels of disease and has demonstrated high levels of patient satisfaction with a significant improvement in joint range of movement [3,6]. Progressive joint stiffness has however been reported when cheilectomy is used for more severe forms of disease [7,8].

For hallux valgus a rotational scarf osteotomy has become one of the most common surgical treatments and has demonstrated good ability to maintain deformity correction over long-term follow up with high levels of patient satisfaction [9]. However, some patients undergoing these procedures can develop ongoing pain and post-operative arthrofibrosis which can occur in up to 8% of patients and result in an altered gait pattern and possibly transfer metatarsalgia. It has been suggested that joint stiffness which is present at 6 months post-operatively, is unlikely to resolve with conventional treatments for arthrofibrosis post-surgery which include shoe modifications, orthotics, and analgesia [10,11].

The authors hypothesised that manipulation under anaesthesia (MUA) and steroid injection may help relieve stiffness and pain that is seen in some patients post cheilectomy for hallux rigidus, or post hallux valgus correction.

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2. Methods

The authors retrospectively assessed a cohort of patients who had undergone first MTPJ surgery under the care of the senior author NMK. Patients were identified using the senior author's surgical logbook. All patients that had undergone manipulation under anaesthesia and steroid injection were identified since 2006. The subjects eligible for inclusion in the present analysis were those who had developed stiffness and pain symptoms within the first MTPJ after hallux valgus or hallux rigidus surgery. Patients undergoing manipulation for other reasons were excluded (e.g., primary arthrofibrosis, trauma). Patients who were non-contactable or had incomplete dataset were also excluded.

Following identification, patient clinical letters and case notes were reviewed to assess of patient symptoms and patient range of movement post index procedure. Range of movement (ROM) post-manipulation under anaesthesia was determined at time of surgery, as documented in the operation note and at subsequent follow-up appointment, as documented in the clinical letters. All ROM measurements were performed by foot and ankle registrars and consultants in clinic or theatre setting without the use of a goniometer.

All pre-operative radiographs of patients with hallux rigidus were reviewed and the level of disease was graded as per the classification of Coughlin and Shurnas, 2003 [3].

Additionally, all patients completed the Manchester–Oxford foot questionnaire (MOXFQ) to assess their current level of joint pain post MUA. Patients were contacted post-operatively to answer the questionnaire via telephone or via post, after they were discharged from the clinic. MOXFQ is a patient-centred questionnaire which assesses foot pain and function through three domains: pain, walking/standing and social. It has been validated for use in patients with conditions of the forefoot. Patients answer a series of 16 questions, which are scored from 0 to 4, depending on the severity of symptoms. A summed score out of 64 is then calculated and individual domain scores can also be calculated and converted to metric scale out of a 100 [10].

2.1. Procedure of manipulation of anaesthesia

The injection used was a mixture of 40 mg of depomedrone (1 ml) made up in 0.5% bupivacaine the amounts that were infiltrated varied between patients the modal volume used was 1 ml but ranged from 0.5 ml to 4 ml. During the procedure distension of the joint and flexion of the toe were considered to be signs of a successful intra-articular injection as well as aspiration of haematoma. Imaging was not used routinely.

The procedures were routinely done several months post-index procedure for patients who complained of stiffness and pain post operatively. Local anaesthesia was infiltrated into the joint and the first MTPJ was manipulated by the senior author with the patient sedated under general anaesthesia as a procedure lasting approximately 10 min.

2.2. Statistical analysis

Data was collated in Microsoft Excel 2013 and analysed using Stats direct statistical software version 2.8.0. The dataset was tested for normality using a Shapiro–Wilk test. When normally distributed it was analysed using paired and unpaired students' T test or repeat measures ANOVA. With regards to the correlation test the data was found to be from a mixed distribution so was analysed using Kendall's tau correlation coefficient.

3. Results

A total of 35 patients (38 foot procedures) were included in the study. Of these, 28 (80%) were female and 7 (20%) were male, with a mean patient age of 52.4 years (range 29–66).

Twenty-seven had a cheilectomy procedure performed for hallux rigidus as the index procedure and 11 patients had undergone corrective surgery for hallux valgus. Three patients had a bunionectomy, 1 patient had an akin osteotomy and 6 patients had a scarf osteotomy. Additionally, one patient also underwent a scarf and akin osteotomy.

Manipulation procedures occurred at a mean 11.4 months (range 2–128) from the date of the index procedure. The final follow-up visits post manipulation occurred at a mean 3.1 months post procedure (range 0–8 months).

On review of pre-operative radiographs, in the hallux rigidus group, 78% (21 patients) had grade 3 disease, 15% (4 patients) had grade 2 disease and 7% (2 patients) had grade 1 disease.

3.1. Clinical examination findings

The mean pre-manipulation total range of movement at the first MTPJ was 25° (range 5–100), immediate post-manipulation ROM was 70° (10–180), and final follow-up ROM was 50° (10–90). Joint ROM significantly improved from before manipulation to both immediately after manipulation and at the final follow-up visit using repeat measures ANOVA ($p < 0.05$).

The total range of movement of the joint significantly improved following manipulation by mean 44.7° combined between groups ($p < 0.0001$). In the hallux rigidus group the mean ROM improved by 43.9° and in the hallux valgus group the mean improvement in ROM was 46.8°. At subsequent follow-up, the total range of movement of the joint was still significantly improved by 22.2° ($p < 0.0001$) overall. In the hallux rigidus group the average improvement remained at 22.1° and in the hallux valgus group the mean improvement was 22.5°.

The mean post-operative MOXFQ score was 25.2 (0–52), which was similar in both groups (25.3 in the hallux rigidus group and 24.9 in the hallux valgus group). Mean individual domain metric scores were 44.3 for pain, 40 for standing/walking and 32.5 for social (Fig. 1). An unpaired t-test showed no significant difference in MOXFQ score between patients that had undergone manipulation post hallux valgus or hallux rigidus surgery ($p = 0.9$). MOXFQ scores were assessed at a mean 33 months post-manipulation (range 6–120).

Joint ROM post-manipulation and MOXFQ scores were analysed to determine if there is a correlation between ROM and MOXFQ score. A Kendall's tau coefficient for correlation demonstrated no correlation between joint ROM and MOXFQ scores (t beta = 0.03) (Fig. 2). No significant correlation was identified when grade of hallux rigidus disease was compared to MOXFQ scores and there was also no significant correlation found when MOXFQ scores were compared to length of time following the MUA.

4. Discussion

Cheilectomy, performed for hallux rigidus and corrective osteotomies for hallux valgus are two of the most frequently performed forefoot operations. Both procedures are successful in improving pain

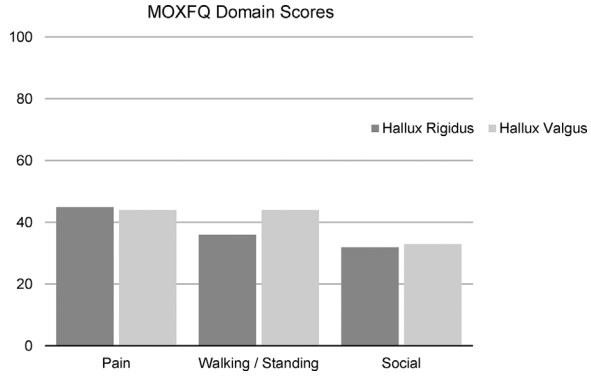

Fig. 1. MOXFQ domain scores.