Acetabular osteoid osteoma excision by controlled hip dislocation: a case report

Oscar de los Santos[a], Paola Filomeno[a], Rogelio Rey[a] and Alejandro Cúneo[b]

Osteoid osteoma of the acetabulum is rare and its treatment represents a challenge for the orthopedic surgeon. We report a case of a 12-year-old boy with osteoid osteoma in the acetabulum who was treated with a controlled hip dislocation and a gamma probe guide to facilitate excision. The diagnosis was confirmed by pathology. The patient was asymptomatic immediately after surgery and remained so at long-term follow-up. *J Pediatr Orthop B* 22:195–199 © 2013 Wolters Kluwer Health | Lippincott Williams & Wilkins.

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[a]University Clinic of Traumatology and Orthopaedics and [b]Department of Clinical Pediatric Orthopedics, Faculty of Medicine, University of the Republic, Montevideo, Uruguay

Correspondence to Oscar de los Santos, MD, University Clinic of Traumatology and Orthopedics, Faculty of Medicine, University of the Republic, Montevideo 11300, Uruguay
Tel: +598 99 121503; fax: +598 2 7095110; e-mail: oscardlsm@gmail.com

Introduction

Osteoid osteoma is a relatively frequent benign bone tumor, consisting of fibrovascular tissue intermixed with osteoid and surrounded by a halo of reactive sclerotic bone. It is typically present in late childhood, adolescence, and young adulthood. The typical clinical history is that of night pain that is reliably relieved by ingestion of nonsteroidal anti-inflammatory drugs (NSAIDs). Imaging generally shows a small lucent nidus surrounded by dense reactive sclerosis. The average size of the nidus is less than 1.5 cm. Frequent locations are the diaphyseal cortex of long bones in the appendicular skeleton and posterior elements of the spine [1].

Osteoid osteoma arising in a periarticular location may present a greater diagnostic dilemma. Intra-articular osteoid osteoma refers to any lesion surrounded by or very close to the joint capsule and synovium [2,3]. Clinical symptoms are often less specific, and may include joint effusion, warmth, tenderness, stiffness, muscle atrophy, and joint degeneration, and long-lasting symptoms can lead to contractures in the nearby joints [4]. Patients can be misdiagnosed as having inflammatory arthritis or osteomyelitis [4]. Imaging is also more difficult to interpret, as periarticular osteoid osteoma less often shows the extensive reactive sclerosis and the lucent nidus is often radiographically occult [3]. Extracapsular periosteal new bone formation and hyperplastic synovitis resembling inflammatory arthritis have been described [1,4]. Because of the less typical symptoms and imaging characteristics, a diagnostic delay of up to 5 years is common [2,4]. Periarticular osteoid osteoma may arise adjacent to any joint, but the pelvis is particularly unusual, with only 1–3% arising in a periacetabular location [5,6].

Case report

A 12-year-old boy complained of right hip pain and limping for 1 year. There was no previous history of trauma or febrile illness. His medical history was otherwise unremarkable. Typical nocturnal pain was present and the symptoms improved after treatment with NSAIDs. Physical examination indicated a limited range of motion of the affected hip. Initial radiography was normal (Fig. 1). Subsequent bone scan [single photon emission computed tomography/computed tomography (CT)] showed high uptake at the right acetabulum (Fig. 2). CT of the right hip showed a 0.5 cm lucent nidus consistent with an osteoid osteoma in the medial wall of the acetabulum (Fig. 3).

CT-guided radiofrequency ablation was dismissed by the radiologist. The decision was made to resect the tumor through a controlled hip dislocation following the Ganz technique [5]. We first localized the lesion using a cadmium telluride detector after an injection of technetium-99m methyldiphosphonate (^{99m}Tc-MDP) [7]. Detectable radioactivity from injected ^{99m}Tc-MDP has a greater intensity at the nidus and can be identified using the cadmium telluride detector.

The patient was placed in the left lateral decubitus position. A greater trochanteric osteotomy was performed through a lateral approach and the trochanter was reflected anteriorly maintaining the gluteus medius insertion. A Z-shaped arthrotomy of the hip joint was performed and the hip was dislocated by the Ganz technique (Fig. 4).

The cadmium telluride detector was used to identify the location of the osteoid osteoma. A trephine with a cylindrical blade of 0.5 cm diameter was used to resect the central portion of the acetabulum with the maximal radioactivity (Fig. 5). Repeat examination with the detector showed a decrease in radioactivity in the acetabulum, suggesting that the tumor had been resected. Before hip reduction, the femoral head was punctured to detect bleeding (Fig. 6). After reduction

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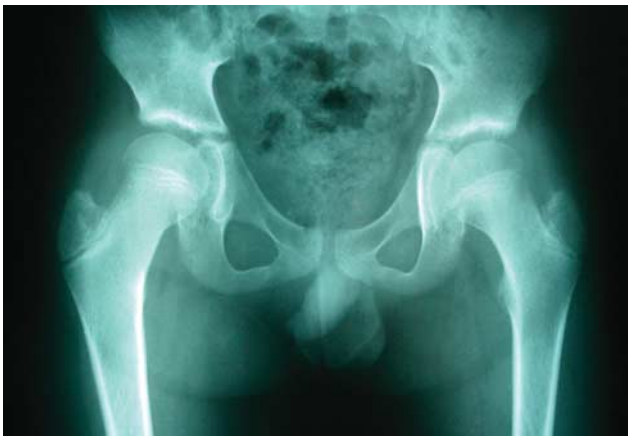
Fig. 1

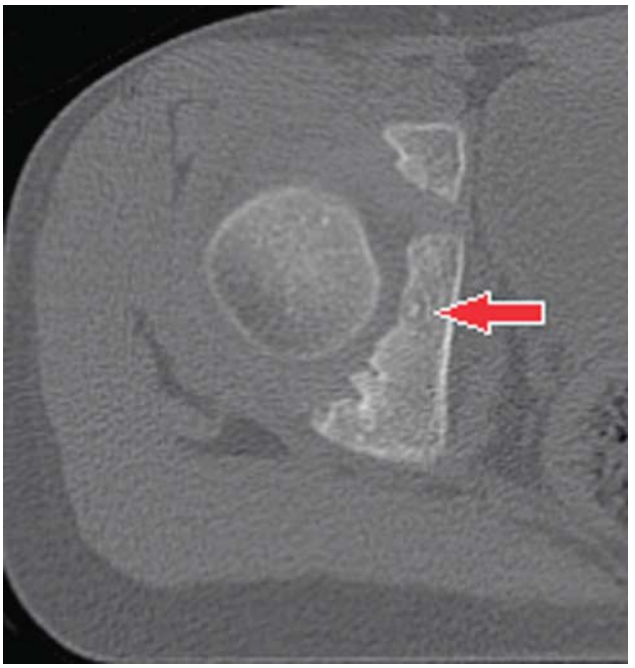


Pelvic radiograph upon admission.

Fig. 2

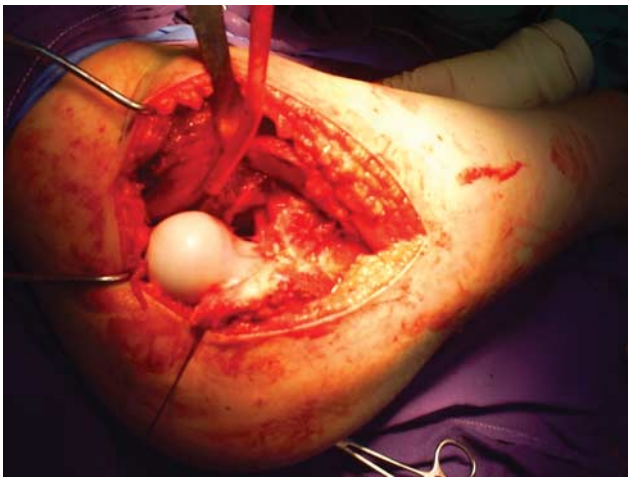
Single photon emission computed tomography/computed tomography of the right acetabulum.

Fig. 3



Computed tomography scan of osteoid osteoma in the right hip.

Fig. 4



Ganz surgical technique.

and capsulorrhaphy, the greater trochanter was fixed with two screws (Fig. 7). A right leg cast with a crossbar was made to prevent rotation of the right lower limb.

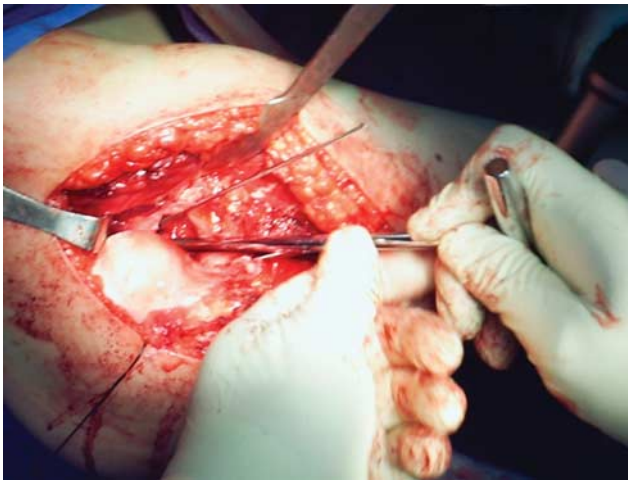
The patient was discharged 4 days postoperatively without complications. On day 15, the cast was removed and the patient was allowed to walk with crutches without weight bearing.

The patient's pain resolved immediately postoperatively. The pathology report confirmed the diagnosis of osteoid osteoma. On postoperative day 45, a new bone scan was performed, which showed significantly reduced uptake in the acetabulum compared with preoperatively. Complete excision was confirmed by CT scan (Fig. 8). Neither of the studies showed signs of epiphyseal necrosis. Partial weight bearing was begun at 6 weeks and complete weight bearing at 10 weeks. At the 3-year follow-up, the patient had a painless gait and showed no radiological evidence of recurrence or avascular necrosis (Figs 9–11).

Discussion

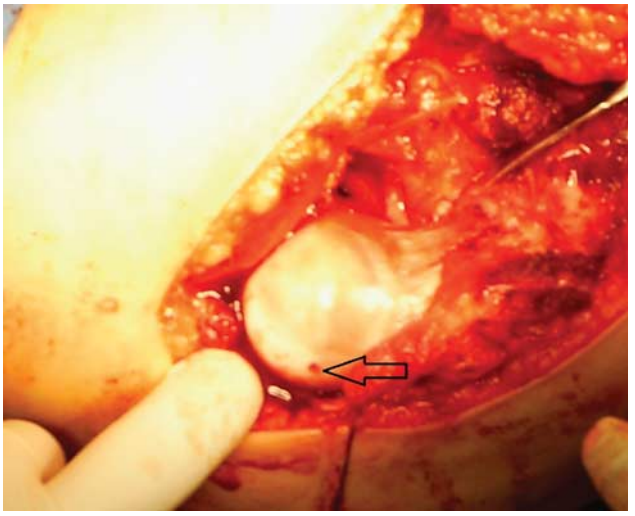
Osteoid osteoma, described by Jaffe [8], comprises ~10% of all benign bone tumors. It is commonly found

Fig. 5



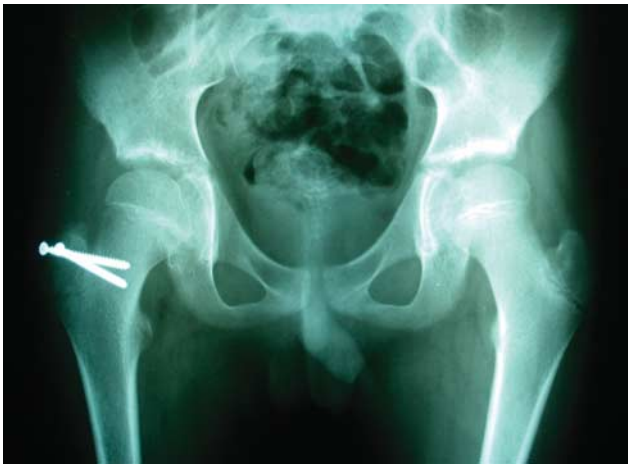
Central portion of acetabulum resection.

Fig. 6



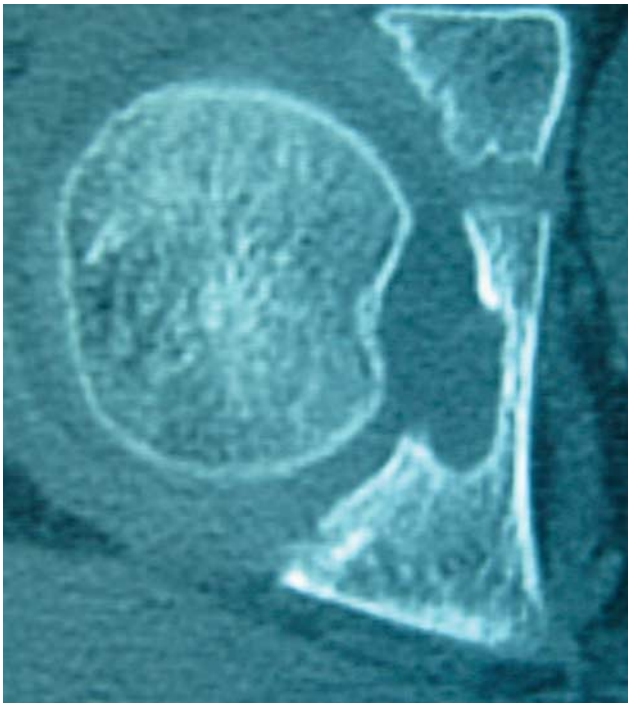
Femoral head drilling.

Fig. 7



Postoperative pelvic radiograph.

Fig. 8

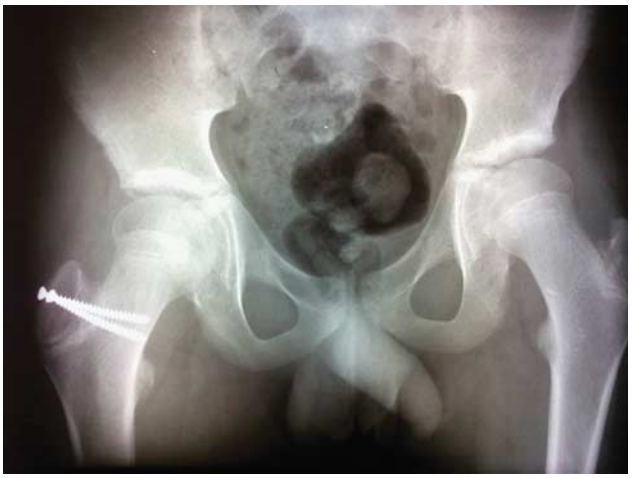


Postoperative computed tomography scan.

in young adults and children, and shows a male predominance [1]. Initial conservative treatment usually consists of the use of NSAIDs. This option is useful in patients in whom surgical treatment is challenging [9–11]. The natural history is one of eventual symptomatic regression, but this may take many years. Therefore, the adverse effects of long-term NSAID use may limit the practicality of this treatment. Furthermore, the success of NSAIDs in controlling the symptoms may be unpredictable [11].

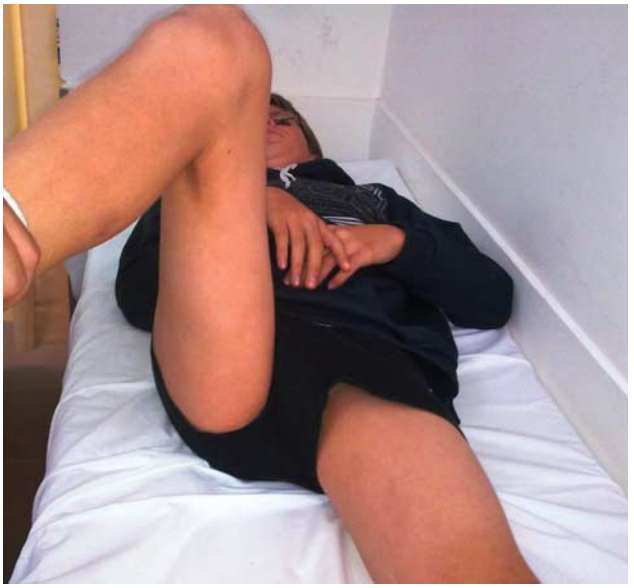
Over the past decade, improved methods for the precise localization of osteoid osteoma with the use of radioisotope scanning or CT have made it possible to treat this lesion with more limited and effective interventional procedures, mainly in deep and noneasily accessible anatomic locations [12]. Although they bear the criticism of lacking histological proof for the diagnosis of osteoid osteoma [5], minimally invasive techniques, such as

Fig. 9



Three-year postoperative pelvic radiograph.

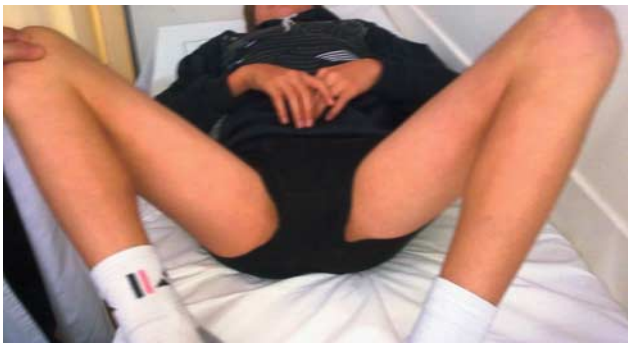
Fig. 10



Complete internal rotation of the right hip 3 years after surgery.

CT-guided percutaneous, radiofrequency, thermal ablation, and laser photocoagulation, have become the treatments of choice for almost all anatomic locations, except those in contact with neural structures [12]. The advantages of these techniques are that they minimize bone removal, reduce the risk of pathologic fracture and the need for bone grafting, and thereby shorten the period of convalescence. These procedures have a relatively low morbidity, although complications such as skin necrosis and infection have been reported [13,14].

Fig. 11



Complete external rotation of the right hip 3 years after surgery.

Success rates of over 90% have been documented, although incomplete ablation can lead to ongoing symptoms [13]. In pediatric patients, it is very important to avoid injury to growth plates, including triradiate cartilage, that may occur secondary to the radiofrequency [15]. The percutaneous methods are slightly less effective than open procedures [16]. A minimally invasive technique with the use of intraoperative 3D C-arm-based navigation has been described recently with the option of taking tissue samples [17].

The location of the osteoid osteoma in our patient represented a particular challenge. CT-guided radiofrequency ablation was not considered in our patient by the imaging team because of the proximity of the sciatic nerve and triradiate cartilage.

Guided arthroscopic excision has been described with good results [5,15,18], but the lesion can be difficult to localize with this technique [15]. Complications range from 0.5 to 6.4% [5]. A recognized complication is pudendal nerve neurapraxia [18].

For the reasons mentioned above, we believed that open surgical resection was the most appropriate treatment for our patient. Intraoperative localization of the nidus is mandatory for success with open surgical excision [16]. Although the endopelvic approach has been described, in our patient, the location in the medial wall of the acetabulum (not weight bearing area) allowed us to perform controlled hip dislocation to identify the nidus intraoperatively by gamma probe radiation [7,19]. The intraoperative use of nuclear medicine allows for improved localization of the lesion, thereby allowing its removal without excessive bone resection. It has also been useful to confirm the absence of residual pathological tissue after excision [7]. The use of controlled hip dislocation using Ganz osteotomy provides excellent exposure, a low rate of avascular necrosis, and good functional outcome for this difficult clinical scenario.

Conclusion

Osteoid osteoma of the acetabulum represents a challenge for the orthopedic surgeon. Our treatment of choice, using controlled hip dislocation and radioguided surgery with an injection of ^{99m}Tc-MDP, provided us with a valid therapeutic option with which we performed a localized, safe, and effective resection.

Acknowledgements

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Conflicts of interest

There are no conflicts of interest.

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