This article describes 2 cases of osteochondroma emanating from the posterior aspect of the femoral neck with a fracture at the base of its stalk caused by impingement between the tumor and the ischium.

A 44-year-old man and a 57-year-old man presented with left hip pain. Radiographs revealed a mass at the posterior aspect of the femoral neck. Computed tomography and magnetic resonance imaging revealed that the mass was fractured at the stalk. The relationship between the tumor and the ischium was examined with an image intensifier. The tumor impinged on the ischium with slight flexion and external rotation of the hip joint. In both patients, the tumor was excised, and the pathological report was osteochondroma. At follow-up, the patients had full hip joint range of motion, and lateral radiographs of the left hip joint showed complete resection of the tumor without recurrence.

To the authors’ knowledge, the current cases are the first reports of fracture of an osteochondroma with confirmed impingement using an image intensifier pre- and intraoperatively. Both patients had histories of restricted hip range of motion and a sudden onset of pain. After excision, the patients recovered to activities of daily living with no complications. An osteochondroma at the posterior aspect of the femoral neck can impinge on the ischium and fracture at its base with a sudden onset of pain. Awareness of this mechanism of impingement may lead to a better understanding of patient symptoms caused by osteochondroma of the femoral neck.

Drs Kanauchi, Suganuma, Kawasaki, Mochizuki, Inoue, Uchikawa, Kitamura, and Honda are from the Department of Orthopaedic Surgery, Hiratsuka City Hospital, Hiratsuka, Kanagawa, Japan.

Drs Kanauchi, Suganuma, Kawasaki, Mochizuki, Inoue, Uchikawa, Kitamura, and Honda have no relevant financial relationships to disclose.

Correspondence should be addressed to: Taira Kanauchi, MD, Department of Orthopaedic Surgery, Hiratsuka City Hospital, 1-19-1 Minamihara, Hiratsuka, Kanagawa 254-0065, Japan (sppd4659@sound.ocn.ne.jp).

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Osteochondroma is a benign tumor most commonly seen at the knee, forearm, and ankle. Although osteochondroma lesions are typically asymptomatic, palpable masses may cause pain due to bursal inflammation or impingement on an overlying structure depending on their size and location. In addition, concern may exist about malignant degeneration.

Osteochondroma of the proximal femur is relatively rare, and it has been described in patients with trochanteric bursitis, sciatic nerve compression, a snapping hip, femoroacetabular impingement, a fracture at the stalk of the tumor, or symptomatic fibrous nonunion of such a fracture. This article describes 2 cases of fracture of a solitary osteochondroma of the femoral neck caused by impingement against the ischium. The case reports were approved by the authors’ institutional review board.

**Case Reports**

**Patient 1**

A 44-year-old man presented with a 5-year history of restricted left hip range of motion (ROM), particularly external rotation with slight flexion. While playing football in January 2010, he felt sudden left hip pain and could not remain standing. Radiographs showed a 36×40-mm mass emanating from the posterior aspect of the femoral neck (Figures 1A, B). Computed tomography (CT) and magnetic resonance imaging (MRI) were performed to characterize the size and location of the mass. On CT scan, the mass was located on the posterior aspect of the femoral neck and was fractured at its base (Figure 1C). No bone marrow edema was found around the fracture site on MRI. The mass was excised through a posterior approach. No inflamed bursa was present on the surface, and no snapping with muscle occurred. The final pathological report indicated that the tumor was an osteochondroma. After excision, the patient regained full ROM.

**Patient 2**

A 57-year-old man had felt discomfort in his left hip for more than 10 years with restricted ROM, particularly external rotation with slight flexion of the hip joint. He felt sudden, severe left hip pain while walking in May 2011. When he presented to the authors’ hospital, he could not sit down because of left buttock pain. Radiographs showed a mass emanating from the posterior aspect of the femoral neck (Figures 2A, B). Computed tomography scan revealed that the mass was fractured at its stalk (Figure 2C). Magnetic resonance imaging revealed an osteochondroma pressing on the sciatic nerve posteriorly and no bone marrow edema around the fracture site (Figure 2D).

To confirm the cause of the fracture, the relationship between the tumor and the ischium was examined with an image intensifier (Figure 3). When his left hip was moved into slight flexion and external rotation, the tumor impinged against the ischium. The tumor was excised around its base after verifying the impingement intraoperatively. At gross examination, the cartilage cap of the tumor had a shiny, glistening surface, reminiscent of cauliflower.
flower (Figure 4). Histological examination of the tumor showed an osteochondroma of the hyaline cartilage cap and columns of cartilage cells (Figure 5). The patient returned to work 2 weeks after the procedure and reported no complications. A lateral radiograph of the left hip joint taken 6 months postoperatively showed complete resection of the tumor without recurrence (Figure 6).

**DISCUSSION**

Osteochondroma, which occurs most often in the knee, forearm, or ankle,\(^8\) is a benign osseous tumor that is pedunculated or sessile and protrudes from the metaphyses of long bones. Depending on the site of origin and the size, osteochondromas may cause bursitis, pain, or symptoms of neurovascular compromise. In addition, fractures at the stalk of the osteochondroma have been reported in some cases due to a direct blow or indirect muscle or tendon injury, but most were located around the knee joint.\(^7\)

Solitary osteochondroma of the femoral neck has been well described. Based on a literature search,\(^1-3\) only cases arose in the posterior femoral neck. Osteochondroma of the proximal femur can cause greater trochanteric bursitis, sciatica, and snapping hip,\(^1-3,11\) and surgical excision may be required. The mechanism by which the stalk of an osteochondroma can fracture may include direct impingement of the tumor against the surrounding tissues and indirect injury caused by strong muscle contraction.\(^6,7\)

Using MRI, Robbins et al\(^6\) reported nontraumatic fracture of hereditary multiple osteochondromas of the anterior aspect of the femoral neck with bone marrow edema at the fracture site. They reported that a benign growth of a pedunculated osteochondroma could lead to relative weakening of its stalk, and friction caused by the surrounding muscles along the osteochondroma could result in a pathologic fracture. Alonso-Torres et al\(^8\) reported a patient with progressive pain and swelling of the thigh following a minor trauma and speculated that persistent motion near the fracture due to the proximity of the tumor to a powerful tendon may have contributed to the nonunion.

In contrast to these case reports, the 2 current patients had a history of a limited hip ROM without pain, particularly external rotation with slight flexion of the hip, followed by the sudden onset of severe pain. Furthermore, MRI revealed no evidence of bone marrow edema at the fracture site in either case.\(^12\) Therefore, the authors speculate that the presence of osseous impingement led to acute fracture of the tumor. On preoperative imaging, impingement of the ischium was observed. Intraoperative findings showed no marked impingement of the osteochondroma on tendons or muscles as a cause of the fracture, which supports the authors’ speculation.

Reports similar to the current cases in which osteochondromas of the posterior femoral neck were symptomatic include 2 patients in whom the sciatic nerve was compressed between the osteochondroma and the ischium, leading to neurologic symptoms,\(^1,2\) which improved with excision of the osteochondroma. In these 2 cases, the osteochondroma grew distally from the femoral neck beyond the lesser trochanter and protruded in a posterosmedial direction,\(^1,2\) which seems more likely to result in compression of the sciatic
nerve between the tumor and the ischium. In the current cases, although the sciatic nerve was displaced posteriorly by the osteochondroma, which remained proximal to the lesser trochanter, the sciatic nerves were not trapped between the osteochondroma and the ischium.

Whether a fractured osteochondroma should be excised remains controversial.\(^7,13-15\) Prakash and Court-Brown\(^13\) recommended that surgery be performed if symptoms continue after conservative management. Carpintero et al\(^7\) reported that patients who underwent surgery recovered to activities of daily living more quickly. The current patients had limited ROM caused by impingement of the osteochondroma on the ischium, and the impingement may have caused nonunion. Therefore, surgery was performed with good outcomes.

**References**