



International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2022; 8(1): 551-554
© 2022 IJOS
www.orthopaper.com
Received: 09-11-2021
Accepted: 12-12-2021

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Massive heterotopic ossification after hip arthroscopy: A case report

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DOI: <https://doi.org/10.22271/ortho.2022.v8.i1h.3070>

Abstract

Heterotopic ossification is a new bone formation that occurs in soft tissue, especially between muscle and joint capsule, which is very common after spinal cord and traumatic brain injuries. It can occur with inflammation as well as with trauma. In this article, we presented a patient who had undergone hip arthroscopy surgery and whose heterotopic ossification had reached a massive size that would affect his daily life. In 2015, a patient applied to an external center clinic with the complaint of pain in the right hip. The patient was 16 years old and practicing martial arts. After various treatments, hip arthroscopy was recommended in June 2016 with the diagnosis of cam-type impingement and he was operated on in June 2017. 3 months after surgery, the patient noticed difficulty in hip movements and radiological imaging showed heterotopic ossification. A daily 75 mg/d Endol treatment was applied for 3 weeks and he received intermittent physical therapy. ESWT (Extracorporeal Shock Wave Therapy) was applied to the patient whose complaints did not improve. The hip flexion of the patient partially recovered and also, he was able to sit partially after ESWT treatment. The patient declared that he had to take a break from the controls due to the pandemic. Open excision and debridement were recommended for the patient's current condition, and hip arthroplasty was offered as a treatment option if necessary. Heterotopic ossification can be seen after hip arthroscopy and can grow to massive sizes, affecting the patient's daily life. It may occur in major surgeries in orthopedics and may occur after hip arthroscopy and, although rarely, reach large dimensions and affect the daily life of the patient. It is important to consider the risk factors associated with heterotopic ossification. Patient selection is important in preventing the occurrence of HO, and appropriate observation, consideration of risk factors before and during the surgical procedure, and appropriate prophylaxis may be beneficial.

Keywords: Heterotopic ossification, hip arthroscopy, massive, case report level of evidence: level 4

Introduction

As of 1970, many data on heterotopic ossification around the hip have been presented. As of 1970, many data on heterotopic ossification around the hip have been presented. Non-steroidal anti-inflammatory drugs (NSAIDs) have been used to reduce the incidence of heterotopic ossification (HO) after total hip replacement. In addition, conventional cyclooxygenase (COX) inhibitors and selective COX-2 inhibitors (COXIB) have also taken their place in the treatment [1-3]. Although there is abundant data on heterotopic ossification after open hip surgery in studies and many definitions have been made, less is known about this complication after hip arthroscopy [2-4].

Heterotopic ossification is a new bone formation that occurs in soft tissue, especially between muscle and joint capsule, which is very common after spinal cord and traumatic brain injuries. It can occur with inflammation as well as with trauma. Existing osteogenic cells, inflammation, and the rich vascular environment can be effective in the formation of HO. Although studies have been conducted on the HO formation mechanism, the entire pathway has not yet been elucidated [5].

Bone tissue, often formed by heterotopic ossification, replaces traumatized and inflamed tissue. The formed bone tissue often does not have a periosteal layer and is metabolically active, however, it is similar to the lamellar structure of the bone. Bone morphogenetic protein 2 (BMP2) is known to be effective in the formation of HO. BMP2 is probably released after injury, increasing inflammatory elements [6].

HO after hip arthroscopy may cause pain. Sometimes it can lead to a decrease in the patient's range of motion and affect his daily life. HO can be seen at a rate of 0-44% after hip arthroscopy, and although they are often small and asymptomatic, they can lead to clinical and functional results in massive sizes [6, 7].

Here, we present a case of massive heterotopic ossification, which highly affects the daily life of the patient.

Case Report

In 2015, when the patient was 16 years old and practicing martial arts, he applied to the external center clinic with the complaint of pain in the right hip. 10 doses of intramuscular cortisol treatment was administered from the gluteal region due to pain. The patient with increasing complaints in the last 8 months was examined by various doctors as of March 2016, due to the complaints of stabbing-type pain in the hip and edema. Suggestions were made with the diagnosis of osteitis pubis. The patient had to quit active sports and exercise due to his increasing complaints. In June 2016, the patient was examined and X-ray (Picture 1) and MRI (Picture 2) were requested. His imaging showed signs of cam-type impingement in his right hip, and with this diagnosis, hip arthroscopy was recommended to the patient.



Fig 1: X-Ray image before the operation. June 2016

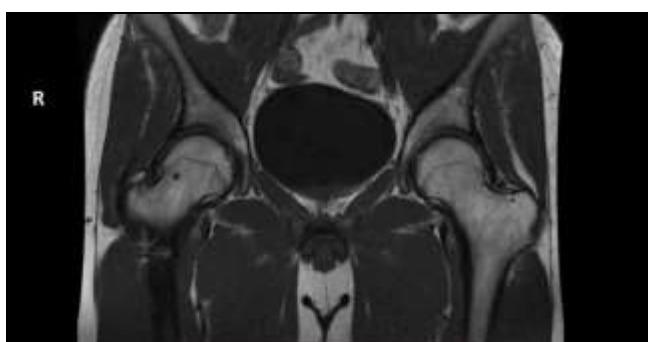


Fig 2: MRI section before the operation. June 2016

The patient with open joint movements underwent hip arthroscopy in June 2017. The cam-type hump was shaved and the labrum was repaired. The patient was not mobilized for 3 days due to numbness in his legs. For the patient who was mobilized with a walker until the 2nd week, mobilization was started with crutches in the 2nd week, and full weight was given after the 1st month. From the 40th day, physical therapy and rehabilitation were applied for 2-3 months. In October 2017, the patient noticed difficulty in rolling over in bed and limitation of hip movements. In the outpatient clinic

control, hip flexion was 90 degrees, external rotation was 40 degrees, internal rotation was 20 degrees, and radiographs showed signs of heterotopic ossification in the right hip (Figure 3).



Fig 3: X Ray – 2017 October– 3 months after the operation

CT scan was also performed and heterotopic ossification level was screened (Figure 4 and 5). The patient was treated with 75 mg/day Endol for 3 weeks. In addition, the patient was taken to rehabilitation and physical therapy was applied. The patient's complaints did not regress and he had difficulty in sitting. The patient underwent 60 sessions of ESWT (Extracorporeal Shock Wave Therapy) from June 2018 to September 2019. Progression was observed by x-ray imaging of the patient (Picture 6). He was able to sit partially after ESWT and gained 20 degrees of hip flexion. The patient was admitted to our clinic in April 2021 and detailed anamnesis was taken and new imaging was performed (Pictures 7 and 8). The patient declared that he had to take a break from the controls due to the pandemic. Open excision and debridement were recommended for the patient's current condition, and hip arthroplasty was offered as a treatment option if necessary. The patient was informed that his condition could be published and his consent was obtained.



Fig 4: CT scan–Coronal Section–2017 November

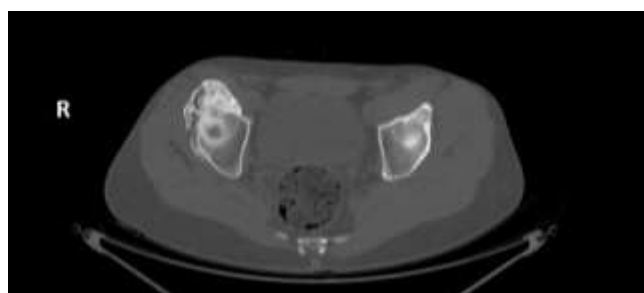


Fig 5: CT scan –Axial Section - 2017 November

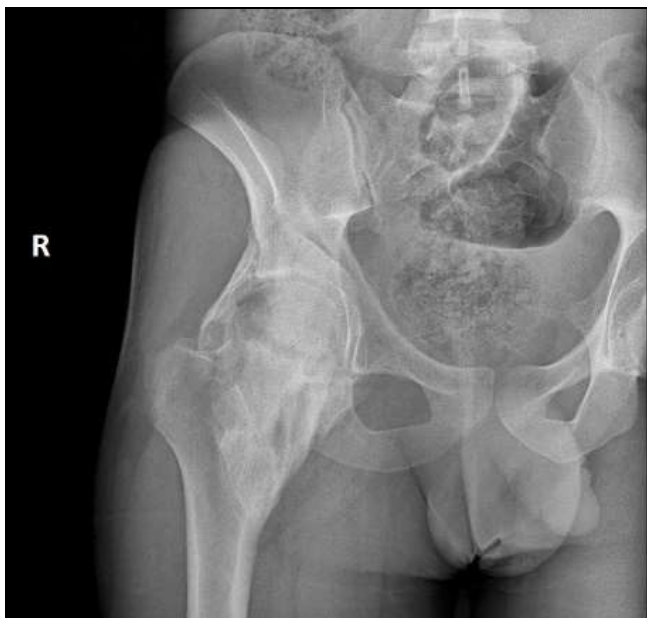


Fig 6: X – Ray – July 2019



Fig 7: X-Ray – March 2021 (1)

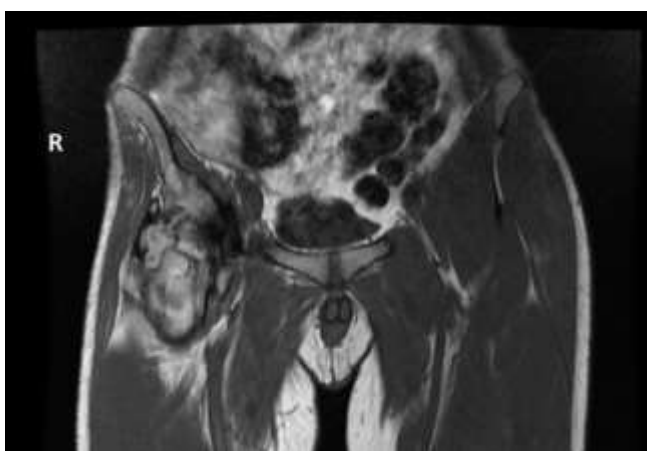


Fig 8: MRI section – April 2021

Discussion

Hip arthroscopy is widely used for various conditions [8]. The main diseases that can be treated with hip arthroscopy are as follows;

Femoroacetabular impingement syndrome: It can be summarized as compression that develops due to deformities of the bones forming the hip joint. Due to this compression, cartilage damage and long-term arthrosis may develop in the hip joint [8].

Hip Labrum tear: Mechanical symptoms such as pain, snagging, and locking may be seen in patients with tears in this area, similar to impingement syndrome. Cystic lesions formed by joint fluid (a sac filled with joint fluid) can be seen in the vicinity of this tear [8].

Cartilage injuries: Cartilage lesions can be seen in the articular cartilage of the bones forming the hip joint, often due to trauma. These lesions can be treated with different methods, similar to cartilage injuries in other joints [8].

Tumor surgery: In the treatment of some benign bone and soft tissue tumors, procedures such as taking a biopsy from the lesion with hip arthroscopy and curettage of the lesion can be performed [8].

Heterotopic ossification (HO) is the formation of new bone in the soft tissue and may manifest as mature lamellar bone formation in non-skeletal soft tissues after hip arthroscopy. This is often asymptomatic and is a minor problem that may occur after hip arthroscopy [6].

In our case, massive heterotopic ossification affects the patient's daily life and prevents him from doing sports.

Heterotopic ossification most often occurs around the hip. It can also occur around the knees, elbows, shoulders, hands, and spine [5, 6, 9]. Risk factors for developing HO after traumatic brain injury are coma lasting more than 2 weeks, being on a mechanical ventilator, signs of autonomic system disorder (for example, spikes in blood pressure), bone fracture, spasticity, and immobility. The first 3-4 months after trauma is the riskiest period in terms of heterotopic ossification [9].

It is important to know the risk factors specific to hip arthroscopy in the formation of HO in order to make appropriate classification and patient selection for possible postoperative prophylaxis [10]. Risk factors include male gender, trauma - especially head trauma-, previous surgeries of the patient, inflammatory conditions, etc. There is literature information that femoral osteoplasty can be a risk factor after hip arthroscopy [10]. In addition, unrepaired capsulotomy was seen as a risk factor for HO after hip arthroscopy [10].

In addition to hip surgeries such as hip arthroplasty, the proximity of the damaged periosteum to the injured muscle tissue may increase the risk of HO in cases of acetabular trauma and hip dislocation [11]. In their study, Rath *et al.* [12], hypothesized that capsular repair after hip arthroscopy reduces HO formation by creating a barrier between necrotized injured muscle tissue and damaged periosteum, whereas Amar *et al.* [13] Amar *et al.* reported that there was no difference between the group that underwent capsule repair and the control group that did not.

In order to prevent the occurrence of HO, the formation mechanism steps can be blocked. Blocking the inflammatory signaling pathway, formation of osteoprogenitor cells, and disruption of the appropriate environment for them are important in treatment and prophylaxis [9].

Hip-specific heterotopic ossification may be asymptomatic. In addition, it may be symptomatic by manifesting itself with tension and decreased range of motion. The Brooker classification was developed to categorize radiologically heterotopic ossification after hip arthroscopy in 1973 [4, 14]. According to Booker's classification, HO is divided into 4 types. This classification system was created by considering

the literature on total hip arthroplasty. With this classification, confusion is avoided in the orthopedic community when discussing HO, especially around the hip joint [4, 14].

Clinically, heterotopic ossification presents with pain, progressive loss of joint range of motion. There can also be present soft tissue swelling and warmth. These postoperative findings may be confused with early infection. Other laboratory changes observed are a decrease in serum calcium levels, an increase in phosphate levels, an increase in alkaline phosphatase levels between two and four weeks, and a peak in the third month [15]. Other laboratory changes are observed to begin to rise in weeks and peak in the third month. The scintigraphic evaluation obtained with technetium-99 is useful for examining the metabolic activity of bone mass and bone development after heterotopic ossification [15].

Various imaging and laboratory methods are used for diagnosis. During the initial formation of the bone, the blood level of ALP may increase [6, 15]. The sedimentation value also increases. These two markers are not specific for heterotopic ossification but may support the diagnosis if in doubt. The gold standard among imaging methods is 3-phase bone scintigraphy, which shows the event in the earliest period [6, 15]. X-ray films and ultrasonography may be normal because calcium deposition is low in the early period. However, as the process progresses, ossification increases and becomes observable in these examinations [6, 15].

Conclusion

Heterotopic ossification may occur in major surgeries in orthopedics and may occur after hip arthroscopy and, although rarely, reach large dimensions and affect the daily life of the patient. Femoral osteoplasty and failure to repair the capsule are among the risk factors specific to hip arthroscopy and should be considered among the more well-known risk factors such as head trauma and inflammatory conditions.

It is important to consider the risk factors associated with heterotopic ossification. Patient selection is important in preventing the occurrence of HO, and appropriate observation, consideration of risk factors before and during the surgical procedure, and appropriate prophylaxis may be beneficial.

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