

KÜMMELL'S DISEASE: AN INTERVENTIONAL PAIN APPROACH

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Background: Kümmell's disease is a rare diagnosis that involves avascular necrosis of the vertebral body after minor injury. Presentation is subtle and there are pathognomonic findings on imaging. Treatment ranges from symptom management to vertebral augmentation to open surgery depending on patient preference.

Case Report: We evaluated the case of an 88-year-old woman with a past medical history of scoliosis who presented to clinic complaining severe low back pain with associated neurologic symptoms 2 weeks after a fall at home. Imaging showed avascular necrosis of T12.

Conclusions: After discussion with the patient, she elected to proceed with a unilateral lumbar medial branch block over vertebral augmentation. Pain scores greatly improved and opioid usage decreased.

Key words: Case report, Kümmell's disease, avascular necrosis, medial branch block

BACKGROUND

Kümmell's disease is a relatively rare diagnosis with a paucity of case studies or research in the literature (1). The disease reflects a failure of the healing process after minor injury, causing avascular necrosis of the vertebral body. Patients often complain of severe back pain resulting in marked functional limitation. Although difficult to accurately predict, the incidence of Kümmell's disease is rising due to America's aging population, with some sources citing an incidence rate between 7% and 37% (1,2). Therefore, our case report aims to highlight the salient points of this increasingly common disease and increase its familiarity within the chronic pain community.

Patient Information

We evaluated the case of an 88-year-old woman with a past medical history of scoliosis who was referred to the interventional pain clinic for evaluation of low back

pain that started one week prior to presentation. The patient states that she fell at home and immediately felt severe back pain. Her pain was located in the midline of her lower back with referred pain to her right axial lumbar spine and described as sharp, shooting, throbbing, and constant. The patient had received lumbar epidural steroid injections for pain associated with her scoliosis with good effect, but had never undergone spinal surgery. An initial computed tomography (CT) scan demonstrated severe scoliosis with a chronic superior endplate depression at T12. She had baseline numbness and tingling in her lower extremities due to chronic peripheral neuropathy. Due to this diagnosis, the patient was started on 10/325 hydrocodone-acetaminophen every 4 hours by her primary care provider (PCP), but still described continued breakthrough pain. Thoracic and lumbar magnetic resonance images (MRIs) were obtained that showed ~15% superior T12 endplate compression fracture, which was consistent with her

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chronic fracture on prior imaging, but with new onset marrow edema and changes suggestive of avascular necrosis (Figs. 1 and 2). The patient was offered vertebral augmentation and right-sided medial branch block for her referred pain.

Clinical Findings

A physical exam was notable for pinpoint tenderness along T12 with referred pain to the right side of the lumbar spine and right lower extremity. Her range of motion, strength, and reflexes were equal to bilateral upper and lower extremities. Her cardiovascular, pulmonary, and gastrointestinal exams were within normal limits.

Timeline

February 1, 2021: Initial evaluation for low back pain at PCP office.

March 1, 2021: Initial referral to interventional pain medicine clinic. Additional imaging studies ordered and physical exam performed.



Fig. 1: Sagittal T2-weighted MRI of the lumbar spine. MRI, magnetic resonance imaging.

March 15, 2021: Follow-up visit with MRI showing avascular necrosis of T12.

March 24, 2021: Right T11, T12, and L1 medial branch block performed.

March 30, 2021: Patient reports increased range of motion, less pain, and less narcotic use.

Diagnostic Assessment

An initial CT scan, in February 2021, demonstrated severe scoliosis with a chronic superior endplate depression at T12. Repeat thoracic and lumbar MRIs, obtained in March 2021, showed ~15% superior T12 endplate compression fracture, which was consistent with her chronic fracture on prior imaging, but with new onset marrow edema and changes suggestive of avascular necrosis (Figs. 1 and 2).

Therapeutic Intervention

Vertebral augmentation has been shown to be effective in providing pain relief and functional improvement for patients with Kümmell's disease (6). Alternatively, for patients who elect not to proceed with vertebral augmentation for compression fractures, medial branch blocks to treat the facet joint has been shown to also be effective (7,8). As majority of patient's symptoms were right sided, we elected to proceed with right T11, T12, and L1 medial branch blocks to block the T11/T12 and T12/L1 facet joints.

Using fluoroscopic guidance, a 25-gauge 3.5-inch

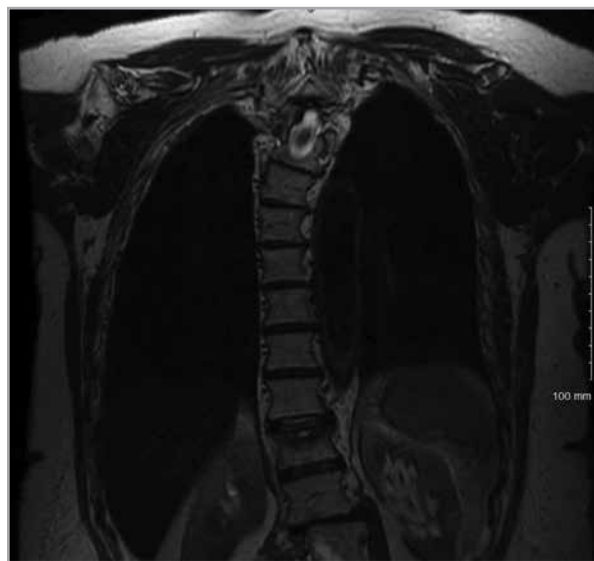
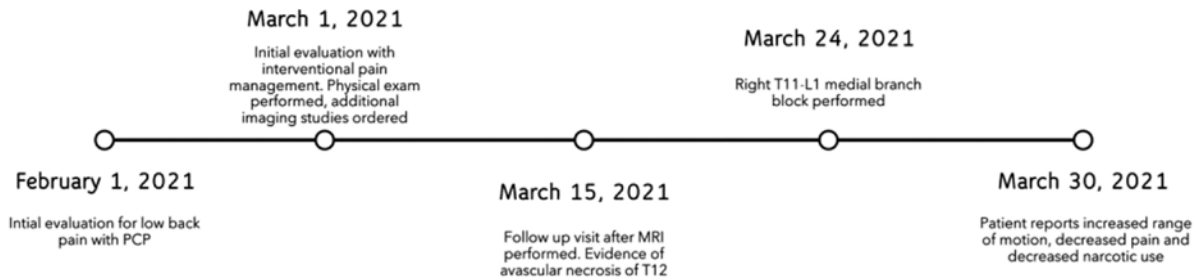


Fig. 2: Coronal T2-weighted MRI of the thoracic and lumbar spine. MRI, magnetic resonance imaging.



needle was placed at the intersection of the superior articular process and transverse process of the T11/T12 and T12/L1 targets. No paresthesias were elicited with needle placement and aspiration was negative for blood and cerebrospinal fluid. A mixture of methylprednisolone and bupivacaine were injected at the target site. There were no complications from the procedure.

Follow-up and Outcome

After completion of the right medial branch block, opioid usage decreased significantly from 6 tablets per day to 1-2 tablets. She also reported an improvement in sleep and function. Prior to this episode, she was not on any opioid medications. She was then offered vertebral augmentation for definite treatment of her Kümmell's disease, but elected not to proceed given her age and multiple comorbidities. The patient had satisfactory pain control at follow-up and elected to follow-up for repeated assessment if pain worsened.

DISCUSSION

This case report highlights some of the quintessential features of Kümmell's disease. Namely, our patient presented with acute, severe back pain after a minor injury. Neurologic involvement is more common in patients with Kümmell's disease than in osteoporotic compression fractures, although our patient had minimal neurologic symptoms on presentation (1). Since the differential diagnosis for a patient with back pain is enormous, imaging can help differentiate Kümmell's disease from other etiologies. Imaging studies immediately after the inciting event often fail to demonstrate any fracture or vertebral body deformity. However, because of the seemingly benign nature of the initial injury, initial imaging is not usually obtained (6). Once imaging is obtained, delayed compression deformity of the affected vertebral body and exaggerated thoracic kyphosis can be seen on plain radiographs, CT, or MRI. CT will also show vertebral osteonecrosis with an intra-vertebral vacuum cleft as seen in our patient. Finally,

MRI is the best modality to characterize the "double-line sign" where a linear region of low intensity represents the vacuum cleft surrounded by elevated T2 signal of the fracture deformity or intravertebral fluid (1). Our patient had ~15% height loss, but associated marrow edema and changes suggestive of avascular necrosis. Her fracture was chronic and present on old imaging, and her clinical symptoms were not typical of an osteoporotic fracture of this magnitude.

Patients at risk for development of Kümmell's disease include those with extensive spondylosis, advanced age, preexisting osteoporosis, and those on long-term steroid therapy (3). Although there is much controversy and research regarding the pathophysiology, it is generally thought of as due to avascular necrosis of the vertebral body leading to vertebral body collapse. Yet, it is unknown if ischemic osteonecrosis or vertebral collapse is the first step of the disease process (4). Diagnosis of Kümmell's disease is one of exclusion as there are many causes of vertebral body collapse and osteonecrosis, including neoplasm, infection (usually from tuberculosis), metabolic disorders, osteoporosis, or radiation (3,5).

Clinical features of Kümmell's disease are similar to those of vertebral compression fractures (2,8) and include pinpoint tenderness along corresponding spinous process and paravertebral structures. A distinguishing feature of Kümmell's disease is that pain may be referred as was present in our patient. She had referred right lumbar axial pain with associated marrow edema and changes suggestive of avascular necrosis at T12, worse within the right vertebral body. It is possible the referred lumbar medial branches were affected that produced an inflammatory response causing referred pain. We offered vertebral augmentation to treat the marrow edema at T12, however, the patient was concerned given her age (88 years old) and multiple comorbidities. We also offered a right lumbar medial branch block for symptom control as a stepwise approach of increasing interventional invasiveness. Furthermore, given the patient's history of chronic T12 fracture with

superimposed marrow edema due to Kümmell's disease, a medial branch block to treat the chronic facet joint pain was considered. A retrospective study of 53 patients with a history of compression fractures showed 78.9% of patients had significant pain relief and functional improvement at 12-month follow-up (7). She responded with a significant drop in milligram morphine equivalents with pre- and post-procedure pain. Vertebral augmentation or radiofrequency ablation of the facet joint was offered if pain returned to severe levels (8).

As evidenced in our case report, Kümmell's disease is a unique disease entity that has virtually pathognomonic imaging findings despite difficulty in clinical diagnosis. Multiple interventional options should be considered when a patient presents with vertebral marrow edema and avascular necrosis. When oral medication and conservative treatment fail, spine injections can be considered for symptom control or vertebral augmentation should be offered and treated as an osteoporotic

compression fracture. Due to the rarity of this disease and paucity of literature, case reports on Kümmell's disease, like this one, are relied upon when treating these patients.

CONCLUSIONS

As noted, the patient had significantly decreased pain and increased mobility after completion of the medial branch block. She did note some nausea post-intervention, but overall had an improved quality of life. She elected to defer more invasive interventions unless her pain worsened.

Informed Consent

In accordance with the Baylor College of Medicine institutional policy, informed consent and institutional review board approval are not required for case reports if there are less than 4 patients and all identifying patient information is removed.

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