
IMAGING PATHOLOGICAL CORRELATION

Acute Osteolysis of the Pubic Bone and Sacral Insufficiency Fracture

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ABSTRACT

Pubic osteolysis can mimic malignant or infective bone disease. With a growing elderly population locally, it is expected that an increasing number of patients with pubic osteolysis will be encountered in clinical practice. Awareness of this entity and a vigorous search for concomitant sacral insufficiency fracture are important to avoid excessive and unnecessary investigations before making the correct diagnosis.

Key Words: Computed tomography, Fractures, Osteolysis, Pubic bone

CLINICAL DETAILS

A 70-year-old woman presented with bilateral lower limb and pelvic pain of 2 weeks' duration. There was no history of injury before the onset of symptoms. Serial plain radiographs of the pelvis showed extensive destruction of the body of the left pubis (Figure 1). Computed tomography (CT) scanning of the abdomen and pelvis was performed to investigate the possibility of underlying malignancy. The scans identified well-defined bony destruction of the body of the left pubic bone, with bony fragments remaining, and the presence of a rim-enhancing, hypodense lesion (Figure 2). Bone biopsy was performed, with the results showing granulation tissue and callus formation (Figure 3). There was no evidence of granulomatous inflammation or neoplasia. Microbiological cultures were negative. On review of the CT scans, incomplete fractures of the sacral ala on both sides, suggestive of insufficiency fractures, were noted (Figure 4). A provisional diagnosis of atypical acute osteolysis due to sacral insufficiency fracture was made, and the patient was treated conservatively. The lower limb and pelvic pain subsided. Follow-up serial radiographs showed callus formation, with no further destruction of the pubic bone evident (Figure 5).

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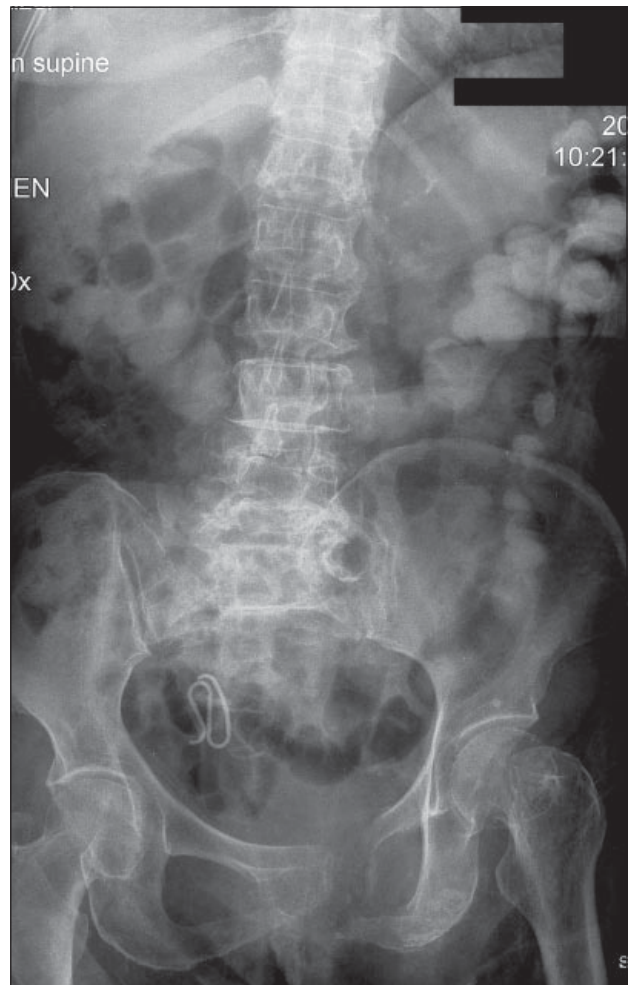


Figure 1. Plain radiograph of the abdomen and pelvis, taken shortly after admission, shows bony destruction of the left pubic body and the subjacent pubic ramus, with loss of corticated borders.

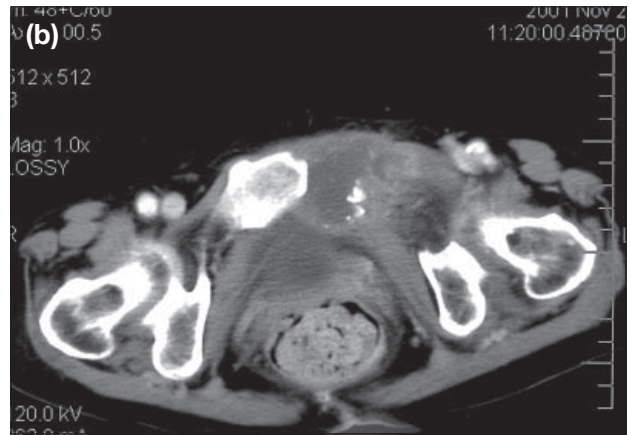
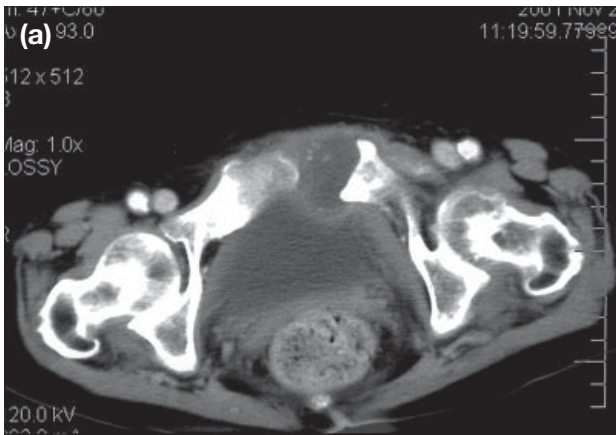


Figure 2. Contrast-enhanced CT scans of the pelvis demonstrate (a) the residual margin of the destroyed left pubic bone is well-defined, and suggestive of sclerosis, and (b) erosion of the left pubic ramus. An abnormal, hypodense mass with peripheral enhancement and bony fragments in place of the left pubic body can be seen.

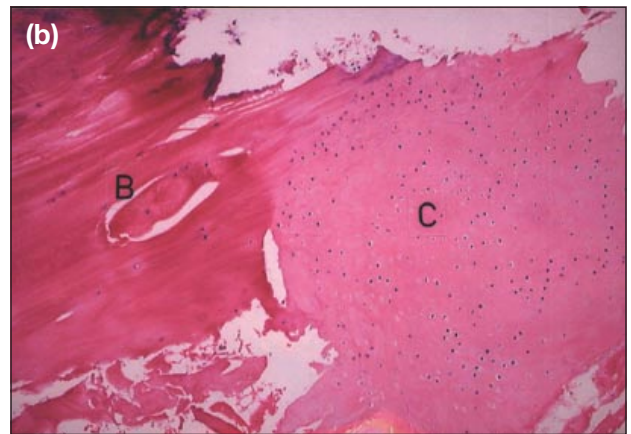
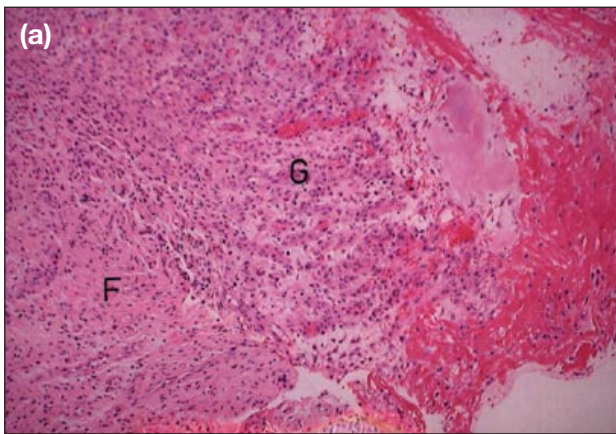


Figure 3. Photomicrographs of the specimen obtained at open biopsy show (a) the cavity wall contains fibrous tissue (F) covered by granulation tissue (G), and (b) callus formation is evident, with woven bone (B) and immature cartilage (C) present.



Figure 4. Axial section of computed tomography scan of the pelvis in bone window setting demonstrates insufficiency fractures (arrows) on both sides of the sacral ala.

Figure 5. Plain radiograph of the pelvis 3 months after initial presentation shows callus formation with no progression of bony destruction. Subtle sclerosis over the sacral ala is noted, which could be related to insufficiency fracture. This film demonstrates the difficulty in identifying sacral lesions on plain radiographs.

COMMENTS

Acute osteolysis in patients with bony fracture has been noted in various sites of the body, including the distal clavicle and ulna.^{1,2} The pubic bone is increasingly

recognised as a common site for osteolysis. Pubic bone osteolysis is usually confined to the pubic body or rami. Bilateral involvement of the pubic bone may also occur.

Although the cause of pubic bone osteolysis is not well known, it is commonly believed to be post-traumatic and related to insufficiency fracture.³ Most reported cases have been in post-menopausal women.^{1,3,4-7} While there is a history of injury before the onset of osteolysis for some patients, a significant number of patients do not report previous trauma. Some of the risk factors leading to local osteopenia have been noted to be associated with the development of osteolysis, including radiotherapy, steroid treatment, rheumatoid arthritis, osteomalacia, and previous hip replacement.⁴⁻⁶

The association of osteolysis with concomitant sacral insufficiency fracture is well-described in the literature.^{1,3,4-6} De Smet and Neff have suggested a causal relationship between the sacral and pubic bone fractures.⁶ They argue that initial mechanical failure of the strong posterior arch of the pelvis could lead to pubic bone fracture because of the resultant increased strain on the weaker anterior portion of the pelvic bony structure.

The patient reported here did not have a history of injury, and insufficiency fracture appeared to be the probable cause of the osteolysis. Differential diagnoses to consider in the presence of a destructive lesion of the pubic bone are malignant and infectious causes. Malignant causes include metastasis and chondrosarcoma, while infections include tuberculosis or pyogenic osteomyelitis. The CT findings for this patient showed bony destruction, with a well-defined, rim-enhancing, hypodense lesion. No significant soft tissue component was demonstrated. During the operation, a cavity with yellowish fluid was entered. Biopsy was then performed at the wall of the cavity. Correlating both CT and pathological findings, the lesion was identified as osteolysis of the bone, with gross resorption of the bony content, and confinement by granulation tissue and callus bone, as a reaction to the osteolytic process.

It is important to be aware of the possibility of acute osteolysis in patients with destructive lesions of the pubic bone in order to avoid excessive and unnecessary investigations and treatment for malignant or infectious causes. Moreover, pathological examination may be misleading, adding to difficulties in making the correct diagnosis. Findings of exuberant cartilage and disordered membranous bone formation may be misinterpreted as chondrosarcoma, for example.⁷ As the

clinical presentation may also be non-specific or misleading, a correct radiological diagnosis is essential.

The appearance of bony destruction due to acute osteolysis may mimic an aggressive bony lesion, with rapid progression of bony destruction. In this case, the relative lack of a solid component in the destructive bony area on CT scan does not suggest the diagnosis of tumour. Moreover, the well-defined, bony border of the lesion is not consistent with a rapidly progressing, aggressive lesion.

The concomitant occurrence of sacral insufficiency fracture is noted in most reported cases of osteolysis,^{1,3,4-6} and is thus a helpful radiological feature to identify or discount. Plain radiographs are not generally useful for diagnosing the fracture, partly due to the osteopenic bone, and partly to obscuration by overlying bowel shadows. However, other imaging modalities including CT scan, magnetic resonance imaging, and radioisotope bone scan are all specific and sensitive for the diagnostic vertical or H-shaped sacral insufficiency fracture. These investigations should be performed to look for fracture if there is a negative finding on plain radiographic evaluation.

Pubic osteolysis is likely to present more frequently in the future, given increases in the size of the elderly population in Hong Kong and elsewhere. Awareness of this possible diagnosis for patients presenting with a destructive lesion of the pubic bone is imperative to limit investigation and ensure appropriate treatment.

REFERENCES

1. Halaby FA, DiSalvo El. Osteolysis: a complication of trauma. *Am J Roentgenol* 1965;94:591-594.
2. Levine AH, Pais MJ, Schwartz EE. Posttraumatic osteolysis of the distal clavicle with emphasis on early radiologic changes. *Am J Roentgenol* 1976;127:781-784.
3. Albertsen AM, Egund N, Jurik AG, Jacobsen E. Posttraumatic osteolysis of the pubic bone simulating malignancy. *Acta Radiol* 1994;35:40-44.
4. Davies AM, Evans NS, Struthers GR. Parasymphyseal and associated insufficiency fractures of the pelvis and sacrum. *Br J Radiol* 1988;61:103-108.
5. McGuigan LE, Edmonds JP, Painter DM. Pubic osteolysis. *J Bone Joint Surg Am* 1984;66:127-129.
6. De Smet AA, Neff JR. Pubic and sacral insufficiency fractures. *AJR Am J Roentgenol* 1985;145:601-606.
7. Goergen TG, Resnick D, Riley RR. Post-traumatic abnormalities of the pubic bone simulating malignancy. *Radiology* 1978; 126:85-87.