

# Osteitis Pubis and Instability of the Pubic Symphysis

## When Nonoperative Measures Fail

Paul R. Williams,\* FRCS(Orth), Daniel P. Thomas, FRCS(Orth), and Edward M. Downes, FRCS

*From Morriston Hospital, Morriston, Swansea, Wales*

### ABSTRACT

Seven rugby players with osteitis pubis and vertical instability at the pubic symphysis were treated operatively after nonoperative treatment had failed to improve their symptoms. The vertical instability was diagnosed based on flamingo view radiographs showing greater than 2 mm of vertical displacement. The players had undergone at least 13 months of nonoperative therapy before surgery was considered. Operative treatment consisted of arthrodesis of the pubic symphysis by bone grafting supplemented by a compression plate. At a mean follow-up of 52.4 months, all patients were free of symptoms and flamingo views confirmed successful arthrodesis with no residual instability of the pubic symphysis. Based on our results with this procedure, we believe that arthrodesis of the pubic symphysis has a role in the treatment of osteitis pubis that is recalcitrant to nonoperative treatment. The combination of osteitis pubis and vertical pubis symphyseal instability may be the cause of failure of nonoperative treatment.

Osteitis pubis is a painful inflammatory condition involving the pubic bones, pubic symphysis, and adjacent structures.<sup>1, 7, 21</sup> This condition is frequently seen in association with urologic, gynecologic, obstetric, and other pathologic pelvic conditions and procedures.<sup>1, 3, 5, 7, 13, 16, 21, 22</sup>

Although the pathogenesis of osteitis pubis is often unclear, periosteal trauma is frequently cited as a common etiologic factor. This may be the result of a direct injurious force or microtrauma related to athletic activity.<sup>1, 5, 6, 11, 13, 22</sup> Nonoperative treatment includes rest,

physical therapy, ultrasonography, nonsteroidal antiinflammatory medications, oral glucocorticoids, and corticosteroid injections directly into the symphysis. Anticoagulation and radiation therapy have also been advocated.<sup>1-3, 5-7, 11-13, 16, 21, 22</sup> Surgery is rarely indicated, as reflected by a paucity of reports on operative procedures for this condition in the literature. Where surgery has been described, it is in patients with nonathletic-related conditions, such as female patients with pathogenesis related to obstetric and gynecologic causes.<sup>9</sup>

We present a series of patients who required surgical stabilization of the pubic symphysis for pain related to osteitis pubis and failure of nonoperative management. All patients were professional rugby players with rigorous playing and training commitments. The condition appeared to be related to athletic activity and the development of vertical pubic symphysis instability secondary to recalcitrant osteitis pubis.

### MATERIALS AND METHODS

Over a 12-year period a single consultant surgeon (EMD) examined and treated seven professional male rugby players (four International players and three National level players) who had persistent clinical and radiologic signs of osteitis pubis that remained unresponsive to nonoperative therapeutic measures (Table 1).

#### Clinical Findings

Patients initially experienced insidious pain in the adductor and suprapubic regions that developed progressively with time. None could recall a specific event or episode that may have precipitated the onset of symptoms. High-intensity exercise, running, sprinting, sharp direction changes, kicking, and performing sit-ups were common aggravating factors. Patients commonly described pain in the region of the symphysis while standing on one leg, as when dressing.

\* Address correspondence and reprint requests to Paul R. Williams, FRCS, 94 Dogfield Street, Cathays, Cardiff, CF24 4QZ, United Kingdom.

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TABLE 1  
Details on Previous Treatment and Time to Return to Sports and Competition for the Seven Rugby Players

Age (years)	Duration of symptoms (months)	Investigations <sup>a</sup>	Previous treatment <sup>b</sup>	Time to resumption of training (months)	Time to match fitness (months)	Time to outcome assessment (months)
27	36	IBS	UST,INJ,BG	6	9	144
21	21			3	6	96
23	48	IBS	UST,INJ	5	9	54
25	13		UST,INJ	3	5	30
29	16	IBS,MRI	UST	3	5	18
25	16		UST,INJ,GG	2	6	15
23	36	IBS	UST,INJ,AT	4	6	10

<sup>a</sup> All patients had plain radiographs and flamingo views of their pelvis. IBS, isotope bone scan; MRI, magnetic resonant imaging scan.

<sup>b</sup> All patients had periods of rest, physical therapy, and nonsteroidal antiinflammatory drug medication. UST, ultrasound therapy; INJ, steroid injections; BG, bone graft; AT, adductor tenotomy; GG, Gilmore's groin repair. See text under "Surgical Findings" for a description of the bone graft and Gilmore's groin repair.

Examination elicited tenderness of the pubic symphysis to deep palpation. There was no clinical evidence of a hernia in any of the cases. The adductor muscle origins were frequently tender either uni- or bilaterally, and resisted thigh adduction was painful. Pain at the limits of hip abduction bilaterally was a common feature, with a general sense of apprehension identified throughout a full range of hip movement. Pelvic springing performed in the lateral position reproduced pain in the region of the symphysis. In all patients, examination elicited salient symptoms and signs of osteitis pubis and symphyseal instability.

Standing AP radiographs showed signs of osteitis pubis (Fig. 1). Flamingo view radiographs were used to determine vertical instability of the pubic symphysis (Fig. 2). A vertical displacement of the pubic symphysis greater than



Figure 1. Standing AP plain film of the pelvis illustrating the classic radiographic features of osteitis pubis: sclerosis, cystic change, and rarefaction of the medial portions of the pubic rami.

2 mm was considered to be diagnostic and was confirmed in all cases.<sup>4,24</sup>

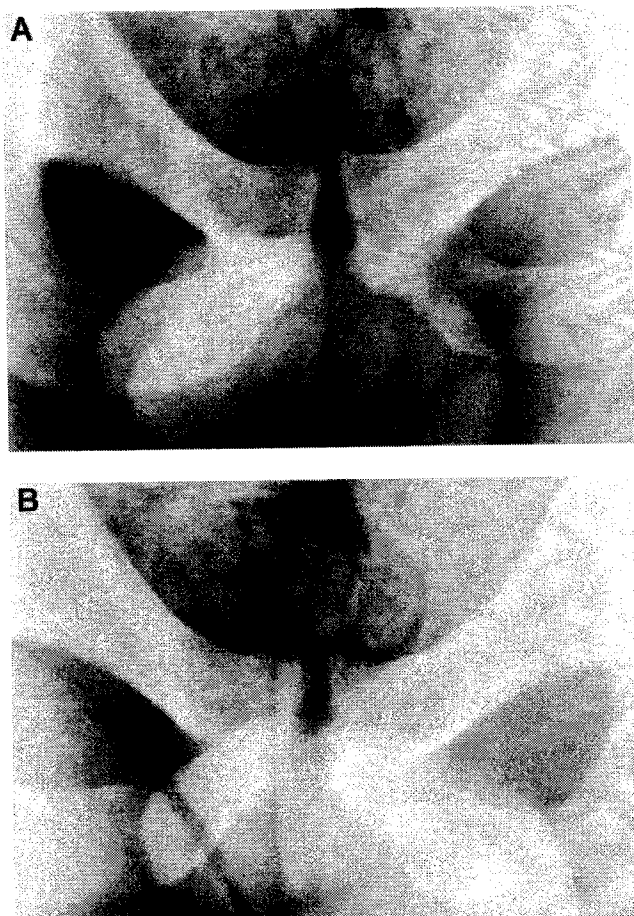
#### Nonoperative Treatment

All patients had had an enforced period of rest away from rugby and training for a minimum of 6 months. All patients had courses of physical therapy and nonsteroidal antiinflammatory drug medication. All were offered corticosteroid injections; two declined. All but one patient received a course of ultrasound therapy. In four cases (Table 1), an isotope bone scan, an MRI scan, or both were performed as part of the diagnostic workup to explore possible differential diagnoses of groin disruption such as adductor tendinitis, osteomyelitis, and other soft tissue abnormalities. Such imaging does not contribute to the diagnosis of pubic symphyseal instability *per se*.

Surgery was considered and discussed only after nonoperative measures were deemed to have failed by *both* the attending surgeon and the patient. In this series, no patient had surgery before a minimum of 13 months (range, 13 to 48) of supervised nonoperative management.

#### Surgical Technique

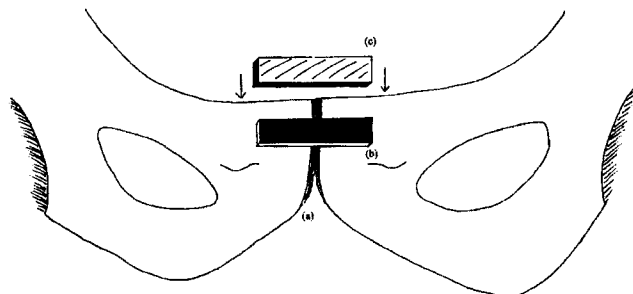
A Pfannenstiel's incision was made with the patient supine. The Scarpa's and Camper's fascia were incised. The superior aspect of the pubic symphysis was exposed by separating and reflecting the insertions of the rectus abdominis muscle from the midline by sharp dissection to expose a sufficient area on either side of the pubic symphysis to allow insertion of the graft and four-hole compression plate. Pubic symphyseal instability was confirmed by vertical translation using blunt AO-type reduction forceps. In all cases, a dense sheath of fibrous granulation tissue was found overlying the symphysis, suggesting a chronic inflammatory process and multiple attempts at repair. In two patients there appeared to be nonunion of a tiny avulsion-type lesion at the anteromedial aspect of the left superior pubic ramus, adjacent to the pubic tubercle. These lesions were small and not detectable on plain radiographs, even with the benefit of retro-



**Figure 2.** Vertical symphyseal instability demonstrated by AP flamingo view radiographs. A, patient standing on left leg. B, patient standing on right leg.

spection. Histologic findings in all cases were consistent with fibrosis and chronic nonspecific inflammatory tissue. There appeared to be no macroscopic evidence of infection in any of the cases, and all tissue cultures of intraoperative material were negative for bacterial growth.

The pubic symphysis was resected and the remaining bone subsequently underwent curettage before the arthrodesis of the pubic symphysis. A gutter was then created by removing a central midline wedge approximately 1 cm wide by 4 to 6 cm long by 1 cm deep from the superior surface of the symphysis. Removing a sandwich of pubic bone and hyaline cartilage from either side of the resected syndesmosis created the gutter. The exact size of the gutter was determined based on the patient's size. A Phemister cancellous graft was punched into the resected pubic symphysis. A full-thickness tricortical bone graft was then harvested from the anterior iliac crest and cut to pattern using a template. It was inserted into the gutter to a tight fit (Fig. 3). A four-hole AO dynamic compression plate was then laid across the pubis-graft construct using four cancellous screws (6.5 cm). The two central screws pass through both the pubis and the graft. The two lateral

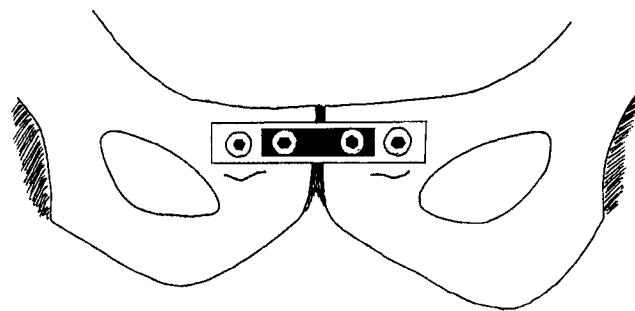


**Figure 3.** Superior view demonstrating resected pubic symphysis packed with a Phemister graft (a) and resected gutter (b) in preparation for inlaying of autologous tricortical iliac crest bone graft (c).

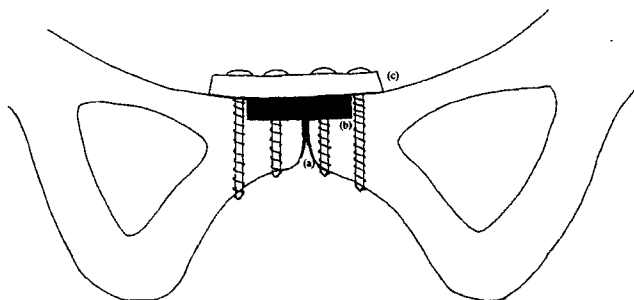
screws pass through the pubic bone independent of the graft (Fig. 4). A finger passed behind the pubic rami assisted optimal drill and screw placement. Compression added stability to the construct (Fig. 5).

The first patient operated on underwent two attempts at arthrodesis. The primary procedure performed was an insertion of tricortical iliac bone block grafting without the addition of a plate. The bone block graft was held in place at each end by a staple. The patient was mobilized very gradually postoperatively (minimal weightbearing with crutches for 3 months followed by partial weightbearing for a further month). He made excellent progress and returned to light training at 6 months and first-class sport at 9 months. However, at 12 months after the operation the patient returned with acute symptom recurrence causing him to retire from a match. At his second surgery, the bone graft was found to have fully incorporated and the staples were found to be secure. A stress fracture passing through the midline of the arthrodesis was identified. The fracture edges were excised and a Phemister bone grafting supplemented by plate fixation was successfully performed.

In addition to arthrodesis of the pubic symphysis one patient had a bilateral groin disruption repair performed by Mr. J. Gilmore at a combined procedure. Gilmore<sup>8</sup> describes a syndrome of groin disruption with pathophysiology caused by a number of factors: 1) a torn external oblique aponeurosis causing dilatation of the superficial



**Figure 4.** Superior view of pubic symphysis demonstrating inlay of four-hole compression plate over the inlaid tricortical iliac crest bone graft.



**Figure 5.** Anteroposterior view demonstrating resected pubic symphysis packed with Phemister graft (a), inlaid tricortical iliac crest bone graft (b), and onlaid four-hole compression plate (c).

inguinal ring, 2) a torn conjoint tendon, and 3) dehiscence between the inguinal ligament and the torn conjoint tendon, which constitutes the major injury. In the patients he describes there is no radiographic evidence of osteitis pubis or of pubic symphyseal instability. His surgical restoration is by way of a modified herniorrhaphy involving plication of the transversalis fascia and suture repair to the conjoint tendon.<sup>8,15</sup>

#### Postoperative Regimen

The postoperative regimen has evolved with time. We now allow a period of 1 week nonweightbearing followed by a further 2 weeks partial weightbearing (no more than 50%) protected with crutches and a swing-through gait. Full weightbearing commences at 3 weeks and light training is encouraged at 2 to 3 months, or when comfort allows.

#### Follow-up Evaluation

Postoperative review for the study was undertaken at a mean follow-up of 52 months (range, 10 months to 12 years). Direct consultation and clinical examination was used to assess outcome. Postsurgical symptoms were recorded for each patient. Time to resumption of light training (for example, swimming and noncontact exercise) and match fitness was established. Hip movements, resisted thigh adduction and abduction, pubic symphysis tenderness, and lateral compression stability were assessed and recorded in each case. Radiography was performed to examine plate fixation and graft incorporation with repeat flamingo views taken to confirm if stability had been restored.

## RESULTS

The mean age of the patients at operation was 24.7 years (range, 21 to 29), and they had a mean duration of symptoms of 26.6 months (range, 13 to 48). The mean time from surgery to formal outcome assessment was 52.4 months (range, 10 to 144).

Patients resumed light training (defined as either swimming or jogging) at 3.7 months (range, 3 to 6) postopera-

tively. The mean time to return to full match fitness postoperatively was 6.6 months (range, 5 to 9).

#### Outcome Assessment

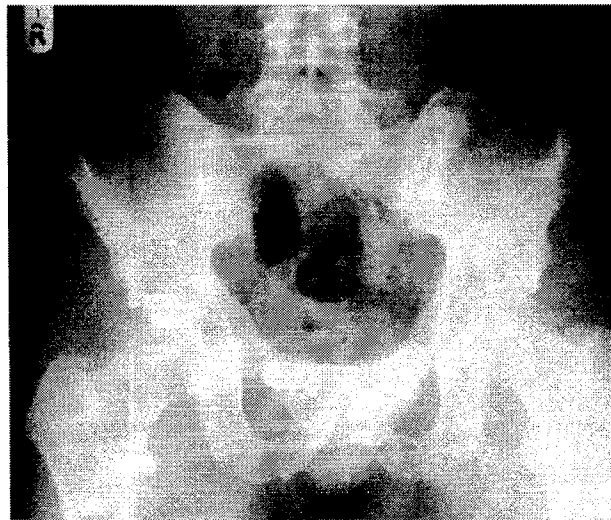
All patients reported that they were free of the symptoms they had experienced preoperatively. We have maintained contact with the patients and this is still true at a mean period of 64.4 months (range, 22 to 166). None of the patients were taking analgesic medications. All had a full symmetrical range of hip movement bilaterally without apprehension. Muscle bulk and tone were symmetrical and normal. Deep palpation over the pubic symphysis, pelvic springing in the lateral position, and resisted thigh adduction no longer reproduced symptoms, nor did patients exhibit pain at the limits of hip abduction as they had done preoperatively.

#### Complications

One patient experienced hemospermia postoperatively for 6 weeks, and a second patient described recurrent intermittent scrotal swelling with exercise for 6 months. There were no graft-site complications.

#### Radiographic Review

All compression plates remained in situ. There were no plate or screw failures. Graft incorporation appeared solid in all cases. In two cases there was evidence of exuberant callus formation surrounding the arthrodesis. In all cases flamingo views confirmed successful arthrodesis with no evidence of residual instability of the pubic symphysis. Figure 6 illustrates an AP standing radiograph of the pelvis at postoperative follow-up of 12 years.



**Figure 6.** Anteroposterior standing radiograph of the pelvis at postoperative follow-up of 12 years.

## DISCUSSION

Groin injuries are common in sport, and their management must be based on an accurate diagnosis.<sup>4</sup> The differential diagnoses of osteitis pubis are many and varied, including muscle strains and other soft tissue injuries, inguinal and femoral herniae, connective tissue diseases, prostatitis, orchitis, urolithiasis, urethritis, iatrogenic causes secondary to pelvic procedures, separation of the pubic symphysis caused by birth trauma, neoplastic disease, and infection. Osteomyelitis in particular could be detrimental to the successful outcome of potential surgery employing prosthetic implantation of a compression plate and is important to rule out before embarking on a surgical course.

With adherence to nonoperative therapeutic measures, osteitis pubis is usually a condition of self-resolution. In today's era of professional sports, increasing physical demands are being placed on athletes. These increases are coupled with financial incentives that make it difficult for injured athletes to successfully follow nonoperative treatment regimens involving long periods of rest from their sport. It is our experience that even in the most compliant of patients, osteitis pubis may remain recalcitrant to nonoperative measures. The patients in this series were large muscular men with body weights ranging from 85 to 120 kg. These patients had had symptoms for a mean of 2 years.

We believe that these patients experienced repeated shear stresses and microtrauma that resulted in a combined clinical picture of osteitis pubis and vertical pubic symphyseal instability in excess of 2 mm. It is difficult to determine which comes first, the osteitis pubis or the symphyseal instability, as each may be argued to predispose to the other. We concede that symptomatic relief after surgery could be related to a number of factors, including denervation of the region and muscular detachment. There is also a period of enforced rest subsequent to surgery. However, it must be stressed that the majority of patients returned to light training within 12 weeks of their procedure.

Arthrodesis of the pubic symphysis by bone grafting alone was unsuccessful in maintaining stability in the first patient in our series. This was due to a stress fracture through the midline of the grafted arthrodesis. It did not result from failure of the bone graft to incorporate. A second procedure with further bone grafting supplemented by a compression plate was successful. The case illustrates the importance of the use of both bone graft and plate fixation in effecting a stable arthrodesis. The use of a compression plate alone may lead to fixation failure in such high-demand athletes.

The stress fracture through the midline of the bone graft in the first case is indicative of a significant vertical shear force at this site. Instability was a feature in all our patients. It was demonstrated clinically by pelvic springing in the lateral position and confirmed radiographically with flamingo views by a vertical displacement of the symphysis pubis in excess of 2 mm. In uninjured subjects movement of the symphysis is less than 2 mm.<sup>14,24</sup>

Fricker and colleagues<sup>6</sup> state that "surgery for instability is never indicated," and indeed surgery for osteitis pubis features only rarely in the literature.<sup>5,9,11,21</sup> Coventry and Mitchell<sup>5</sup> hold the opposing view, stating "there is little doubt that surgical measures can shorten the clinical course," and they support their opinion with their successful results achieved by wedge resection of the symphysis pubis in two patients. Schnute in 1961,<sup>21</sup> and Grace et al. in 1989<sup>9</sup> also describe wedge resection as a means of surgical treatment for osteitis pubis. However, their patients were mostly women with osteitis pubis related to obstetric and gynecologic causes. The 10 female patients in the Grace et al. series had a mean age of 51.1 years. Three of the patients were not satisfied with their result and a further patient required bilateral sacroiliac arthrodesis for pain caused by posterior instability.

Moore et al.<sup>17</sup> have recently reported two cases of late posterior instability of the pelvis after resection of the symphysis pubis for the treatment of osteitis pubis. These cases both required bilateral sacroiliac arthrodesis. They point out the lack of discussion in the orthopaedic literature regarding the pubic symphysis and its role in pelvic stability. We postulated that wedge resection alone in our series of patients may have resulted in increased symphyseal instability, particularly during single-limb stance when vertical shear forces at the symphysis are at a maximum. We agree that there may be a late risk of posterior pelvic instability with resection procedures.

Internal fixation of pubic diastasis secondary to acute trauma is well described.<sup>14,23</sup> The use of a bone graft to supplement plate fixation and effect arthrodesis of the pubic symphysis has also been described in relation to chronic pain secondary to parturition and pelvic injury.<sup>10,15,18-20</sup> Moore et al.<sup>17</sup> conclude by advocating arthrodesis of the pubic symphysis when considering surgery in patients with recalcitrant osteitis pubis. Their suggested method is performed in a fashion similar to that described in this report, although they favor a more conservative approach to the postoperative course. They make no mention of symphyseal instability in their decision-making.

The patients in this series represent less than 5% of all athletes (male and female) seen for groin symptoms related to osteitis pubis during the period covered by this paper. They placed high demands on their corrective surgery and all returned to first-class rugby. We believe that the majority of patients with osteitis pubis can, and should, be managed nonoperatively. It is possible that we have identified a particular subgroup of patients in whom the combination of vertical pubic symphyseal instability together with osteitis pubis leads to a condition recalcitrant to nonoperative measures. We believe that surgery should be considered very much a "last resort" and only after nonoperative measures have been deemed to fail by *both* the attending surgeon and the patient. In this series, surgery was not offered before a minimum of 13 months (range, 13 to 48) of supervised nonoperative management.

Although this series is small, the results suggest that arthrodesis of the pubic symphysis has a definite role to play in the treatment of patients with proven osteitis

pubis recalcitrant to nonoperative treatment and in whom instability is clearly demonstrated. To date we have performed the procedure in well-motivated young men with pathogenesis related to athletic activity (rugby football), but we see no reason why it could not be applied to other groups of patients with recalcitrant osteitis pubis secondary to alternative causes.

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