



Osteoid Osteoma: Resection with CT Guidance

Kalman Katz MD¹, Liora Kornreich MD², Rami David MD¹, Gad Horev MD² and Michael Soudry MD¹

¹Orthopedic Surgery Unit and ²Department of Imaging, Schneider Children's Medical Center of Israel, Petah Tiqva, and Sackler Faculty of Medicine, Tel Aviv University, Israel

Key words: osteoid osteoma, resection, CT guide

Abstract

Background: Osteoid osteoma is a benign bone lesion characterized by nocturnal pain mostly, which may be relieved by non-steroidal prostaglandin inhibitors. Treatment by complete resection of the nidus immediately relieves the pain. Intraoperative location of the nidus may be difficult, and extensive bone resection may be necessary to ensure complete excision. Few studies have described resection of osteoid osteoma under CT guidance, and little attention has been given to lesions near the neurovascular bundle.

Objective: To report our results of osteoid osteoma resection under CT guidance, with specific attention to lesions lying near the neural structure.

Methods: Nine patients with suspected osteoid osteoma underwent resection with a 6.8 mm core drill under CT guidance.

Results: Histologic confirmation was obtained in seven patients, while in two there was no evidence of the nidus in the excised bone material. All nine reported complete pain relief immediately after the surgery. Postoperative CT scan showed complete removal of the osteoid osteoma.

Conclusions: Removal of osteoid osteoma under CT guidance is simple, safe and allows complete removal of the nidus with low morbidity.

IMAJ 2000;2:151-153

Osteoid osteoma is a benign bone lesion characterized by the formation of a small nidus of variably calcified osteoid tissue in the stroma of loose vascular connective tissue, surrounded by a margin of dense sclerotic bone. The lesion causes considerable pain, more marked at night, which may be relieved by non-steroidal prostaglandin inhibitors [1].

Treatment consists of complete resection of the nidus, which immediately relieves the pain. Intraoperative location of the nidus may be difficult, and extensive bone resection may be necessary to ensure complete excision, with possible risk of fracture and an extended period of healing.

Few studies have described resection of osteoid osteoma under CT guidance [2-5]. Moreover, little attention has been given to lesions located near the neurovascular bundle. We report our results of osteoid osteoma resection under CT guidance, with specific attention to lesions lying near the neural structure.

Materials and Methods

The study population included nine patients, seven males and two females, aged 10 to 22 years, who had pain from osteoid osteoma for 3-12 months. The patients reported that the pain was more severe at night and was relieved with naproxen. The preoperative diagnosis was based on clinical history, plain radiography, bone scan and computed tomography studies. Bone scan indicated an increased area of intake at the site of the lesion.

The osteoid osteoma was located in the proximal tibia in two patients, the femoral shaft in two, the posteromedial cortex of the femoral neck near the sciatic nerve in two, the posterior cortex of the medial condyle of the humerus near the ulnar nerve in one, proximal humerus in one, and both the medial malleolus and talus of the same leg in one patient. In each case the patient was positioned on the CT table to allow the shortest access to the lesion, as determined at the initial diagnostic CT scan. The lesions were initially localized on CT scan by imaging continuous 2 mm thick sections. The site was then marked on the skin surface. A guide wire was inserted under general anesthesia through the marked skin into the nidus by a direct route. Its position was verified by CT scan and, if necessary, corrected. A small incision was made on both sides of the wire and a blunt cannulated obturator and sleeve were inserted over the guide wire. The obturator was then removed and a 6.8 mm core biopsy drill was inserted over the guide wire. The depth of the drill into the bone and past the cortex was also verified by CT scan and the whole lesion was excised in one step. Bone curettage was then performed with a small spoon to remove residual debris. At the end of the procedure, CT scanning was repeated to confirm complete removal of the nidus. The excised core was sent for histological examination.

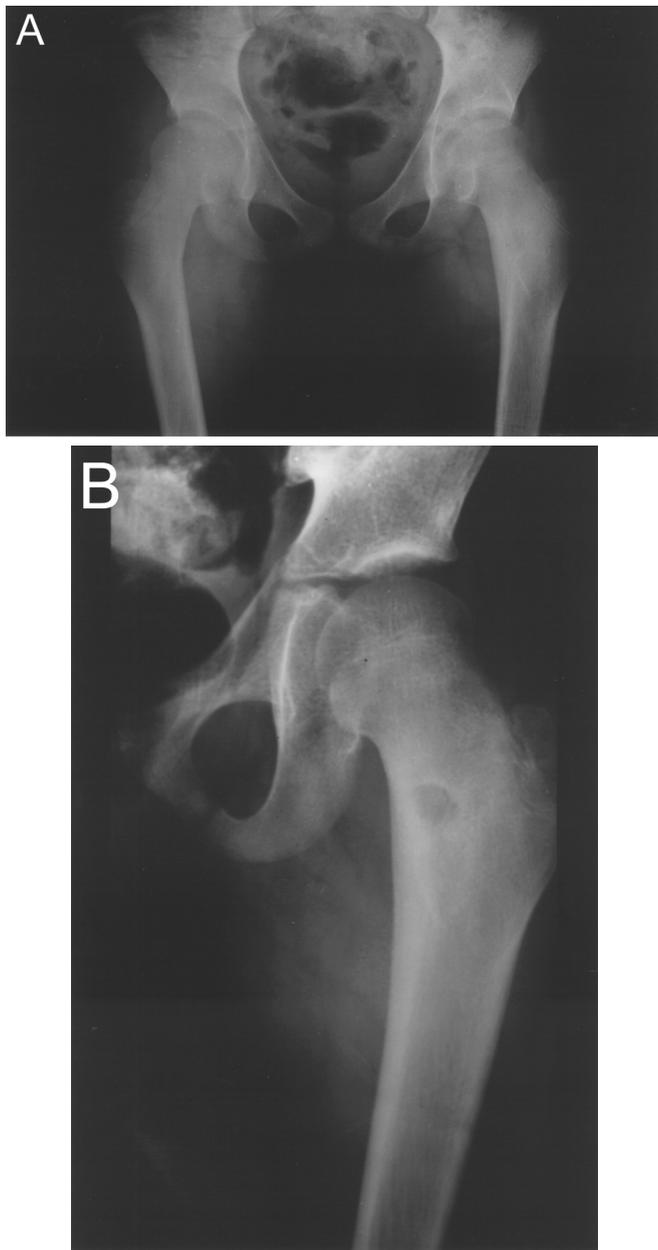


Figure 1. [A] Anteroposterior radiography of the left hip of a 10-year-old girl, showing osteoid osteoma in the femoral neck. [B] Radiograph of the hip of the same patient showing the size of the bone defect after removal of the osteoid osteoma.

To avoid nerve injury, a small incision was made over the skin mark in the remaining three patients, in whom the lesion was located near the ulnar nerve in the posteromedial cortex of the condyle of the humerus and in the posterior cortex of the femoral neck [Figures 1 and 2]. With the patients in the prone position, the bone surface was exposed by blunt dissection, and with direct vision under CT guidance the guide wire and the core drill were inserted into the nidus. All patients received prophylactic antibiotic treatment before surgery.

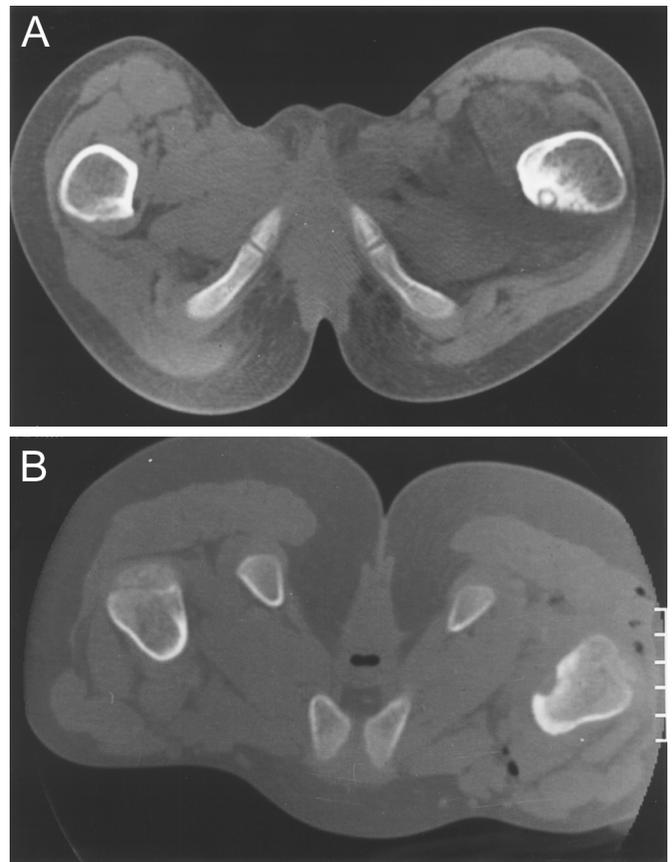


Figure 2. [A] Axial CT scan (while lying supine) showing osteoid osteoma in the cortex of the left femoral neck. [B] Postoperative CT scan (prone) showing complete removal of the nidus.

Results

Complete and immediate relief of pain was achieved in all cases. Postoperative plain radiograph and CT scan confirmed complete removal of the nidus [Figure 2B]. In seven patients a nidus was found on histological study; in one there was no evidence of a nidus in the excised bone material and in one the heat caused by the power drill burnt the excised material. The procedures required from 2 to 4 hours to complete.

Although the operation was performed in the CT room, no infection occurred. The bone defect healed within 3 months in all patients, and they returned to full activity. No recurrence was observed at follow-up 6–36 months after surgery.

Discussion

Successful treatment of osteoid osteoma can be achieved only with complete excision of the nidus. Localization of the nidus during open surgery is not always possible, and extensive resection is sometimes necessary to ensure complete removal. Excision of excessive bone results in weakening of the bone, prolonged healing time, and high risk of fracture. The results of the present study, as well as others [2–5], demonstrate that CT guidance enables

complete excision of the nidus and the removal of only small amounts of bone.

This method has some disadvantages: the main problem has been that a reliable diagnostic sample cannot always be retrieved for histological analysis [2,3]. This was true for two of our patients as well.

CT guidance is excellent for localizing the lesion and placing the guide. However, because the CT scans are obtained intermittently there is a danger of the guide and the drill being placed deeper than necessary. To minimize the amount of bone removed, the drill should be inserted through the shorter route from the skin to the lesion. To avoid neurovascular damage we recommend inserting the guide and drill under direct visualization when the lesion is adjacent to a neurovascular structure.

Removal of osteoid osteoma under CT guidance is simple, safe, and allows complete removal of the nidus with low morbidity.

References

1. Gittelis S, Wilkins R, Conrad EU. Benign bone tumors. *J Bone Joint Surg* 1995;77A:1756–82.
2. Assoun J, Railhac JJ, Bonneville P, Poey C, De Gauzy JS, Baunin C, Cahuzac JP, Clement JL, Coustets B, Railhac N. Osteoid osteoma: percutaneous resection with CT guidance. *Musculoskel Radiol* 1993;188:541–7.
3. Mazoyer JF, Kohler R, Bassard D. Osteoid osteoma: CT-guided percutaneous treatment. *Radiology* 1991;181:269–71.
4. Porat S, Abu Sneina K, Amir G, Bar Ziv J, Fields S. Percutaneous CT-guided excision of femoral osteoid osteoma. *Harefuab* 1994;126:10–12 (Hebrew).
5. Towbin R, Keye R, Meza MP, Pollock AN, Yaw K, Moreland M. Osteoid osteoma: percutaneous excision using a CT-guided coaxial technique. *Am J Radiol* 1995;164:945–9.

Correspondence: Dr. K. Katz, Orthopedic Surgery Unit, Schneider Children's Medical Center of Israel, Petah Tiqva 49202, Israel. Tel: (972-3) 925 3759; Fax: (972-3) 925 3988; email: catz@isdnet.il.