

## You're the Flight Surgeon

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You're the flight surgeon for a training wing, often referred to as the busiest airport in the world, with over one million flight operations a year. While you mostly spend your clinical day processing flight physicals and treating airsickness, the occasional interesting case does cross your desk. Today, your desk is piled high with administrative up-chits, per usual, when one of your colleagues asks you to evaluate a struggling advanced rotary flight student. While this student aviator excelled in primary flight training, he has had difficulty in staying ahead of the training curve. He attributes his problems to his low back pain, which begins within 30 min of taking off and continues throughout the flight. While he is not alone in this complaint of low back pain, all other cases have been resolved with conservative means. Despite 4 mo of physical therapy and other efforts, he has shown no improvement. Command is considering separating him from training, as he will not complete on time if his back pain continues. You have been asked to review his case and determine if he warrants further workup or if he should be medically attrited from the program. Recurrent low back is currently not compatible with continued flight training.

The patient is a thin, 23-yr-old man whose pain is exacerbated by sitting for prolonged periods of time. The pain is described as achy in quality and quantified as a constant 4/10 in intensity. His symptoms worsen to an intensity of 6/10 when flying and may decrease to as low as a 2/10 depending on activity. He has had this pain since high school. In college, he was treated with physical therapy and other conservative measures. These sessions did not provide him with significant improvement. His back pain gradually subsided with rest and decreased during college. He did not notice his pain again until he began the initial phases of flight training, where greater stress was placed on his low back during flight. It continued to be tolerable with conservative therapy, including stretching and rest. However, once he began rotary wing training, his symptoms began to worsen exponentially. His pain localizes to his right lumbar paraspinal muscles with occasional radiation to his right lateral hip, and his symptoms are worsened by sitting in a solitary position for durations of greater than 1 h. His only alleviating mechanism is stretching, which only provides brief respite from his pain. He denies any numbness or tingling of his perineum or scrotum, loss of bowel or bladder control, or weakness in his lower extremities or sciatica. The patient has already completed 4 mo of physical therapy with nonsteroidal anti-inflammatory drugs (NSAIDs) and muscle relaxants for pain relief. This treatment has been without any lasting benefit. On

exam, he has no evidence of tenderness to palpation, vertebral step-offs, muscular atrophy, asymmetric weakness, or reflex abnormalities.

### 1. At this point, what further workup should be done?

- A. Order magnetic resonance imaging (MRI) of the lumbar spine.
- B. Order a lumbosacral spine series.
- C. Order erythrocyte sedimentation rate and/or C-reactive proteins.
- D. Evaluate for tender points for fibromyalgia.
- E. Educate the patient on low back pain and conservative management, refer to physical therapy, and schedule a follow-up.

### ANSWER/DISCUSSION

**1. B.** The majority of patients with low back pain lasting less than 4 wk do not require imaging. The American College of Physicians and the American Pain Association recommend that "clinicians should avoid imaging or other diagnostic tests in patients with nonspecific low back pain" and reserve imaging for patients with severe pain or progressive neurologic deficits.<sup>1,2</sup> In this case, the patient has had pain for 4 mo and warrants further diagnostic imaging. An MRI is not warranted at this time as the patient has no neurologic deficits on exam, no symptoms of cauda equine syndrome, no evidence for risk of infection, nor moderate to high risk of cancer. This makes choice C an incorrect choice. The patient does not demonstrate symptoms of fibromyalgia, so evaluation for tender points is not necessary. The patient has already begun chiropractic manipulation with only minor improvements in symptoms, making E a poor choice. Lumbosacral spine radiographs are the most appropriate first diagnostic approach for this patient. The views should include anteroposterior (A/P), lateral, and oblique.

Views of the lumbar spine come back without a discernable cause for his symptoms.

### 2. How likely is standard physical exam to predict true lumbar radiculopathy?

- A. Not likely.
- B. Somewhat.
- C. Equivocal.

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- D. Very likely.
- E. Spot on.

### ANSWER/DISCUSSION

**2. B.** Looking at a 2013 study where the authors worked to investigate the accuracy of clinical exam findings and nerve root impingement, the author's conclusions were that the accuracy of individual tests were low but that overall clinician evaluation improved somewhat to correlate lumbar radiculopathy and positive MRI/computed tomography imaging findings.<sup>6</sup> Physical exam tests used to predict radiculopathy were straight leg raising, muscle strength, dermatome sensory loss, and reflex impairment with calculated sensitivity, specificity, and positive and negative likelihood ratios corresponding to L4, L5, S1 nerve root impingement confirmed via imaging.<sup>6</sup> The study appears to indicate evaluation was by specialists such as neurologists, further concluding that results of this study should not be generalized toward a primary care setting in which our patient presented. While a thorough, focused, and standardized exam with the presenting complaint of persistent low back pain remains an important part of diagnosis in this patient, it appears even positive findings are at best only somewhat reliable in our diagnostic workup.

Given this information, as well as the patient's continued symptoms after several months of physical therapy, a more thorough history was obtained. During the second interview, he started to discuss his right hip pain, which was 4/10 in intensity and accompanied by an occasional clicking sound. He reports experiencing similar symptoms since high school but that the pain is usually less than his back pain. He reports that the pain was achy, seemed to radiate to his groin, and was aggravated by physical activity.

### 3. At this point, what further workup is warranted?

- A. Physical exam of the hips and knees.
- B. A/P view of the pelvis.
- C. Observation of gait.
- D. Observation of position change.
- E. All of the above.

### ANSWER/DISCUSSION:

**3. B (E).** All of the above options are good and should be included; however, an A/P view of the pelvis with a lateral view of the right hip would be most important. A/P view of the pelvis should include coccyx and symphysis pubis; both sides of the iliac wings and obturator foramen should be visible and symmetric. Joint space width and acetabular version can be evaluated in the A/P view.<sup>8</sup> Physical exam of the hips looking for range of motion and overall strength is a good starting point, but one must be sure to evaluate the knees to rule out a knee disorder causing the hip pain. X-ray of the hips will be useful to evaluate for the causes of chronic hip pain. Observation of gait will help to assess for impact of hip condition on patient overall mobility. This will also help to recognize specific patterns of hip abnormalities such as Trendelenburg gait (patient shifts the torso over the affected hip), which is indicative of gluteus medius weakness or an antalgic gait (where the

patient spends a shorter time weight bearing on the affected side). Finally, observation of position change demonstrates any weakness in hip flexibility, iliopsoas and quadriceps muscle strength, and normal function of the lumbosacral nerve roots.

In this patient all of the physical exam findings are normal. An A/P view of the pelvis with a lateral view focused on the affected hip is ordered and comes back with diagnosis of questionable retroversion of the right acetabulum. At this point the patient is referred to orthopedics for further evaluation. An MRI is ordered followed by an MRI arthrogram, with radiologic diagnosis of a retroverted acetabulum as well as an anterior superior labral tear.

### 4. What are some causes of low back pain with or without radiculopathy?

- A. Degenerative disk disease with herniation.
- B. Spinal stenosis.
- C. Hip labral pathology.
- D. Spinal metastasis.
- E. Piriformis syndrome.
- F. All of the above.

### ANSWERS/DISCUSSION

**4. F.** The correct answer is F, all of the above. Low back pain and lower extremity pain are some of the most common chief complaints presenting to physicians. Differentiating low back pain from lower extremity pain can be challenging, which makes the physical exam a crucial tool. True lumbar radiculopathy has a reported incidence of 3–5%, which is a low proportion of patients presenting with low back pain.<sup>3</sup> Lumbar disc herniation is the most common cause of radiculopathy. Labrum tears are another common pathology that may be difficult to diagnose. Labral tears are not apparent on standard imaging, which prolongs diagnosis. Labral tears often present with nonspecific symptoms, including anterior thigh pain, groin pain, and buttock pain.<sup>3</sup> Piriformis syndrome is another common cause of low back pain. Presenting symptoms include buttock pain and tenderness, and treatment typically includes physical therapy that focuses on stretching.<sup>10</sup>

### 5. Of the following examinations, which is the recommended standard in determining labral tears in a joint?

- A. Ultrasound.
- B. MRI.
- C. Arthrogram.
- D. Computed tomography scan.
- E. DEXA scan.

### ANSWER/DISCUSSION:

**5. C.** MRI arthrogram is the recommended means of evaluating for labral cartilage tears. In this patient, MRI arthrogram identified a problem in the acetabular cartilage. In many patients, similar conditions will not be identifiable under other routine imaging protocols. This highlights the need for enhanced imaging with the arthrogram.

In some cases, not considering higher level imaging can result in worsening symptoms and further injury in the patient.

Low back pain is a known occupational hazard for rotary wing aviators, with up to 71% of surveyed aviators reporting low back pain on at least 50% of their flights and 34% admitting that the pain had affected their situational awareness at some point.<sup>11</sup> Per the Navy, Air Force, and Army waiver guides, this condition is not disqualifying provided that the patient's somatic dysfunction is amenable to conservative therapy (stretching, exercise) or manual medicine. The Army even allows for use of over-the-counter medications and NSAIDs for treatment/management of the condition.<sup>12</sup> In the Navy, if the condition is persistent, a waiver may be recommended if the pain can be controlled by conservative, nonpharmacological means and is not associated with an organic cause. For designated personnel with chronic backache, low-dose NSAIDs or acetaminophen may be used provided there is close follow-up with the flight surgeon.<sup>9</sup> Per the U.S. Air Force Waiver Guide, low back pain is disqualifying if the patient has a "history of disease or injury of the spine or sacroiliac joints, whether with or without objective signs, which prevent the examinee from successfully following a physically active lifestyle or associated with local or referred pain to the extremities, muscular spasms, postural deformities, requires external support, requires frequent treatment or prevents satisfactory performance of duties."<sup>4</sup> This condition is disqualifying for Flying Classes IIA, II, and III, but a waiver is possible provided the condition responds adequately to treatment (of note, a search of the Aeromedical Information Management Waiver Tracking System in July 2015 showed that out of 399 individuals with a waiver disposition containing a diagnosis of low back pain, 198 were disqualified).<sup>4</sup> The Federal Aviation Administration guidelines do not directly address low back pain; however, it likely falls under musculoskeletal evaluation. An aviator is afforded the opportunity to demonstrate ability to control the aircraft, and a Federal Aviation Administration inspector writes up a report indicating the presence or absence of a safety problem.<sup>5</sup>

In this patient's situation, his labral tear is likely secondary to a dysplastic hip condition known as femoroacetabular impingement syndrome.<sup>7</sup> The patient's retroverted acetabulum most likely contributed to his overall diagnosis of femoroacetabular impingement syndrome. With his repetitive entry and egress from the aircraft cockpit, prolonged sitting, and required use of rudder pedals, his condition was likely exacerbated.

The patient underwent surgical correction for his tear and 4 mo of physical therapy, at which time his back pain had significantly improved, and he was able to start observation flights in the aircraft. He did not have increased back pain after several flights and a waiver was submitted and approved. The patient in question went on to excel in his rotary wing training and has recently received his Wings of Gold.

As demonstrated by this patient, not all cases of back pain are secondary to somatic dysfunction, and if a patient is not responding to conservative therapy, then a more thorough musculoskeletal review of systems may assist with helping the patient.

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