Technical Note

Fluoroscopy-Guided Sacroiliac Intraarticular Injection via the Middle Portion of the Joint

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Abstract

Objective. Sacroiliac intraarticular injection is necessary to confirm sacroiliac joint (SIJ) pain and is usually performed via the caudal one-third portion of the joint. However, this is occasionally impossible for anatomical reasons, and the success rate is low in clinical settings. We describe a technique via the middle portion of the joint.

Design. Observational study.

Subjects. Enrolled were 69 consecutive patients (27 men and 42 women, with an average age of 53 years) in whom the middle portion of 100 joints was targeted.

Method. With the patient lying prone-oblique with the painful side down, a spinal needle was inserted into the middle portion of the joint. Subsequently, the fluoroscopy tube was angled at a caudal tilt of 25–30° to clearly detect the recess between the ilium and sacrum and the needle depth and direction. When the needle reached the posterior joint line, 2% lidocaine was injected after the contrast medium outlined the joint.

Results. The success rate of the injection method was 80% (80/100). Among 80 successful cases, four were previously unsuccessful when the conventional method was used. Intraarticular injection using the new technique was unsuccessful in 20 joints; in three of these cases, the conventional method proved successful, and no techniques were successful in the other 17 cases.

Conclusion. The injection technique via the middle portion of the joint can overcome some of the difficulties of the conventional injection method and can improve the chances of successful intraarticular injection.

Key Words. Sacroiliac Joint; Intraarticular Injection; Middle Portion; Technique

Introduction

A sacroiliac intraarticular injection is essential for establishing the definitive diagnosis of sacroiliac joint (SIJ) pain, according to the criteria outlined by the International Association for the Study of Pain [1]. Although various techniques have been employed to successfully perform the intraarticular injection [2–9], the procedure remains difficult for general physicians as well as spine specialists.

The caudal one-third of the SIJ is typically chosen to obtain access [2–5]. To improve the success rate of access to the SIJ, many previous studies [6–9] have used fluoroscopy, computed tomography (CT), or ultrasound guidance. We previously adopted the technique described by Dussault et al. [3] because our personal success rate was higher than that achieved with the conventional technique described by Hendrix et al. [2]. However, intraarticular injection via the caudal one-third of the SIJ is occasionally impossible for anatomical reasons: the twisting shape of the caudal portion of the joint or a bony spur near the needle entry point.

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In the present study, we evaluate a technique that targets the middle portion of the SIJ. We developed this technique independently during our experience with periarticular SIJ injections [10,11]. A similar technique has previously been studied in cadavers [12] and has been mentioned in practice guidelines [13]; however, technical details in clinical settings were not described.

Methods

This study was approved by the Institutional Review Board of JCHO Sendai Hospital. Patients provided written informed consent for the use of their data in the study.

Patients

From October 2015 to February 2016, 69 consecutive patients (100 joints) underwent sacroiliac intraarticular injection for the diagnosis and treatment of SIJ pain. There were 27 men and 42 women, with a mean age of 53 years (11–86 years). Thirty-one patients had bilateral SIJ pain, 17 had right-sided pain, and 21 had left-sided pain. On plain radiographs, the SIJ appeared normal in 53 patients, showed substantial degenerative changes on the injected side in 10, and showed sacroiliitis with erosion and subchondral sclerosis from ankylosing spondylitis in six.

Injection Method

Patients were positioned prone on the fluoroscopy table (Digital X-ray TV System/Winscope64, TOSHIBA, Japan). The angulation of the fluoroscopy tube we used could only change to maximum 30° in the caudal direction and 30° in the cephalic direction. With the patient lying prone-oblique with the painful side down on a fluoroscopy table, the posterior SIJ line was divided into four sections, as shown in our previous studies according to the periarticular SIJ injection technique (Figure 1) [10,11]. After administering local anesthetics at the needle entry point, a 23-gauge or 22-gauge, 90-mm straight spinal needle was inserted into the middle portion of the joint, which was designated as Section 2 in our previous study (Figure 2A). The needle was advanced nearly perpendicular to the fluoroscopic beam angle. After the needle was inserted and advanced until the bone tissue, the fluoroscopy tube was angled at a caudal tilt of 25–30°. The image clearly showed the recess between the ilium and sacrum (Figure 2B). The needle direction could be adjusted under fluoroscopic guidance to the obviously detected posterior margin of the joint. When the needle was advanced until it reached the ilium bone wall in the middle portion, contrast medium was injected. However, because of the presence of ilium cartilage, the tip of the needle was occasionally blocked; the needle, then, had to be slightly retracted while simultaneously injecting the contrast medium. This slight retraction allowed the contrast medium to flow freely into the joint cavity. After the joint was outlined by contrast medium, 1.5 to 2.0 mL of 2% lidocaine was injected (Figure 3).

Depending on the needs of each case, the retro-oblique view was useful for confirming whether the needle tip

Figure 1  The posterior sacroiliac joint line is divided into four equal sections (0 to 3). Section 2 is the middle portion of the joint. (A) Prone-oblique view of the sacroiliac joint with the painful side down under fluoroscopy. (B) Diagram of four sections in the posterior sacroiliac ligament region.
had reached into the middle portion of the joint. When
the needle tip did not insert into the posterior margin of
the joint with the posterior and anterior joint lines super-
imposed, we rotated the patient’s body in the
retro-oblique direction, such that the anterior and pos-
terior joint lines were separated, to confirm that the nee-
dle tip had reached the ilium bone line in the middle
portion of the joint (Figure 4).

Figure 2 Middle portion sacroiliac intraarticular injection technique. (A-a) Posteroanterior view with the patient lying
prone-oblique. A needle is inserted into the point where the joint line intersects with the parallel lines consisting of the
inferior border of the posterior superior iliac spine (PSIS) and the border of the lateral sacral crest. The needle is
advanced nearly perpendicular to the fluoroscopic beam. (A-b) The needle entry point on a dry pelvic specimen (cen-
ter of the circle). (A-c) Diagram of the needle entry point. (B-a) After needle insertion, the fluoroscopy tube is angled
caudally 25–30°. The image clearly shows the recess between the ilium and sacrum. The needle direction and depth
are also clearly shown. (B-b) The needle position on a dry pelvic specimen. (B-c) Diagram of the needle position in
the recess.

Figure 3 Injection of contrast medium to outline the joint. (A) Injection of contrast medium with the fluoroscopic
tube angled caudally at 25–30°. The contrast medium outlines the joint. (B) Posteroanterior view after contrast me-
dium injection. (C) Contra-oblique view. The needle is inserted into the joint via the middle portion.
Upon failure of this technique, the conventional injection method, using Dussault’s technique \[3\], was performed.

**Results**

For entering the SIJ, the success rate of the procedure was 80% (80/100). Among 80 successful cases, four were previously unsuccessful when the conventional method was used (Figure 5). Intraarticular injection using the middle portion technique failed in 20 joints, and Dussault’s technique was subsequently successful in three of these joints. The reasons for failure of the middle portion technique included an extremely narrow recess space or twisting of the recess line just in front of the posterior joint line in five joints (Figure 6), an iliac bone bipartite in one joint (Figure 7), severe obesity in one joint, and severe osteoporosis in one patient with bilateral joints. The reasons for failure of this technique for the other 11 joints were unclear.

After the procedure, four patients experienced transient lower extremity weakness on the injected side as a result of infiltration of the anesthetic around the sciatic nerve. There were no other complications during or after the injections.

**Discussion**

Several previous studies have reported that it is often not possible to gain access into the SIJ \[13–15\]; clinically, successful intraarticular injection is not easy. Therefore, a definitive diagnosis of SIJ pain using

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**Figure 4** Retro-oblique view technique. (A) Image shows the patient lying prone-oblique with the painful side down and with the fluoroscopic tube angled caudally at 30°. The posterior and anterior joint line are superimposed. The needle seems to be blocked and cannot reach the posterior margin of the joint. (B) Radiograph after rotating the patient’s body in a retro-oblique direction shows separation of the anterior and postero-caudal joint lines. Usually, the anterior joint line comes to be observed laterally and postero-caudal joint line moves medially. It can be confirmed that the needle tip has access to the ilium bone line beyond the sacrum boundary in the middle portion. (C) Radiograph displays contrast medium outlining the joint. Initially, the needle is advanced until it reaches the ilium bone wall. Subsequently, the needle is slightly retracted while contrast medium is simultaneously injected. This slight retraction allows the contrast medium to flow freely into the joint cavity. (D) Radiograph displays the contra-oblique view. The needle has been inserted into the joint via the middle portion. (E) Diagram of the retro-oblique view technique.
intraarticular injection has been difficult. Borowsky et al. [16] proposed that the actual success rate of intraarticular injection was about 20%. The difficulty associated with the procedure depends on each case. Injection is particularly difficult or even impossible in cases of twisting of the distal portion of the joint, or if a bony spur is near the needle entry site.

The technique via the middle portion of the joint can overcome the difficulties experienced during the conventional injection method. This technique was developed from a periarticular SIJ injection technique [10,11]. With the posterior SIJ region divided into four sections, the margin of the posterior joint line in Section 2 is located at the bottom of the deep recess. We occasionally check the needle tip depth in the posterior sacroiliac ligament under axial imaging with the fluoroscopy tube angled at a caudal tilt of 25–30°. The image clearly showed the direction and depth of the needle tip in the recess region and the distance to the posterior joint line. We found that a long needle could reach the deep posterior joint line. Although this image might be obtained under CT guidance, fluoroscopic guidance offers an advantage in that the direction of the needle can be adjusted toward the joint immediately.

When administering contrast medium into the joint, the contrast medium occasionally leaks into the posterior ligamentous region (Section 2). This may be attributed to the fact that the capsule of this portion is thinner than that of the caudal portion and lacks ligamentous tissue in the adjacent posterior joint space [17,18]. These characteristics allow for smooth access into the joint cavity, without being disturbed by the dense posterior ligament tissue.

The middle portion technique failed in cases of extremely narrow recess spaces and twisting at the recess line just in front of the posterior joint line. It can also be challenging in patients with an iliac bone bipartite [19] or with obesity or osteoporosis.

Figure 5  The injection technique via the middle portion overcomes the difficulties of the conventional method. (A) A case of twisting at the caudal one-third region of the joint (arrow). (B) The needle is unable to reach into the joint cavity, with the leakage of contrast medium. (C) The needle is able to access the posterior joint line (arrow) via the middle portion. (D) The contrast medium outlining the joint. (E) A contra-oblique view showing the needle inserted into the joint via the middle portion.
**Figure 6** CT depicts a case of a twisted recess line just before the posterior joint line (circle). These anatomical variations can cause failure of the injection via the middle portion.

**Figure 7** Sacroiliac joint with the anatomical variance; iliac bone bipartite. Iliac bone bipartite tends to cause depression of the iliac side in the middle portion. (A) The depression of the iliac side in the middle portion (circle). (B) Iliac bone bipartite in the middle to caudal portion (circle). (C) Axial image with the fluoroscopic tube angled caudally. Even if the needle reaches the iliac bone wall, the needle tip is outside of the articular region. Contrast medium leaks into the recess.
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References


