A Review of Spinal Cord Injuries

In this review article, neurosurgeons from Thomas Jefferson University Hospital in Philadelphia take a look at the diagnosis, treatment, and results of treatment for spinal cord injuries. They focus specifically on fractures and cord injury at the thoracolumbar area.

The thoracic spine ends at T12 (the last thoracic vertebra). The lumbar spine (L1) begins right after T12. The union between T12 and L1 is called the thoracolumbar junction. Spinal cord injuries at this level can result in one of two neurologic injury syndromes. These are the cauda equina syndrome (CES) and the conus medullaris syndrome (CMS).

The word "syndrome" tells us that each one of these conditions is defined by a set or collection of signs and symptoms that are always present. The cauda equina syndrome affects the spinal cord where the main cord ends and a "tail" of nerves forms down to the tip of the tailbone and down the legs. The conus medullaris syndrome occurs when the injury has affected the area between the spinal cord and the spinal nerve roots.

Clinical signs and symptoms of these two syndromes can be so similar as to be confused and misdiagnosed. The clinical presentation may vary slightly depending on where the damage has occurred. In the case of the cauda equina syndrome, there is often an asymmetric presentation. In other words, the symptoms occur on one side (not both sides). In the conus medullaris syndrome, symptoms are more likely to occur symmetrically (evenly on both sides). The most common symptoms are loss of sensation, motor control, and bowel and/or bladder function.

Injuries to these areas of the spinal cord are most often the result of car accidents or traumatic sports injuries in young patients. Men in their 40s to 50s are more likely to experience spinal cord injury from disc herniation (damaged, degenerated disc presses on the spinal cord). Violence, falls, and other traumatic sources can also be linked with spinal cord injuries leading to cauda equina syndrome or conus medullaris syndrome.

At first, the spinal cord may go into "shock." The patient loses all function below the level of the injury. There may be paralysis of the legs, loss of bowel and bladder control, and for men, loss of penis erection. These symptoms may last a short time with recovery in 24 to 48 hours or there may be a longer period of time for recovery (several weeks).

These injuries are diagnosed based on history (what happened), clinical presentation (signs and symptoms), and imaging studies. MRIs have the best chance of showing damage to the nerve tissue but studies have shown the results are not 100 per cent reliable. In fact as many as 43 per cent false positives for cauda equina syndrome have been reported. In other words, the test shows there is a problem when nothing is really wrong.

Treatment is an area that remains under heavy debate. The two main goals of any treatment are first to stabilize the spine and second to restore as much neurologic function as possible. Surgery is required to accomplish both goals. And the sooner the better -- experts suggest surgery should be done within eight hours of the trauma whenever possible.

There's no disagreement about that. The best way to do the surgery isn't clear. The surgeon must decide if an anterior approach (from the front of the body) is better than a posterior procedure. Both have advantages and disadvantages.
Pressure must be removed from the spinal cord, the spinal nerve roots, and/or any compromised neural tissue. The procedure is called decompression. There are several different ways to perform a surgical decompression for thoracolumbar spinal cord injury.

From the front (anterior approach), the surgeon can remove the entire vertebral body, a procedure called a corpectomy. When the spine is opened from the back (posterior approach), just the posterior column of bone (called the lamina) is removed. If the spine is still unstable, then a spinal fusion is done next.

The authors of this review also report on some of the newer treatments being tried with spinal cord injuries. For example, giving patients a powerful steroid drug (methylprednisolone) intravenously is supposed to reduce the swelling and minimize the damage done.

But research to assess the long-term results of this type of treatment aren't all consistently supporting this treatment as necessary or gaining anything more than treatment without it. And there is a potential for significant side effects (e.g., pneumonia, gastrointestinal bleeding). These authors say, "don't use methylprednisolone."

What else is on the forefront? Some scientists are looking into the use of biologic agents to stimulate bone growth. This method referred to as osteosynthesis or nonfusion technology could make it possible to avoid using plates and screws to fuse the spine. Eliminating hardware reduces the risk of hardware breaking (requiring another surgery) or loss of spinal correction.

For sure there is a need for continued study of thoracolumbar spinal cord injuries. Results of various treatments must be compared in order to identify the best treatment approach for each patient. Level and severity of injury may be deciding factors. Other important patient factors may include age, body-mass index (BMI), and general health.

Additional studies looking at prognostic factors are also advised. If surgeons can predict who should have each different surgical procedure based on patient factors, it might be possible to streamline the entire decision-making process while improving long-term results. And finally, more study is needed to confirm the current belief and practice of decompression as soon as possible in order to achieve the best long-term results.