

A review of sacroiliac joint pain

Revisão da dor na articulação sacro-ílica

Revisión del dolor de la articulación sacroiliaca

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ABSTRACT

Throughout the twentieth century the recognition of the sacroiliac joint as a potential source of low back pain has stirred controversy in the established academia. Many medical providers suggested that the relative lack of motion of the sacroiliac joint negates its significance as a pain generator. However, the limited mobility does not explain why the sacroiliac joint should be the only synovial joint in the human body incapable of generating pain. This paper reviews the current thinking on the aetiology, diagnosis, and treatment options for sacroiliac joint pain. In addition, the paper discusses in details the most pertinent papers on sacroiliac joint surgical arthrodesis techniques.

KEYWORDS: Sacroiliac joint/
pathology; Arthrodesis;
Arthralgia/etiology; Arthralgia/
diagnosis; Arthralgia/therapy

RESUMO

O reconhecimento no século vinte da articulação sacroílica como sítio responsável pela dor provocou muita controvérsia no âmbito dos conceitos estabelecidos. A sua capacidade de produzir dor tem sido negada, devido à falta de movimentos dessa articulação. No entanto, a limitação da sua mobilidade não seria suficiente para explicar a incapacidade de uma articulação sinovial em gerar a dor. O objetivo desse relato é apresentar e revisar os conceitos da etiologia, diagnóstico e tratamento da dor oriunda da articulação sacroilíaca, e discutir os relatos mais relevantes relacionados com a artrodesse dessa articulação.

DESCRITORES: Articulação
sacroilíaca/patologia;
Arthrodesis; Arthralgia/etologia;
Arthralgia/diagnóstico;
Arthralgia/terapia

RESUMEN

El reconocimiento en el siglo veinte de la articulación sacroiliaca como lugar responsable por dolor provocó mucha controversia en el ámbito de los conceptos establecidos. Su capacidad de producir dolor ha sido negada debido a la falta de movimientos de esa articulación. Sin embargo, la limitación de su movimiento no sería suficiente para explicar la incapacidad de una articulación sinovial en generar un dolor. El objetivo de este relato es presentar y revisar los conceptos de la etiología, diagnóstico y tratamiento del dolor oriundo de la articulación sacroiliaca, además de discutir los relatos más relevantes relacionados con la artrodesis de esta articulación.

DESCRIPTORS: Articulación
sacroiliaca/patología; Arthrodesis;
Arthralgia/etología; Arthralgia/
diagnóstico; Arthralgia/terapia

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INTRODUCTION

Medical providers managing the variety of musculoskeletal problems will at one time or another evaluate and treat a patient with sacroiliac joint pain. At the beginning of the twentieth century, many physicians including Osgood 1905, Albee 1909, Baer 1917, Smith-Petersen 1926, Campbell 1927, and Garnet 1927 advised that the sacroiliac joint should be considered as a cause of low back pain. The development of discectomy surgery by Mixter and Barr (1934) shifted doctors' focus toward the intervertebral disc. Subsequent reports published later in the century by Bellamy 1983, Bernard & Kirkaldy-Willis 1987, Bernard & Cassidy 1991, Mooney 1993, Moore 1994, Daum 1995, and Schwarzer 1995 have re-introduced the concept of sacroiliac joint pain¹⁻⁵.

Establishing the diagnosis of sacroiliac joint pain can be difficult for the following reasons: First, history, clinical examination, and imaging studies are not reliable in confirming the diagnosis⁶⁻¹¹. Second, sacroiliac joint pain radiates to various locations in the lower extremities, which makes distinguishing it from other types of pain very difficult¹²⁻¹⁵.

Nevertheless, the pain relief obtained with fluoroscopy guided sacroiliac joint blocks in several recent studies has confirmed that the sacroiliac joint can cause pain^{1, 15-16}. In fact, the sacroiliac joint has been considered as the cause of low back pain in 13% to 30% of patients seen in specialised spinal centres^{1, 17-18}.

Anatomy and Biomechanics

The sacroiliac joint is an ear shaped complex synovial joint; only the inferior 25% of its surface is synovial while the remaining is not. The shape of the sacroiliac joint varies in size and contour from side to side and between individuals. It forms a triplanar shock absorber that transmits and dissipates upper trunk loads. It allows minimal but multiaxial movements including rotation, gliding, tilting, nodding and translation^{10, 19-21}. The two most important type of motion are nutation (backward rotation of the ilium on the sacrum) and counternutation (forward rotation)²². Radiological studies demonstrated movements in the sacroiliac joint, this is limited to < 4 degrees rotation and 1.6 mm translation²³.

The stability of sacroiliac joint is both static and dynamic.

Dynamic stability depends on numerous surroundings ligamentous and muscles structures. The ligaments are: interosseous, accessory, long posterior sacroiliac, sacrotuberous, and sacrospinous ligaments. The muscles are: gluteus maximus and medius, erector spinae, latissimus dorsi, biceps femoris, psoas, piriformis, and oblique and transversus abdominus muscles. The prime stabiliser in this category is the tough posterior interosseous ligament.

Static stability depends on the anatomical elevations and depressions, and the complexity of the orientation of the sacroiliac joint surfaces.

It has been argued that the loss of the dynamic or static

stability could be the reason for sacroiliac joint pain³.

Pathophysiology of sacroiliac joint pain

Many theories exist to explain the nature of sacroiliac joint pain; these include inflammation, ligamentous tension, capsular tension, external shear forces, external compression, hypo- or hyper-mobility, and abnormal joint mechanics.

The most common reported cause for sacroiliac joint pain is the sacroiliac joint dysfunction due to pregnancy or repetitive minor trauma. The remaining causes can be broadly classified into^{6, 19, 20, 24-27}.

1. Idiopathic
2. Infection (mainly due to hematogenous spread)
3. Inflammatory spondyloarthropathies (ankylosis spondylitis, Reiter's Syndrome)
4. Osteoarthritis, degenerative arthritis
5. Post traumatic arthritis (insufficiency fractures in elderly, major trauma in adults)
6. Metabolic (gout, hyperparathyroidism)
7. Previous spinal surgery
8. Primary tumors such as giant cell tumors, chondrosarcomas, and synovial villous adenomas
9. Metastases to the pelvis
10. Other rare causes (psychogenic, iatrogenic)

Many diseases can mimic sacroiliac joint pain because of the overlapping pain referral zones, these include:

1. Spinal disorders such as degenerative disc disease, nerve root compression, and facets joint pain.
2. Non-spinal disorders such as gastrointestinal, genitourinary, and hip joint dysfunction.

It is important to notice that distinguishing primary joint pain from other spinal conditions can be difficult without supportive radiological investigations. On the other hand non-spinal disorders may be distinguished on clinical grounds and with appropriate ancillary testing.

Sacroiliac Joint Pain Distribution

Several sacroiliac joint pain referral zones have been described. The most dominant zone is the sacral sulcus which is the soft-tissue depression appreciated just medial to the posterior superior iliac spine. The remaining zones can be arranged in decreasing frequency to: buttocks, thighs, legs, feet, groin.

The pain can be unilateral or bilateral, and any combination between the above zones is possible and has been mentioned in the literature¹⁵.

DIAGNOSIS OF SACROILIAC JOINT PAIN

Clinical Tests

Many clinical tests for sacroiliac joint pain are available, the most practiced in our experience are:

- Patrick's test (FABER's or Flexion, ABduction, EXternal rotation of the leg on the affected side).
- Thigh thrust test: a posterior shearing stress is applied to the sacroiliac joint through the femur.

The midline sacral thrust test requires the application of a posteroanterior force to the sacrum as the patient lies prone.

Those tests are considered positive if the manoeuvre aggravates the patient's typical pain.

Many clinical tests have been described in the literature, the following are an example: Gaenslen's test, sacroiliac joint compression test, sacroiliac joint distraction test, and standing flexion test.

In addition to the above tests many signs can be elicited, these although not inclusive include: abnormal sitting posture, groin pain, buttock pain, sacroiliac joint pain, sacral sulcus tenderness, gluteal trigger points, pointing to the posterior superior iliac spine (PSIS) as the main site of pain, iliopsoas tenderness, pubic symphysis tenderness, lower quadrant abdominal pain, and an increase or decrease in pain with any of the following: flexion or extension, rotation, ipsilateral or contralateral flexion, straight leg raising, sitting, standing, walking, sacroiliac joint compression.

However, all the available clinical tests and signs are not reliable in confirming the diagnosis of sacroiliac joint pain because they lack sensitivity and scientific validity²⁸.

Radiological Investigations

The role of these investigations in sacroiliac joint pain is limited. It is already proven that no imaging study provides consistent findings that are helpful to diagnose primary sacroiliac joint pain^{6-11, 29}. However, magnetic resonance imaging, bone scan or computed tomography of the lumbar spine might be needed to exclude other pain sources (lumbar disc prolapse, pelvic tumors, and degenerative spinal disease).

Diagnostic Intraarticular Injections

It is widely agreed that temporary pain relief obtained by fluoroscopy guided sacroiliac joint block with no more than 2.5mls of local anaesthetic constitutes the **gold standard** test for diagnosing primary sacroiliac joint pain^{10, 16, 18, 26, 30}. 75% temporary pain relief or more after sacroiliac joint injection has been accepted as diagnostic of sacroiliac joint-related pain.

The sacroiliac joint injection technique is well described in literature. The importance of injecting the inferior synovial part of the joint has been stressed^{1, 31}.

The injection of a contrast medium is essential to confirm intra-articular placement of the needle prior to the local anaesthetic injection. Using fluoroscopic guidance is essential to confirm the position of the needle in the joint cavity throughout the procedure and to avoid leakage.

Current treatment modalities

Having established that the sacroiliac joint is the cause of the patient's pain, and having confirmed the diagnosis with fluoroscopy guided sacroiliac joint injection; treatment should be initiated.

Conservative treatment

Many options have been suggested by physicians throughout the twentieth century, these include: rest,

medications such as nonsteroidal anti-inflammatory and muscle relaxants, physical therapy, home exercises, application of local heat and cold, manipulations of the sacroiliac joint, activity modification, bracing, orthotics, shoe modifications.

In addition to the above treatment modalities physicians have tried:

Intraarticular injections: the injection of lidocaine and corticosteroid into the sacroiliac joint aiming for a long pain relief^{26, 32-34}.

Prolotherapy: the injection of phenol, glycerine, dextrose or high concentration glucose in the ligamentous complex around the sacroiliac joint can stimulate an inflammatory response and eventually lead to the production of extra collagen. The procedure aims theoretically to strengthen the sacroiliac joint ligaments.

Neuroaugmentation: the use of electrical stimulation of deep brain structures and the spinal cord to relieve debilitating chronic pain³⁵.

Viscosupplementation: the injection of hyaluronic acid into the sacroiliac joint, this acts as a lubricant to enable smooth movements³⁵.

Radiofrequency neurotomy: is an injection procedure in which a heat lesion is created on the lateral branches of S1 S3 nerves with the goal of interrupting the pain signals from the sacroiliac joint to the brain³⁶.

No prospective controlled studies assessed the efficacy of any of the above treatment modalities in the published literature.

Surgical treatment

Surgical arthrodesis is considered whenever conservative treatment fails to address the patient symptoms. Many surgical techniques have been described. We performed a detailed review of all papers that looked at the surgical arthrodesis of the sacroiliac joint in the published literature. Two electronic databases were utilised for this purpose; Pubmed, High Wire Press. Twenty-six papers dating from 1984 to 2005 were identified; twenty-one of these were published in peer-reviewed journals^{19, 21, 24, 37-54} and five were published in textbooks^{20, 25, 31, 55, 56}.

The papers reviewed spanned a total of 21 years; nevertheless there was no significant variability in the study designs. Out of the twenty-six reviewed papers, twenty were case reports or case series, and six were purely technique or surgical approaches papers.

Sixteen out of the twenty-six papers were related to techniques used in acute fractures settings. It is important to notice that these techniques can be adopted to treat chronic painful sacroiliac joint disorders.

Twenty-one different techniques were described in the literature, all aimed to achieve pain relief and sacroiliac joint arthrodesis. These techniques can be summarised as follow:

1. Arthrodesis with bone graft but without metalwork^{24, 42}.
2. Instrumented arthrodesis with or without bone graft,

and through large anterior or posterior surgical approaches^{19,21, 25,31, 37,38, 39,43,44,45,47,51,53}.

3. Percutaneous stabilisation guided by fluoroscopy or computed tomography but without bone graft^{20,40,41,46,49,52}.

There were variable sample sizes in the reviewed papers ranging from 1^{42,44,47,50}. Only four papers collected the data prospectively^{24,25,42,50}.

The follow up period ranged from 6 weeks⁵⁰ to 9 years^{19,21}. However, the majority of the reviewed papers were not able to identify changes over time because of the single cross-sectional outcome assessment at follow-up. Only Routt in 1997 assessed his group of patient prospectively at 6 weeks, 3 months and one year; this allowed him to address the radiological and clinical changes in sacroiliac joint fixation over time.

The outcome measures of the reviewed papers can be summarised as follow:

1. Clinical assessment at follow up: the majority of authors documented their assessment of the patients' recovery. They commented on: wound healing, relief of symptoms, and the degree of remnant pain. However, this is not a validated method for assessing the outcomes following surgical procedures^{21, 24, 31, 37-41, 44, 46-51, 53, 54}.
2. Radiological assessment to evaluate the fusion or displacement of the instrumentation^{19, 40, 46, 50}.
3. Patient satisfaction with surgery^{19, 21}.
4. General health and function (SF36 questionnaire)¹⁹.
5. Patient walking ability and return to pre injury mobility level⁴¹.
6. Return to work, lumbar isometric strength, and upper and lower leg numbness²⁵.

The six pure technique papers^{20,43,49,52,55,56} did not mention any method for follow up assessment.

The emerging themes from the above review are:

1. Very little statistical evidence identified, only Buchowski et al. in their study in 2005 applied statistical significance to their findings.
2. Most of these surgical techniques suffered from significant complications including: bleeding, infection, non union, chronic pain, pelvic instability, cosmetic defects, nerve damage, iliac wing fractures, disturbance of the iliac crest contour and the periarticular structures, and derangement of the inherent stability of the sacroiliac joint.
3. Most of the papers suffered from lack of information on functional outcome.
4. All the identified papers were either case reports or case series or technique papers. The need for a prospective controlled study is evident.
5. No single technique has been acknowledged universally as the standard.

CONCLUSION

Sacroiliac joint is an important cause of low back pain. Clinical examination alone or in combination with different radiological investigations lack scientific validity.

The gold standard test is fluoroscopy guided sacroiliac joint block.

Conservative treatment should be initiated after confirming the diagnosis. Sacroiliac joint surgical arthrodesis is justified if conservative treatment fails to address the patient's pain. No surgical technique has been accepted yet as the standard.

More studies and research are needed to improve the current understanding of sacroiliac joint pain, diagnosis and treatment.

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