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You are the flight surgeon at a large Air Mobility Command base. You are dreaming about your upcoming cargo mission, knowing that in the heavy community you only go to places where they have really nice hotels, when your last patient shows up. He is a 32-yr-old flight engineer who comes in complaining his low back hurts. He says his pain is so severe that he is unable to walk very far without increased discomfort and it is very difficult for him to bend over. You talk to him further and find out he was involved in a motor vehicle crash approximately 2 wk ago.

You begin to question him further regarding the crash and find out he had been stopped at a traffic light and was rear ended by another car. He states the other car was only going about 10 mph prior to hitting his car. He says there was no significant damage to either car and no intrusion into the vehicular compartment. He was also wearing his seatbelt at the time of collision.

1. What other questions should you ask that may indicate possible serious underlying pathology?

A. Significant trauma.
B. Motor or sensory deficit.
C. New-onset bowel or bladder incontinence or urinary retention.
D. Saddle anesthesia.
E. All the above.

ANSWER/DISCUSSION

1. E. Any affirmative answer to the above questions would indicate the possibility of serious pathology and the potential need of additional work-up. In this case, from the patient's description, he did not have significant trauma. Significant trauma would be concerning for the possibility of a compression fracture. In someone with osteoporosis, it would take significantly less force to cause a compression fracture. In addition, he was wearing his seatbelt and was provided additional protection from significant trauma. Motor or sensory deficits would be concerning for the possibility of a herniated nucleus pulpous or a mass-type lesion compressing the nerve. Changes in bowel and bladder habits and/or saddle anesthesia would be concerning for cauda equina syndrome and would require an immediate neurosurgical consultation and magnetic resonance imaging (MRI) of the lower back.[2]

During your physical exam, you find he has diffuse pain in the lower back without specific pinpoint tenderness. Deep tendon reflexes are 2/4 bilaterally and strength is 5/5 bilaterally. Light touch sensations

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are intact in his lower extremities bilaterally. Abdominal exam is normal, nontender, without pulsatile masses or other abnormalities appreciated.

2. As you listen to the engineer, you review the possible serious or emergent causes of low back pain. Which of the following is NOT a strong indicator for a serious etiology?

A. History of cancer that can metastasize away from initial area.
B. Motor weakness.
C. Sensory deficit.
D. Pain.
E. Strong pain with lumbar spinal surgery within the last year.

ANSWER/DISCUSSION

2. D. A history of cancer that can metastasize should concern the physician about possible bony involvement as a source of pain. Motor weakness as well as a sensory deficit would be suggestive of a more serious etiology such as a mass or herniation that is compressing the nerve. Any patient with strong pain and lumbar surgery within the last year would raise concern for an underlying infectious etiology and would warrant immediate consultation and evaluation in addition to having any bowel or bladder concerns. Pain in and of itself is a very weak indicator for serious underlying etiology and requires clinical correlation.[2]

As previously discussed, the flight engineer states it is very painful to walk long distances, run, or bend over, and he admits an inability to safely egress the aircraft. At this time, you place the member in duties not including flying status and elect to medically treat him. During your physical exam, you do not discover any significant red flag findings such as midline pinpoint tenderness, pulsatile abdominal mass, fever, or a distended bladder.

3. What tests and/or treatments would you initiate at this time?

A. Lumbar spine X-rays.
B. Nonsteroidal anti-inflammatory drugs (NSAIDs) and/or muscle relaxers.
C. MRI lumbar spine.
D. Physical therapy evaluation.
E. B and D.

ANSWER/DISCUSSION

3. E. At this point the patient does not have any evidence of a more serious etiology for his low back pain, and conservative treatment is indicated. Since his trauma was relatively minor and he does not have bony pain, plain X-rays are not indicated, as they are not very specific or sensitive.[6] He does not have any radicular symptoms or changes in bowel or bladder habits, so an MRI is not indicated.[3] Low back pain is the number one reason for patients seeking medical care and 80% of patients will get better no matter how they are treated, even with just giving them reassurance.[2,3] Muscle relaxers and NSAIDs have been shown to be effective in the treatment of nonspecific low back pain.[14]

Your patient presents about a month later to your clinic and states his pain is unchanged despite the conservative treatment with NSAIDs and physical therapy. At this time you order plain radiographs of the lumbar spine. The radiologist reports the patient has diffuse degenerative changes and has a transitional vertebra at S1. He returns again another month later as his back pain has increased and he now states he has pain in his right hip. This new pain radiates down his right leg to about the midcalf. Upon physical examination, it is unchanged from previous exams except for now the patient demonstrates a positive straight leg raise test on the right. You order an MRI of the lumbar spine without contrast, and the report from the radiologist states he has an intrathecal mass at L3 and a possible second mass at the S1-2 level. Per the radiologist's suggestion, you send him back for a contrast lumbar MRI. This study shows at least three discrete lesions at L3, L5-S1, and S1-2.

4. What further studies are indicated at this time?

A. Abdominal computed tomography with/without contrast.
B. Abdominal ultrasound.
C. MRI of the cervical and thoracic spine and brain.
D. Plain radiographs of the cervical and thoracic spine.
E. None of the above.

ANSWER/DISCUSSION

4. C. Due to the possibility of seeding of the neuraxis, complete brain and spine MRI and cerebral spinal fluid analysis should be performed once the intrathecal mass has been identified.[4] Abdominal computed tomography and plain radiographs will not show enough detail of the spine to evaluate for tumors. In addition, the brain would not be evaluated with these studies. An ultrasound of the abdomen would be of value only if there was concern about the possibility of an abdominal aortic aneurysm.

The patient is referred to neurosurgery and subsequently undergoes lumbar laminectomy with gross removal of the L3 lesion. Postoperatively, he is noted to have mild right leg and genital numbness that steadily improves. Pathology ultimately reports the mass is a myxopapillary ependymoma. Due to the histopathology of having a myxopapillary ependymoma, he undergoes a second surgery to remove the tumor at the L5-S1 level.

With time, the patient's genital and right leg numbness resolves and no further neurological deficits are noted. He undergoes subsequent MRIs showing only postsurgical changes without tumor reoccurrence.

5. The patient returns to clinic asking about returning to flying status. What do you do?

A. Have the patient cross train to a duty that does not involve being on flying status.
B. Return him to flying status.
C. Continue to monitor and then evaluate for flying duty 2 yr post-resection.
D. Send him to the Aeromedical Consultation Service for return to flying duty now.

ANSWER/DISCUSSION

5. C. Myxopapillary ependymomas are slow-growing glial tumors that are typically found in early adulthood. They are more common in men than women, with a reported ratio of 1.4–2.5 to 1, male to female. Median age at diagnosis is 35 to 37 yr.

Myxopapillary ependymomas generally present with low back pain, which the patient can have for months. Radicular features may or may not be present. The average duration of symptoms prior to diagnosis is 20.8 mo.[1] The overwhelming majority of these types of tumors are located in the lumbosacral or thoracolumbar spine. As previously mentioned, due to the potential of dissemination in the cerebrospinal fluid (CSF), evaluation of the entire spine and brain is required, as well as CSF analysis. If there is seeding of the CSF, the fluid will show an increase in protein, with one study demonstrating preoperative CSF protein levels averaging 2462 mg · dL^{-1} (normal CSF protein levels are 23–38 mg · dL^{-1}).[12]

Initial management is a laminectomy with attempted surgical resection. The initial surgery may be sufficient and provide a cure for the patient. Aggressive surgical excision of the tumor has an overall survival after 11.5 yr of 94% in another study.[1] Local reoccurrence of the tumor can occur as much as 20 yr after the initial surgery. Radiation therapy postoperatively has not shown improvement on long-term survival.[7] If the tumor returns, 85% of patients will have reoccurrence in the original location followed by distant spine. A small proportion may only show reoccurrence in the brain. Possible late adverse effects can include urinary and/or bowel sphincter dysfunction, motor paraplegia, chronic pain, and hypoesthesia. In one large study, these adverse effects were seen in 25% of the patients with tumor reoccurrence.[8] In another study, the estimated 10-yr survival rate exceeds 90%, but up to one-third of these patients had tumor reoccurrence within 2 yr.[11] With the reoccurrence rate so high, the recommendation to wait a period of time before granting a waiver would be prudent, and if the patient remains symptom and tumor free, a conditional waiver could be granted at that time.

AEROMEDICAL DISPOSITION

For flyers having a myxopapillary ependymoma, the greatest concern would be sudden incapacitation due to intractable pain and the possible neurological symptoms that would prevent safe landing of the aircraft. In the event the tumor causes neurological symptoms and these symptoms do not resolve after surgical resection, evaluation will need to be performed to determine how these symptoms could impact one's ability to safely fly and egress an aircraft in the event of an emergency. The likelihood of sudden incapacitation due to pain is low, as the tumor takes time to grow and the patient would develop increased pain and/or neurological symptoms long before he/she would be incapacitated. In addition, in one study in which patients were followed for 2 to 12 yr, gross total surgical removal was achieved in 70% of patients with a myxopapillary ependymoma.[9] For flyers to remain on flying status, they would need to undergo regular neurological evaluations and MRI studies for the rest of their lives to ensure no tumor reoccurrence. It would be extremely important to stress to the flyers the need to seek evaluation if there are any changes in their neurological status, as this could indicate tumor reoccurrence and it would place them and their crew at risk if they were to pilot an aircraft. If these conditions are met, then they could safely return to flying duties. In this case, the engineer was returned to flying status with the provision that he undergo continued surveillance for reoccurrence of the tumor.[*] Navy and Army flyers can be considered for a waiver 2 yr after completion of therapy provided there is no evidence of reoccurrence.[10,13] The Federal Aviation Administration (FAA) Guide for Aviation Medical Examiners has no specific guidance on myxopapillary ependymoma; to renew an FAA medical certificate, airmen would need to submit all their information to the FAA for a decision.[5]

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