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Joint Manipulation Under Anesthesia for Arthrofibrosis After Hallux Valgus Surgery

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ABSTRACT

Arthrofibrosis is a known complication of hallux valgus surgery. Joint manipulation under anesthesia has been studied for adhesive capsulitis of the shoulder; however, a paucity of published data exists on the use of this modality in the foot and ankle. The purpose of the present study was to investigate the outcomes of first metatarsophalangeal joint manipulation for arthrofibrosis that occurred as a complication of bunion surgery. The study population consisted of patients attending a single foot and ankle specialty clinic who were evaluated for arthrofibrosis after bunion surgery. Patients who underwent joint manipulation under anesthesia were asked to complete a research visit in which a clinical examination was performed and the presence and severity of joint pain were assessed. A total of 38 patients (34 females, 4 males, 53 feet), with a mean age of 55.7 ± 11.8 (range 30 to 83) years, agreed to participate. The mean follow-up period was 6.5 ± 3.4 (range 1 to 17) years. The visual analog scale scores improved significantly from baseline to the final follow-up visit (baseline 6.5 ± 1.5, range 2 to 10; final follow-up visit 2.3 ± 1.5, range 0 to 6; $p < .001$). Furthermore, joint motion had increased significantly ($p < .001$) for both dorsiflexion and plantarflexion at the final follow-up examination. The final range of motion (dorsiflexion, $r = -0.431$, $p = .002$; plantarflexion, $r = -0.494$, $p < .001$) correlated highly with patient self-reported pain in the first metatarsophalangeal joint. Our findings suggest that joint manipulation could be a useful modality for increasing first metatarsophalangeal joint mobility and alleviating pain in patients who experience arthrofibrosis after surgical correction of hallux valgus.

Arthrofibrosis is characterized by painful, restricted joint motion and is thought to result from an exaggerated fibrotic response after joint trauma or surgery (1,2). Patients experiencing arthrofibrosis typically experience a heightened immune response after injury, allowing the excessive activation of inflammatory cells and subsequent induction and proliferation of undifferentiated cells residing in the synovial tissue (2).

Much of what we know about the treatment options for symptomatic arthrofibrosis comes from shoulder studies, because adhesive capsulitis (i.e., frozen shoulder) is a fairly common occurrence (3,4). The established treatments for arthrofibrosis of the shoulder consist of physiotherapy, corticosteroid injections, exercise, manipulation under anesthesia, arthroscopic arthrolysis, or a combination of these modalities (4). Manipulation, in particular, has been shown to significantly decrease shoulder pain and increase the range of motion (ROM) in patients with adhesive capsulitis (5). Furthermore, manipulation combined with limited arthroscopic arthrolysis has been found to result in faster pain relief and better shoulder ROM compared with intra-articular steroid injection alone (3). Although the underlying mechanisms for manipulation-related pain relief remain largely unknown, it has been postulated that the analgesic effects seen after joint manipulation likely involve descending inhibitory mechanisms that use serotonin and noradrenaline (6).

Arthrofibrosis is a well-recognized complication after bunion surgery (7). The initial treatment of arthrofibrosis of the first metatarsophalangeal (MTP) joint includes orthotics, shoe modifications,

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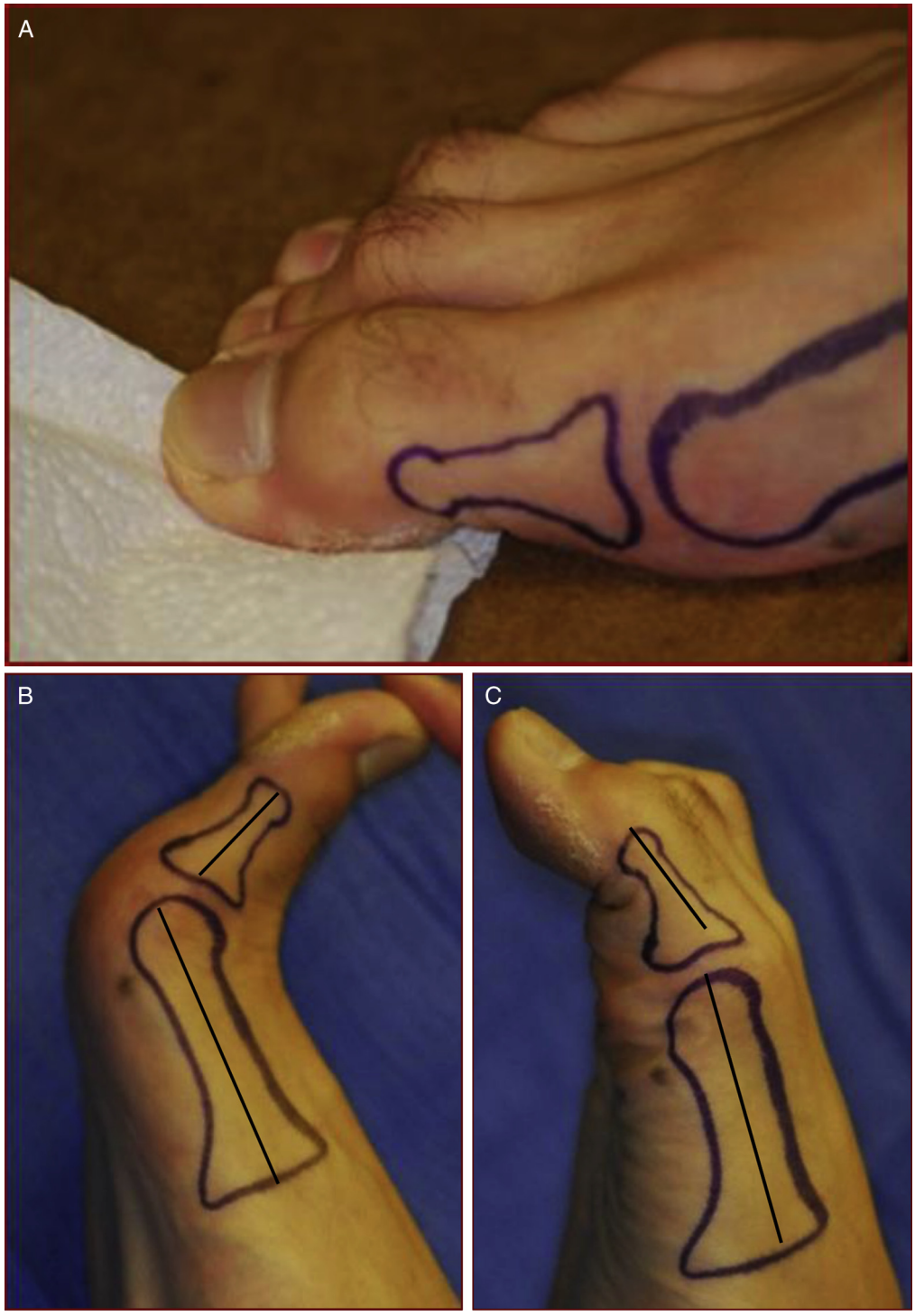

Fig. 1. (*A*) The paper pull out test. With the patient standing, a piece of paper is inserted between the hallux and the floor. The patient is then asked to grip the floor. The examiner tries to remove the piece of paper. This test demonstrates the plantarflexor strength of the intrinsic muscles of the hallux. (*B*) Dorsiflexion of the first metatarsophalangeal (MTP) joint. The amount of dorsiflexion available at the first MTP joint is the angle formed between the longitudinal bisection of the first metatarsal bone and the longitudinal bisection of the proximal phalanx of the hallux. (*C*) Plantarflexion of the first MTP joint. With the ankle joint at 90° (neutral), the patient curls the toes into plantarflexion. The amount of plantarflexion available at the first MTP joint is the longitudinal bisection of the first metatarsal bone and the longitudinal bisection of the proximal phalanx of the hallux.

injections, physical therapy, and anti-inflammatory medications (7). However, when conservative techniques fail, manipulation of the first MTP joint under anesthesia is a viable option. Joint manipulation has been studied in patients with all-cause hallux rigidus (8); however, a paucity of published data is available regarding the efficacy of manipulation techniques to treat foot and ankle disorders (9). The objective of the present study was to investigate the intermediate- and long-term outcomes of first MTP joint manipulation for arthrofibrosis that developed, specifically, as a complication of hallux valgus surgery.