Bilateral Stress Fractures of the Pubic Rami Following THA
An Unusual Case of Groin Pain

Daniel Smith, B.S., and Joseph D. Zuckerman, M.D.

Abstract
Stress fractures of the pubic rami are rare occurrences and most frequently occur in association with total hip arthroplasty (THA). Reported historically with both cemented and noncemented THA components, postoperative stress fractures likely occur secondary to a rapid postoperative increase in patient activity following years of disability. Though stress fractures of the pubic rami should be considered in the differential diagnosis of groin pain following THA, they require a high degree of suspicion. Diagnosis may be achieved via bone scan after ruling out alternative causes of postoperative groin pain and after accounting for associated medical conditions. Treatment is minimally invasive, requiring a limited period of weightbearing and activity modification, often with full resolution of groin pain and a return to postoperative activity levels.

The persistence or recurrence of groin pain following total hip arthroplasty is uncommon and when it occurs there may be both orthopaedic and nonorthopaedic etiologies. Stress fracture of the pubic rami following total hip arthroplasty is one possible etiology and is very uncommon.1-4 We report a case of a patient who complained of recurrent bilateral groin pain following bilateral total hip arthroplasty who was found to have bilateral stress fractures of the pubic rami.

Case Report
A 58-year-old female presented in 2001 with severe bilateral hip and groin pain. Over the previous 7 years, she had been treated with different nonsteroidal antiinflammatory medications, with limited benefit. At that time, standard radiographs showed advanced degenerative arthritis of both hips, with findings somewhat worse in the left hip. Bilateral total hip arthroplasty (THA) was recommended; however, because of personal reasons, the patient delayed surgery for an additional 3 years. During this period, she became progressively more disabled. When the patient returned for reevaluation, in 2004, she was ambulating, with full-time use of a cane or walker. Radiographs showed further bilateral progression of the degenerative arthritis. In July 2004, she underwent bilateral noncemented THA during the same operative setting (Fig. 1); the procedure was tolerated well. She progressed in a postoperative rehabilitation program, and her hospital course was uneventful.

The patient returned for a reevaluation 6 weeks following surgery. She was progressing well and reported resolution of the bilateral hip pain. Three months postoperatively, she presented with complaints of left groin pain that initially was associated with physical therapy sessions. However, the symptoms became more constant, and she required use of a cane in the right hand. She denied a history of a fall or of another traumatic event. Radiographs, at that time, did not show any significant findings. She was treated with antiinflammatory medication and modification of activities. Over the next 2 months, the left groin pain did not subside and she developed pain about the right groin as well. The symptoms were worse with weightbearing and walking. New radiographs showed only fractures of the left superior and inferior rami, with a mild degree of displacement of the superior ramus fracture (Fig. 2). At that time, the use of crutches or a walker for ambulation was recommended, with the goal of limited weightbearing to control symptoms.
Within one month, the left groin discomfort subsided, but the right groin pain persisted. Radiographs showed reactive changes about the left superior and inferior pubic rami. A technetium bone scan was performed and demonstrated abnormal uptake about the right superior pubic ramus and the left pubic rami. These findings were consistent with a right pubic ramus stress fracture. She was continued on a course of limited weightbearing and activity modification. Evaluation for metabolic bone disease was performed; bone densitometry testing did not show significant osteopenia. The patient continued to use assistive devices for ambulation over the course of the next 3 months. By this time, all symptoms had subsided. Follow-up radiographs did reveal changes about the right pubic ramus consistent with a stress fracture (Fig. 3). The patient resumed full activities and remained asymptomatic.

**Discussion**

Stress fractures of the pubic rami may occur subsequent to THA and should be considered in the differential diagnosis of groin pain following a THA procedure. Though described earlier in the setting of cemented arthroplasty, pubic rami stress fractures also have been recognized to occur postoperatively with the use of noncemented THA components. One such explanation for the late onset of these stress fractures is patients’ attempts to resume normal activity due to a sense of completed healing on their part, secondary to the resolution of the preoperative symptoms. Due to the prior significant preoperative disability, the patient resumes activity at a much higher level than before the THA. This activity increases stress on the pelvis, which, if combined with the stress of the noncemented acetabular component on the pubic bones and possible underlying osteopenia-osteoporosis, may lead to stress fractures in some individuals. The difference between preoperative activities and postoperative activities is even more striking in that the patient delayed operative management for an additional 3 years after bilateral arthroplasty was initially recommended.

In previous reports of postoperative pubic rami stress fractures, unilateral fractures were identified in the setting of bilateral total hip arthroplasty. However, our patient presented with bilateral pubic rami stress fractures, with evidence of some displacement of the left-sided fracture. It is difficult to determine the reason for displacement, since this has not been a pattern previously described. There was no concurrent injury that would explain the displacement. Our patient did not show evidence of significant metabolic bone disease. It is interesting that this patient initially developed symptoms about the left hip that was consistent with a pubic rami stress fracture. She was placed on limited...
weightbearing, with use of a cane in the right hand. This increased the weightbearing stresses on the right side, and she subsequently developed right groin pain and findings consistent with a second pubic rami stress fracture. It is possible that the treatment for the left-sided fracture contributed to the development of the right-sided fracture.

This case illustrates that pubic rami stress fractures should be considered within the differential of groin pain in patients who have undergone THA. It is essential that a complete diagnostic work-up be performed to rule out other causes of stress fracture. With a high index of suspicion, a technetium bone scan should be obtained when symptoms occur; the test is able to confirm the diagnosis of stress fractures before changes become evident in standard radiographs. Treatment consisting of limited weightbearing and activity modification has proven to be successful in resolving symptoms, as has been shown in our case and others reported in the literature.

Disclosure Statement
None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

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