Low Back Pain in a Female Varsity Ice-Hockey Player

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LOW BACK PAIN is experienced by upwards of 80% of the general population at some point in their lives.[1] There are numerous causes of low back pain, including muscular, ligamentous, bony, and articular sources. One common source is an intervertebral disk. Many times, people with damage to a disk do not present with any overt signs of disk pathology. Disk pathology can take many forms. One specific injury that is often overlooked or not considered is damage to the vertebral endplate that eventually results in the development of Schmorl's nodes. Schmorl's nodes (Figure 1) are the result of protrusion of the intervertebral-disk nucleus material through an endplate fracture and "pits that form from localized underlying trabecular bone collapse which are linked to trauma."[2(p■)] They were first described in 1927 by German pathologist Christian G. Schmorl.[3] McGill[2] found that they are commonly seen with repeated compressive forces in a neutral spine. The endplate fractures are often misdiagnosed as disk herniations because of "the flattened interdiscal space seen on planar X-rays."[2(p■)] Many patients describe hearing a "pop" at the instant of the injury, which McGill documents as an "audible 'pop' at the instant of endplate fracture"[2] when compressing pig spines in vitro in the lab. Some patients present with acute symptoms after the injury, whereas others do not display any overt signs or symptoms. This might result from biomechanical changes accompanying the fracture.[2] Changes include loss of disk space and impingement of the nerve-root space by osseous or other structures. This case review describes a female varsity ice-hockey player presenting with low back pain. I will employ a timeline method of presentation of symptoms because it best demonstrates the chronological progression.

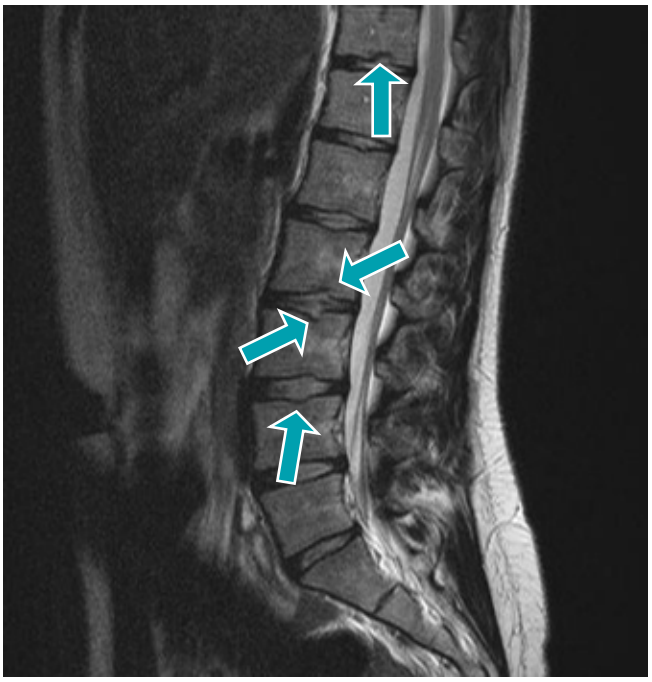

Figure 1 Reaching directions for the Star Excursion Balance Test.

Case History

JD is a healthy 21-year-old female varsity ice-hockey player who first presented to the athletic therapy clinic in October. In her adolescent years, she had played both soccer and ice hockey at a competitive level. Initially she had been experiencing right-sided lumbar pain radiating into her right buttock that was aggravated by activity and also by sitting and standing for periods of time. No specific positions or activities reduced or alleviated her signs or symptoms. She described the

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pain as constant and dull, with an occasional episode of sharp, shooting pain. She had pain with active flexion, left-side flexion, and left rotation on the right side of her spine, specifically at the L2–L3 level. She had pain on palpation over the right facets of L2 and L3. The team physician assessed her in November and diagnosed mechanical low back pain. She was treated with local modalities, ultrasound to the right lumbar-facet joints, stretching, core strengthening, and interferential stimulation and improved over the next few weeks. Her progress is described sequentially as follows.

March. She returned to the clinic with a recurrence of her pain, which was controlled fairly quickly. She had recurring, intermittent episodes of pain followed by improvement in the next few weeks.

October. JD returned to play and experienced more radicular symptoms including tingling along the posterior aspect of her right buttocks, leg, and down into the plantar aspect of her foot, aggravated again by sitting. Her L2–S2 myotomes, dermatomes, and patellar and Achilles reflexes were equal and within normal limits. She did present with reproduction of her low back pain with positive straight-leg-raise (SLR) and slump tests.[4] Her back pain subsided, but she continued to have varying amounts of tingling and numbness in her foot. The team physician prescribed her NSAIDs.

November. Because of the location and nature of her symptoms and a growing concern about spondylolysis, X-rays were ordered. The X-rays were negative for any spondylolytic changes.

December. JD was referred to a local physiotherapist for another opinion. Two treatments were performed involving manual-therapy techniques, exercise, and therapeutic modalities with no specific relief of her signs and symptoms.

January. A CT scan was ordered and performed in February 2005. No specific abnormalities were observed.

February/March. JD reported more frequent tingling and numbness down her right leg and foot localizing in her heel, which was worsened by small amounts of standing or sitting (for less than 15 min). She was referred to a spine surgeon for examination. She had magnetic resonance imaging (MRI) performed before her assessment. The surgeon informed her that she was not a surgical candidate.

April. JD was assessed by a spine researcher. He found a few minor postural factors contributing to her pain, but nothing dramatic. After reviewing the MRI he noticed a number of Schmorl's nodes at a variety of lumbar levels (Figure 1). He advised her to reduce her physical training regimen, change from running to fast walking as a starting point for her cardiovascular fitness until she could perform the exercise pain free, perform neural flossing, and then begin a gradual return to higher level activity. She had a slight reduction in symptoms but still experiences local lumbar pain and some distal pain in her right foot.

Treatment Interventions

A variety of therapeutic treatments have been attempted with JD. She has been reluctant to reduce her activity level during the varsity season, which likely contributes to a worsening of her signs and symptoms. She had been prescribed NSAIDs to reduce local inflammation. Ultrasound and interferential stimulation were used to manage localized symptoms. Manual therapy and muscle-energy techniques were performed in the clinic to correct pelvic misalignments. Therapeutic stretching focusing on regional tightness was also carried out. Manual lumbar traction with a traction belt was performed as described in Porterfield and DeRosa.[4] Specific trunk-strengthening exercises designed as per McGill[2] were also instituted. These exercises included cat/camel, side bridge, and bird dog, all incorporating the abdominal bracing technique McGill describes. Sport-specific pulley exercise simulating shooting or passing incorporating the abdominal bracing was gradually incorporated and always well tolerated. More advanced pulley crossover drills, Plyoball™ (JumpUSA.com, Sunnyvale, CA) tossing, and advanced challenges to trunk stability were supervised in the clinic. The vast majority of these exercises never exacerbated her symptoms while or after she performed them. Nerve flossing, as described by McGill,[2] was initiated to attempt to reduce the peripheralization of symptoms. McKenzie[5] prone and standing extension exercises were attempted but did not reduce symptoms.

Discussion

There are a few important points to consider from the review of this case. The first is that back pain is relatively common in high-level, intensely trained,

competitive athletes. Most teams during various periods of a season are practicing four to five times a week, playing one to two times per week, and involved with conditioning sessions two to three times per week This places a tremendous physical and mental demand on these student-athletes during a period when many are still in their developmental life stages (most student-athletes in Canada enter universities as 17-year-olds). Various musculoskeletal structures in these participants are at risk for potential stress and injury. Second, it is important to develop and consider differential diagnoses when assessing patients. It is difficult to definitively fault certain tissues, especially during a time when continued training or a delay in reporting injuries can blur the picture. This is a salient point for students, newly certified athletic therapists, and even the patients themselves, who want a specific diagnosis.

Clinicians must do their best to rule out certain injuries by performing ongoing assessments of their patients. It is important not to get stuck on a specific diagnosis but consider that most tissues are not isolated in injury. For example, several different tissues are likely injured or at fault. In this instance, we can say with some confidence that JD suffered some trauma to her spine, likely involving a compression injury with a number of vertebral endplate fractures and the subsequent development of a number of Schmorl's nodes at various levels of the lumbar spine. This, however, does not entirely explain the signs and symptoms she continues to experience. It is a piece of the puzzle, but the key is finding the best treatment option amenable to the student-athlete, given the various factors.

A thorough knowledge of the mechanics and anatomy of the lumbar spine is essential. The vertebral endplate is a unique structure that comprises relatively compressive cancellous bone interspersed with transverse trabeculae. To visualize the amount of deformation present in the endplate, McGill[1]■ suggests obtaining a pig's vertebral segment from a butcher and squeezing it between your thumb and index finger. Under an axial compressive load the nucleus material of the intervertebral disk pressurizes and begins to press into the vertebral endplate and fracture while the "viscous nucleus will squirt through the crack in the vertebral body."[1(p■)]

Low back pain can at times be a complex puzzle. We must endeavor to get the best history possible from our patients. Highly motivated patients will usually be reluctant to abstain from returning to activity, so it is important to educate them regarding their injuries and devise alternative exercises or activities for them during their rehabilitation. To unlock the mystery of injuries involving the spine we must ask the right questions, listen effectively to what patients are telling us, and consider all of the possibilities in both assessment and treatment. ▮

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