

## Clinical Diagnosis of Sacroiliac Joint Dysfunction

### To the Editor:

I would like to comment on an article that appeared in the May 2001 issue titled "Using Published Evidence to Guide the Examination of the Sacroiliac Joint Region" by Janet Freburger and Daniel Riddle.

I read with great interest their description of how to determine the best evidence when identifying sacroiliac joint (SIJ) dysfunction. Surprisingly, when I read the same evidence, I disagreed with many of their conclusions. I believe a major problem is that considerable emphasis in the Update was placed on 2 types of studies: injection studies of the SIJ and movement studies using radiostereophotogrammetric (RSA) analysis. Both methods, however, have serious methodological flaws that were not discussed in the Update.

First, I agree that injection of the SIJ can be difficult to interpret because of insufficient infiltration; however, I believe the real problem is that no SIJ injection study has yet used a randomized controlled trial.<sup>1</sup> As noted by Nelmas et al,<sup>2</sup> a randomized controlled trial is essential to eliminate the possibility of bias when only one group is used. With only one group, the reader is left in doubt as to the reason for change in the dependent measure. Therefore, evidence on the effectiveness of SIJ injections is clearly insufficient. Any effect, including a placebo effect, could have produced the improvement in perceived pain relief. In addition, many of the SIJ injection studies used questionable methods. For example, in the study by Dreyfuss et al,<sup>2</sup> no statistics on reliability were given on how well the expert panel agreed on the definition of SIJ dysfunction among patients. The panel, therefore, used only tests that they thought would yield the most reliable SIJ measurements.<sup>2</sup> Furthermore, for a study to be useful, patients should be somewhat similar to those seen in the clinic. In the studies by Dreyfuss et al<sup>2</sup> and Schwarzer et al,<sup>3</sup> most patients were either receiving workers' compensation (70% and 79%, respectively), a group well known in the literature to be a difficult, if not a dubious, group. I believe this is

further supported by the fact that, in the study by Dreyfuss et al,<sup>2</sup> 90% of the patients had chronic low back pain (pain of over 3 months' duration) and as a group had high pain scores (mean pain score = 6.9). In contrast, the mean pain score reported by Dreyfuss et al is higher than that found by Fritz and George<sup>4</sup> (mean pain score = 3.8) in a recent study of patients with SIJ dysfunction. Finally, I find it puzzling to infer success just because pain was diminished temporarily after using a short-acting anesthetic in patients who primarily report having chronic low back pain. This does not make sense to me. Clearly, some randomized controlled trials are needed when performing SIJ injection studies.

Second, previous studies using RSA have shown considerable precision in measuring motion, but none to date have shown the validity of this method when measuring SIJ motion. Radiostereophotogrammetric analysis, because of its excellent precision and relative transparency when examining small amounts of movement, has become a well-accepted measurement technique.<sup>5</sup> This I agree on. However, no matter how precise RSA measurements may be, the validity of any RSA procedure is still dependent on the specific setup. In RSA, 2 orthogonally directed radiographic beams, 40 degrees apart, are directed toward a subject.<sup>5</sup> Percutaneously implanted tantalum markers are well distributed in each rigid body to be measured.<sup>6-8</sup> The sacrum and the innominate bone are considered the 2 rigid bodies in this particular setup.

In the studies by Sturesson and colleagues<sup>9,10</sup> and Tullberg et al,<sup>11</sup> markers were placed only on the dorsal aspect of the sacrum and the ilium; none were placed on either the pubis or the ischium. The validity of RSA setup for showing movement depends on the 3-dimensional reconstruction of each fixed body segment.<sup>9,12</sup> Therefore, for valid RSA measurements, the tantalum markers must be placed in a non-collinear position (not all in the same plane), be well distributed throughout the fixed segments, and be widely separated to fully represent the moving segment.<sup>9,12</sup> In the studies by Sturesson and colleagues<sup>9,10</sup> and Tullberg et al,<sup>11</sup> markers

were placed in a mostly collinear fashion only on the dorsal aspect of the pelvis and not spread throughout the pelvis. Therefore, the problem is how can the primarily frontal-plane markers detect any significant sagittal-plane motion, especially as the SIJ moves predominantly in a sagittal direction? I seriously question whether the collinear marker configuration can fully represent the fixed body of the innominate bone, thus limiting any conclusions made regarding SIJ motion in these RSA studies.

Last, Freburger and Kiddle omitted some studies that demonstrated SIJ motion. For example, studies by Lavignolle et al,<sup>12</sup> Smidt et al,<sup>14</sup> and Barakatt et al<sup>15</sup> showed considerably more movement in the SIJ than did the studies by Stuessson and colleagues<sup>6,7</sup>; however, none of these studies were cited in this Update. Perhaps it is time to consider a clinical diagnosis for SIJ dysfunction, especially because some of the more recently acclaimed methods have significant design weaknesses. At least a clinical diagnosis has already shown its usefulness in helping physical therapists guide successful intervention,<sup>16</sup> which I believe is the ultimate goal of any examination.

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## Author Response:

We agree with Cibulka that we emphasized the diagnostic properties of fluoroscopically guided anesthetic blocks and roentgen stereophotogrammetric analysis (RSA) in our Update. We contend, as do many others, that the anesthetic block is the best available gold standard for identifying pathology of the sacroiliac joint (SIJ) region<sup>17</sup> and that RSA is the best available gold standard for measuring motion of the SIJ.<sup>18</sup> Anesthetic blocks and RSA are not perfect standards, but we contend that the literature supports the use of these 2 procedures over the

use of others when examining the pathology or motion of the SIJ region.

In regard to SIJ anesthetic blocks, we did discuss what we believe to be the primary methodological flaw (ie, the possibility of infiltration of the anesthetic beyond the SIJ). Because insertion of the needle is fluoroscopically guided and because a contrast medium is used to confirm that the needle is within the joint, we believe error in this portion of the procedure is likely to be minimal.

Cibulka suggests that anesthetic blocks have no diagnostic value because randomized controlled trials assessing the efficacy of SIJ injections for the treatment of pain have not been conducted. We disagree. The diagnostic value and therapeutic value of SIJ injections are 2 separate issues. The use of anesthetic blocks (short-acting or otherwise) for assessing the diagnostic validity of SIJ tests appears to be appropriate as long as the SIJ tests are performed while the anesthetic should be having an effect. We agree that randomized controlled trials are needed to assess the efficacy of SIJ injections for the management of SIJ region pain. We also agree that a short-acting anesthetic is likely not an appropriate treatment for SIJ region pain.

We disagree with Cibulka's comments on the "questionable methods" of the SIJ injection studies. Dreyfuss et al used a panel of experts to determine which SIJ tests to examine in their study. They asked each member of the panel to use his or her judgment in ranking the reliability of measurements obtained with 20 common SIJ tests. Based on the input from the expert panel, the 12 "most reliable" tests were chosen to be studied. This approach appears to us to be reasonable and, in our opinion, has no impact on determining the diagnostic validity of the 12 tests. We also do not believe the types of patients included in the studies by Dreyfuss et al and Schwarzer et al make the methods of their studies "questionable." The patients included in both of these studies met the investigators' inclusion criteria. Although some may argue that the external validity of the results is limited in these 2 studies, we cited 4 other studies<sup>19-22</sup> that used SIJ blocks to identify SIJ dysfunction. Collectively, the 6 studies cited in our review

examined patients with a variety of characteristics that we believe are commonly seen by physical therapists.

We also disagree with Cibulka's comments regarding the validity of RSA. Selvik, the developer of RSA, wrote the following in his thesis on the method: "The position in space of three non-collinear points in a [rigid] body obviously determines the position of the whole rigid body. If the three points were collinear, the body could rotate about the axis joining these points."<sup>10</sup> The 3-dimensional motion (translatory and rotary) of a rigid body, therefore, can be determined if the rigid body is defined by 3 (or more) points that are not in a straight line. The RSA techniques described by Stuessen and colleagues<sup>11,12</sup> and Hill-

berg et al<sup>13</sup> meet these criteria. Although the markers were placed primarily on the dorsal aspects of the pelvis and sacrum, each rigid body (ie, pelvis and sacrum) was defined by 3 or more markers and the markers were not collinear. Finally, in regard to the movement studies cited by Cibulka, we did not reference these studies because they did not use RSA to study SIJ motion in living subjects. Roentgen stereophotogrammetric analysis is considered the gold standard for assessing human motion<sup>14</sup> because tantalum markers are inserted directly into the skeletal structures (ie, rigid bodies), thereby eliminating error due to skin or soft tissue movement.

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