http://informahealthcare.com/ptp
ISSN: 0959-3985 (print), 1532-5040 (electronic)

PHYSIOTHERAPY THEORY and PRACTICE

Physiother Theory Pract, Early Online: 1–7
 DOI: 10.3109/09593985.2013.799723

informa healthcare

CASE REPORT

Recognition of signs and symptoms of a Type 1 chondrosarcoma: a case report

John D. Heick, PT, DPT, OCS[1], Karen L. Bustillo, PT, DPT, OCS[2], and James W. Farris, PT, PhD[1]

[1]*Department of Physical Therapy, A.T. Still University-Arizona School of Health Sciences, 5850 E. Still Circle Mesa, Arizona, USA and* [2]*Bustillo Physical Therapy, 201 W. Guadalupe Rd. #313 Gilbert, Arizona, USA*

Abstract

Background: Hip pain in the absence of trauma is difficult to diagnose due to the number of structures that refer pain to the hip and thigh. When identifying the origin of pain, the ability to increase or decrease the patient's pain level with rest, posture or movement is important to determine a clinical pattern. If that pattern does not make sense, other causes of the onset of pain need to be considered. *Case description*: A 47-year-old male experienced intermittent hip pain for two years that varied in intensity and duration after weight-bearing activities. The patient was ultimately diagnosed with a low grade chondrosarcoma (type 1) of the right proximal femur. *Discussion*: This case highlights the medical management of a patient eventually diagnosed with a chondrosarcoma and the post-surgical physical therapy management. It also describes the multidisciplinary care of the patient from onset of hip pain to discharge from physical therapy and illustrates the importance of recognizing atypical signs and symptoms to facilitate referral and accurate diagnosis.

Keywords

Chondrosarcoma, differential diagnosis, hip

History

Received 11 September 2012
Revised 19 March 2013
Accepted 21 March 2013
Published online 11 July 2013

Background

Chondrosarcoma is the second most common primary malignant solid tumor of bone and accounts for approximately 20% of all bone sarcomas in the United States (Bertoni, Bacchini, and Hogendoorn, 2002; Healey and Lane, 1986; Pant et al, 2005). A chondrosarcoma is a malignant tumor that originates from cartilage cells and maintains it cartilaginous nature throughout its evolution (Sisu et al, 2011).

Chondrosarcomas affect a wide range of age groups (20–70 years), but most commonly occur in the 30 s to 50 s with a slight male predominance (Sisu et al, 2011). Chondrosarcomas can also be either a primary or secondary chondral lesion, such as an osteochondroma or an enchondroma (Sisu et al, 2011). The most common site affected is the proximal end of the femur, followed by the proximal end of the humerus (de Camargo, Baptista, Atanasio, and Waisberg, 2010). Flat bones are less frequently affected compared with long bones, however, the most frequent flat bone to be invaded is the ilium (de Camargo, Baptista, Atanasio, and Waisberg, 2010). Chondrosarcomas are classified by location of the lesion: central; peripheral; or juxtacortical. Chondrosarcomas may arise from within the medullary portion of the bone or as a secondary degenerative process from an existing cartilaginous tumor (de Camargo, Baptista, Atanasio, and Waisberg, 2010). Juxtacortical chondrosarcoma has also been termed periosteal chondrosarcoma because it arises as a continuation of the periosteum of a long tubular bone, such as the femur (Resnick, 1995).

Address correspondence to John D. Heick, PT, DPT, Department of Physical Therapy, A.T. Still University-Arizona School of Health Sciences, 5850 E. Still Circle Mesa, Arizona 85206, USA. E-mail: jheick@atsu.edu

Oncologists generally use plain radiographs to initially assess the aggressiveness of the tumor, and pathologists follow this with histology to properly grade the tumor (Bloem and Reidsma, 2012). Chondrosarcomas have a spectrum of histological grades and a wide disparity of grading systems used by pathologists at different institutions (Weber and Raymond, 2002). Commonly, Lichtenstein and Jaffe's grading system (Lichtenstein and Jaffe, 1943; Weber and Raymond, 2002) is used where grade 1 tumors are classified as low-grade neoplasms and grade 2 and 3 tumors as high-grade neoplasms. Patients with a grade 1 tumor have a 5-year survival rate of 90%, whereas only 40% to 60% of patients with grade 2 or 3 tumors survive after 5 years (Etchebehere et al, 2005; Evans, Ayala, and Romsdahl, 1977). Low-grade tumors usually have more benign behavior and a less aggressive aspect on imaging with no cortical expansion, destruction, or soft tissue mass visible. High-grade chondrosarcomas typically exhibit all three of these aspects on imaging (de Camargo, Baptista, Atanasio, and Waisberg, 2010).

In outpatient physical therapy practice, cancer is not frequently encountered. Boissonnault (1999) collected data through a multi-site prospective, observational study on 2433 patients in 65 rehabilitation clinics across 20 states and found bone cancer in 33 patients or 0.2%. Although undiagnosed cancer is a rarity in outpatient physical therapy clinics, physical therapists, like other healthcare practitioners, need to be able to recognize the clinical manifestations of chondrosarcomas and other cancers.

The purpose of this case report is to describe a patient who was ultimately diagnosed with a low-grade chondrosarcoma in the right proximal femur. The patient presentation of intermittent hip pain prior to diagnosis masqueraded as a musculoskeletal condition for several years. This case report demonstrates the importance of differential diagnosis to recognize atypical signs and symptoms.

Case description

History

The patient was a 47-year-old male with a chief complaint of right hip pain that began two years prior to diagnosis of chondrosarcoma. Prior to pain symptoms, the patient did not recall hip pain and regularly participated in running, cycling, or hiking for exercise three to four times a week. The patient had no previous history of cancer and maintained a body mass index of 25.6 kg/m^2 from initial onset of hip pain to discharge. At initial onset, the patient specifically remembered running and then having right hip pain that slowly dissipated after two or three days. The patient recalled that the right hip pain became much worse when ascending a flight of stairs at work after a run (7–8 on an eleven-point numerical pain-rating scale with 0 being no pain and 10 the worst pain imaginable). During that time, the patient used the stairs as a guide, noting that he had to ascend or descend the stairs in a step-by-step approach when the right hip pain was at its worst compared to his normal approach of ascending or descending two or three steps at a time. The pain was described as constant, dull; and sharp after weight-bearing activity of short duration. The patient gradually discontinued running and switched to cycling, which initially was not a painful activity.

The patient reported right hip pain at his annual medical exam five months after initial onset. The physician suspected trochanteric bursitis or iliotibial band irritation due to the pain location and provided the patient with a script for radiographic imaging of the hip. However, the patient did not follow-up with imaging because of the intermittent nature of the hip pain. A year passed with the patient experiencing intermittent but mild pain that did not limit his activities. The patient returned to the primary care physician for his annual examination and mentioned the continued hip pain to the physician. This time the patient followed through with radiographic imaging, which consisted of anterior-posterior and lateral frog-leg views. The imaging of the hip and pelvis was unremarkable according to the radiologist reading the images.

The patient had routine blood work done at both his annual medical exams. Because the patient was taking 20 mg of Simvasstatin daily for hyperlipidemia, he also had blood work done at six month follow-up visits. The patient was not taking any other medications, except an over-the-counter low dose aspirin once a day.

Eighteen months after the initial onset of pain, the patient was cycling home from work (2 miles) when he experienced a pain in his anterior lateral proximal right thigh at the midpoint of the ride that was described as ''being hit by a hammer.'' The patient was unable to pedal with his right lower extremity for the rest of the distance home due to weakness and pain. The patient described the pain as 10 out of 10 on a numerical pain rating scale while pedaling and 6–7 out of 10 without pedaling. The lower extremity pain rating persisted after the ride. The patient called his primary care physician the next morning and was able to schedule an appointment for the first available appointment two days later.

Diagnosis and surgical intervention

The physician ordered radiographs again and the radiologist read them that week. A 10.7 cm long intramedullary expansile lesion of the proximal femoral diaphysis from the subtrochanteric region that extended distally with associated periosteal edema was noted on the magnetic resonance imaging (MRI) scan. A computed tomography (CT) scan of the lower extremity confirmed the MRI scan (Figure 1) and a CT scan of the chest was read as negative for metastatic disease. The radiographs precipitated an appointment with an oncologist 11 days later. The oncologist immediately scheduled the patient for a surgical biopsy. A diagnosis of a chondrosarcoma type I, low grade was made one month after this second onset of pain when the pathologist returned the results of the biopsy. Surgery was then scheduled within the next two weeks.

The surgery was initiated by reflecting the vastus lateralis from the bone, starting with the tensor fascia latae. The surgery also involved curettage to remove the tumor within the medullary column. The femoral shaft was then repacked with a calcium matrix bone graft, and the surgeon placed a permanent indwelling plate with an extension to the head of the femur. The femur was never fractured during the surgery, and the acetabulum was intact and not exposed during the surgery.

The patient was discharged from the hospital the following day and allowed 50% weight bearing to the right lower extremity. The patient was provided 325 mg of Hydrocodone and instructed to take two pills every four hours for pain. He was issued bilateral crutches to maintain his weight-bearing precautions. The patient noted the pain was 3–4 out of 10 on a numerical pain-rating

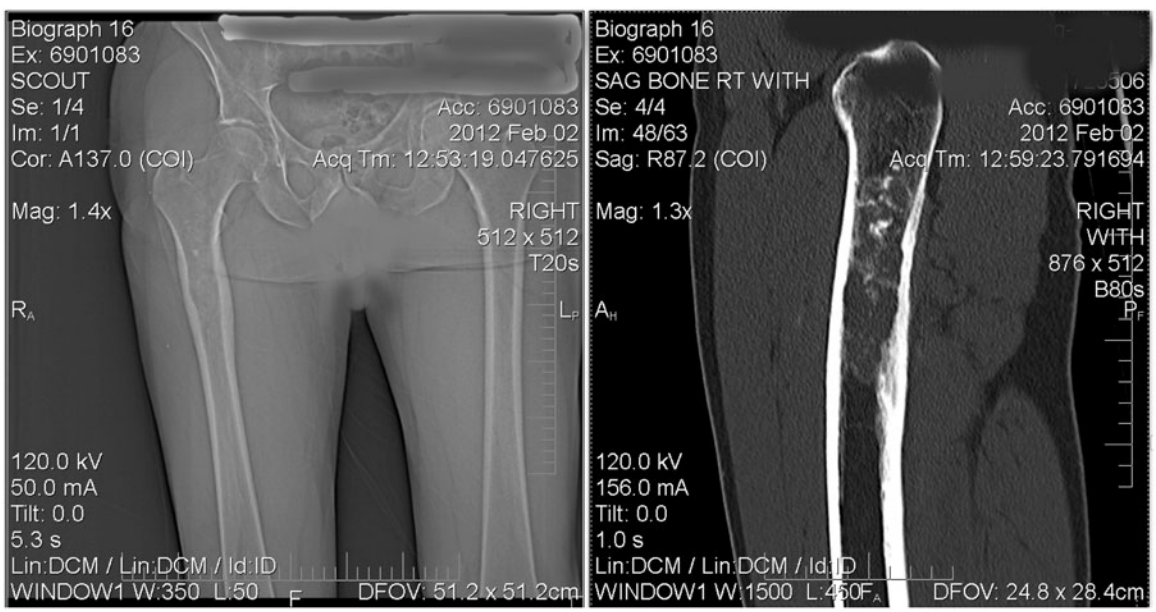

Figure 1. CT Scan with contrast medium on initial diagnosis of a grade 1 chondrosarcoma.

scale immediately after the surgery but escalated after about 6 hours to a 7–8 level. The pain dissipated during the first week after surgery, and the patient reduced the amount of Hydrocodone to one tablet every four hours during the second week after surgery.

Physical therapy management after surgery

The patient reported that he had not received physical therapy prior to surgery and was seen by a physical therapist for one visit in the hospital setting when he was shown proper ambulation, bed mobility, and how to ascend and descend stairs. The physical therapist at the hospital gave the patient postsurgical exercises that included short arc quadriceps exercises to initiate activation of the quadriceps musculature and ankle pumps to decrease the swelling and promote circulation. When the patient returned home from the hospital, he noticed swelling in the right ankle that was evaluated as 2+ pitting edema by a family member who works in the health care profession. The patient was instructed by the family member to elevate the lower extremity and do repeated dorsiflexion and plantar flexion exercises to alleviate edema.

The patient was able to return to work 13 days after surgery and remained limited to 50% weight bearing. During ambulation, the patient noted the pain was between 3 and 6 out of 10 on a numerical pain rating scale. The patient was able to reduce his pain medication to one pill at night and occasionally one during the day depending on how much he needed to ambulate. The patient was sent for outpatient physical therapy two weeks after surgery.

Post-surgery examination

The surgeon sent the patient to outpatient physical therapy without activity restrictions except for precautions regarding the patient's weight bearing status. Following the terminology within the *Guide to Physical Therapist Practice*, the patient on initial examination had impairments in hip joint mobility identified as hypomobility secondary to pain, delayed motor function secondary to pain, muscle performance, and range of motion as well as impairments in knee joint range of motion and strength (Table 1). The therapist noted mild effusion in the right knee and at the surgical site, but the pitting edema in the ankle was no longer present. The patient's immediate goals were to place his right ankle across his left knee to more easily don shoes and socks, and to be able to put on his pants while standing. The patient's long-term goals were to resume cycling, swimming, and all activities of daily living.

Physical therapy evaluation and diagnosis/prognosis

The physical therapy diagnosis for the patient was abnormal gait and muscle weakness, and the prognosis was excellent for him to reach his goals, especially since he was motivated to return to his normal activities. The patient was scheduled for outpatient physical therapy twice a week for four weeks. The physical therapist's goal was to achieve full active range of motion and return to lower extremity strength sufficient for all activities of daily living and recreational pursuits with-in surgical limitations in four weeks.

Intervention

Throughout the plan of care, the physical therapist utilized electrical stimulation to reduce the soft tissue edema and promote healing. Manual therapy techniques included soft tissue mobilization to improve soft tissue extensibility, reduce edema, and improve the hip and knee range of motion (Table 2). The treatment plan included application of soft tissue mobilization and electrical stimulation to the edematous areas which included the lateral quadriceps, lateral hamstrings, gluteus medius, scar mobilization for flexibility around the plate, and to discourage adherence to subcutaneous tissues. Interferential electrical stimulation was increased to produce a motor contraction to decrease the edematous areas surrounding the incision with the primary purpose of reducing postsurgical edema and promotion of healing. Pain although present, was not the primary problem at this point in the patient's rehabilitation process. Therapeutic exercises were paired with manual therapy techniques to regain muscle strength, endurance and balance, and to normalize the gait pattern. After the initial evaluation, the patient was instructed in bridging exercises and short arc quad exercises as a home exercise program. A stationary cycle was added to the treatment plan and the home exercise program on the third visit. The therapist noted a smooth cadence to the pedaling, and the patient enjoyed being able to return to cycling without pain. At the next visit, the patient complained of soreness and muscular tightness. The therapist adjusted the patient's presentation by primarily using passive exercises directed at the hip joint and soft tissue mobilization to the lateral iliotibial band to address the soreness and tightness the patient was experiencing.

At the fifth outpatient visit, the patient was able to reach his goal of putting on his socks and shoes in the manner he did prior to surgery. At outpatient visit 5 and 6, the physician permitted full weight bearing. Initially the patient's gait was antalgic, and after short distances he fatigued much more rapidly than when he was ambulating with the crutches. Therapeutic exercises at this point included stationary cycling for 15 min, short arc quad exercises, straight leg raises, resistive theraband hamstring exercises, and multiplanar ankle exercises (Table 2). Manual therapy techniques were effective at improving hip and knee joint range of motion and in reducing muscle stiffness and lack of extensibility. The patient continued these exercises at home and a local gym

Table 1. Measures of strength and active range of motion (ROM).

	Initial	Initial	11 weeks after surgery	11 weeks after surgery	Discharge		Goal from initial exam	Goal from initial exam
	Strength	Active ROM	Strength	Active ROM	Strength	Active ROM	Strength	Active ROM
Hip								
Flexion	3/5	90°	4/5	120°	4+/5	130°	5/5	115°
Extension	NT	NT	4/5	NT	4+/5	NT	NT	NT
Abduction	3/5	10°	3+/5	25°	4/5	30°	5/5	25°
Internal rotation	NT	20°	NT	30°	NT	45°	5/5	30°
External rotation	NT	10°	NT	30°	NT	45°	5/5	45°
Knee								
Flexion	NT	120°	4/5	130°	4/5	130°	5/5	140°
Extension	NT	0°	4/5	0°	4/5	0°	5/5	0°

NT = not tested or deferred.

Table 2. Interventions provided by the physical therapist corresponding to days post-surgery and outpatient visit.

Post-surgery day	Physical therapy visit	Physical therapy intervention
Initial	Inpatient for one visit	Bed mobility, mobility with bilateral crutches maintaining 50% weight bearing, ascend/descend stairs, therapeutic exercise to include short arc quadriceps and ankle pumps.
2 weeks	Outpatient visit 1 and 2	Initial evaluation, ROM exercises, bridging, short arc quadriceps, soft tissue mobilization to periwound, and Interferential Electrical Stimulation for pain.
3 weeks	Outpatient visit 3 and 4	Added stationary bicycle, standing hip exercises, and soft tissue mobilization to adductors to the treatment plan.
4–6 weeks	Outpatient visit 5 and 6	Added hamstring and ankle multiplanar exercises, manual therapy for improving rectus femoris flexibility, hip and knee ROM as well as mobilizations of the talocrural joint to improve dorsiflexion ROM; and straight leg raises. Home exercise program of side-lying hip abduction and bridging.
7–8 weeks	Outpatient visit 7 and 8	Added ball wall squats, 4″ step-ups, rockerboard for balance and mini squat rebounder work.
9 weeks	Outpatient visit 9 and 10	Added hamstring concentric and eccentric exercises and side-lying abduction with manual resistance, progression of gait without crutches, and quadruped positioning to increase knee flexion.
10 weeks	Outpatient visit 11 and 12	Added Total Gym squats with 50–70% of body weight for concentric and eccentric exercises, 6″ step-ups and step-downs, and soft tissue mobilizations to the fibularis muscles secondary to tightness reported by the patient.
11 weeks	Outpatient visit 13 and 14	Added side lunges, resisted forward, lateral and retro gait, soft tissue mobilization to periwound and manual therapy techniques for distraction and improving internal rotation.
12–13 weeks	Outpatient visit 15–18	Continuing exercise plan. No additions.
14 weeks	Outpatient visit 19–20	Added use of golf swing trainer for weight shifting and work on swing.
15 weeks	Outpatient visit 21	Episode of care finished.

between therapy visits. Between outpatient visit 5 and 6, the patient was cautioned to respect the healing process and to not increase his activities too much because of several occasions when the patient overdid his exercises at the local gym, resulting in excessive soreness in the lateral hip area. Additional visits were requested at this point because the patient had not met his goals for physical therapy.

Dynamic activities in weight bearing, such as step-ups, rockerboard activities, and ball wall squats, were added during the fourth and fifth weeks of therapy to promote a normal gait pattern. The intention of these added activities was to promote normalized gait for the patient by increasing weight bearing tolerance thus allowing longer stance phase on the right lower extremity with knee extension and to promote full hip extension just prior to push off. During surgery, the lateral quadriceps was reflected from the femur therefore both closed and open chain quadriceps exercises were difficult for the patient. Closed chain quadriceps exercises were difficult for the patient throughout the early phases of rehabilitation as well as during gait specifically at terminal knee extension for heel strike. Because of pain in the stance phase of gait, the patient's gait pattern was slow and reduced in stride length. Therefore, exercises were focused on gaining strength for single limb stance for transfer to gait. Exercises included: karaoke braiding; 50–70% total body weight performing Total Gym squats; lateral lunges to the right; rockerboard; mini squats; and rebounder work in a squat position on a BOSU ball. All of these exercises were done within the patient's tolerance and fatigue limitations. The patient was able to reach his goal of putting on his pants while standing nine weeks after surgery.

Nine weeks after the surgery, the patient had a follow-up visit with his physician. The physician informed the patient that the femur was just beginning to fill in with bone as expected at both ends. The physician explained to the patient and the physical therapist that due to the surgical curettage of the intermedullary canal of the femur, the femur was not expected to completely fill in with bone for 10–12 months. The physician asked the patient and the physical therapist to maintain the weight bearing status as partial weight bearing, even though the plate provided support, the bone itself was still considered fragile because of the area of the bone mass removed (Figure 2). The physician suggested the patient not to participate in any activities that increase the impact to the hip or any activity that could involve a fall. During the patient's re-evaluation 11 weeks after surgery, he tolerated single limb stance on the right leg for 35 s. Functionally, the patient could climb stairs without pulling himself up using his upper extremity and the handrail, but the therapist noted that ascent consisted of a step-over-step pattern whereas descent was slow, guarded and deliberate. The patient was able to walk on the beach during that time, but he noted that it was very difficult to feel comfortable with the activity because he felt nervous. Throughout the rehabilitation process, the physical therapist emphasized the importance of muscle setting, full active range of motion exercises for the hip and ankle, and concentric contractions through the patient's available range of motion for the knee because of the restrictions of the sutures. The patient's home exercise program was modified to adjust to the patient's presentation and primarily consisted of: range of motion exercises for the hip, knee, and ankle; short range ambulation; and self-care for the incision.

Outcomes

The patient was discharged from physical therapy after 21 visits. He lacked 10° of knee flexion and had 4+/5 muscle strength for hip extension and flexion. He also lacked 15° of hip abduction and had a 4/5 muscle strength for hip abduction. The patient was limited by pain during hip extension at the end of range. He was able to ambulate with near normal gait at slow walking speeds but had an antalgic gait pattern with normal walking speeds. Functionally, the patient resumed swimming and was able to cycle on a stationary bicycle for 30 min. The physician did not want the patient to participate in any activities that might lead to a fall so the patient did not cycle outdoors.

Discussion

Red flags, or warning signs, can be identified during the review of systems part of an examination, and their identification should prompt the physical therapist to refer the patient to a physician or another healthcare provider. Leerar, Boissonnault, Domholdt, and Roddey (2007) did a retrospective analysis of 160 patients referred for back pain and evaluated at six different private

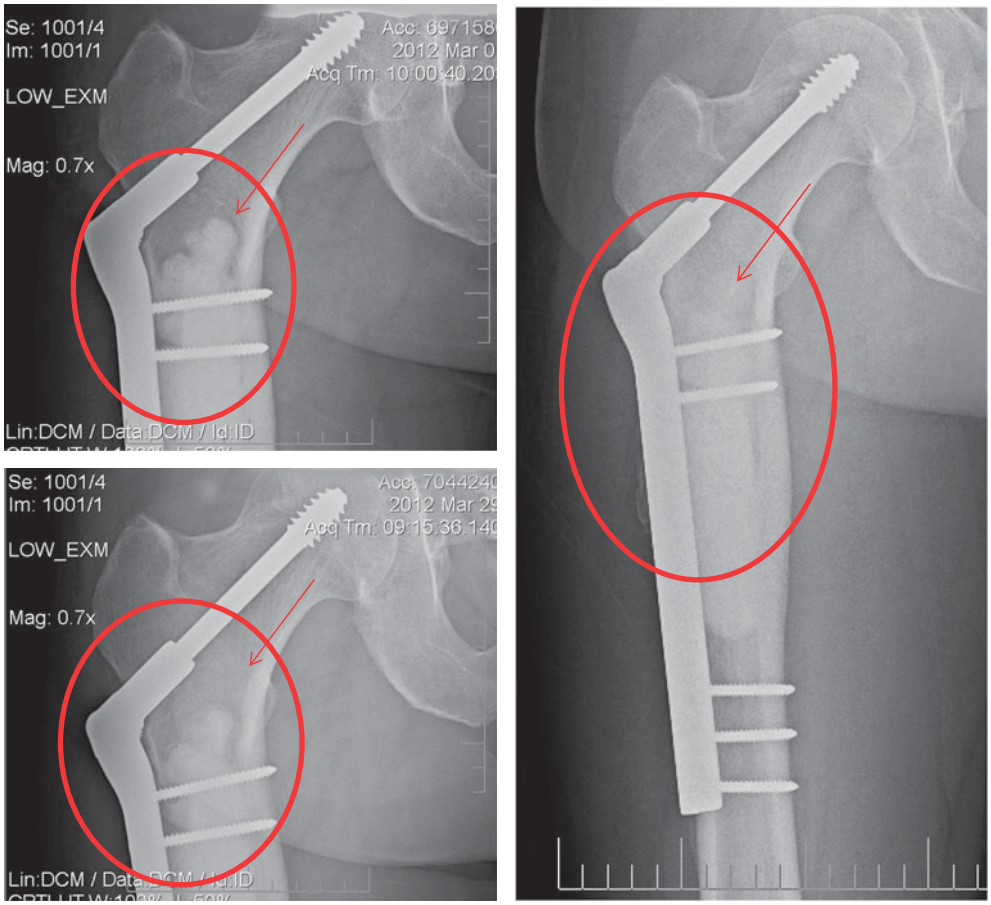

Figure 2. Comparison between 1, 5 and 11 weeks post-surgery. Note the difference in cortical bone laying down from proximal to more distal in the femur.

practice clinics by 16 different physical therapists. The authors identified deficiencies in the documentation of red flags for these patients in three categories: (1) weight loss; (2) recent infection; and (3) fever or chills, and night sweats. The red flag of weight loss is described as unexplained weight loss of over 10 pounds in three months that is not directly related to a change in activity or diet. The rationale for this item as a red flag is that it may be indicative of infection or cancer (Boissonnault and Bass, 1990; Bratton, 1999; Deyo and Diehl, 1988; DiIorio, Henley, and Doughty, 2000; Ferguson, Griffin, and Mulcahy, 1999). The red flag of recent infection is described as recent bacterial infection, such as a urinary tract infection. The rationale for this item as a red flag is that it increases the risk of another infection (Bigos et al, 1994). The red flag of fever, chills, night sweats is described as fever over 100°F, a sensation of being cold, waking up sweating, or increased temperatures at night. The rationale for this item as a red flag is that constitutional symptoms may increase the risk of infection or cancer (Bigos et al, 1994; Boissonnault and Bass, 1990; Bratton 1999; Deyo and Diehl, 1988). A single red flag identified during the review of systems is usually not indicative of a serious medical condition, but a pattern or cluster of red flag findings should raise the clinician's suspicion of serious medical conditions (Boeglin, 1995; Boissonnault, 1995; Deyo, Rainville, and Kent, 1992; Goodman and Snyder, 1999; Hall and Thein-Brody, 1999). In this case report, the patient had one red flag but did not tell the physician during his medical exam visits. The patient had intermittent night sweats that he attributed to a change in weather and seasons.

Physical therapists and other healthcare practitioners must learn to recognize atypical signs and symptoms after physical activity and pain patterns that continue over time as possibly indicative of an underlying condition. The patient in this case report initially complained of intermittent pain that did not prevent him from participating in any activities he enjoyed. Pain persisted and increased in both intensity and duration of symptoms after weight-bearing activities, such as running, and was eased by non-weight-bearing activities, such as cycling. The pain pattern experienced by this patient was atypical but was not considered a red flag. Often red flags come in clusters of signs and symptoms (Leerar, Boissonnault, Domholdt, and Roddey, 2007). In this unique case, the only red flag, which was described by the patient for the first time after surgery, was night sweats that were disregarded as too insignificant to report to the physician. It was not until several weeks before diagnosis (two years after initial onset of pain) that the patient had other red flags, such as a severe increase in pain. Malignant tumors are more likely to present with a higher intensity of pain than their benign counterparts (Marco, Gitelis, Brebach, and Healey, 2000).

In a study of 58 patients with low-grade chondrosarcoma, Marco, Gitelis, Brebach, and Healey (2000) reported that 60% of patients had rest or night pain, 21% had regional pain, and 19% were incidental findings. In the current case, the patient did not see a physical therapist for an evaluation of his hip pain at the onset of the pain, but if he had seen a physical therapist, it is likely that the therapist, like the primary care physician, would have suspected a musculoskeletal origin for the pain as opposed to a chondrosarcoma due to the rarity of this condition.

When making a diagnosis, musculoskeletal conditions that should be considered for this patient's age and complaint of intermittent anterior thigh or hip pain include hip joint origin and non-articular hip origin of pain. Hip joint origin of pain may arise from such conditions as osseous necrosis, stress fractures, hip

dysplasia, or intra-articular pathology (e.g. labral tear, ligamentum teres tear, or loose body within the joint). In differentiating hip origin of pain, often the pain will be reproduced with active or passive motion of the hip joint and will increase with weight bearing (Kimpel, 1999). Nonarticular hip origin of pain may arise from such conditions as bursitis, tendonopathy, muscle strains, urogenital conditions, metabolic disease, vascular conditions, infections and cancer.

Differentiation of hip pain is difficult to determine because pain may be referred to the hip from the low back or sacroiliac joint or knee (Goodman and Snyder, 1999). Hip pain referred from the upper lumbar vertebrae can radiate into the anterior aspect of the thigh (Goodman and Snyder, 1999). The origin of pain can be differentiated by evaluating what activities or physical tests change the pain for better or worse. The physical therapist of this case did not have the opportunity to assess the causative factors of the patient's pain early in the disease and, therefore, the potential for earlier diagnosis based on these differential tests is unknown for this patient.

The patient's physician originally suspected bursitis due to the location of the pain and the increase of pain after activity. Iliopectineal bursitis has symptoms similar to the patient's symptoms, can take several years to be diagnosed (Mallant, Mastboom, and de Backer, 1998), and causes activity-related groin pain that radiates to the anterior aspect of the hip. This bursa is located between the anterior side of the joint capsule of the hip and the musculotendinous junction of the iliopsoas muscle. However, passive motions of hip flexion, hip external rotation, and hip extension reproduce the same pain as that experienced by the patient. Magnetic resonance imaging can confirm this diagnosis (Forstner, Forstner, Grethen, and Kainberger, 1998; Pavlica et al, 2000).

Subtrochanteric bursitis is another condition that has the same location of symptoms as those experienced by the patient. The trochanteric bursa is associated with the gluteus maximus muscle and lies between the posterior aspect of the greater trochanter and the muscle. Pain is usually experienced at the greater trochanter and proximal to the greater trochanter but can refer more distally. Typically, the patient's pain increases with sitting and weight-bearing activities. Subtrochanteric bursitis can be identified by a patient complaint of pain during passive hip internal or external rotation with the hip positioned at 90° of flexion and by palpation over the greater trochanter.

The physician also considered iliotibial band syndrome as a possible cause of the patient's pain because of the location of the pain, the intermittent nature of the pain, and the increase of pain after activity. Examination of this syndrome would have revealed pain on the lateral aspect of the thigh, just proximal to the greater trochanter. Often with iliotibial band syndrome, if the patient side bends away from the affected side, this motion reproduces and increases pain. If the involved lower extremity is simultaneously adducted during the side bending motion, the pain is even worse. When the patient first complained of hip pain, the physician did not do a physical examination to evaluate for this condition but considered it as a possible cause of the pain.

The physician did, however, order radiograph images to identify bony conditions of the pain. The patient neglected to follow through with the radiographs, and it appears this delay did not affect the diagnosis because the radiologist that read the initial radiographs eighteen months later did not see evidence of a tumor. Two years after initial onset of pain, the evidence of a tumor was clearly seen on radiographic imaging. On radiographs, tumors often show an expansile lesion in the diaphysis of long bones with cortical thickening and destruction of the medullary bone (Goodman and Fuller, 2009). Typically, tumors located in the extremities are superficial compared to pelvic tumors that tend to be located deep in the body (Bloem and Reidsma, 2012). Diagnosis of bony lesions relies mainly on conventional radiographs, while diagnosis of soft tissue tumors relies mainly on MRI and sometimes on CT (Bloem and Reidsma 2012). An MRI is the primary preoperative staging tool of bony tumors (Bloem and Reidsma, 2012). Chondrosarcomas are usually large when detected by imaging, and diagnosis is straightforward because of the characteristic cartilaginous popcorn calcifications seen on radiographs and the ring and arc enhancement pattern on MRI (Bloem and Reidsma, 2012) (Figure 1).

Once the tumor was identified as a chondrosarcoma, the physician, oncologist, radiologist, and pathologist quickly conferred on the case to successfully care for the patient. The physician ordered radiographs and an MRI to identify the lesion and grade the tumor. He also ordered a CT to make sure that the tumor had not metastasized to the lungs and scheduled the patient for a visit with the oncologist. The oncologist ordered a biopsy and scheduled the patient immediately for surgery. Biopsy is important not only for accurate diagnosis but also for guiding surgical treatment (Goodman and Fuller, 2009). The teamwork between the professionals led to a successful surgical outcome.

This patient could have seen a physical therapist at the initial onset of hip pain because the patient, and even the physician at that time, believed the pain was musculoskeletal in origin. The location of the pain and the intermittent pain pattern suggested a musculoskeletal problem, but the differentiating point in this patient case was that the pain continued. The patient also could have decided to see a physical therapist after experiencing a sharp increase in pain intensity and duration when bicycling home. This case highlights the importance of differential diagnosis and careful examination and evaluation followed by appropriate referral when atypical presentation or red flags suggest the possibility of medical disease.

Conclusion

This case report highlights the importance of differential diagnosis in a patient that was initially present with hip pain. The ultimate diagnosis of a low-grade type 1 chondrosarcoma was made and a successful surgery followed. This case also details the importance of recognizing pain patterns and differentiating hip joint and non-articular origins of pain.

Declaration of Interest

There are no declarations of interest in this case report.

References

Bertoni F, Bacchini P, Hogendoorn PC 2002 Chondrosarcoma. In: Fletcher CD, Unni KK, Mertens F (eds) World Health Organization classification of tumours: Pathology and genetics of tumours of soft tissue and bone, pp 247–251. Lyon, IARC Press.

Bigos SJ, Bowyer O, Braen GR, Brown K, Deyo R, Haldeman S, Hart JL, Johnson EW, Keller R, Kido D, Liang MH, Nelson RM, Nordin M, Owen BD, Pope MH, Schwartz RK, Stewart DH Jr, Susman J, Triano JJ, Tripp LC, Turk DC, Watts C, Weinstein JN 1994 Acute low back problems in adults, Clinical Practice Guideline No. 14, AHCPR publication 95-0642. Rockville, Agency for Health Care Policy and Research, Public Health Service, US Department of Health and Human Services.

Bloem JL, Reidsma II 2012 Bone and soft tissue tumors of hip and pelvis. European Journal of Radiology 81: 3793–3801.

Boeglin ER 1995 Vertebral osteomyelitis presenting as a lumbar dysfunction: A case study. Journal of Orthopaedic and Sports Physical Therapy 22: 267–271.

Boissonnault WG 1995 Examination in physical therapy practice: Screening for medical disease, 2nd edn. New York, Churchill Livingstone.

Boissonnault WG 1999 Prevalence of comorbid conditions, surgeries, and medication use in a physical therapy outpatient population: A multicentered study. Journal of Orthopaedic and Sports Physical Therapy 29: 506–519.

Boissonnault WG, Bass C 1990 Pathological origins of trunk and neck pain: Part 1-pelvic and abdominal visceral disorders. Journal of Orthopaedic and Sports Physical Therapy 12: 192–207.

Bratton RL 1999 Assessment and management of acute low back pain. American Family Physician 60: 2299–2308.

de Camargo OP, Baptista AM, Atanasio MJ, Waisberg DR 2010 Chondrosarcoma of bone: Lessons from 46 operated cases in a single institution. Clinical Orthopaedics and Related Research 468: 2969–2975.

Deyo RA, Diehl AK 1988 Cancer as a cause of back pain: Frequency, clinical presentation, and diagnostic strategies. Journal of General Internal Medicine 3: 230–238.

Deyo RA, Rainville J, Kent DL 1992 What can the history and physical examination tell us about low back pain? Journal of the American Medical Association 268: 760–765.

DiIorio D, Henley E, Doughty A 2000 A survey of primary care physician practice patterns and adherence to acute low back problem guidelines. Archives of Family Medicine 9: 1015–1021.

Etchebehere M, de Camargo OP, Croci AT, Oliveira CRG, Baptista AM 2005 Relationship between surgical procedure and outcome for patients with grade I chondrosarcomas. Clinics 60: 121–126.

Evans HL, Ayala AG, Romsdahl MM 1977 Prognostic factors in chondrosarcoma of bone: A clinicopathologic analysis with emphasis on histologic grading. Cancer 40: 818–831.

Ferguson A, Griffin E, Mulcahy C 1999 Patient self-referral to physiotherapy in general practice: A model for the new NHS? Physiotherapy 85: 13–20.

Forstner R, Forstner K, Grethen C, Kainberger P 1998 Ultrasound diagnosis of iliopectineal bursitis–contribution to differential diagnosis of leg swelling. Rofo 169: 408–411.

Goodman CC, Fuller KS 2009 Pathology: Implications for the physical therapist, 4th edn. Philadelphia, WB Saunders.

Goodman CC, Snyder TEK 1999 Differential diagnosis for the physical therapist, 3rd edn. Philadelphia, WB Saunders.

Hall CM, Thein-Brody L 1999 Therapeutic exercise: Moving toward function. Philadelphia, Lippincott Williams & Wilkins.

Healey JH, Lane JM 1986 Chondrosarcoma. Clinical orthopaedics and related research 204: 119–129.

Kimpel DL 1999 Hip pain in a 50-year old woman with RA. Journal of Musculoskeletal Medicine 16: 651–652.

Leerar PJ, Boissonnault WG, Domholdt E, Roddey T 2007 Documentation of red flags by physical therapists for patients with low back pain. Journal of Manual and Manipulative Therapy 15: 42–49.

Lichtenstein L, Jaffe HL 1943 Chondrosarcoma of bone. American Journal of Pathology 19: 553–589.

Mallant MP, Mastboom WJ, de Backer GP 1998 Inguinal pain caused by iliopsoas bursitis. Nederlands Tijdschrift voor Geneeskunde 142: 1328–1331.

Marco RA, Gitelis S, Brebach GT, Healey JH 2000 Cartilage tumors: Evaluation and treatment. Journal of the American Academy of Orthopaedic Surgeons 8: 292–304.

Pant R, Yasko AW, Lewis VO, Raymond K, Lin PP 2005 Chondrosarcoma of the scapula: Long-term oncologic outcome. Cancer 104: 149–158.

Pavlica P, Barozzi L, Salvarani C, Cantini F, Oliveri I 2000 Magnetic resonance imaging in the diagnosis of PMR. Clinical and Experimental Rheumatology 18: S38–S39.

Resnick D 1995 Diagnosis of bone and joint disorders, 3rd edn. Philadelphia, WB Saunders.

Sisu AM, Tatu FR, Stana LG, Petrescu CI, Tatu C, Motoc A 2011 Chondrosarcoma of the upper end of the femur. Romanian Journal of Morphology and Embryology 52: 709–713.

Weber KL, Raymond AK 2002 Low-grade/dedifferentiated/high-grade chondrosarcoma: A case of histological and biological progression. Iowa Orthopaedic Journal 22: 75–80.