

Minimally Invasive Technique for Treatment of Osteoid Osteoma: A Case of Anatomically Critical Lesion in an Adolescent Patient

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Received: 25 January 2021; Revised: 06 March 2021; Accepted: 12 May 2021

Abstract

Background: Osteoid osteoma is a benign osteogenic tumor affecting adolescents and young adults. It is managed using different treatment options. The lesions located around the lesser trochanter is rare and the management of these lesions is troublesome. Here, we report a case of an osteoid osteoma in the lesser trochanteric region, managed with a minimally invasive surgical excision of the lesion.

Case Report: In a 14-year-old girl patient with nocturnal left thigh pain from 2 years before, conservative treatment with administration of non-steroidal anti-inflammatory drugs (NSAIDs) was not effective, and symptoms were refractory to medication. The day after surgery the patient was pain-free.

Conclusion: The surgical management of osteoid osteoma in the region of the lesser trochanter is troublesome. The minimally invasive surgical excision of the lesion using CT-guided percutaneous drilling and resection of the osteoid osteoma is a safe, simple, cost-benefit, and effective technique.

Keywords: Osteoid Osteoma; Bone Neoplasms; Treatment

Citation: Masoumi F, Sharafi MH, Nabian MH. Minimally Invasive Technique for Treatment of Osteoid Osteoma: A Case of Anatomically Critical Lesion in an Adolescent Patient. *J Orthop Spine Trauma* 2021; 7(2): 74-6.

Background

Osteoid osteoma is a benign tumor, first described in 1932 (1). Lower limbs and especially proximal femur, are the common locations (about 25% of cases) (2). The vascular osteoid accompanied by surrounding sclerosis, named 'nidus', is the characteristic of this tumor. The diameter of osteoid osteomas is less than 2 cm. They are classified into 3 subtypes, including cortical, cancellous, and subperiosteal. The intracortical subtype is the predominant subtype in osteoid osteomas of the appendicular long bones (3, 4).

Osteoid osteomas account for 10% of benign bone tumors (5). The etiology of this benign tumor is not well-defined. The nidus reportedly contains high levels of prostaglandin E2 and prostacyclin, causing local inflammation and vasodilatation (6). Osteoid osteomas are painful lesions with characteristic pain pattern described variously as sharp, boring, deep, often worst at night and frequently relieved by salicylates (6, 7).

Osteoid osteoma mainly affects adolescents and young adults (6). 70% of the affected young patients are younger than 20-year-old. The prevalence is higher in the lower extremities compared to the upper extremities. The femoral and tibial bones are involved in approximately 50 to 60%. Intra-articular regions of the femoral neck (intracapsular) or adjacent areas are the common sites of femoral involvement (8). The lesions located around the lesser trochanter is rare and the management of these lesions is demanding. Therefore, it is of importance to be well skilled to handle it in structurally critical anatomical sites (7, 9). Here, we report a case of an osteoid osteoma in the lesser trochanteric region and describe the clinical presentation,

radiological findings, and successful outcome after a minimally invasive surgical excision of the lesion.

Case Report

A 14-year-old girl presented with the severe nocturnal proximal left thigh pain of 24 months duration. It had been treated on and off with non-steroidal anti-inflammatory drugs with partial relief and prompt return of pain, on its discontinuance. Physical examination did not reveal any evidence.

Radiographic Finding: In plain radiography of the proximal right femur, there was an elliptical lucency in the medial proximal femoral cortex with a zone of surrounding sclerosis (Figure 1).



Figure 1. Plain radiography of the osteoid osteoma



Computed tomography (CT) scan revealed a diffuse cortical thickening, involving the medial proximal femoral cortex of the left side. An internally lytic lesion was noted with a thickened medial cortex and a little nidus within it (Figure 2).



Figure 2. Computed tomography (CT) scan shows a radiolucent nidus with central calcification and surrounding reactive sclerosis

Surgical Technique: This procedure was performed under general anaesthesia. The patient was placed in the supine position for a lateral or anterior approach to the tumor. After induction of general anaesthesia in the operating room, the patient was conveyed to the CT suite. The nidus was identified to determine the best CT-slice for the instruments. A 1-cm incision was made on the skin, and a guidewire was aimed at the nidus.

The guidewire was inserted by the lateral approach through the vastus lateralis muscle, employing CT guidance (Figure 3).

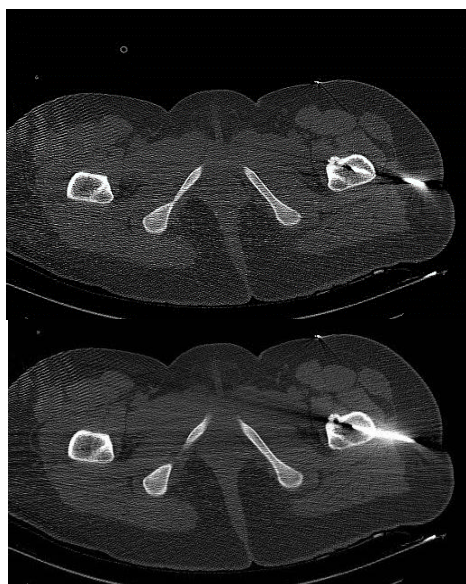


Figure 3. Utilizing the guide wire

Then, the patient was taken back to the operating room. The wire was used to guide a drill bit. The patient was moved to the fracture table. Intraoperative C-arm fluoroscopy was used for careful drilling using a number 4 cannulated drill bit (1.2 mm Guidewire). Then with a surgical molt curette, the whole tumor with the nidus was removed in a 1-cm diameter bone cylinder (Figure 4).



Figure 4. Cannulated drill guided over the wire into the nidus and the nidus removed

The nidus and a cylinder of bone were sent to the pathology unit for further assessment. No serious complications, including hemorrhage, infection, or neurovascular injury were noted after surgery.

The day after surgery the patient was pain-free; so, the hospitalization lasted for 2 days with toe touch weight-bearing on crutches for the first few days. The histopathology confirmed the diagnosis of osteoid osteoma. Postoperative radiographs were free of the tumor (Figure 5).



Figure 5. Radiograph after discharge

Discussion

There are different options for the treatment of osteoid osteoma, including conservative, surgical, and percutaneous techniques (10). Regarding the spontaneous healing of osteoid osteomas, treatment with aspirin or other non-steroidal anti-inflammatory drugs (NSAIDs) is first considered as a preferred option (8, 9). On the other hand, surgical treatment is selected for patients with severe pain, unresponsive to NSAIDs, patients with structural complications of bone and joints, or contractures. There are several techniques, including En bloc resection, trephine excision, cryoablation, radiofrequency ablation, and laser thermocoagulation. Additionally, the arthroscopic techniques are used for intra-articular lesions (7).

The classic surgical methods have been successfully applied for years with a reported rate of 88-100%. Due to the high rate of complications, there has been a rapid transition to minimally invasive treatment methods (11). Among these treatment options, the complications of radio frequency ablation (RFA) are less than percutaneous drilling and open surgery. Remarkably, even though RFA is minimally invasive, the complications are not considered

low. Fractures, abscesses, and superficial and deep thermal damages have been reported. Hence, it is important to have a precise pre-operative plan. The high cost of required probes and specific materials has limited these techniques, especially in developing countries (12).

Surgical techniques should be considered in cases with failure of conservative treatments. The classical treatment is the complete surgical excision, but occasionally it may cause structural weakness of the bone. Moreover, it requires a long period of non-weight bearing and activity restriction. For structurally critical anatomical sites such as the proximal femur, minimally invasive methods are appropriate options (7).

The surgery of the nidus located around the lesser trochanter is challenging. Open surgical techniques should be performed with the medial approach that may cause regional complications like neurovascular damage and subtrochanteric fracture (13). Besides, there are some reports of thermal damage following percutaneous thermocoagulation or RFA (11, 14). Moreover, the treatment approach to the lesions near the open growth plates in the adolescent patients with the small-sized bones is easier said than done (13).

Fine drills, bone trephine, Tru-Cut needles, and cannulated curettes have been successfully employed with percutaneous CT-guided techniques (14). Among these techniques, using the fine drill, as done in this report, is a safe, minimally invasive, cost-benefit and simple way to treat this pathology. The devices used in this report are generally available, which is an important issue in developing countries.

Conclusion

Osteoid osteoma is a benign bone tumor, managed with various treatment options. CT-guided percutaneous drilling and resection of the osteoid osteoma is a safe, minimally invasive, cost-benefit, simple, and effective technique.

Conflict of Interest

The authors declare no conflict of interest in this study.

Acknowledgments

None.

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