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**PUBIC SYMPHYSIS. BIBLIOGRAPHIC REVIEW****Abstract**

Pubic symphysis, also known as osteitis pubis, is an inflammatory condition of the pubic symphysis, clinically characterized by severe pelvic pain, abnormal gait with the increased base of support, and bone destruction of the pubic symphysis margins. Initially associated with certain surgical interventions, speculation about its pathogenesis includes infection, trauma, local vascular anomalies, and reflex-sympathetic dystrophy. This confusion about its etiology is reflected in the wide variety of treatments that have been used over the years, including radiation, bed rest for long periods, infiltration with local anesthetics, anti-inflammatories nonsteroidal drugs, antibiotics, heparin, surgical debridement, wedge resection of the pubic symphysis, and autologous iliac bone transplantation. Both bony infection and inflammation of the pubic area are rare. In the medical literature these two entities have been frequently confused, so that many diagnosed cases of osteitis pubis have actually been shown to be misdiagnosed osteomyelitis pubis. For this reason, an aggressive diagnostic approach is recommended, especially in post-surgical cases, with biopsy and arthrocentesis of the symphysis guided by computed tomography.

**Keywords:** *arthritis, pubic, symphysis, osteitis, pubis*

**Introduction**

Pubic symphysis, also known as osteitis pubis, is an inflammatory process of the pubic symphysis, which causes intense pain and bone destruction of the articular surfaces of the pubis. Despite 7 decades of speculation about this disease and although it has traditionally been considered a non-infectious entity, the truth is that even today its pathogenesis, diagnostic criteria, natural history, and optimal treatment continue to be controversial issues. The scientific literature contains numerous cases of pubic osteomyelitis initially diagnosed as osteitis pubis, which is why many researchers currently maintain that this condition may be, in a high proportion, secondary to infection. This review article reviews the different affections of the symphysis pubis, their terminology, symptoms, diagnosis, and most correct treatments, trying to adequately classify each entity and make a correct distinction between infectious and non-infectious conditions.

**Anatomical Considerations**

The pubic symphysis is an amphiarthrodial joint located at the confluence of the 2 pubic bones. A small fibrocartilaginous disc is interposed between 2 narrow sheets of hyaline cartilage. The articular surfaces lack an adequate synovial membrane, which prevents the important destructive processes that take place in inflammatory arthropathies, such as rheumatoid arthritis. Biomechanical analyzes of the pelvis show that this set of bones functions as a group of arches that transfer the weight of the trunk from the sacrum to the hips. There are three ligaments that confer stability to the pubic symphysis: the superior, the anterior, and the inferior; the latter –also called the arcuate ligament– is primarily responsible for maintaining joint stability. This ligaments allow only minimal movement of the joint during most bodily activities, although some degree of angulation, rotation, and displacement that occurs during work on the sacroiliac and hip joints is possible. In the case of women, in the last months of pregnancy, and especially during childbirth, there is a certain separation of the pubic bones. The symphysis is richly innervated with branches of the pudendal and genitofemoral nerves, which explains the intense pain that inflammatory conditions of this small joint can cause. The blood supply is provided by branches of the pudendal, inferior epigastric, and mid-femoral circumflex arteries. As for the musculature that is involved in the pubic

symphysis, it includes the rectus abdominis, the gracilis, the pectineus and the adductors, both long and short.

### **Terminology.**

In 1924, Beer (Beer, 1924) coined the term osteitis pubis to describe a post-surgical complication of suprapubic prostatectomy, characterized by severe pelvic pain, abnormal gait with increased base of support, and bone destruction at the margins of the symphysis pubis. For decades there has been significant terminological confusion, as well as numerous imprecise definitions of the condition, which have contributed to making this syndrome a controversial pathology, whose origin is not completely clarified. From a strict point of view, pubic symphysis consists of an enthesopathy of the pubis, that is to say, a painful inflammation of the muscular insertions in the area of the pubic rami (Montes Gonzalez, 2002). It is interesting to consider the various terminologies used to define pubic enthesopathy: pubalgia, pubitis, osteitis pubis, pubic symphysis, pelvic-arthritis syndrome, dynamic osteopathy of the pubis, traumatic inguino-cruralgia, adductor disease, pubic osteopathy, pubic osteopathy, sports hernia, sports pubalgia, athletic pubalgia, lumbo-abdomino-pubalgia, and lumbopubalgia. In turn, the term pubic symphysis is somewhat imprecise when it comes to defining what type of pathology of the pubic joint we want to refer to. From the outset, the suffix -itis speaks of an inflammatory affectation, without specifying its possible infectious, traumatic, or other type of etiology. From a practical point of view, we could classify the diseases that affect this joint as follows (Gamble, 1986):

Congenital anomalies (such as bladder exstrophy, craniocaudal dysostosis, and Dyggve-Melchior-Clausen syndrome) cause varying degrees of separation of the pubic bones, resulting in a variable spectrum of functional disability. Infections, such as septic arthritis of the pubic symphysis or pubic osteomyelitis, are sometimes misdiagnosed as osteitis pubis to which we will dedicate an entire section of this review. Among the inflammatory diseases, the main one is osteitis pubis or pubic symphysis, the “sterile” inflammation that concerns us in this review. In addition to the above, seronegative spondyloarthropathies can affect the joint, in such a way that in them the progressive ossification of the fibrous elements of the joint conditions a complete synostosis of the symphysis. – Metabolic diseases, such as renal osteodystrophy and hyperparathyroidism, can cause bone resorption. Likewise, arthropathy due to calcium pyrophosphate crystals, ochronosis, and hemochromatosis can also cause joint lesions, consisting of fibrocartilage calcifications, and subchondral bone erosions - degenerative diseases. From the fifth decade of life, degenerative lesions of the symphysis begin to appear, which initially consist of sclerosis of the articular surfaces, with the progressive appearance of marginal osteophytes– neoplasms. As with other joints, the symphysis pubis is resistant to tumor invasion, that is, although tumors, malignant or benign, can affect the pubic bone, they rarely reach the joint. There may be bilateral involvement of the pubis in the case of metastatic carcinoma, myelosclerosis, multiple myeloma, and Hodgkin's disease. Unilateral bone involvement occurs in benign lesions, such as desmoplastic fibroma, and the symphysis is always intact. – post-traumatic disease. With four typical lesion patterns: pubic diastasis (the most frequent; 45% of the total), displaced fracture, intra-articular fracture with dislocation-overlapping, and finally a combination of the above. The pathologies that most frequently affect the pubis are of non-infectious etiology, although other important etiologies will be taken into account in the differential diagnosis, such as septic arthritis, whose early identification is essential to avoid not only the poor prognosis derived from a therapeutic intervention late but even the death of the patient.

### **Etiology.**

Traditionally, and in general terms, pubic symphysis has been considered an inflammatory process of non-bacterial origin that presented as a complication of various types of surgical interventions (Henderson, 1950; O’Learly, 1964; McGinn, 1949; Klinefelter, 1950) (especially urological and gynecological), pregnancy and childbirth (Wiltse, 1956; Wilensky, 1938; Golden, 1952) trauma, (Klinefelter, 1950; Wiltse, 1956; Leucutia, 1951), herniorrhaphy (Harth, 1981) and pyelonephritis (Kleinberg, 1942). However, the theory that osteitis pubis is a non-infectious disease

is in direct conflict with the record of numerous cases that do not recover with conservative treatment ( Henderson, 1950; Wiltse, 1956), patients who even develop perineal fistulas (Henderson, 1950; Adams, 1953; Barnes, 1933) and patients whose osteitis pubis is associated with infections of a surgical wound (Henderson, 1950; O'Learly, 1964; Barnes, 1933), positive blood cultures ( Wheeler, 1941 ) or the finding of an abscess adjacent to the pubis (Barnes, 1933; Goldstein, 1947). Added to this is the fact that most patients with osteitis pubis who undergo bone biopsy show changes suggestive or typical of osteomyelitis (Adams, 1953; Goldstein, 1947; Lavalley, 1951; Friedenberg, 1950; Lame, 1954). In cases where an infectious origin is identified, the most frequently isolated germs are Staphylococcus aureus, followed by Pseudomonas aeruginosa and, lastly, polymicrobial infections ( Ross, 2003). In numerous cases of osteitis pubis with good evolution after conservative treatment, it is inferred that there is no infection because the symptoms disappear without antibiotic treatment. However, the absence of symptoms should not be considered the basis for determining that the patient does not have pubic osteomyelitis, since in the scientific literature there are several cases of pubic osteomyelitis that resolve "spontaneously" without antibiotic treatment ( Lavalley, 1951; Sexton,1993). Despite all these arguments, the concept that osteitis pubis is a non-infectious disease has persisted to the present day, appearing as such in many trauma, urology, gynecology, and radiology textbooks. Other authors have speculated about its etiology, in such a way that in 1941 Wheeler ( Wheeler, 1941) proposed the theory that the origin of the condition resides in a sympathetic-reflex dystrophy of the pubis. More recently, in 1980, an attempt was made to associate it with thrombosis of the parapubic veins, (Nisenkorn, 1980) which would cause difficulty in venous return of the joint, proposing the administration of heparin as a treatment for the condition. However, these two hypotheses have not been supported by very solid arguments. Apart from these considerations about its etiology, the truth is that its appearance is especially frequent in athletes, who are running and suddenly changing direction. Thus, numerous studies show that the disease does not have the same incidence in all population groups: it is much more frequent in men (5:1 ratio) ( Montes Gonzalez, 2002), and not due to morphological differences between the sexes, but rather due to activities traditionally linked to the male sex. Some authors define this pathology as inflammation due to overuse associated with some sports (Lieberman, 1997).

According to the study by Renstrom, (Renstrom, 1992;) the sports with the highest risk are:

1. Soccer (50% of cases).
2. Long distance runners.
3. Rugby.
4. Weightlifters.
5. Cyclists.

If we stick to the sports field, to know the etiological factors involved in the origin and development of pubic symphysis it is essential to differentiate between two clinical forms of the disease (Danowskik, 1992):

#### **Microtraumatic pubic osteoarthropathy (traumatic pubalgia).**

It appears as a consequence of an attack on the symphysis pubis. There are two possibilities regarding its etiology: – It may be the consequence of a fall on the feet in which the forces of reception on the ground are unequal, so that one pubic branch rises more than the other, causing shearing of the pubis, with stretching of the pubic ligaments. – The loss of support on the ground, or an opposition movement on the lower extremity, can cause sudden tension on the adductors, causing stress that can damage the ligaments or muscle insertions located in the pubis.

#### **Chronic groin pain.**

Unlike the previous one, in chronic pubalgia the pubis is not the cause of the pubalgia at all, but rather it results from an altered functional scheme. It admits, in turn, a subclassification into two types:

- Upper pubalgia, secondary to involvement of the rectus abdominis muscle.

– Lower pubalgia. The damage originates in the adductor musculature, generally being the median adductor the cause of pubic osteopathy.

It should be noted that the studies carried out to date point to a series of triggering factors, which are classified into two groups: intrinsic factors, such as shortening of the lower extremities, lumbar hyperlordosis or abdominal wall and/or inguinal tract deficiencies, and extrinsic factors, such as the quality of the sports field, overtraining or the practice of certain dangerous movements.

### **Frequency.**

The incidence of this pathology in the general population is not fully established, but numerous studies show that there is a strong association, among other situations, with pelvic organ surgery (Beer, 1924; O’Learly, 1949; Barnes, 1933; Wheeler, 1941; Goldstein AE, Rubin, 1947), in such a way that, in Specifically, after urinary incontinence surgery using the Marshall-Marchetti-Krantz technique, an incidence of osteitis pubis is estimated at 2 to 3% (Lentz, 1995). Apart from its relationship with surgery, it is clear that it is a picture with a clear occupational character, that is, pubic symphysis is clearly and indivisibly associated with sports practice. In the study published by Montes González ( Montes Gonzalez, 2002) in 2002, which focused on determining the influence of risk factors associated with sports practice, extrinsic factors are analyzed (quality of the ground, overtraining, incorrect training programming, and the practice of certain dangerous movements) in 3 subgroups of individuals:

Class 1: individuals who train regularly, strengthening the abdominal muscles and stretching the adductor muscles.

Class 2: individuals who train regularly, with poor preparation, based on muscle strengthening exercises without control.

Class 3: individuals who do not train regularly (once or not once a week). The results show that class 2 presents a much higher incidence of pathology (7.58%), with group 3 presenting the lowest risk of developing osteopubic osteopathy (1%). The study concludes that the incidence of the pathology, even in a high-risk group such as the one considered (assuming the overall incidence in the 3 classes), is very low, less than 5%. There is a strong correlation between the diagnosed cases and the months of sports competition, and it shows how overtraining and incorrect physical conditioning will be the triggering elements of the pathology, while the performance of preventive exercises (adductor stretching, abdominal and hamstring strengthening ) significantly reduces the chances of suffering from osteopubic osteopathy.

### **Clinical Manifestations.**

The classic symptom of pubic symphysis is pain in the suprapubic region, which can radiate to the groin, hips, and thighs, following the path of the adductor musculature<sup>28</sup> (Sequeira W. Diseases of the pubic symphysis. Sem Arth Rheum. 1986). Walking, going up or down stairs, monopodal support, or a sudden change of direction during walking intensify the pain. You may also notice a clicking sound when getting up from a seat, turning over in bed, or walking over uneven ground. The patient has a typical ambulation with the increased base of support. Hip flexion or hip abduction and rotation in flexion cause pain. However, these maneuvers are painless with the hip in extension. A variable degree of erythema, edema and local temperature increase may appear, and in some cases fever can even be detected (Sequeira, 1986). During gait, suprapubic pain may be due to the development of torsion or compression forces on the inflamed symphysis. The interosseous ligaments of the sacroiliac joints have great stabilizing power and allow only imperceptible movement of the joint. This movement becomes 0.5 mm in the symphysis in men, and 1.5 mm in non-pregnant women. However, even small mobilizations of the sacroiliac joint, when amplified by the lever represented by the pubic rami, can cause detectable movements in the pubic symphysis.

### **Differential Diagnosis.**

Historically, there has always been confusion between pubic symphysis (sterile inflammation of the pubic symphysis), osteomyelitis pubis, and septic arthritis of the pubic symphysis (Table 1). The first of these syndromes (pubic symphysis) is clinically indistinguishable from pubic osteomyelitis, and in order to make an adequate diagnostic differentiation it is necessary to obtain negative

cultures (Ross, 2003). Furthermore, to complicate the distinction between these entities, antibiotics, surgical debridement, glucocorticoids, and nonsteroidal anti-inflammatory drugs (NSAIDs) have been used for the treatment of osteitis pubis. Many cases of osteomyelitis are initially misdiagnosed as osteitis pubis, especially after urological surgery ( Sexton, 1993; Bouza, 1978; Gilbert, 1975; Rosenthal, 1982) Sexton et al.: (Sexton, 1993) reported a case of pubic osteomyelitis resolved despite an inadequate antibiotic regimen, suggesting that many cases of "low-grade" osteomyelitis pubis are diagnosed as osteitis pubis, with slow and spontaneous healing, in most cases due to immune containment (in the same way that in the pre-antibiotic era some vertebral osteomyelitis resolved without specific treatment). In fact, this contention phenomenon is supported by a recent study (Karpos, 1995 )in which it was shown that up to 71% of patients with osteitis pubis after urological intervention using the Marshall-Marchetti-Krantz technique had positive bone biopsy cultures. The second pathology that must be taken into account when making a differential diagnosis is septic arthritis of the pubic symphysis. Inflammation from pre-existing osteitis pubis may predispose to septic pubic arthritis if *S. aureus* bacteremia occurs (Img. 1). In the review article by Ross and Hu (Ross, 2003) published in *Medicine*, there are 100 cases of septic arthritis documented from 1973 to 2003, identified in Pubmed. The cases were accepted if there was microbiological isolation from arthrocentesis, surgical debridement, or blood cultures, together with images that supported the septic process in the symphysis. Of the 100 cases, 34 were caused by *S. aureus*, 24 by *P. aeruginosa*, 19 were polymicrobial, and the rest were caused by *Escherichia coli* and other gram-negative bacilli. Clinically, it is striking that only 74% of the cases presented with fever, although 88% had pubic pain. 59% presented an abnormal gait, and 45%, had pain with hip movements. Inguinal adenopathies were detected in only 4% of the cases. Regarding the laboratory, only 35% of the patients had leukocytosis, the mean erythrocyte sedimentation rate (ESR) was 83 mm/h, and germs were isolated in 86% of the symphysis pubis aspirate (Img. 2). Four large risk groups were identified: women with recent surgery for urinary incontinence, athletes, pelvic neoplasms, and intravenous drug addiction (IVDA).

**Table 1.**

**Characteristics of osteitis pubis compared with osteomyelitis pubis and septic arthritis of the pubic symphysis**

	Osteitis pubis	Osteomyelitis pubis	Symphysis pubis septic arthritis
<b>Nature</b>	Inflammation	Infectious	Infectious
<b>Location</b>	Insertion of the musculature in the pubic symphysis	Bone tissue of the pubic rami	Pubic symphysis joint
<b>Culture</b>	Negative	Positive	Positive
<b>Etiology</b>	Overuse (athletes), trauma, pelvic surgery, pregnancy and childbirth	Pelvic surgery, abdominal pathology, IVDA, pregnancy and childbirth	Pelvic surgery, abdominal pathology, IVDA pregnancy and childbirth
<b>Clinic</b>	Pelvic pain, abnormal gait	Pelvic pain, abnormal gait	Pelvic pain, abnormal gait
<b>Imaging techniques</b>	Conventional radiography CT, MRI, bone scintigraphy	Conventional radiography CT, MRI, bone scintigraphy	Conventional radiography CT, MRI, bone scintigraphy
<b>Treatment</b>	Self-limited, rest, NSAIDs, corticosteroids	Antibiotics, NSAIDs, rest, surgery for complicated cases	Antibiotics, NSAIDs, rest, surgery for complicated cases

**IVDA: intravenous drug addiction; NSAID: nonsteroid antiinflammatory drugs; MR: magnetic resonance; CT: computer tomography.**



**Image 1.**

Pelvic computed tomography: bilateral erosions (arrows) of the symphysis pubis in a 38-year-old patient with septic arthritis of the pubis due to *Staphylococcus aureus*.



**Image 2.**

Image taken during a computed tomography-guided symphysis pubic aspirate. The path of the puncture needle can be seen from the skin plane to the joint cavity.

### Diagnosis. Complementary Explorations.

The initial suspicion that the patient has osteitis pubis is given by typical clinical manifestations (intensified suprapubic pain when walking, going up or down stairs and, of course, when running, together with an abnormal gait) in a patient with a Congruent medical history (athletes, history of surgery, etc.). Regarding the complementary tests, the laboratory techniques are usually unremarkable, or at most there is a slight leukocytosis, with increased values of ESR28. Conventional radiology is often normal in the initial stages, and in more advanced stages it shows sclerosis of the articular surfaces (Img. 3) and even some erosion of the subchondral bone, which typically appears bilaterally.

Diagnostic delay is quite common, taking into account that it is an infrequent pathology and that it is difficult to establish a differential diagnosis with urological, gynecological, and even abdominal conditions (Pauli, 2002). The time between the onset of symptoms and the diagnosis of osteitis pubis usually varies from weeks to months in most cases, although the average time is approximately 30 days. Bearing in mind –as we have seen in the differential diagnosis section– that osteitis pubis is clinically indistinguishable from pubic osteomyelitis, more specific imaging techniques may be required to carry out a correct diagnosis (Img. 4) than a simple X-ray of pubic symphysis. In this sense, magnetic resonance imaging (MRI) and computed tomography (CT) can show inflammatory changes in the bone that point the condition toward osteomyelitis. The images that usually appear on MRI consist of bone destruction, joint effusion, and widening of the symphysis, and may reveal the presence of a mass and edema of the adductor and obturator muscles (Ross, 2003). CT findings basically consist of bone erosions (Img. 5), abscesses, phlegmon, marginal irregularities of the symphysis, and joint widening. However, to definitively rule out the existence of a condition of infectious origin, a CT-guided bone biopsy (Lupovitch, 1989) and an arthrocentesis of the symphysis are required, to obtain samples for microbiological (aerobic and anaerobic culture) and histopathological (Sexton, 1993) processing.



**Image 3.**

Conventional radiograph of a patient with osteitis pubis. Some sclerosis of the articular surfaces can be seen, together with some subchondral geode (black arrow) and bilateral erosions (white arrows), more marked on the left ramus.

**Image 4.**

Bone scan of a patient with osteitis pubis. A very significant increase in the deposit of the radioisotopic tracer is observed in the pubic symphysis.



**Image 5.**

Pelvic pubic CT scan of a 52-year-old patient with *Pseudomonas aeruginosa* septic arthritis of the symphysis pubis. Note the unilateral presence of erosions on the articular surface of the symphysis (arrow).

**Forecast.**

Osteitis pubis, understood as sterile inflammation of the pubic symphysis, is an entity with a good prognosis (some authors (Pauli, 2006) even describe it as a self-limiting process), which in most cases usually responds well to conservative treatment (Montes Gonzalez, 2002). With the correct diagnosis and treatment, resolution of the condition is usually achieved in approximately 4-6 weeks. On the contrary, osteomyelitis pubis and septic arthritis of the pubic symphysis are pathologies of greater importance; require hospitalization for intravenous treatment and can cause sequelae such as pelvic instability, which can even lead to sacroiliac stress fractures, pubic diastasis, urinary incontinence (especially in patients who develop the condition after surgery), bladder perforation urinary tract and chronic pelvic pain. These pictures of infectious origin even have an associated mortality that oscillates around 2%, according to the series of 100 cases by Ross and Hu (Ross, 2003).

**Treatment.**

The existing confusion about the origin of this disease is reflected in the great variety of treatments used in these patients during the last 50 years. The different therapeutic options include radiation, absolute bed rest for prolonged periods, infiltration with local anesthetics with or without glucocorticoids, NSAIDs, antibiotics, heparin, surgical debridement, wedge resection of the pubic symphysis, and iliac bone autologous transplantation (Sexton, 1993). In order to establish the

correct treatment, it is obviously essential to rule out the existence of an infectious basis. For osteitis pubis understood as such, that is, sterile inflammation of the bone and periarticular soft parts of the pubis, conservative treatment is usually sufficient. The basis of this therapy consists of sports rest for 4-6 weeks, physical therapy (isometric work on abductors, adductors, rectus abdominis, and obliques), and NSAIDs. In cases without response to previous treatment, infiltrations with local anesthetic and corticosteroids can be performed. Surgery is rarely indicated, and it is estimated that it may be necessary in 5 to 10% of cases. The article by Mehin et al. (Mehin, 2006) basically identifies 4 types of surgical intervention: curettage, arthrodesis, wedge resection, and wide resection. These authors maintain that athletes with osteitis pubis respond well to curettage, while if the disease is secondary to urological or gynecological interventions, somewhat more aggressive surgery is required in up to 50% of cases. Regarding the cases of symphysis in which a microorganism is finally identified as the cause of the symptoms, the treatment of choice is obviously intravenous antibiotic treatment maintained for at least 4 weeks, 21 continuing with the oral antibiotic regimen for a minimum of 2 weeks more. Sometimes conservative treatment with rest and antibiotics may not be enough to guarantee therapeutic success, thus requiring curettage and surgical cleaning. In the series of 100 septic arthritis of the pubis published by Ross and Hu, 97% had pubic osteomyelitis, and in more than 50% of the cases a surgical attitude was required, consisting mainly of bone debridement and, secondly, incision. and drainage of the abscess.

**Discussion.** For decades, pubic symphysisitis has been defined by its clinical presentation and by its radiological manifestations, although, in most registries, osteomyelitis was not adequately excluded by biopsies or cultures. Many patients presumably suffering from osteitis pubis showed a clinical course suggestive or typical of intra-treated osteomyelitis (abscess formation, fistula development, etc.). Hence, some authors defend the hypothesis that all cases of osteitis pubis are secondary to infection, while others try to separate pubic symphysisitis into 2 categories: infectious and non-infectious.

### Conclusion

However, in the majority of registered cases and reviews it is assumed that osteitis pubis and osteomyelitis are 2 different entities, and that osteitis pubis is non-infectious in nature. After carrying out this review, it seems reasonable to consider fundamentally 2 questions: firstly, the need to re-examine the concepts concerning the pathogenesis and treatment of osteitis pubis, and secondly, the change in attitude towards patients presenting with pubic pain and radiological findings suggestive of pubic symphysisitis, who should undergo symphysis pubis arthrocentesis and CT-guided bone biopsy to obtain samples for microbiological processing to definitively rule out the existence of a underlying infectious disease.

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