

(CASE REPORT)



## Appearance of facet joint syndrome in a case of chronic sacroiliitis: Evidenced from quantitative sacroiliac scintigraphy and dual images of SPECT-CT

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### Abstract

Lower back pain (LBP) is a global health concern with increasing prevalence, projected to reach 843 million cases by 2050. Lumbar facet joint (LFJ) syndrome contributes significantly to LBP, impacting patient quality of life. Despite its prevalence, a gold standard for accurate and noninvasive diagnosis of LBP has not yet been established, leading to underdiagnosis and inadequate treatment. This case report presents a 57-year-old woman diagnosed with LFJ syndrome and mild sacroiliitis through single-photon emission computed tomography-computed tomography (SPECT-CT) and quantitative sacroiliac scintigraphy (QSS). The patient presented with persistent LBP and hip pain without history of trauma or surgery. Clinical examination revealed lumbar tenderness, limited mobility, and positive Fortin and STORK tests. Whole body bone scan (WBBS) revealed tracer uptake at the sacroiliac (SI) joints and multiple spinal levels, particularly L3-L4. Hybrid SPECT-CT imaging showed heightened bone activity on lumbar spine, confirming degenerative arthropathy of the L3-L4 facet joints, in contrast with minimal evidence obtained from plain radiography and CT images. Furthermore, combining results from SPECT-CT and borderline sacroiliac indices from QSS indicate the presence of chronic degenerative sacroiliitis. Identifying the source of LBP remains challenging. SPECT-CT emerges as a valuable tool for comprehensive evaluation of LBP by combining anatomical and functional imaging of target tissues, allowing increased foci localization and accuracy of diagnosis. QSS can also be utilized as a complement in identifying the presence of chronic lesions of the SI joints. These promising results open opportunities for more research on the efficacy of combined morphological and functional imaging, as well as sacroiliac indices as a complementary diagnostic tool.

**Keywords:** Facet joint syndrome; SPECT-CT; Quantitative sacroiliac scintigraphy; Lower back pain; Sacroiliitis; Case report

### 1 Introduction

The World Health Organization (WHO) predicts a significant rise in cases of lower back pain (LBP) from 619 million in 2020 to an estimated 843 million by 2050<sup>1</sup>. In Taiwan, approximately 84% of adults have reported experiencing LBP at least once in their lifetime<sup>2</sup>. Lumbar facet joint (LFJ) syndrome, accounting for 15% to 41% of LBP cases globally, significantly decreasing patients' quality of life<sup>3</sup>. This condition arises when facet joints become a source of pain, often due to spine degeneration or spondylolysis<sup>3</sup>. Despite its wide prevalence and significant impact on quality of life, precise diagnostic tools and accurate data remain lacking. LFJ syndrome is frequently either undiagnosed, misdiagnosed, or inadequately treated.

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Currently, the gold standard for evaluating facet joint pain involves administering diagnostic blocks, a procedure associated with invasiveness and a notable false positive rate<sup>4</sup>. The hybrid single-photon emission computed tomography- computed tomography (SPECT-CT) has demonstrated superior diagnostic and treatment outcomes for LFJ syndrome patients, as it integrates both spinal anatomy and function<sup>5</sup>. We present the case of a 57-year-old woman who suffered from lower back and hip pain for more than five months. After a series of clinical and instrumental assessments, she was confirmed to have LFJ syndrome with mild sacroiliitis ultimately through quantitative sacroiliac scintigraphy (QSS) and hybrid SPECT-CT.

## 2 Case Presentation

### 2.1 Patient history

The patient, a 57-year-old female, presented with LBP and hip pain persisting for the last five months. She described substantial difficulties in various movements, particularly when transitioning from a seated to standing position. She reported previous consults from general physicians who prescribed muscle relaxants but provided minimal relief. Due to persistent discomfort, the patient sought further evaluation at our outpatient department. The patient is currently in a pre-menopausal stage and has a medical history of functional thoracolumbar scoliosis.

### 2.2 Physical examination

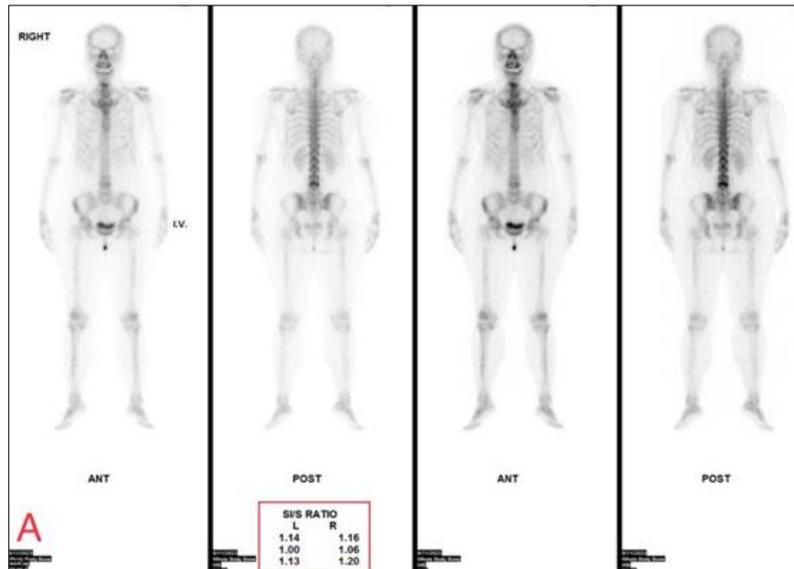
Local tenderness in the lumbar spine and bilateral sacroiliac (SI) region, limited range of motion were observed during physical examination. A positive Fortin finger test was noted, during which the patient identified the point(s) of pain upon command around the sacroiliac region (<1 cm away) on three occasions. Moreover, a positive bilateral STORK test was observed, with the patient experiencing pain during both the stance and swing phases.

### 2.3 Diagnostic assessment

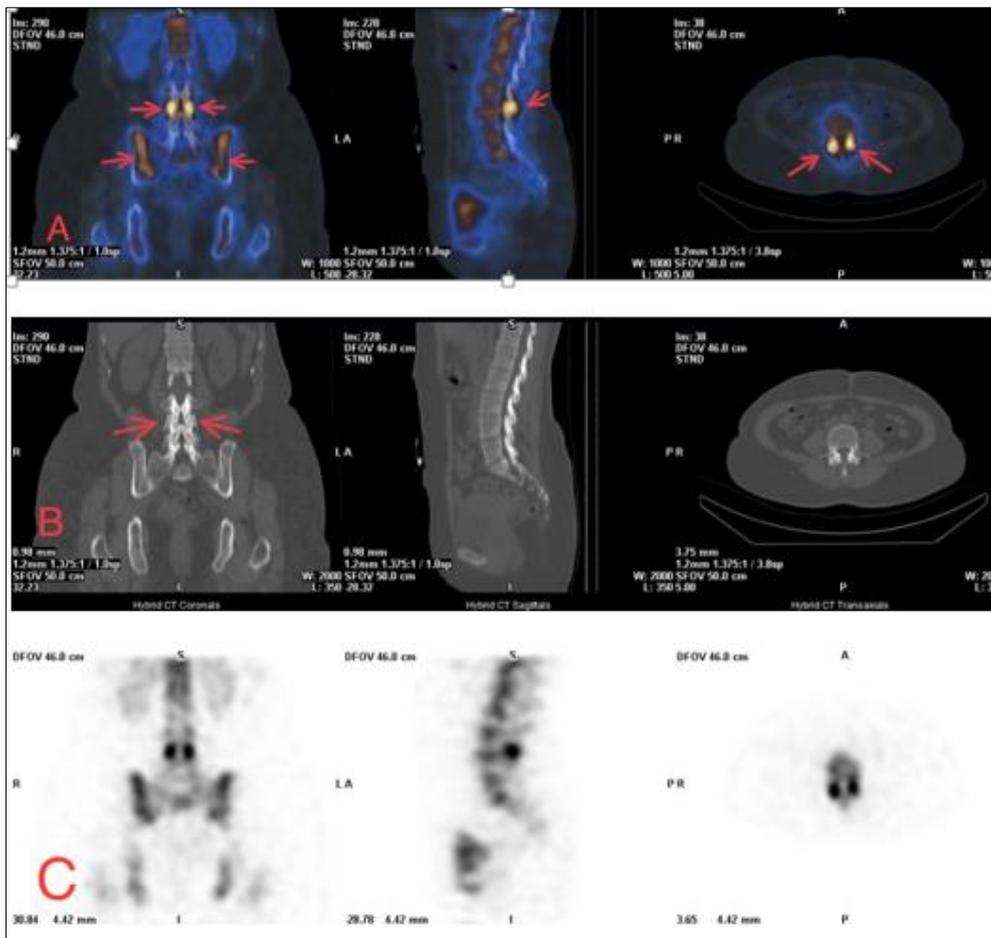
Plain radiography showed no apparent lesions in the spinal column but with observable degenerative changes at the SI joints (see Figure 1). WBBS using technetium 99m-methyl diphosphonate (Tc-99m MDP) revealed increased focal tracer uptake at multiple spinal levels and in the SI joints, with particularly pronounced uptake bilaterally at the L3-L4 level (see Figure 2 and 3C), suggesting potential lesion in this region. The QSS examination yielded sacroiliac joint/sacrum (SI/S) ratios of 1.14, 1.00, and 1.13 for the left side, and corresponding values of 1.16, 1.06, and 1.20 for the right side (see Figure 2). With a cutoff value of 1.30 at our facility<sup>6</sup>, the left side indicated typical values, while the right was borderline, indicating possible benign lesion. The hybrid SPECT-CT findings confirmed the bilateral LFJ of the L3 and L4 as the source of LBP, as supported by the intense radiotracer uptake in this specific area (see Figure 2A). Furthermore, increased metabolic activity is also observed in the right SI joints, concurrent with mild sacroiliac inflammation.



**Figure 1** X-ray of the thoracolumbar spine and the sacroiliac region.



**Figure 2** Quantitative sacroiliac scan results showed borderline sacroiliac index on the left (1.14, 1.00, 1.13) and slightly higher on the right (1.16, 1.06, 1.20)



**Figure 3** (A) SPECT-CT showing increased tracer activity in the bilateral L3-L4 region; moderate tracer uptake at the SI joint. (B) Subtle lesions revealed by CT compared to the SPECT-CT. (C) WBBS results indicated increased tracer uptake at the L3-L4 level

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### 3 Discussion

We reported a case of a 57-year-old woman whose LBP and hip pain were identified to originate from the facet joints at the lumbar spine (i.e., LFJ syndrome) and SI joints (i.e., mild sacroiliitis) through hybrid SPECT-CT and QSS.

Despite the widespread prevalence of chronic back pain globally, a gold standard for noninvasive examination (i.e., imaging techniques) has not yet been established<sup>4,7</sup>. FJ syndrome poses diagnostic challenges due to the non-specificity of clinical examinations, leading to irrelevant instrumental assessments<sup>7</sup>. While morphological imaging (e.g., CT) allows visualization of joint degeneration, detection of FJ inflammation may possess more clinical relevance for appropriate intervention<sup>3</sup>. Diagnostic blocks are generally regarded as the most reliable method for detecting pain that originated from the facet joints<sup>8</sup>. It involves the precise injection of a numbing medication into or around the joint suspected of causing pain<sup>9</sup>. However, numerous issues concerning the accuracy of diagnostic blocks were raised, particularly the high rate of false positives ranging from 20% to 45%<sup>3,10</sup>.

SPECT-CT is a hybrid imaging technique that incorporates molecular and anatomical imaging from SPECT and CT to provide more detailed information on the anatomical and functional characteristics of the target tissues. SPECT-CT has been found to have superior diagnostic value in several aspects such as precise foci localization and identification of serendipitous lesions, which may not be evident in plain radiographs alone<sup>3,6,7</sup>. In our case, although manifestations of degenerative change in the SI region were observable through x-ray and CT, lesions on the facet joints were not evident. Spinal radiographs were described to be of limited use in investigating chronic LBP due to poor specificity and sensitivity, only demonstrating degenerative changes at a later stage, and containing little value in predicting treatment response to FJ pathologies<sup>11</sup>. Meanwhile, SPECT-CT was reported to be effective in identifying the source of back pain in 92% of cervical spine scans and 86% of lumbar spine scans and in predicting treatment response in chronic LBP<sup>5,12</sup>. Several cases have also reported either the early detection of other spinal lesions or identification of chronic, subtle pathologies through SPECT-CT<sup>13,14,15</sup>. Our case findings are consistent with a previous Canadian case reported by Carstensen and colleagues, in which lumbar facet arthropathy was evident on plain radiographs but was confirmed only through SPECT-CT<sup>16</sup>. Conflicting data on the diagnostic value of QSS exists, with multiple studies reporting low sensitivity for identifying SI joint pathologies, thus precluding its use as a standalone diagnostic tool for sacroiliitis<sup>17,18</sup>. Despite this limitation, it is recognized as a valuable complementary instrument for confirming sacroiliitis due to high specificity<sup>19,20</sup>. However, as these values can be influenced by various factors, each institution should establish its own standard index values. Simultaneously, it is essential to account for the impact of age and gender on these values<sup>17,19,21</sup>.

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### 4 Conclusion

LFJ syndrome constitutes a significant portion of chronic LBP cases. Nonetheless, there remains a lack of consensus regarding diagnostic standards. Our case supports the use of SPECT-CT as a valuable diagnostic tool for precise localization of the primary pain source and potential contributing factors. Combining the quantitative measures from QSS and qualitative findings from SPECT-CT also contribute to a more accurate diagnosis of sacroiliitis.

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### Compliance with ethical standards

#### *Disclosure of conflict of interest*

There is no conflict of interest.

#### *Statement of informed Consent*

Written consent from the patient, available upon request.

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