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Research Article

Injection Placement for Palpation-Guided Intra-Articular Glucocorticoid Therapy for the Elbow

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Abstract

Objectives: There are two different palpationguided injection techniques described how to enter the elbow joint when injecting intraarticular glucocorticoids – the lateral and the posterior. Both methods are used in clinical practice and based on individual experience each practicing physician decides which technique to use.

The aims of the present study were to compare the accuracy of palpationguided injection placement and the clinical effects regarding pain and function between these methods.

Methods: Patients at the rheumatology department at Gävle hospital, Sweden, presenting with clinical signs of elbow synovitis were included and randomized to either lateral or posterior injection technique using 20 mg trimacinolone hexacetonide in combination with a contrast agent. Radiographs with lateral view were performed immediately after the injection and were blindly assessed by an independent radiologist.

A validated questionnaire regarding elbow pain and function was answered before and one month after the injection.

Results: 24 elbows in 20 patients were randomized, to lateral (n=12) or posterior (n=12) injection technique. All lateral injections were correct and so were 67% of posterior injections. The difference was statistically significant ($p<0.05$). Synovial fluid aspiration was successful in 50% and 17% respectively. There were no significant differences between the treatment arms regarding pain reduction and functional improvement.

Conclusion: This study shows that the proportion of correct injection placement for the elbow is larger with lateral technique. There were no differences between the treatment arms regarding the clinical response, but a larger study is necessary to draw firm conclusions.

Keywords: Intra-articular glucocorticoid; Injection therapy; Arthritis disorders

1. Introduction

Intra-articular glucocorticoid (IAGC) injection therapy is an effective method to rapidly reduce joint pain and swelling in arthritis disorders. The injection procedure is easy to learn, and the clinical response is mostly excellent and it has therefore been used in the treatment of rheumatic diseases for more than 60 years. Serious side effects are rare and it has become a corner stone of the anti-rheumatic therapy. However, despite this long experience the injection routines vary worldwide because of several gaps of knowledge. In the literature regarding injection technique, the recommendations differ, for example concerning where to enter the elbow joint for intraarticular treatment [1].

Ultrasound (US) guided injections have increased the accuracy of intraarticular injection placement [2-4], but it is less clear whether US improves the treatment response [2]. The US procedure is time consuming and not always available, certainly not in the primary care. The knowledge how to perform a joint puncture the most appropriate way, without US guidance, will therefore still be needed as a clinical skill in the future. Successful synovial fluid (SF) aspiration is regarded as an indirect sign of correct injection placement, and clinical studies using radiographic methods have confirmed such correlation [5]. In addition, successful aspiration is associated with a longer duration of therapeutic effect of IAGC, at least for knee synovitis [6].

In the literature two injection techniques for the elbow are described [1, 7]: the posterior technique using fossa olecrani as an anatomical landmark and the lateral technique using the soft spot in middle of the triangle between the radial head, the lateral epicondyle of humerus and olecranon. Which one of these methods that has the highest frequency of correct intraarticular injection placement is not known. There are three previous clinical studies on the accuracy of palpation guided elbow injections using radiography as outcome parameter, showing correct injections between 37% and 100% [5, 8, 9]. However, none of them gives information of which location for needle placement was used and the materials are small (5, 8 and 31 joints, respectively). The aims of the present pilot study were to investigate which injection technique gives most accurate intraarticular placement according to radiographs,

most successful SF aspirations and best outcome regarding elbow pain and function.

2. Methods

Patients visiting the Rheumatology department and presenting clinical signs of elbow arthritis (joint swelling, tenderness and limited range of motion) were asked to participate in the study. Patients with renal failure, treatment with metformin, asthma, allergy to contrast agents and patients with signs of infection in the joint or in the skin on the site for injection were excluded. After informed consent, the patients were randomized to IAGC with either posterior or lateral technique with a 0.6 x 25 mm needle. Synovial fluid was aspirated as much as possible and 3 ml of the contrast agent iohexol (Omnipaque® 180 mg/ml, GE Health Care AB, Sweden) in combination with 1 ml triamcinolone hexacetonide (Lederspan® 20 mg/ml, Meda AB, Sweden) were injected. Immediately after IAGC the patient had a radiographic examination of the elbow with a lateral view to identify the location of the contrast medium. The radiographs were graded as intra-articular, extra-articular or difficult to assess by an independent radiologist. Before and one month after the injection the patient answered a self-assessment questionnaire, the Patient Rated Elbow Evaluation (PREE) [10], which contains 5 questions regarding elbow pain (scale 0-50) and 15 questions regarding elbow function (scale 0-150, divided by factor three).

The randomization procedure was prepared by an independent research nurse using 50 pieces of paper with information of randomization group (ratio1:1). Each one of them was put in an opaque envelope, and were sorted in eleven blocks of six (3+3). The envelopes in each block were carefully mixed followed by a careful mixing of the blocks. The protocol was approved by the Regional Ethical Review Board in Uppsala (Dnr 2019/00440, on 2019-01-16) and the Local Radiation Committee at the hospital in Gävle. All patients gave their written informed consent and the study was performed in accordance with Good Clinical Practice and the Helsinki Declaration. Chi2-test and Mann Whitney U-test were used when appropriate for comparison between treatment arms. A P-value <0.05 was regarded as significant.

3. Results

24 elbows in 20 patients were included. There were no significant differences in patient characteristics between the treatment arms at baseline. See Table 1. Unfortunately, patient inclusion was stopped when the corona virus pandemia appeared, and our hospital did not allow study patients at the radiology department. Our rheumatology department was then moved from the hospital to a distant building for outpatient care and the logistics for radiographic examinations became very difficult. Most recruited patients suffered from chronic rheumatic diseases: twelve patients had rheumatoid arthritis, three patients had juvenile chronic arthritis, three patients had spondyloarthritis and one patient had psoriatic arthritis. Another patient presented with an unclassified monoarthritis of the elbow.

	Lateral technique (n=12)	**Posterior technique (n=12)**	**All (n=24)**
Age (years)	58 (32-82)	57 (34-75)	58 (32-82)
Gender (male/ female)	2/10	3/9	5/19
Disease duration (years)	13 (1-62)	21 (1-63)	17 (1-63)
s-DMARD therapy	6/12	9/12	15/24
b-DMARD therapy	6/12	3/12	9/24
Prednisolone therapy	3/12	4/12	7/24
Pain baseline (PREE)	30 (16-50)	35 (17-46)	32 (16-50)
Function baseline (PREE)	25 (12-46)	28 (9-50)	28 (9-50)

Median (range)

Table 1: Patient characteristics.

Eighteen patients were treated with synthetic disease modifying antirheumatic drugs (s-DMARD) and eleven of them were treated with methotrexate as monotherapy or in combination. Eight patients were on biologics (b-DMARD) and six of them used etanercept. Four patients were treated with low dose prednisolone (5-7.5 mg/day). The radiographs showed that all lateral elbow injections were correct, but only 67% of posterior injections. The difference was statistically significant ($p<0.05$). See Table 2. Synovial fluid aspirations were successful in 50% and 17% respectively. There were no significant differences between the treatment arms regarding pain reduction and functional improvement. Four patients had bilateral elbow injections and experienced both injection methods. Three of them preferred the posterior technique. No adverse reactions or infectious complications were observed.

	Lateral technique (n=12)	**Posterior technique (n=12)**	**All (n=24)**
Synovial fluid	6/12	2/12	8/24
Intra-articular contrast	12/12	8/12*	20/24
Extra-articular contrast	0/12	4/12	4/24
Pain reduction 1 month	13 (-8-46)	21 (1-41)	19 (-8-46)
Function change 1 month	16 (-13-41)	21 (8-28)	18 (-13-41)

*= $p<0.05$

Table 2: Results of injection placement, synovial fluid aspiration and changes of elbow pain and function from baseline to assessment after one month.

4. Discussion

The main finding in the present study was that correct injection placement was significantly more frequent when using the lateral injection technique. However, no significant difference was found in treatment outcome regarding elbow pain and function. To our knowledge, this is the first randomized controlled study comparing the accuracy of different palpation guided IAGC techniques for the elbow. Previous studies have shown differences in the rate of correct injection placement and clinical outcome between different injection methods for the knee and the shoulder [11] and in the education how to perform IAGC therapy without US the most accurate method should be taught.

However, the clinical response after IAGC is very complex and may depend on several other factors beside the accuracy of the injection placement, such as the choice of glucocorticoid preparation [12], degree of joint damage and levels of vascular endothelial growth factor in SF [13]. However, in contrast to IAGC for knee injections postinjection rest for the elbow does not influence the treatment response [14]. Unfortunately, this study was stopped during the coronavirus pandemia and we did not reach our goal for patient inclusions, but it may be regarded as pilot study. Despite the limited number of participants, there were a significantly larger proportion of accurate elbow injections in the group with lateral injections. The insufficient number of patients may explain the lack of difference in pain reduction and functional improvement between the treatment arms. However, we conclude that the lateral injection technique is more reliable to get a correct injection placement, but larger studies are needed to confirm this.

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Conflict of Interest

The authors declare no conflict of interest.

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