

Traumatic Heterotrophic Ossification Of Quadriceps Femoris – A Case Report

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Abstract

Background: Formation of mature lamellar bone at unusual sites like soft tissues, which normally does not exhibit properties of ossification is known as Heterotopic ossification (HO). It has a multi-factorial etiology with multiple risk factors. Trauma is one of such inciting event.

Case report- We are reporting a rare case of Heterotopic ossification of right quadriceps femoris in a 26 year old young adult, with severe knee stiffness, with no improvement following conservative treatment, which was successfully treated with surgical excision, obtaining good clinical results.

Key words- Heterotopic ossification, quadriceps femoris, knee stiffness, surgical excision

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Introduction

Heterotopic ossification (ectopic ossification), can be defined as the formation of mature lamellar bone at sites, where normally no ossifications occurs, like muscles and soft tissues [1]. The lesion comprises of fibroblasts and osteoblasts, with a high proliferating potential. It is quiet commonly seen in active young adults, especially among male athletes [2]. Trauma, either acute or chronic is a major cause leading to HO, and lesions adjacent to joints can be seen in some conditions with neurological component. Upon presentation, ossification becomes so extensive that it becomes evident and radiological studies reveal the benign behavior of the lesion.

Connective tissues like involuntary muscles, tendons, fascial sheaths, and ligaments are

the sites commonly involved in ectopic bone formation [3]. The flexor of the arm, the hamstrings and quadriceps femoris are the muscles, commonly involved in heterotrophic ossification (HO) [4]. The most common location of the heterotrophic ossification is represented by the pelvic ring, followed by the elbow, shoulder, and knee. Joint stiffness is often the pathognomonic characteristic of this disabling disease [5].

Synonyms for Heterotrophic ossification are myositis ossificans, florid ossification, ectopic ossification, neurogenic ossifying fibro myopathy [6, 7]. The histology of the lesions varies from osteoid osteoma - like features to osteosarcoma-like appearances [2, 8].

We report a case of traumatic heterotrophic ossification of quadriceps femoris, which was successfully managed with surgical resection, and continuous physiotherapy.

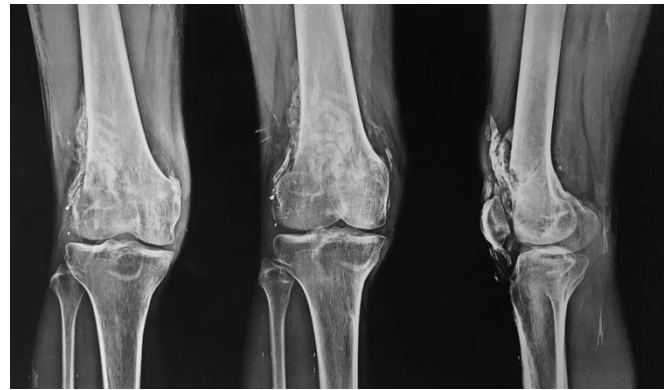
Case Report

A case of 26 year old male who, presented in our outpatient department with complaints of generalised swelling in right distal thigh, mild pain, restricted movement in right knee joint and difficulty in walking for 6 months. There was a history of road traffic accident 8 months back sustaining open injury over the right knee following which, he was diagnosed to have undisplaced unicortical fracture of anterior cortex of distal femur. Patient was managed elsewhere with debridement and primary wound coverage. The wound got infected after 10 days, for which repeated debridement with curettage was done. The wound got healed after a month, but patient was left with severe knee stiffness and difficulties in activities of daily living. The patient was then advised physiotherapy on regular basis, but there was no improvement in knee stiffness. The patient then went to a local therapist for massage therapy, but the problem got worsened.

Clinical examination revealed a generalized firm swelling noted in the anterior aspect of right distal thigh extending up to the knee. Overlying skin was non pinchable and puckered. Skin was adhered to underlying bone at one point. Range of motion (ROM) at knee was 0-10° with a normal ROM at hip (figure 1). Patient was on continuous physiotherapy for 6 months, but had no improvement. X-rays revealed a well ossified mass anterior to anterior cortex of the right distal femur with some lateral extension, with a radiolucent cleft separating the ossified mass from cortex (figure 2).



Figure 2



As conservative measures produced no improvement in the patient, hence, surgical excision of the lesion was planned. Surgical resection of the ectopic ossified mass was done using a standard anterior approach to the knee joint. A well-defined mass (5cmX3cmX3cm) was excised from within the substance of rectus femoris posteriorly and mass on the lateral aspect of vastus lateralis was nibbled. Only easily resectable mass, was excised without causing much damage to overlying and underlying muscles. The adhesions were released from over the quadriceps and under the patella. Intra operatively knee flexion of 90 degrees was obtained after mass excision as shown in Figure 3.

Figure 3



The skin was closed over a drain which was removed with first dressing. The excised mass was sent for histopathological

examination and was confirmed to be a calcified mass, hence confirming heterotrophic ossification. Figure 4 shows the post-operative X rays.

The knee flexion improved to almost 90 degrees immediately after surgery. Active assisted physiotherapy including hamstrings and quadriceps exercises were initiated from day one, along with continuous passive motion of the knee joint under. Meanwhile patient developed wound complication (small area of skin necrosis), and ROM gradually got worsened.

Figure 4



Continuous physiotherapy was maintained with extended period of intravenous antibiotics for 3 weeks, along with regular dressings of the wound. The wound got healed and patient was then started on continuous passive motion. Follow up of patient was done regularly once in 6 weeks. The knee ROM on discharge was 0-100°. After 6 months knee ROM improved to 0-120°. After a follow up period of 1 year, the patient had no recurrence and achieved satisfactory range of knee movements, resuming back to activities of daily living. Figure 5 shows the ROM in the post-operative period and at 6 months follow up.

Figure 5



Discussion

The usual sites for muscular heterotrophic ossification are the quadriceps femoris and brachialis muscle [9]. HO arising within the muscle occurs at all age, but adolescents and young adults are at significantly higher risk [10]. The earliest manifestations are typically localized swelling, local rise of temperature, mild to moderate pain and limited ROM of the nearby joints [9,11]. The pain, warmth, and swelling subside with the maturity of the lesion [12]. It usually takes 6 to 18 months for a HO lesion to form a trabecular bone [11].

Plain roentgenograms reveal either mature ossified masses forming a ring like pattern centralized over a radiolucent area or homogenous calcified lesions [13]. The serum alkaline phosphatase level and 24-hour urinary excretion of PGE2 are the important biochemical markers for heterotrophic ossification.[14]

No exact cause has been found describing the pathophysiology of heterotrophic ossification. A number of theories have been proposed for the development of heterotrophic ossification, but none is specific. Majority cases of HO within the muscles are posttraumatic type [15]. The idiopathic sort of HO is rare and occurs especially in those with no predisposing factors, like trauma [16].

Craven and Urist in their study concluded that primitive mesenchymal cells, transforming into osteogenic cells within the soft tissues was responsible for the development of HO [17]. Chalmers et al. concluded that osteogenic precursor cells, inducing agents and a permissible environment were the 3 conditions necessary for HO formation [18]. All these

would incite the conversion of primitive mesenchymal cells into osteoid-forming cells, under the effect of bone morphogenic proteins (BMPs)[19].

Heterotrophic ossification developing within muscles is usually a self-limiting condition and resolves spontaneously. It is more likely to occur in smaller upper extremity lesions [20]. Non operative management including subsequent clinical and radiographic follow-up should be considered in early stages [10] Surgical excision is the treatment of choice,

if the pain does not subside, or if a prominent mass is felt, or if adjacent joint has limited range motion. Lesion should be excised only after attaining maturity, typically after 8-12 months of the inciting event. Premature excision can lead to a rapid local recurrence [12].

Conclusion

Heterotopic ossification though not a very common disease, but has particular characteristics with debilitating consequences. The disease may result in severe stiffness, restricted range of movement, and severe reduction in the functioning of the affected joint. Surgical excision is treatment of choice, when non-operative measures produce no satisfactory results. In this patient, excision of mass was done because of restricted knee ROM, and good clinical results were obtained, without any recurrence.

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