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Successful and Rapid Resolution of Transient Osteoporosis of the Hip (TOH) with Hyperbaric Oxygen Therapy (HBOT): A Case Report

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Abstract

Transient osteoporosis of the hip (TOH) is a condition that can cause severe and debilitating joint pain. It can be misdiagnosed as avascular necrosis of the hip (AVN). Hyperbaric oxygen therapy (HBOT) was given to a patient with severe hip pain and diagnosed with early AVN with the hopes of avoiding surgical intervention. Within 2 months, the clinical symptoms of hip pain completely resolved, and the diagnosis was changed to TOH. HBOT successfully reversed TOH, minimized the period of debilitation in this disorder and may hold promise in early AVN patients.

Keywords: Transient osteoporosis of the hip; Avascular necrosis; Hyperbaric oxygen therapy, Hip pain

Introduction

Transient osteoporosis of the hip (TOH) is a condition characterized by its primary symptom of joint pain and is more common in males versus females [1]. The condition affects several regions of the body, and greatly limits patient mobility and range of motion [2]. Presently, there are limited treatment options available for afflicted patients. The practice of Hyperbaric Oxygen Therapy (HBOT) has emerged as a possible treatment choice for patients diagnosed with TOH [3]. This article reports the case of a 47-year-old male initially diagnosed with AVN based on clinical and radiological findings which was then subsequently reinterpreted as being possibly consistent with TOH. The patient underwent 40 HBOT sessions and reached a stage of complete recovery within 2 months.

Case Report

We report a case of a 47-year-old male who had a past medical history significant for lumbar disc herniation with right-sided sciatica. His medication list included Thyroxine, Lipitor and Aspirin. He reported no medical allergies and no significant surgical history. The patient had a one month history of left hip and buttock pain. He was previously diagnosed with right L4-L5 disc herniation with primarily right-sided symptoms. He was treated with a two week course of Prednisone 15 mg PO Q-day for three weeks. This resolved the lower back pain, however, similar symptoms developed on the left hip and buttock six months later. The pain was quite disabling and he had difficulties ambulating.

The patient was referred for imaging studies including plain films and an MRI scan of the hip. Plain radiographs of the pelvis and hip revealed some element of femoral sclerosis (Figure 1). The Magnetic Resonance Imaging (MRI) showed bone marrow edema with increased signal intensity in the femoral head on T2-weighted images (Figure 2). In addition, bone density testing was performed which demonstrated osteoporosis at 2 significant standard deviations below the mean. His symptoms included pain rated 6/10 in the left hip with gait disturbance and limping. The pain was worse with weight bearing activities. He was diagnosed with Avascular Bone Necrosis (AVN) of the hip Stage I. Given this diagnosis, it was recommended that he be considered for surgical decompression of the left hip. The patient was reluctant to undergo surgery and was suggested to avoid weight bearing, walking with a cane, and the use of nonsteroidal anti-inflammatory medications including Prednisone. It was then suggested that he attempt hyperbaric oxygen treatment. The hyperbaric oxygen treatment was instituted over 45 days. In total, thirty treatments were delivered from Monday to Friday.

Figure 1: Plain X-Ray. Query mild sclerosis of the left femoral head. No other notable findings.

Hyperbaric oxygen treatments lasted 90 minutes with 100% oxygen delivered at 2.5 atm in a multiplane chamber. By treatment twenty-one, the pain began to dissipate and by treatment thirty, the pain was

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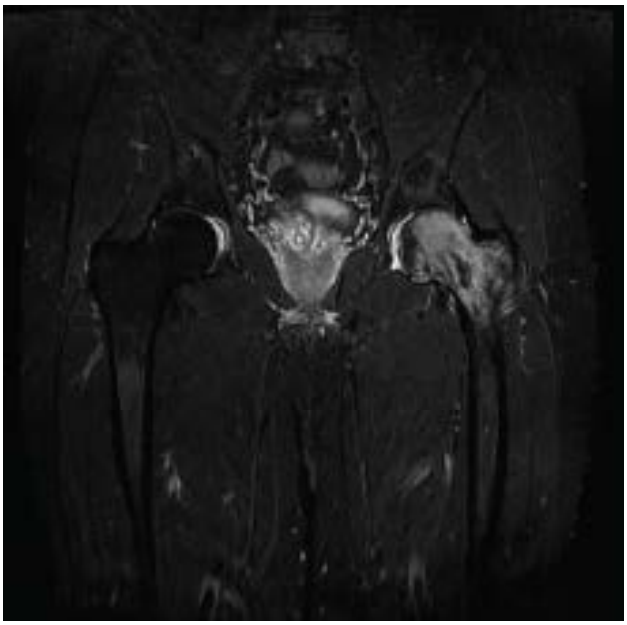

Figure 2: MRI Scan. Multiplanar multisequence MR imaging of the left hip was performed without intravenous contrast. Coronal T1 and STIR imaging through the bony pelvis. Abnormal signal involving the left femoral head and neck mainly weight-bearing aspect of the femoral head with low signal on T1 high signal on T2 and STIR. There is some irregularity and evidence of subcortical fracture of the left femoral head. There is some degree of edema of the soft tissues adjacent to the femoral neck. Appearances are consistent with early stage avascular necrosis of the left femoral head.

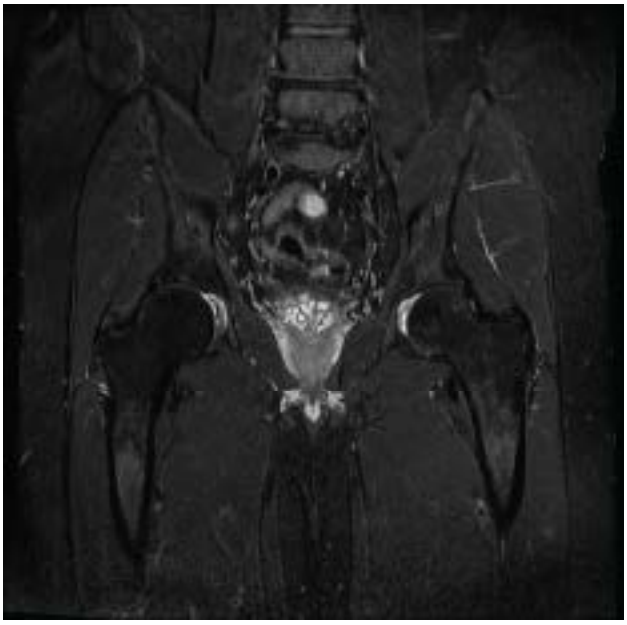

Figure 3: Post HBOT MRI Scan. MRI with avascular necrosis protocol including coronal T1 and STIR of bilateral hips. Axial T1 axial T2 fat sat and sagittal T2 hips were performed with comparison to the previous MRI. Examination demonstrates normal bone signal of the femoral heads bilaterally on coronal T1 and STIR sequences which demonstrates no evidence of transient osteoporosis, avascular necrosis or any signal abnormality.

rated by the patient as a 0/10. A follow-up MRI scan three months later revealed complete resolution of the abnormalities noted on the initial MRI scan (Figure 3). Retrospective review of the MRI scans suggested that the clinical condition was possibly more consistent with Transient Osteoporosis of the Hip (TOH) as opposed to AVN. After treatment, the patient has returned to normal activities of daily living and has no issues with weight-bearing status. He has not had a recurrence of any of the symptomatology for greater than two years.

Result and Discussion

Transient Osteoporosis (TOH) of the hip is an uncommon clinical entity that has been sporadically mentioned since first defined by Curtis and Cincaide in 1959 [3-6]. The etiology and pathophysiology remain unclear and the main clinical symptom is unexplained joint pain [5]. TOH patients exhibit symptoms ranging from escalating hip pain with limitation in the range of motion of the hip accompanied by compromised weight bearing status [4]. Transient Osteoporosis (TOH) typically develops in middle aged men and women in the third trimester of pregnancy [4]. It is often considered or misdiagnosed as early Avascular Necrosis (AVN) of the hip [6]. Fortunately, TOH is a condition that, unlike AVN, does not require surgical intervention. Transient Osteoporosis (TOH) is a self-limiting condition and is treated by supportive and conservative therapy such as analgesics, NSAIDS, Benzodiazepines, rest and protected weight bearing [6]. Most symptoms resolve within 6 months to 18 months from onset [2-6]. Case reports have suggested that there is a role for HBOT in both early AVN and TOH to reduce physical discomfort and pain [1-6]. The patient we describe is a middle-aged male who underwent HBOT for presumed early stage AVN. The diagnosis was later revisited to include TOH. Hyperbaric Oxygen Therapy (HBOT) is increasingly being considered as a treatment option for Transient Osteoporosis of the Hip (TOH) as well as early stage Avascular Necrosis (AVN) [7]. Under normal circumstances, oxygen is delivered to the body through the movement of red blood cells. With HBOT, oxygen is dissolved into all the body's fluids: the plasma, the central nervous system, the lymph, and the bone and can reach multiple areas [7]. The result is rapid improvement in microcirculation [8-10]. Hyperbaric Oxygen Treatment involves the inhalation of 100% oxygen at 2.5 atmospheres of pressure [7]. The cellular and biomechanical benefits of HBOT relate to the reduction of edema, the promotion of angiogenesis, proliferation of fibroblasts and collagen synthesis by means of its vasoconstrictive effect. Hyperbaric Oxygen Therapy reduces tissue edema, lowers intraosseous pressure, restores venous drainage and rapidly improves microcirculation [10]. The value of HBOT in multiple medical conditions such as decompression sickness, arterial gas embolism, osteonecrosis and flap healing is well documented [8]. The therapy significantly amplifies the body's healing processes. TOH in its earlier stages is commonly misdiagnosed for Steinberg Stage-I Avascular bone Necrosis (AVN), as it was in our patient [7]. It may be difficult to differentiate the two clinical entities as the radiographs can be unclear during the earlier stages of either conditions [7-11]. Some researchers have suggested that TOH may be an early reversible phase of AVN [11]. It is imperative to distinguish between the two entities as different treatment regimens follow suit. Unlike TOH, Avascular Necrosis (AVN), is a progressive condition resulting from an interruption of the vascular supply to the femoral head. A delay in diagnosis of AVN may cause a progression towards the collapse of the femoral head. Close clinical follow up and prompt surgical intervention may be required.

Conclusion

The complicating factor in the case report presented is that steroid

use was noted prior to the development of the left hip symptoms for disc herniation. A known risk factor for the development of AVN is steroid use. There have been reports to suggest that HBOT can play a beneficial role in both early stage AVN of the hip as well as TOH [11]. The patient in question initiated HBOT with a pretreatment diagnosis of early stage AVN of the hip. The goal of this form of conservative therapy was to influence the rate of bone resorption and repair of the femoral head to preserve femoral head structural integrity. The earliest finding in both TOH and AVN is bone marrow edema which has been shown to be improved with HBOT [11]. Bone marrow edema is the radiological finding of note in this patient and HBOT definitively reversed the abnormal signal findings on the pretreatment and post treatment MRI scans (Figures 2 and 3). The period of debilitation for TOH normally runs between 6 to 18 months but with the use of HBOT, this was reduced in our patient to only 2 months before complete resolution and even earlier for pain elimination and return to normal activities. We suggest that HBOT is an effective, noninvasive treatment option in cases where bone marrow edema of the femoral head is present and TOH or early AVN of the hip are the considered diagnoses.

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