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Review

Intra-articular injections in thumb osteoarthritis: A systematic review and meta-analysis of randomized controlled trials

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ABSTRACT

Objectives: The objective was to assess the efficacy of intra-articular injections of corticosteroids or hyaluronic acid in thumb osteoarthritis.
Methods: A systematic review of the literature was performed until August 2014. All controlled trials reporting the efficacy on pain, functional capacity and pulp pinch force of hyaluronic acid or corticosteroids in thumb osteoarthritis were selected. Pooled standardized response means (SRMs) were assessed by meta-analysis.
Results: Six trials were included and contributed to 3 meta-analyses (hyaluronic acid versus placebo, corticosteroids vs. placebo and hyaluronic acid vs. corticosteroids). Among the 428 patients included, 169 were treated with hyaluronic acid, 147 with corticosteroids and 74 with placebo. Versus placebo at week 12, hyaluronic acid (2 trials, 148 patients) lead to better functional capacity (SRM −1.14 [−1.69; −0.60]) with no difference on pain; corticosteroids (2 trials, 164 patients) lead to no difference on pain or function. When comparing hyaluronic acid vs. corticosteroids (4 trials, 304 patients), no difference was evidenced until week 12. At week 24, pain was significantly lower in the corticosteroids group (SRM 1.44 [0.14; 2.74]) and pulp pinch force higher in the hyaluronic acid group (SRM −0.75 [−3.87; −1.97]).
Conclusion: This meta-analysis shows great heterogeneity. Hyaluronic acid may be useful to increase functional capacity and corticosteroids to decrease pain in thumb osteoarthritis at week 24.

1. Introduction

Osteoarthritis (OA) of the carpo-metacarpal joint of the thumb is a common condition, affecting at least 30% of women over the age of 65 [1]. The life impact and disability associated to hand OA are significant. Hand disability is frequent in patients suffering from thumb OA, with a reduction of grip strength and difficulty writing or fingering small objects [2,3]. Few treatments have been assessed in thumb OA. According to the European League Against Rheumatism (EULAR) and the American College of Rheumatology (ACR) recommendations, the optimal management of thumb OA requires a combination of non-pharmacological measures such as local application of heat or splints, and pharmacological treatment modalities [4,5]. Local treatments are preferred to systemic treatments. For intra-articular injections, experts' opinion differs in thumb OA [4,5]. Evidence of efficacy of intra-articular hyaluronic acid or corticosteroid injections in thumb OA is scarce, while largely investigated in hip and knee [6–9]. For example in knee OA, intra-articular corticosteroids are reported to decrease pain [9] whereas hyaluronic acid injection seems to relieve pain and to improve functional capacity [6–8]. Both of these modalities are recommended by international associations for the treatment of lower-limb OA [4,10,11].

In thumb OA, corticosteroid injections are recommended, and hyaluronic acid injections may be useful, according to the EULAR experts [5]. However, both of these injection modalities are not recommended by the ACR experts [4]. The objective of the present study was to assess short-term and medium-term efficacy on pain, functional capacity and pulp pinch force of intra-articular injections of corticosteroids or hyaluronic acid in patients with thumb OA in controlled trials, by performing a meta-analysis of published articles.

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2. Methods

A systematic search was performed in PubMed Medline and EMBASE databases up to August 2013 with an update up to August 2014, without limitation of year of publication or journal, using the following keywords: (((("thumb" [MeSH Terms] OR "thumb"[All Fields]) OR ("trapeziometacarpal joint"[MeSH Terms] OR "trapeziometacarpal"[All Fields]) OR "first metacarpal-carpal"[All Fields] OR "carpo-metacarpal"[All Fields]) "osteoarthritis") OR "rhizarthrosis"[All Fields]) AND ("injection"[MeSH Terms] OR "injection"[All Fields] OR "injections"[All Fields]). The limits were English, French, German or Spanish language and controlled trials. In addition, the Cochrane database, reference lists of the papers initially detected to identify additional relevant reports were manually searched, as were EULAR, OARSI and ACR abstracts of the last 5 years. Studies were initially selected on their title and abstract by one author (ST), then on their full text. All controlled trials reporting the efficacy on pain and/or functional capacity and/or pulp pinch force of intra-articular injections of corticosteroids and/or hyaluronic acid in thumb OA were selected. For studies with incomplete data, the corresponding authors were contacted by email.

2.1. Data collection

Using a predetermined form, the following features were collected: blinding, intention-to-treat analysis and number of participants who completed the follow-up. The Jadad scale [12] was applied to assess the methodological quality: 5 points can be awarded, with higher scores indicating higher quality. The Cochrane risk of bias tools was also applied. For each trial, demographic characteristics (sex, mean age), thumb OA features, type of corticosteroids and/or hyaluronic acid (with doses and number of injections), type of placebo if needed and duration of follow-up were collected. Pain was extracted from the studies by a 100 mm visual analogue scale; functional capacity was extracted as available by the following scores: Disabilities of the Arm, Shoulder and Hand [13], the Dreiser functional index [14], the Purdue Pegboard Test [15] and/or the Duruöz Hand Index [16]; because functional capacity was assessed by different scores, each score was transformed linearly to fit the range 0–100, in which 0 was the best situation and 100 the worst. Pulp pinch force was extracted by pulp-to-pulp pinch force in pounds [17]. Studies were classified according to the injection type (hyaluronic acid versus placebo, corticosteroids versus placebo and hyaluronic acid versus corticosteroids). Efficacy was assessed by the change in pain and/or functional capacity and/or pulp pinch force status between baseline and week 4, week 12 and week 24 to 26 (as available according to the studies, called week 24 in the text) in corticosteroids, hyaluronic acid and placebo groups.

2.2. Statistical analysis

In each study, the standardized response mean (SRM) was determined to assess the magnitude of treatment effect. The SRM is calculated as the mean change divided by the standard deviation of the change. Improvement was considered as a positive change. Pooled SRMs were calculated by meta-analysis, using the Mantel-Haenszel method with RevMan version 5.2 statistical software (Review Manager, Copenhagen, Denmark). Statistical heterogeneity was measured by I^2. All meta-analyses were carried out with use of random effects model in case of significant heterogeneity.

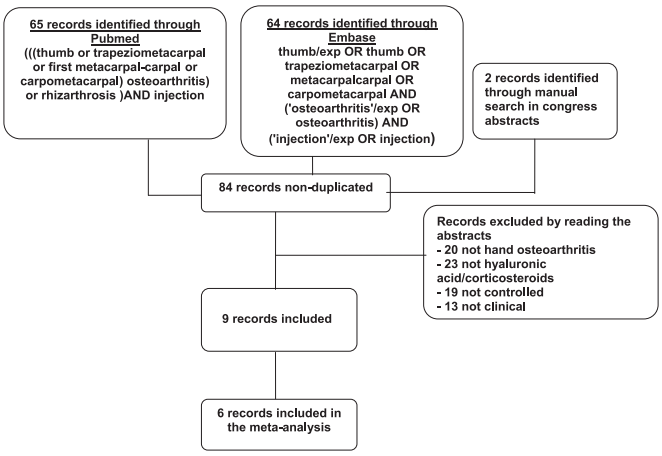

Fig. 1. Flow chart.

3. Results

3.1. Literature search results and trial characteristics

Initially, 84 potentially relevant articles were screened; 76 were excluded (Fig. 1). For 3 studies, the results described in the articles did not allow meta-analysis, but the studies are reported descriptively here (Table 1) [18–20]. After adding 1 report from congress abstracts, 9 reports were included (Table 1) [18–26]. Thus this meta-analysis included 428 patients; 168 (39.2%) treated by hyaluronic acid injections, 166 (38.8%) by corticosteroids injections and 94 (22.0%) by placebo. Mean (standard deviation [SD]) age was 63 years (2.3) and 368 patients (86%) were females (Table 1). The methodological quality was moderate: the mean Jadad score was 2.2 (SD 2.8) (range 1–5); 4 (67%) trials performed intention-to-treat analyses. Of the 6 trials, 3 described precisely the patient selection or outcome, 2 used a concealed random allocation, 5 presented difference in changes with standard error of the mean and 1 with interquartile range. The Cochrane risk of bias tool also indicated moderate quality (online Fig. S2). The injection was guided by X-ray in 2 studies, by ultrasound in 1 study and not guided in 3 studies. The number of injections varied across studies and sometimes across study groups (Table 1). Heterogeneity was substantial, varying between 0% and 97% for I^2 across the analyses.

3.2. Efficacy of corticosteroids injections versus placebo

Mandl's study [22] indicated no difference on pain at week 24 between two groups of 62 patients with 2 injections (Table 2). Meenagh's study [23] compared 2 groups of 20 patients with one injection, and showed efficacy for corticosteroids on pain at week 24 with a large effect size (Table 2). Heyworth's study [20] indicated no difference on pain at week 24 after 2 injections between corticosteroids (22 patients) and placebo (18 patients), but the data could not be included in the meta-analysis. The pooled analysis (82 patients in each arm) showed no difference between the two treatments for pain (SRM = −1.20 [−3.69; 1.29]) (online Fig. S1 and Table 3).

3.3. Efficacy of hyaluronic acid injections versus placebo

Roux's study [25] compared one versus three injection of hyaluronic acid with 14 patients in each group at week 12. Patients who received one injection of hyaluronic acid were considered as placebo (Table 1). It showed efficacy on pain and functional capacity at week 12 for 3 injections with a large effect size (Table 2).