

Referred Hip Joint and Lower Extremity Pain from a Dermoid Cyst of the Ovary

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Submitted: 02 Mar 2018; **Accepted:** 10 Mar 2018; **Published:** 15 Mar 2018**Abstract**

Referred pain patterns, which are associated with embryological development, can complicate treatment and management of pain, especially in the presence of visceral pathological processes. A dermoid cyst of the ovary can refer pain to the hip joint and lower extremity mimicking pain patterns associated with hip joint disease. It can also present with pain that persists after corticosteroid and local anesthetic joint injections. In such cases of pain refractory to interventional pain procedures, referred pain patterns secondary to undiagnosed pathology should be explored as a potential diagnosis.

Introduction

The concept of referred pain has long been studied and is still not completely understood. The distribution of referred pain can be attributed to embryological development starting with the development of segmental visceral and somatic innervation through somatogenesis. As segmental somites progress through their development, during later stage separate regions of somites commit to development of specific structures creating the body plan of the organism [1]. As the myogenesis, osteogenesis, organogenesis and tendon formation progresses, internal structures migrate based on predetermined maps and specific pathways, however peripheral nerves and its components remain synapsed and within close proximity in the segments of the spinal cord [2].

It was suggested that afferent impulses from a pathological focus provide constant bombardment of impulses traveling through the sensory nerves at specific segmental levels, which decreases the threshold for activation of separate neurons that either synapse with, or are present in the vicinity of that activated neuron at the same segmental level [3]. However, the afferent neurons have been known to have synapses not only at the single respective segmental level, but also to either ascent or descent in the spinal cord to synapse at levels above or below the expected and predicted segment [4].

The constant activation of these neurons secondary to pathology of either visceral or somatic origin can cause activation of neighboring neurons creating viscerosomatic, somato-visceral, somato-somatic, viscerosomatic referred pain patterns [5]. These viscerosomatic and somato-somatic reflex phenomena can often be seen in dysfunction of the hip joints. Hip joint disease specifically osteoarthritis and osteonecrosis commonly presents as pain exacerbated at rest or by

joint motion [6]. Referred pain to groin, thigh, knee and lower leg is very common in these patients [7,8]. Patients with osteoarthritis of the hip joint were complaining of groin pain in 84.3% of cases, and of pain below the knee in 47% of cases [7]. This distribution of referred pain pattern can be attributed to embryological development starting with the development of segmental visceral and somatic innervation described earlier. In this study we describe a case of pain referred from the dermoid cyst of the ovary (ovarian teratoma) that mimicked and contributed to pain at the hip joint, groin, thigh and the knee.

Case Study

A 83 y.o. Caucasian female was referred to our clinic in March, 2017 for low back, right hip, right anterior thigh and right knee pain. Patient described the pain as “aching, throbbing, and dull”, and rated it as a 9 out of 10 on Visual Analog Scale. She denied any weakness, but stated that her right leg felt fatigued. Her symptoms were exacerbated by walking, bending, lifting, standing and also by changes in weather patterns. Aside from pain patient denied numbness, tingling, bladder or bowel dysfunction. Prior to this visit patient tried chiropractic manipulation, lidocaine cream and NSAIDS this helped to alleviate the pain minimally, and tried a course of physical therapy with no relief in her symptoms. At the time of examination patient denied any history of surgery or recent trauma.

Upon physical exam she had 5/5 strength in her upper and lower extremities, facet loading test produced pain in her lower lumbar and upper sacrum regions bilaterally. Bilateral cervical, thoracic and lumbar paraspinal muscles hypertonicity with spasms were palpated. Patient also had tenderness to palpation over her right IT band and trochanteric bursa, and pain to palpation over her right knee. The dermatomes and myotomes were intact, she had +2/4 deep

tendon reflexes throughout the upper and lower extremities, negative Hoffman sign, negative Lhermitte's sign, negative Spurling's test, and no deficits in sensation.

Prior imaging studies included X-rays of the hip and lumbar spine in June 2016. The results showed moderate bilateral hip degenerative joint disease without any erosive or destructive changes or other acute findings, scoliosis with the apex left in the mid lumbar level measuring 20 degrees, disc and facet degenerative change at all levels with bridging osteophyte at thoracolumbar junction, anterior subluxation of L5 with respect to S1 or 25 mm that was interpreted as a grade 2 subluxation at L5-S1 likely from pars fractures at that location.

Based on the patient's history and physical examination as well as current treatment guidelines it was recommended for the patient to receive X-rays of bilateral knees, functional X-ray of lower back, as well as X-ray study of the entire spine to visualize and assess the severity of scoliosis. Patient was also recommended for medial branch blocks in the lumbar spine, with possible future right knee, right IT band, greater trochanteric bursa and intraarticular injections if indicated.

X-rays performed in March 2017 revealed mild degenerative joint disease in the knees bilaterally, and anterior listhesis of L5 with respect to S1 that did not change with flexion and extension suggesting a stable grade 2 listhesis.

During three week follow up patient reported her pain has increased to a maximum number of 10 on Visual Analog Scale, but denied any change in symptoms. During this encounter patient stated that her biggest issue was pain in the region of right lateral hip and right knee, and not the back or the left knee. Based on this assessment she was scheduled for an intraarticular injection in the right knee, right greater trochanteric bursa and right IT band.

The initial procedure scheduled for May, 2017 was canceled by the provider because of patient's severely elevated blood pressure recorded in the procedure room. In June, 2017 patient was determined to be appropriate for the recommended procedures with pre-procedure pain scale of 10 on Visual Analog Scale in the right hip and the right knee. Under fluoroscopic guidance 1 mL of clear, yellow synovial fluid was aspirated, and 40mg Triamcinolone mixed with 2ml of 1% Lidocaine and 0.25% of Bupivacaine was injected into a joint space in the right knee. After, under fluoroscopic guidance with visualized appropriate spread with 1cc of IsoVue without vascular uptake, 3mL of 1% Lidocaine and 0.25% Bupivacaine plus 40mg Triamcinolone was injected into the bursa. Patient reported post procedure pain levels as 1/10 in both right hip and right knee.

During the four week follow up patient reported an overall 80% improvement in her pain and functionality. The greater trochanteric bursa and IT band injections improved her pain level by 90-95%. However, during this visit patient reposted that her axial low back pain and her groin pain on the right has worsened significantly since the procedure, which she rated as 10/10. At the time of the follow up patient rated her pain in the right hip as 5/10 and pain in the right knee as 2/10. On physical exam, the strength was still 5/5 in upper and lower extremities, however the patient was complaining of right hip with groin pain elicited by internal rotation. Notably there was no tenderness to palpation of the right knee and over

the right trochanteric bursa and IT band. The paraspinal muscle hypertonicity with spasms was still present over the cervical, thoracic and lumbar regions bilaterally. Based on patient's new complaints, prior imaging studies and physical exam findings it was determined that patient would benefit from lumbar medial branch nerve blocks and intraarticular injections into the right hip. Patient's scheduled procedure for August, 2017 had to be canceled again because of significantly elevated blood pressure.

Patient returned for her procedures in November 2017, and was determined to be appropriate for the recommended procedures. Her pre-procedure pain level was 10/10. After application of standard monitors, the patient was placed on a table in supine position. Because of significant panniculus adiposus overlying the injection field, it was carefully retracted to get secured in place with tape. During this retraction the patient complained of extreme pain at that site which she referred as the source of her back and hip pain.

Upon further examination, a firm mass was palpated in the right lower quadrant which originally was thought to be a solid stool since the patient was on a recent opioid therapy, however upon further questioning she said that she had a large bowel movement earlier that day. After discussion with the patient and her PCP that the pain was visceral in origin it was determined that the patient should transfer to ED for further evaluation including CT scan of abdomen and pelvis.

Same day CT of abdomen and pelvis with contrast revealed a complex mass in the right adnexa region. The mass appeared to contain cystic and solid components with fat attenuation and coarse calcifications most consistent with a dermoid. The uterus appeared normal, however radiologist noted fluid in endometrial canal later confirmed with a pelvic ultrasound along with a thickened endometrial stripe of 15mm. Upon further consultation with gynecologic oncology it was determined that the mass is likely a benign teratoma with a minimal chance of malignant transformation and serial ultrasounds to trend any further changes are the best course of action for this patient. Since this evaluation the patient has underwent one fluoroscopy guided intraarticular hip injection with 40mg Triamcinolone mixed with 1.5 ml of 0.25% Bupivacaine and 1.5 ml of 1% Lidocaine with partial relief of pain. Patient continues to state that the pain elicited with the palpation over the dermoid reproduces her hip pain by approximately 25%.

Discussion

Hip joint capsule sensory innervation is commonly thought to be transmitted by branches of obturator and femoral nerves, however more in depth studies have revealed that the hip joint innervation was more complex than originally thought [9]. It was determined that the hip joint capsule had more of a regional innervation with branches of femoral nerve innervating anterolateral portion, obturator nerve branches innervating anteromedial portion, superior gluteal nerve innervating posterolateral portion, nerve for the quadratus femoris muscle innervating posteroinferior portion and sciatic nerve innervating posterosuperior portion of the hip joint capsule [10]. These findings suggest that the hip joint receives contributions from L2-S3 spinal cord levels, which explains why patients with hip joint disease have referred pain in the groin, thigh and knee [7,8].

The spinal segmental levels for somatic dysfunction associated with visceral pathology are thought to be related to the autonomic

nervous system innervation of the affected organ [11]. Sensory innervation to the ovary arises via ovarian plexus, an extension of renal and aortic plexuses, which in turn receive contributions from thoracolumbar (primarily T10-T11) and craniosacral (primarily S2-S4) levels of the spinal cord [11-15]. As the neurons from the renal plexus synapse on nerves that innervate hip joint capsule at those levels, sensitization and activation of efferent nerves to the hip by afferent sensory nerves from the pathological teratoma is likely the cause of referred pain pattern that we observed in our patient. Although intraarticular steroid with local anesthetic injections into the hip joint have produced significant relief of her pain, it was never fully alleviated and continues to increase and reproduced when the teratoma is palpated during the exam or stressed during her daily activities.

For the individuals with chronic pain refractory to localized injections and procedures, it is important to consider the source of the pain keeping referred pain from a visceral pathology as a potential source. In addition, it is important to understand that any somatic pathology can cause or contribute to visceral dysfunction, especially in patients with predisposition to a particular disease.

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