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Original article

Diagram specific to sacroiliac joint pain site indicated by one-finger test

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Abstract

Background. The sacroiliac joint (SIJ) can be a source of low back and lower limb pain. The SIJ pain can originate not only from the joint space but also from the ligaments supporting the joint. Its diagnosis has been difficult because the physical and radiological examinations have proved less than satisfactory. Thus, to know the specific sites of SIJ pain, if these exist, could be very useful for making the diagnosis. The purpose of the present study was to identify the main site of SIJ pain according to the patient's pointing with one finger and to confirm the site by a pain-provocation test and periarticular lidocaine injection.

Methods. Forty-six of 247 consecutive patients with low back pain at our outpatient clinic, who could indicate with one finger the main site of the pain, which presented at only one site and was reproducible, were the subjects of this study. The main site of pain was anatomically confirmed by fluoroscopy. Then, a periarticular SIJ injection was performed. The patients were blindly assessed and a diagram of the main site of the SIJ pain was made.

Results. There were 19 males and 27 females and the age averaged 50 years. Eight patients showed a positive placebo response and were excluded from this study. Twenty-five of the remaining 38 patients indicated the main site of pain at the posterior-superior iliac spine (PSIS) or within 2 cm of the PSIS, and 18 of these patients showed a positive effect with periarticular SIJ block. The other 13 patients, including 2 patients with a positive response to the periarticular block, did not show the PSIS as the main site of pain.

Conclusions. Our study clearly indicated that when patients point to the PSIS or within 2 cm of it as the main site of low back pain, using one finger, the SIJ should be considered as the origin of their low back pain.

Introduction

Most of the structures and tissues in the lower back, hip joint, and pelvis are capable of producing of low back pain. Correct identification of the pain site should provide important information for correctly identifying the source of low back pain.[1,2] Several methods have been devised for identifying the site of the pain. Usually, patients demonstrate their back pain with the palm of the hand at the site of maximal pain.[1] "Patient pain drawings" reported by Mooney et al.[3] showed how patients noted the painful region on a human form outline with many anatomical symbols. A more recent study showed that indication of the region of low back pain with the patient's finger was more accurate for localized identification of the source of the pain than that by hand.[2]

The sacroiliac joint (SIJ) can be a source of low back and lower limb pain.[4–6] It is generally believed that SIJ pain is localized from the buttock to the upper thigh of the ipsilateral side, and it might also spread to the lower and upper lumbar region, abdomen and groin area, or even to the foot.[4–9] The main site of pain, however, would be around the joint, where the patient might indicate with a finger, as Fortin and Falco[10] have reported. Because neither the medical history, physical examination, nor radiological findings are consistently capable of identifying the SIJ as the source of pain, to know the specific areas of such pain would be very useful for diagnosis.[8] In the present study, we asked patients with low back pain to indicate the main site of pain with one finger. Then, we investigated whether the pain originated from the SIJ by performing a pain-provocation test and by lidocaine injection in the periarticular region, because this block can relieve the pain caused by the SIJ joint effectively and easily.[11] Based on these findings, the main site of pain specific to the SIJ was identified.

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Patients and methods

Patient collection

Our institutional review board approved this study, and informed consent was obtained from all patients before their participation in this study.

The study design is presented graphically in Fig. 1. The source population consisted of 247 consecutive patients referred for investigation of low back pain at our outpatient clinic. Among these 247 patients, 46 were included in this study because they met all three of the following criteria: (1) the main site of the low back pain, induced by lumbar flexion, extension, or lateral bending in the standing position, could be indicated with one finger, usually the index or middle finger, (2) the pain was present at only one site, and (3) the identification of the pain was reproducible. In this study, the "low back" was defined as the region from the costal margin to the gluteal sulcus, and the reproducibility of pain was taken as two successive indications of the same region confirmed by two other authors of the study.

Patients aged under 16 years or more than 75 years old and those diagnosed as having vertebral fracture, spinal infection or tumor, inflammatory spondylopathy, or pregnancy, and those who had previously undergone lumbar spinal surgery due to lumbar disc herniation or lumbar spinal canal stenosis were excluded from this study.

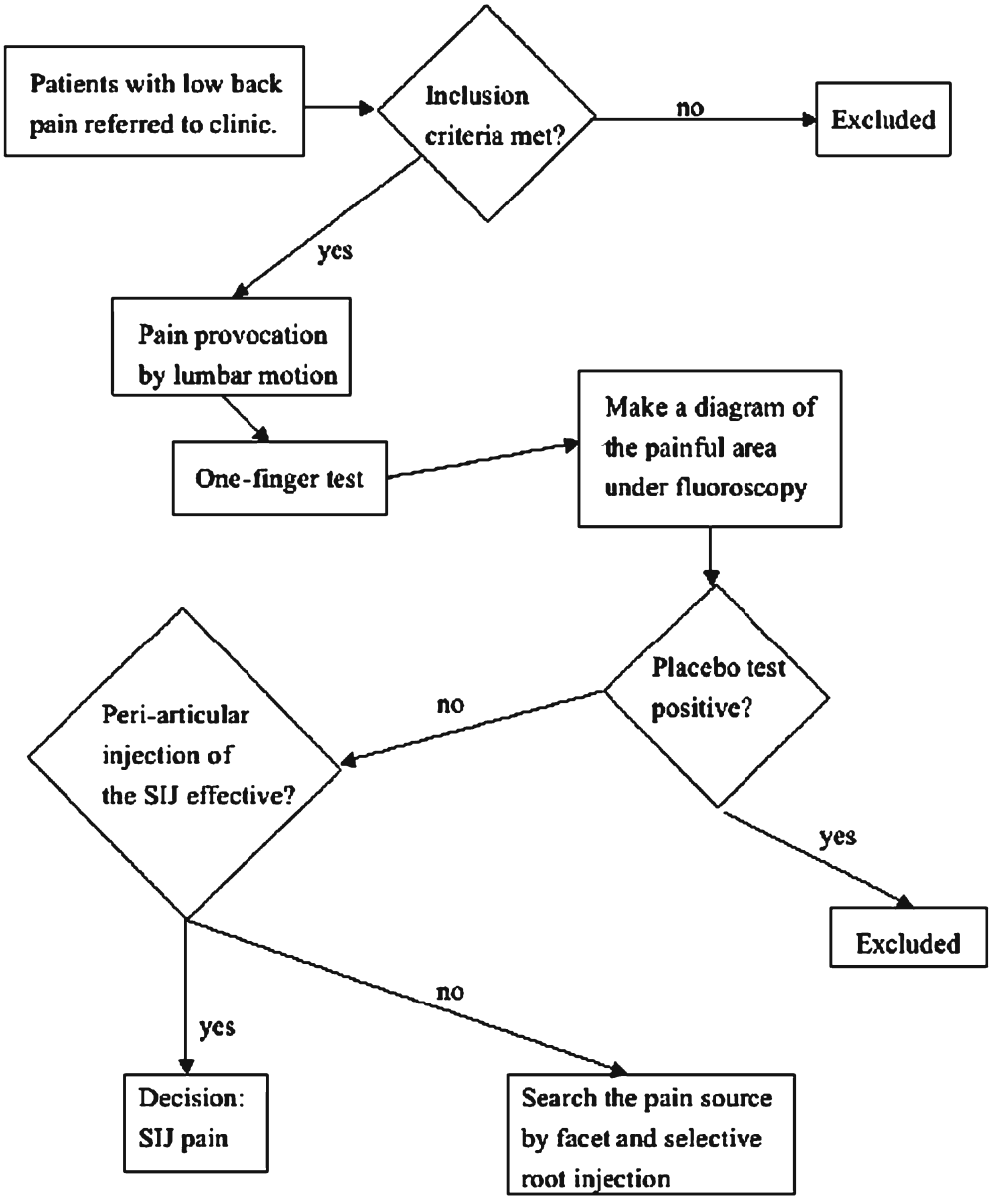

Fig. 1. Flow diagram of study protocol. *SIJ*, Sacroiliac joint

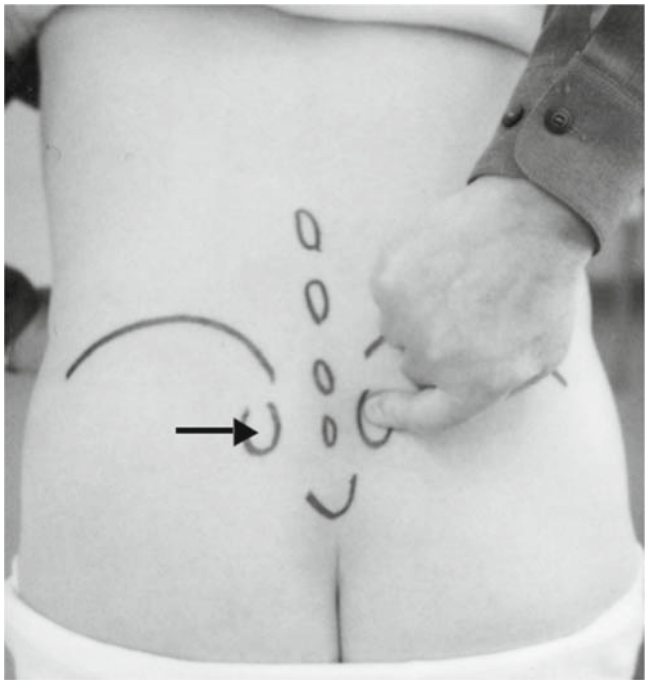

Fig. 2. One-finger test. Patients identify the main site of pain with one finger. The *arrow* shows the posterior superior iliac spine

Fig. 3. Periarticular injection for the sacroiliac joint. Oblique view of radiograph showing periarticular injection of the sacroiliac joint. A mixture of lidocaine and contrast medium is injected into the posterior margin of the joint

Diagram of the painful area

The patients fulfilling the above-described criteria were examined. First, the patients were asked to demonstrate the standing trunk position of lumbar flexion, extension, or lateral bending that provoked the low back pain as the chief complaint. We marked the area indicated by one finger as the main site of pain, which we designated the "one-finger test" (Fig. 2). The pain area was anatomically confirmed using fluoroscopy, and the distance between the area pointed to and the posterior-superior iliac spine (PSIS) was measured. Then, a diagram of the painful area was made.

Diagnostic injection

In order to exclude patients who showed a positive placebo response, 1.0 ml of isotonic sodium chloride was first injected into the paravertebral muscle of the involved side at the L4/5 level. Then, a periarticular injection to the SIJ was performed, as in our previous report.[11] Initially, 0.5 ml of 10% hypertonic saline was injected into the posterior margin of the SIJ for the pain-provocation test, and this area was divided into three equal sections, i.e., upper, middle, and lower sections, designated as sections 1, 2, and 3, respectively. When a patient showed a positive reaction for the provocation test in one of the three sections, 0.5–1.0 ml of a mixture of 2% lidocaine and contrast medium (mixed at a ratio of 1:1) was injected in the positive-provocation area, confirming that it had not spread over the other sections (Fig. 3). When a patient showed a positive reaction in two or more divided sections, the periarticular injection was performed in all the positive-response sections. When a patient showed a negative reaction in all three sections, the periarticular block was performed in section 2, because this section is thought to be more often responsible for SIJ pain. We defined the injection as effective if the patient indicated a more than 70% decrease of their pain by means of a visual analogue scale (VAS) 15 min after the injection. For both the placebo and periarticular injections, the patients were blindly assessed before and after the injection by one of the authors who did not perform the injections.

Additional injections

Patients who showed a negative effect with the periarticular injection were further evaluated by facet injec-

tion and selective root injection, in addition to magnetic resonance imaging examination.

Results

Diagram of the painful area

The 46 patients who participated in this study included 19 males and 27 females and their age averaged 50 years (range, 16 to 75 years). The average duration of symptoms was 13 days (range, 2 to 30 days).

A diagram of the painful areas for all the 46 patients is shown in Fig. 4. Twenty-five patients identified the main site of pain at the PSIS or within 2 cm of the PSIS. Five patients indicated the facet joint at the L4/5 or L5/S1 level.

Diagnostic injection

Eight patients showed a positive placebo response, and the remaining 38 of the 46 patients were therefore investigated by diagnostic injection. Twenty patients regarded as having pain originating from the SIJ indicated a positive effect for both the pain-provocation test and the periarticular injection to the SIJ (SIJ block); this group included 8 patients with a positive response in two of the three divided sections. On the other hand, 16 patients had a negative effect with both the pain-provocation test and the SIJ block, and 2 patients had a positive effect with the pain-provocation test but a negative effect with the SIJ block, these 18 patients were considered to have pain not originating from the SIJ.

Among the 25 patients who indicated the PSIS as the main site of pain, 18 patients were positive for the SIJ block; the main site of the pain was at the PSIS in 5 patients, and within 2 cm of the PSIS in 13 patients (superolateral or inferolateral to the PSIS in 4 patients each, inferomedial in 3, and superomedial in 2). Seven patients were negative for the SIJ block (the main site of the pain was superomedial to the PSIS in 4, inferomedial in 2, and superolateral in 1). Each patient with a positive result for the SIJ block identified the lateral margin of the inferior sacrum or the ischial tuberosity as the main site of pain. Concerning those patients who showed a site other than at or within 2 cm of the PSIS as the main site of pain and were negative for the SIJ block, the most painful area was at the gluteal surface of the ilium to the acetabulum in 5, at the L4/5 or L5/S facet joint in 3, at the lateral margin of the inferior sacrum in 2, and at the iliac crest in 1.

Additional injections

For those who showed a negative effect with the SIJ injection, an additional diagnostic injection was performed. Eight patients showed a positive response to S1 root block, and the identified main painful area was at the gluteal surface of the ilium to the acetabulum in 4, at or around the PSIS in 2, the L5/S facet joint in 1, and the lateral margin of the inferior sacrum in 1. Seven patients indicated positive effects with facet joint injection at the L4/5 or L5/S level, and the main site of the pain was at or around the PSIS in 4, the gluteal surface of the ilium to the acetabulum in 1, the L4/5 facet joint in 1, and the L5/S facet joint in 1. The other 3 patients could not determine from where their back pain had originated.

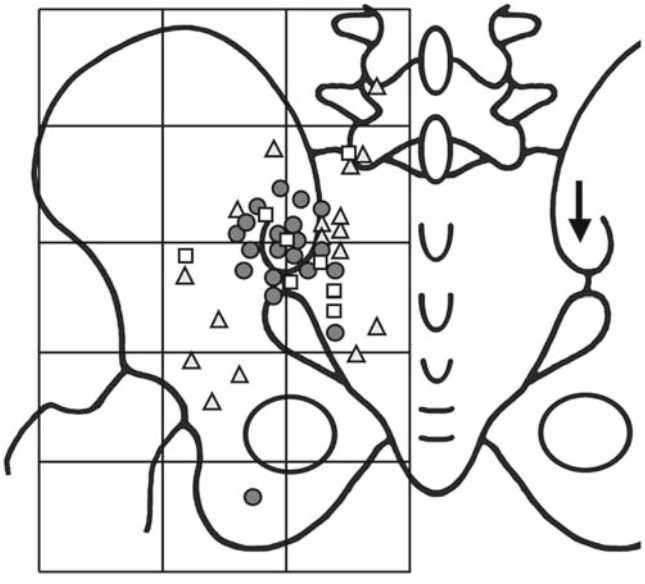

Fig. 4. Diagram of the painful areas in all 46 patients. The main site of pain spread to the lateral margin of the sacrum, the posterior superior iliac spine, and the gluteal surface of the ilium. The *arrow* shows the posterior superior iliac spine. *Circles*, Positive effect of periarticular injection into the sacroiliac joint (SIJ block); *triangles*, negative effect of the SIJ block; *squares*, positive placebo response

Discussion

There are many known sources of low back pain, including injuries to myofascial tissues, intervertebral discs, and facet joints.[12] The SIJ can also be a source of such pain, but, even today, it is underestimated as a source by general orthopedists compared to other structures, although it may affect 15% to 25% of patients with low back pain.[5–8,13] In the present study, at least 8% of the patients with low back pain were thought to have pain originating from SIJ dysfunction, because there may have been patients with SIJ pain who could not indicate

the main site of pain by the one-finger test. Thus, the SIJ is likely to be a more frequent cause of low back pain than is thought, and general orthopedists and spinal surgeons should be better informed concerning this source of pain.

The SIJ has a characteristic morphology consisting of a ligamentous compartment posteriorly and an articular compartment anteriorly.[14] SIJ pain can originate from both the joint capsule and the posterior ligamentous tissues such as the sacroiliac ligaments and sacrotuberous ligament.[15] Injection of local anesthetic into both the intraarticular and the periarticular regions is usually performed for the treatment of SIJ pain.[7,8,11,13,16] Because the injection of local anesthetic into the intraarticular region is more common than injection into the periarticular region for the study of SIJ pain, doubts may arise as to whether the present study, using the latter technique, really evaluated SIJ pain.[5,11,17] However, our previous comparative prospective study clearly demonstrated that periarticular injection is more effective and easier than intraarticular injection.[11] Thus, we used periarticular injection for the diagnostic evaluation of the SIJ pain.

The diagnosis of SIJ pain has been frustrating for many clinicians because standard diagnostic methods, including medical history, physical examination, and even imaging studies have proved less than satisfactory.[7,17] Only diagnostic injections have been shown to be consistently effective.[7,8] However, an intraarticular injection is one of the most difficult injection procedures[16,17] and there are many factors that can impact on its sensitivity and specificity, such as the placebo effect, the systemic absorption of local anesthetic, neuroplasticity, and central sensitization.[8] Therefore, if the specific area of the SIJ pain can be determined, it should be very helpful to make a correct diagnosis of SIJ dysfunction.

Previous studies showed that the specific area of SIJ pain might be medial or inferomedial to the PSIS.[10,18] In those studies, however, the authors did not detail how they decided these areas as the main site of SIJ pain. Of note, Fortin and Falco first assumed the "SIJ painful area" to be within 1 cm inferomedial to the PSIS, with no explanation.[10] There may be other areas that patients with SIJ pain feel are the most painful. In the present study, therefore, we initially selected the patients with low back pain who could indicate the main site of pain with one finger. Then the origins of the pain were investigated by administering several kinds of injections.

In the present study, 72% of the patients who could indicate the main site of their back pain at or within 2 cm of the PSIS (not necessarily inferomedial to it) by the one-finger test showed a positive effect with the SIJ block. Thus, in patients with SIJ pain, there is a high incidence of those who feel that the most painful area is at or around the PSIS. Anatomically, several structures are attached to the PSIS; the long and short posterior sacroiliac ligaments, the sacrotuberous ligament, the interosseous ligament, and the gluteus maximus muscle.[7,19] These structures show link-motion to standing and walking actions and thus their insertions are exposed to strong and long-acting stresses and may become torn.[20–22] In addition, there is an accessory sacroiliac joint, the "axial sacroiliac joint", located very close to the PSIS, which has loose connective tissue designated as the axial interosseous ligament.[23,24] This ligament may also be a source of pain because it is relatively weak and is a primary site for degenerative changes within the SIJ.[24]

There were several limitations in the present study. The biggest problem was that a selection bias was introduced by the choice of the patients. Among patients with SIJ pain, there may be some patients who cannot indicate their main sites of pain by the one-finger test. Thus, the actual proportion of patients with SIJ dysfunction indicating the PSIS as the main site of pain is uncertain. The injection technique in the present study may be debated as well. Larger strictly controlled studies might be necessary to determine the predictive value, sensitivity, and specificity of the one-finger test; however, this study is a practical report. We believe that this study could be useful for making a clinical diagnosis of SIJ pain.

Conclusions

It is very important to ask patients where their pain originates as a regular part of obtaining a complete medical history, as this gives us useful information about the source of low back pain. Our study clearly indicated that when patients can point to the PSIS or within 2 cm of it as the main site of pain with the one-finger test, the SIJ should be considered as the origin of the low back pain.

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