Diagnosis and management of osteoid osteoma in children;Review

Nusaybah Fahad Alhadi

Abstract— Our main objective in this review was to discuss the diagnosis and therapeutics option in management of osteoid osteoma. We also intended to review different diagnostic methods as well as different treatment strategies. We conducted a narrative review of the literature using the online databases such; Medline and EMBASE. Studies ivolving the diagnostic procedures and management options were targeted in our search. We included studies published up to September, 2017. restriction to English language and human subject were performed in our search strategy. Osteoid osteoma is a benign primary skeletal tumor taking place generally in the cortex of long bones, but also in the spine. Osteoid osteoma may happen in basically any bone of the body, however the method of therapy has to be considered carefully, especially when it occurs in the spinal column. Osteoid osteomas and osteoblastomas in childhood years can be taken care of efficiently either operatively or nonsurgically. Signs for surgical procedure consist of failing to regulate signs with NSAIDs, neurological deficit, and also requirement for pathological medical diagnosis. The use of modern intraoperative CT as well as image advice can be helpful in challenging situations.

Index Terms—Benign bone tumors,Diagnosis of bone and joint disorders,Imaging and pathology of bone lesions,Orthopedic diseases, Osteoid osteoma, Pediatric bone diseases diagnosis,Percutaneous treatment with radiofrequency energy,Tumors and tumor-like lesions of the bone.

INTRODUCTION

Osteoid osteoma is a benign reactive bone sore [1] that most regularly takes place in youngsters male patients in between 10 and 20 years of age [2]. It comprises a central component, the nidus, made up of osteoid tissue and also surrounded by a sclerotic reactive edge. It represents 2-3% of all bone tumors as well as 10-- 20% of benign bone tumors. It involves more frequently long bones (primarily the femur) complied with much behind by brief bones of feet and also hands. Roughly 10--25% of osteoid osteomas happen in the back [3, 4, 5]. Osteoid osteoma commonly begins with a dangerous start of pain over the affected area [6], that might emit distally [7].

It usually happens in the 3rd and also the second decade of life (75% of the situations are in patients below 25), and also males outnumber females at a proportion of 2 to 1 [3]. Foot is an infrequent site for osteoid osteomas, comprising 4-16% of all areas but osteoid osteoma is the most common benign bone tumor affecting the foot and also ankle joint, accounting for up to 35% of all biopsied benign tumors [4,6]. Talus is one of the most usual website (31- 59%) with calcaneus adhering to in 12.5 - 22% of instances involving the foot [7].

The radiography is commonly diagnostic and also appears as a tiny radiolucent nidus with a thick uniform edge of responsive bone without linked bony disintegration or soft tissue mass [8,9]. Nevertheless, a little sore can be ignored and also could regularly be spotted by means of a bone check [9].

The dominant medical signs and symptom is pain that is most severe at rest as well as at night which is thought to react well to non-steroidal anti-inflammatory drugs, such as painkillers [10,11]. When traditional therapy with anti-inflammatory representatives stops working, surgical treatment is recommended [12]. Existing therapy for osteoid osteomas is usually standard surgical is approached [13,14]. Recently, minimally invasive surgical treatment, either through percutaneous core excisional bone biopsy or radiofrequency ablation, has actually been effectively presented for the management of osteoid osteoma [7,12,14].

Our main objective in this review was to discuss the diagnosis and therapeutics option in management of osteoid osteoma. We also intended to review different diagnostic methods as well as different treatment strategies.

METHODOLOGY

Detailed We conducted a narrative review of the literature using the online databases such; Medline and EMBASE. Studies involving the diagnostic procedures and management options were targeted in our search. We included studies published up to September, 2017. restriction to English language and human subject were performed in our search strategy.

DISCUSSION

1 Diagnostic Methods

These osteoblastic tumors seldom exceed 1.5- 2 centimeters in size. The main location, or nidus, consists of interconnected trabeculae of osteoid and also woven bone. Osteoblasts and also a variable number of osteoclasts are bordered by loosened fibrovascular connective tissue [15,16]. Cartilage, bone marrow elements, and mitotic numbers are typically missing [16]. The central nidus usually shows more abundant mineralization, representing the calcification within the lucent area recognized on imaging [16].

1.1 Radiological assessment

The typical appearance is of a small rounded to oval location of osteolysis (nidus), the diameter which hardly ever goes beyond 1 centimeters, bordered by a normal ring of bone scle-

IJSER © 2017
http://www.ijser.org

rosis. In many cases, within the nidus there may be a central and also irregular center of bone thickness, offering a regular cockade appearance [15]. An isotope bone scan is particular and also commonly positive, showing a tiny as well as a rounded location of intense uptake centered in a much less intensely positive and much more diffuse halo, the former standing for the nidus, and the last the peripheral hypervascularization. When making use of a pinhole zoom of the website of boosted uptake [this is called the dual thickness indication and also is best seen [16]. Radiographs, as well as isotope scan, work to direct CT scans. CT is the diagnostic method of selection for tumor discovery and also characterization [15,16]. Thin-section CT (1 - 2-mm pieces) reconstructed in the bone algorithm with multiplanar reformats is ideal. CT is typically used when the presumed nidus is obscured by bordering sclerosis on radiography [16] There is a distinct round or oval sore of soft-tissue depletion, less dense compared to as well as surrounded by variable amounts of osteosclerosis (Figure 1) [17] CT usually shows nidus mineralization, which may be punctate, amorphous, or ringlike [17].

Technetium-99- classified bone scintigraphy may prove beneficial for confirming an osteoid osteoma diagnosis. The sensitivity of skeletal scintigraphy for discovery is practically 100% [15]. Specialists have actually used intraoperative gamma cameras both to situate tumors and also to confirm resection. Pathologists have additionally used radionuclide researches to situate the nidus, hence facilitating histopathologic analysis [8,9,15].

1.2 Patient Natural History

The natural history of osteoid osteoma varies depending upon its location. Otherwise detected, it can generate bone widening and contortion, or perhaps limb length inequality or angular inconsistencies when it lies close to a growth plate. Intra-articular osteoid osteomas may generate a durable synovitis. When located at the back, it can result in an unpleasant scoliosis or an excruciating torticollis. In some cases, nevertheless, it can recover spontaneously after a period ranging from 3 to 7 years [18].

Incorporating clinical history and a multimodality imaging strategy generally causes appropriately detecting osteoid osteoma. Stress fractures typically create cortical enlarging in a lengthy bone diaphysis similar to tumors. However, fractures look like a straight offense in the center of the cortical thickening, whereas osteoid osteomas materialize as a round or oblong lucency (Figure 1) [17].

2 Treatment Options

The clinical presentation is most commonly pain, occasionally with a neurological shortage and also often scoliosis. Neurological deficit has actually been reported to be much more often related to osteoblastoma, due to the fact that this tumor encroaches on the neural canal greater than osteoid osteoma [13] The presence of scoliosis can be due to either sort of tumor, as it has actually been reported as being a measure of osteoblastoma and also of osteoid osteoma [19]. The nature of osteoid osteoma varies, and patients may experience symptomatic relief in some cases. The natural history of osteoblastoma tends to be extra aggressive, as well as these lesions, once detected, are normally dealt with operatively [18].

There are three basic techniques to dealing with osteoid osteomas: medical, medical, as well as percutaneous management [20]. Conservative management with NSAIDs could be promoted initially, and also studies have actually discovered these medications to be a sensible option to surgery with respect to long-term symptomatic relief [21]. In one recent study by Goto et al. [22], 92 % (11/12) of patients with osteoid osteoma treated with NSAIDs were discomfort totally free at a mean interval of 18 months after therapy initiation. Numerous authors have actually reported that the all-natural training course of osteoid osteomas is spontaneous regression and that NSAIDs accelerate this process [21,23]. Nevertheless, patients could not endure long-lasting NSAID therapy as a result of undesirable intestinal adverse effects [20]. The surgical procedure comes with possible disadvantages, consisting of dangers associated with general anesthesia, difficulty finding the sore intraoperatively, extended hospitalization and also rehabilitation, as well as weakness at the resection website [20,21].

2.1 Percutaneous CT in Management of Osteoid Osteoma:

Percutaneous CT guided resection of osteoid osteoma was first reported for management of lesions in the appendicular skeleton and consequently applied to the spine [24,25]. As a result of the possible threat of unintended penetration of the spine canal [13,14] and the regular failings of percutaneous CT guided resection of back lesions [24], as opposed to the successful management of osteoid osteomas of the extremities [13,16,24], its appeal has not gained energy. Percutaneous radiofrequency ablation has been suggested as an alternate method to overcome restrictions of percutaneous resection. The method wased initially reported in the appendicular skeletal system by Rosenthal et al. [12] as well as soon obtained appeal for the treatment of osteoid osteomas of the extremities and also pelvis [12,26].

DCT-guided percutaneous excision using trephines and also hollow huge caliber drills might call for limitation of activity and weight bearing for up to 3 months. Thinking about that a 1-- 2 centimeters cut is called for on the skin as well as deeply via the soft tissues, the denomination 'percutaneous' needs to be solidified when contrasting this technique with radiofrequency coagulation or laser photocoagulation, which do not necessitate any cut at all. In a series of 38 patients treated by percutaneous resection, Sans et al. [27] reported an overall difficulty price of 24%, and a pathologic crack with the area of percutaneous excision in two situations. Percutaneous damage of the nidus utilizing ethanol has likewise been reported. Adam et al. [28] accomplished good outcomes after a combination of drill biopsy of the nidus and also succeeding ethanol shot. The performance of ethanol alone is, nonetheless, questionable, because of that healing might have happened just as a result of drill ablation of the nidus for biopsy. This is sustained by the writer's experience [29].

IJSER

2.2 Surgical and Minimal Invasive Radiation Management of Osteoid Osteoma in The Spine

Osteoid osteoma in the spine is commonly local in the posterior components and might have a close structural partnership to neural and also dural structures [19,20]. Because of the location of the sore and the risk for neurologic injury, therapy has usually been open en bloc excision or intralesional curettage under basic anesthesia [9,13].

Computed tomography (CT)- assisted radiofrequency ablation (RFA) is the common therapy for osteoid osteoma [20]; nonetheless, this treatment is difficult in children, specifically when the sores are located in the hand or foot [21,22], as bordering neurovascular bundles are at risk of being affected by ablation. Some writers have recommended that surgery should be utilized as the primary therapy in this patient population [9, 13].

Radiofrequency electrocoagulation to treat osteoid osteoma by thermal death has actually been called a legitimate choice for lesions localized in the appendicular skeleton [13,18,19].

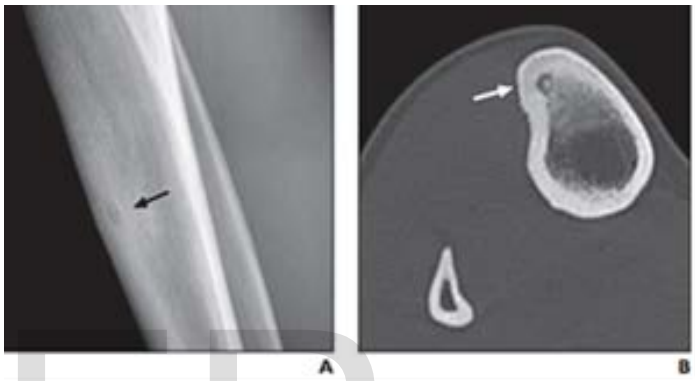
Ablation is typically executed for 4 - 6 mins. Bigger sores may need numerous ablation cycles with electrode rearranging [23]. A number of teams have actually pointed out clinical success rates greater than 90% for RFA of osteoid osteomas [18, 24]. Possible step-by-step complications include thermal skin or neural injury, damage to surrounding soft tissues consisting of cartilage, as well as blood loss or infection at the skin entrance website [23]. Various other minimally intrusive strategies include cryoablation, arthroscopic excision, ethanol shot, and also interstitial laser photocoagulation [27,28,29].

CONCLUSION

Osteoid osteoma is a benign primary skeletal tumor taking place generally in the cortex of long bones, but also in the spine. Osteoid osteoma may happen in basically any bone of the body, however the method of therapy has to be considered carefully, especially when it occurs in the spinal column. Osteoid osteomas and osteoblastomas in childhood years can be taken care of efficiently either operatively or nonsurgically. Signs for surgical procedure consist of failing to regulate signs with NSAIDs, neurological deficit, and also requirement for pathological medical diagnosis. The use of modern intraoperative CT as well as image advice can be helpful in challenging situations.

FIGURES

Figure 1: A, Lateral radiograph shows oval lucent nidus (arrow) within anterior tibial cortex with surrounding osteosclerosis. B, Axial unenhanced CT shows to greater advantage central calcification within nidus (arrow) [17].



REFERENCES

[1] Aergerter EE, Kirkpatrick JA Jr, editors. Orthopedic diseases. 3. Philadelphia: Saunders; 1968. pp. 491–500.
[2] Mehta MH. Pain provoked scoliosis. Observations on the evolution of the deformity. Clin Orthop Relat Res. 1978;135:58–65.
[3] Azouz EM, Kozlowski K, Marton D, Sprague P, Zerhouni A, Asselah F. Osteoid osteoma and osteoblastoma of the spine in children. Report of 22 cases with brief literature review. Pediatr Radiol. 1986;16(1):25–31
[4] Barei DP, Moreau G, Scarborough MT, Neel MD. Percutaneous radiofrequency ablation of osteoid osteoma. Clin Orthop Relat Res. 2000;373:115–124.
[5] Lindner NJ, Ozaki T, Roedl R, Gosheger G, Winkelmann W, Wörtler K. Percutaneous radiofrequency ablation in osteoid osteoma. J Bone Joint Surg Br. 2001;83(3):391–396.
[6] Pettine KA, Klassen RA. Osteoid-osteoma and osteoblastoma of the spine. J Bone Joint Surg Am. 1986;68(3):354–361.
[7] Fountain EM, Burge CH. Osteoid osteoma of the cervical spine. A review and case report. J Neurosurg. 1961;18:380–383.
[8] Kaweblum M, Lehman WB, Bash J, et al. Osteoid osteoma under the age of five years. The difficulty of diagnosis. Clin Orthop 1993;296:218–24.
[9] Kchouk M, Mrabet A, Touibi S, et al. Osteoid osteoma of the spine. Radiological study of 21 cases. J Radiol 1993;74:135–42.
[10] Resnick D, Kyriakos M, Greenway GD. Tumors and tumor-like lesions of the bone: imaging and pathology of specific lesions. In: Resnick D, editor. Diagnosis of bone and joint disorders. Philadelphia: Saunders; 2002. p. 3763–4128.
[11] Braun S, Chevrot A, Tomeno B, Delbarre F, Pallardy G, Moutounet J, et al. Phalangeal osteoid osteoma (13 cases). Rev Rhum Mal Osteoartic 1979;46:225–33
[12] Rosenthal DI, Alexander A, Rosenberg AE, Springfield D. Ablation of osteoid osteomas with a percutaneously placed electrode: a new procedure. Radiology. 1992;183:29–33.

[13] Ozaki T, Liljenqvist U, Hillmann A, et al. Osteoid osteoma and osteoblastoma of the spine: experience with 22 patients. Clin Orthop 2002;397:394– 402.
[14] Lee D, Malawer M. Staging and treatment of primary and persistent (recurrent) osteoid osteoma: evaluation of intraoperative nuclear scanning, tetracycline fluorescence and tomography. Clin Orthop 1992;281:229–38.
[15] Kransdorf MJ, Stull MA, Gilkey FW, Moser RP Jr. Osteoid osteoma. RadioGraphics 1991; 11:671–696
[16] Papathanassiou ZG, Megas P, Petsas T, et al. Osteoid osteoma: diagnosis and treatment. Orthopedics 2008; 31:1118–1127
[17] Iyer RS1, Chapman T, Chew FS. Pediatric bone imaging: diagnostic imaging of osteoid osteoma. AJR Am J Roentgenol. 2012 May;198(5):1039-52.
[18] Golding JSR. The natural history of osteoid osteoma. With a report of twenty cases. J Bone Joint Surg Br 1954; 36B:218–229.
[19] Zileli M, Cagli S, Basdemir G, Ersahin Y: Osteoid osteomas and osteoblastomas of the spine. Neurosurg Focus 15(5):E5, 2003
[20] Rosenthal DI, Hornicek FJ, Torriani M, et al. Osteoid osteoma: percutaneous treatment with radiofrequency energy. Radiology 2003; 229:171–175
[21] Kneisl JS, Simon MA. Medical management compared with operative treatment for osteoid osteoma. J Bone Joint Surg Am 1992; 74:179–185
[22] Goto T, Shinoda Y, Okuma T, et al. Administration of nonsteroidal anti-inflammatory drugs accelerates spontaneous healing of osteoid osteoma. Arch Orthop Trauma Surg 2011; 131:619–625
[23] Feletar M, Hall S. Osteoid osteoma: a case for conservative management. Rheumatology 2002; 41:585–586
[24] Assoun J, Railhac JJ, Bonnevialle P, Poey C, Salles de Gauzy J, Baunin C, et al. Osteoid osteoma: percutaneous resection with CT guidance. Radiology. 1993;188(2):541–547.
[25] Poey C, Clement JL, Baunin C, Assoun J, Puget-Mechinaud C, Giron J, et al. Percutaneous extraction of osteoid osteoma of the lumbar spine under CT guidance. J Comput Assist Tomogr. 1991;15(6):1056–1058.
[26] Rosenthal DI, Hornicek F, Wolfe M, et al. Percutaneous radiofrequency coagulation of osteoid osteoma compared with operative treatment. J Bone Joint Surg Am. 1998;80(6):815–821.
[27] Sans N, Galy-Fourcade D, Assoun J, et al. Osteoid osteoma: CT-guided percutaneous resection and follow-up in 38 patients. Radiology 1999; 212: 687–692.
[28] Adam G, Neuerburg J, Vorwerk D, et al. Percutaneous treatment of osteoid osteomas: combination of drill biopsy and subsequent ethanol injection. Semin Musculoskelet Radiol 1997; 1:281–284.
[29] Ghanem I, Collet LM, Kharrat K, et al. Percutaneous radiofrequency coagulation of osteoid osteoma in children and adolescents. J Pediatr Orthop B 2003; 4:244–252.

IJSER