Direct Epidural Metastasis of Breast Cancer Mimicking a Large Lumbar Disc Sequestrum: A Case Report and Review of Literature

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Abstract

Abstract We report a case of cauda equina syndrome (CES) caused by an epidural metastasis of breast cancer, which oddly mimicked a large disc sequestrum leading to misdiagnosis. To our knowledge, it is the first report of the direct metastasis of breast cancer to epidural space.

Introduction

As the most common malignancy, breast cancer is the second leading cause of mortality in women [1]. Speaking of metastases, it has a special affinity for spine with around 67% of the diagnosed bone metastases occurring in spine [2]. It is the most common cause of symptomatic spine metastases as one-third of them becomes symptomatic showing a spectrum of manifestations from lumbar pain to cord compression or cauda equina syndrome (CES) [3-5].

Disc sequestration, accounting for 28.6% of disc herniations, happens when a herniated disc migrates into the intracanal space with no link to the parent disc [6,7]. Sometimes, the shape and place of a disc sequestrum (DS) can cause confusion in the radiologic diagnosis[8]. The differential diagnoses include tumors, abscess, hematoma, synovial cysts, and vascular lesions [7,9,10].

In this study, we have reported a case of CES caused by an epidural metastasis of breast cancer, which oddly mimicked a large disc sequestrum leading to misdiagnosis. To our knowledge, it is the first report of the direct metastasis of breast cancer to epidural space. We believe it is a cautionary case to remind in patients with known breast cancer, who present with disc herniation symptoms and MRI findings suggestive of a DS.

Case Report

In July 2020, a 49-year-old woman was referred to our orthopedic spine clinic by an orthopedist colleague with diagnosis of lumbar disc herniation causing cauda equina syndrome. She had low back pain from six months ago, which was aggravated since the last week and was severe enough to completely disable the patient from her job and daily life. She described it as radicular to both lower extremities. It was aggravated by a short walk, 10 steps, and relieved only partially by lying decubitus and rest for at least 30 minutes. She described nocturnal pain since the beginning, but had no fever, malaise, and history of recent trauma, drug, or alcohol abuse. She mentioned no perianal/perineal anesthesia but some paresthesia of dorsal aspect of both feet.

On past medico-surgical history, she had invasive ductal carcinoma of right breast (ER-, PR-, HER2-) and had undergone right lumpectomy (2009). In 2017, she developed the same pathology in her left breast and was treated by left lumpectomy. She underwent standard chemoradiotherapy regimen after both surgeries and had no sign of recurrence in her regular follow-up.

On examination, there was no sign of skin rash or palpable mass in lumbar area. She had difficulty in walking. Mild tenderness was found over the lower lumbar vertebrae. Straight leg raise (SLR) and Cross SLR tests were positive bilaterally. The lower extremity muscle forces were 4/5 proximally and 3/5 distally. The dorsiflexion force of both ankles was 2/5. No sensory deficit was elicited. Patellar and Achilles deep tendon reflexes were decreased in both sides. There was no Babinski sign.

The magnetic resonance imaging (MRI) was in favor of a severe L4-L5 disc herniation with a large teardrop shaped sequestrum, which migrated caudally and caused severe canal stenosis at L5-S1 level. Sagittal and axial cuts showed compression of both L5 roots by the sequestrated disc in the L5-S1 neural foramina (Figure 1). However, due to the history of breast cancer and some MRI features, discussed in the 'discussion' section, we were suspicious of the diagnosis of DS. Her past follow-up positron emission/ computed tomography (PET/CT) in November 2019 showed increased FDG uptake in L5 and lower L3 endplate, which was interpreted as degenerative changes with no sign of metastatic lesions. Her last whole body bone scan (May 2020) also had shown only degenerative changes in L5.

Considering the eminent CES, we scheduled the patient for urgent decompressive laminectomy and discectomy. We performed the surgery through posterior midline incision by bilateral partial laminectomy and foraminotomy. However, after laminectomy, we found suspicious lobular tissue at the level of L4-L5 intervertebral disc bulging posteriorly into the spinal canal. As the patient had known history of breast cancer, we considered the tissue as metastasis, and tried to decompress the spinal canal and foramina by carefully removing the intra-canal mass, first diagnosed as a disc sequestrum on MRI by radiologist. Mass resection was performed with as minimal dissection as possible to avoid probable local tumor contamination. The whole resected tissue was sent for pathologic study (Figure 2). The intervertebral disc was completely intact, and we did not perform any discectomy. After sufficient decompression of canal and nerve roots, standard hemostasis and wound closure was performed.

The patient started ambulation the evening after surgery according to our postoperative protocol. Lumbar pain was significantly relieved. She was discharged after two days.

The pathology report was positive for metastatic breast -invasive ductal- carcinoma (Figure 3). We referred the patient to radio-oncologist, and she underwent a course of radiotherapy. Now, we have a seven-month follow-up of her, and she has had no recurrence so far.

Discussion

Epidural metastasis affects 5-10% of patients with systemic cancers[11]. Breast cancer accounts for 15-20% of all metastatic epidural spinal cord compressions [12]. There are three routes for a metastatic tumor to reach the epidural space: indirectly through vertebral column (85%), local invasion from paravertebral tissues (15%), and direct metastasis to epidural space (rare) [11,13]. The first is the most common route for most tumors including breast cancer, in which the tumor grows in the highly vascular vertebral bone and then invades the epidural space. The second route is mostly seen with tumors like lymphoma and neuroblastoma. However, the third route, which is the case in our patient, is extremely rare. To the best of our knowledge, it is the first report of a direct epidural metastasis of breast cancer. Although due to the higher vasculature of thoracic spine, it is the most common site of epidural metastasis (60%), our case was in the lumbosacral region (10%)[14].

DS can be a diagnostic challenge based on its shape, size, and place within the spinal canal [8,10]. Our review of literature showed such challenge can exist in either of patterns: a DS mimicking a tumor, and a tumor simulating a DS. In both patterns, the clinical manifestations of disc herniation and the morphologic similarity between DS and tumor coexist. The former has been reported much more frequently in the literature,

as we found 31 reports of DS resembling tumoral lesions in the extradural [6,8,10,15-27], intradural[19,28-32], intramedullary [33], foraminal [34-39], and extraforaminal[40-42] sites. Almost all the cases were in lower lumbar region with few cases in cervical and thoracic spine.

However, the second scenario, which is the case in our report, has been rarely reported [43,44]. One was a 65-year-old male with chordoma presenting as DS in the epidural space posterior to L4 and extending into L4-L5 foramina [43]. The other was a 41-year-old patients with a solitary fibrous tumor in the extradural space along L4 mimicking a DS [44]. Both patients had worsening lumbar pain and radiculopathy and underwent laminectomy, discectomy, and lesion resection, which was proved to be a tumor after pathologic study. To our knowledge, no case of metastatic breast cancer mimicking a DS has been reported so far. In our case, the extradural lesion seemed to originate from L4-L5 disc and moved caudally along the posterior surface of L5 to cause stenosis at the level of L5 and L5-S1 foramina. Our case was a metastatic tumor, while the two former studies reported primary tumors. It should be kept in mind that in such settings, the history of a previous malignancy, although remote, can help the diagnosis tremendously.

MRI is the gold standard for assessing spinal intracanal lesions, as it is unparalleled in visualization of bone marrow, disco-ligamentous structures, and tumors [45,46]. Generally, DS shows low intensity in T1- and high intensity (80%) in T2-weighted MRI. Although, in 20% of cases, it is isointense relative to the parent disc[47]. In our case, the lesion was isointense, peripherally extended around the disc, and occupied both foramina in axial T2 cuts highly mimicking a DS. The intracanal part was teardrop-shaped in the sagittal and polygonal in the axial cuts with clear distinction from the dural sac, not in favor of malignancy. Another misleading finding was the seemingly disrupted posterior annulus fibrosus of L4-L5 disc and the apparent origin of teardrop from it in sagittal T2 cuts (Figure 1a). However, what makes us suspect the nature of lesion as a DS was the unchanged disc height. As it should have been decreased, had such a large sequestrum have originated from it. In addition, gadolinium-enhanced MRI can help in differentiating the spinal tumors [45]. However, we did not have time to do it, as the patient had a full blown CES.

Conclusion

In conclusion, breast cancer can rarely invade the epidural space directly and mimic the radiologic features of a disc sequestrum. The history of previous malignancy, although remote, in a patient presenting with manifestations of disc herniation or CES should alarm the clinician not to miss the diagnosis, which can cause significant morbidity for the patient.

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Figure Legends

Figure 1. Sagittal T2-weighted MRI showing the teardrop lesion, which is relatively isointense to intervertebral disc and obstruct the canal (a); myelogram showing partial obstruction at L5 level (b); axial T2-weighted cuts showing the polygonal shape of lesion, which is clearly distinct from dural sac and occupies the neural foramina (c).

Figure 2. Intraoperative photograph showing the lesion in situ (yellow circle), which became visible after partial laminectomy. The dural sac (asterisk) is drawn laterally by a Love retractor.

Figure 3. The photomicrograph of lesion showing invasive ductal carcinoma (Hematoxylin and Eosin; × 200 and × 400)