ORIGINAL ARTICLE

Evaluation of Needle Positioning During Blind Intra-Articular Hip Injections for Osteoarthritis: Fluoroscopy Versus Arthrography

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ABSTRACT. Dıraçoğlu D, Alptekin K, Dikici F, Balcı Hİ, Özçakar L, Aksoy C. Evaluation of needle positioning during blind intra-articular hip injections for osteoarthritis: fluoroscopy versus arthrography. Arch Phys Med Rehabil 2009;90: 2112-5.

Objective: To evaluate needle positioning during blind/anatomically referenced hip joint injections for osteoarthritis (OA).

Design: Experimental clinical study.

Setting: Operating theater of a university hospital.

Participants: Patients (N=16) (10 women, 6 men), who were diagnosed as having OA according to the American College of Rheumatology criteria and whose radiologic grades were II or III according to Kellgren-Lawrence.

Interventions: Three bilateral and 13 unilateral hip injections were performed (3 times at 1-week intervals). After it was presumed blindly that the needle was within the joint, the location of the needle was checked with backflow technique and fluoroscopy. Entrance to the joint cavity was also ensured by reconfirmation with contrast medium, and the procedure was then terminated with hyaluronic acid injection.

Main Outcome Measures: Assessment of blind needle placement into the hip joint by using backflow technique, fluoroscopic images, and contrast enhancement.

Results: The location of the needle was fluoroscopically confirmed to be at the proper position in 38 (66.7%) of the 57 blind interventions. Furthermore, in 29 (76.3%) of those 38 interventions, localization of the intra-articular needle could be confirmed by intra-articular contrast uptake. Overall, 29 of 57 (50.9%) blind interventions exhibited intra-articular contrast enhancement. Backflow was not observed in 23 (79.3%) of these 29 interventions. Five (17.9%) of 28 interventions with no contrast uptake showed backflow.

Conclusions: In light of our results, we suggest that blind injection of the osteoarthritic hip joint can be inaccurate even with careful technique. Further, the backflow method does not appear to be reliable, and guidance during the injection seems to be necessary.

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INTRA-ARTICULAR INTERVENTIONS of the hip joint have increasingly become commonplace in recent years. They include diagnostic interventions for septic arthritis, crystal arthropathy, prosthetic infections, and postoperative pain; and therapeutic interventions such as corticosteroid injections or viscosupplementation.[1-7] Although its efficacy is debatable, intra-articular hyaluronic acid injection into the hip joint has been performed for patients with OA refractory to conservative therapeutic approaches.[8-10] In addition, intra-articular local analgesics may be used after hip arthroplasty for pain management.[11] On the other hand, there is no consensus on the technique of hip injections (imaging-guided or anatomically referenced) in the relevant literature. Most authors suggest fluoroscopy-guided or ultrasonography-guided techniques[1,12-15]; however, others claim that intra-articular hip aspiration and injection might also be performed by the use of anatomical landmarks without any imaging.[16-18] Injection without guidance is inexpensive and does not contain radiation or require a special setting. Therefore, it is important to know whether an injection can be performed without guidance.

To our knowledge, arthrographic confirmation of the needle localization in a blind/anatomically referenced intra-articular hip injection in living subjects has not been studied. Accordingly, the purpose of this study was to evaluate the correct placement of the needle during blind hip joint injections for OA with (1) the backflow method, (2) fluoroscopy, and (3) arthrography.

METHODS

Sixteen patients (10 women; 6 men), diagnosed as having OA according to the American College of Rheumatology criteria[19] and whose radiologic grades were II or III according to Kellgren-Lawrence[20] were enrolled. Intra-articular interventions were performed by the same physician (D.D., who had more than 10 years of experience with intra-articular injections) at the symptomatic hip joints under sterile conditions in an operating theater. Three patients with bilateral hip OA received intra-articular injections for both hip joints, and 13 patients with unilateral hip OA had single injections. Injections were repeated at 1-week intervals for a total of 3 injections. Fifty-seven intra-articular hip injections were performed in a total of 19 hip joints.

List of Abbreviations

BMI	body mass index
OA	osteoarthritis

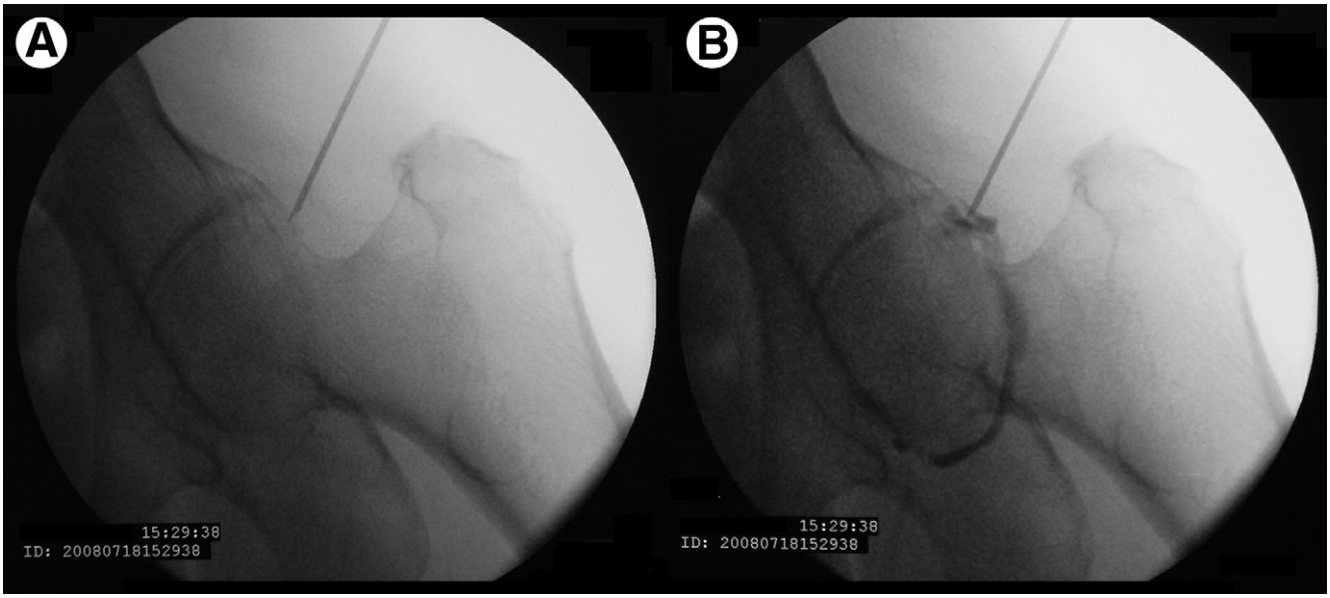

Fig 1. Fluoroscopic imaging of the patient's hip joint (A) and intra-articular contrast medium uptake of the same patient (B).

The subjects were informed about the study procedure, and they gave informed consent to participate. The study protocol was approved by the institutional review board.

Injection Technique and Arthrography

Patients underwent a standard anatomically referenced lateral injection technique.[3,18,21,22] They were laid down in a lateral position with the side to be injected facing upward. In order to make the hip joint come into 10° of internal rotation and adduction position, the opposing hip and knee joints were given a flexion position. The hip and knee joints to be injected were brought into extension. Cutaneous and subcutaneous local anesthetic administrations were followed by palpation of the trochanter major, superior to which an 18-gauge, 90-mm needle was advanced perpendicularly until bone contact was achieved, and the needle was withdrawn a few millimeters. Local anesthetics were administered if the subject perceived pain during the procedure. One milliliter of physiologic saline was applied and was tested for whether it could be aspirated and whether there was spontaneous backflow. The backflow method can be described as "spontaneous back streaming of injected liquid into a closed body space (ie, joint cavity)."[14] After it was presumed blindly that the needle was within the joint, the location of the needle was checked with C-arm fluoroscopy (fig 1A) and recorded. Later the images were retaken on administration of 2mL radio-opaque dye (iohexol 300mg/mL) (fig 1B). Patients with intra-articular contrast medium uptake after the blind injection were accepted as successful, and the procedure was completed with hyaluronic acid injection. Patients without intra-articular contrast medium uptake after blind access were not accepted as successful, and the needle was directed to the femoral neck region. Entrance to the joint cavity was ensured by reconfirmation with contrast medium, and the procedure was then terminated with hyaluronic acid injection (fig 2).

SPSS 15.0[a] was used for statistical analyses. Data were expressed by descriptive statistics and percentages. To compare BMI values in between the groups, the independent samples *t* test and Kruskal-Wallis test were used.

RESULTS

The mean age of the patients was 60.6±8.2 years. The BMI of the patients was 28.3±2.7kg/m^2 (range, 24.8–33.3). The radiologic grade was II in 11 and III in 8 hip joints. The location of the needle was fluoroscopically verified to be at the proper position in 38 (66.7%) of 57 blind interventions. In 29 (76.3%) of those 38 interventions, localization of the intra-articular needle could be confirmed by intra-articular contrast medium uptake, which meant that overall, 29 (50.9%) of 57 blind interventions exhibited intra-articular contrast medium uptake. No intervention with a false fluoroscopic placement revealed intra-articular contrast medium uptake. The difference between the confirmation rates (fluoroscopy vs contrast uptake) was significant ($z=2.27$; $P=.02$; power=.98).

There was no difference between BMI values of subjects with correct versus false needle positioning and with contrast-positive versus contrast-negative results ($P=.91$ and $P=.93$, respectively). There were 2 normal, 29 overweight, and 7 obese patients in the proper needle position group and 4 normal, 10 overweight, and 5 obese patients in the false needle position group ($P=.69$). There were 1 normal, 23 overweight, and 5 obese patients in the contrast-positive group and 5 normal, 16 overweight, and 7 obese patients in the contrast-negative group ($P=.46$).

Backflow was not observed in 23 (79.3%) of 29 interventions with intra-articular contrast medium uptake (false-negative). On the contrary, 5 (17.2%) of 29 interventions with no contrast uptake showed backflow (false positive).

No patient developed tenderness, hematoma, allergic or pseudoseptic reaction or infection. Increased hip pain was observed in 3 patients after the first injection, which disappeared within 24 hours.

DISCUSSION

In this study, we tried to evaluate the exact positioning of the needle during hip injections in patients with OA. Our results have shown that the success rate of correct needle placement in anatomically referenced intra-articular hip injections without