

Essentials of Sports Injury Prevention & Rehabilitation

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Lecture – 16

Spine Injuries

Good morning ladies and gentlemen, and welcome to lecture 2 of week 4, of the course on Sports Injury Prevention and Rehabilitation. Today, we will be dealing with a very important topic that is spine injuries. We have finished head, face, neck in the previous lecture, and we will be continuing with the spine injuries in this lecture. Several concepts which were discussed in the previous lecture will be made much more clearer now once we discuss all of them in detail in this lecture. We will start with statistics, the basic anatomy of the spine, the biomechanics of spine injuries. There is something called a three column concept of the spine which will be made clearer in this lecture. We will discuss the different types of spine injuries. We will talk about the first-aid management of spine injuries, and we will conclude with a take home message.

Globally around 250,000 to 500,000 patients every year suffer a spinal injury or a spinal cord injury. In the US, there are 17,000 new cases and around 282,000 persons are estimated to be living with spinal cord injuries. Males represent the majority of patients with spinal cord injuries, if it is caused by a sports injury. The age group with the highest risk of spinal cord injuries is 16 to 30 years of age.

If you look at the vertebral column it consists of 33 vertebrae, which are joined together by ligaments and muscles. Each vertebra consists of an anterior body and a posterior neural arch. Between the two vertebrae, there is something called an intervertebral disc.

It is basically a strong cushions sort of thing which comprises two portions, a central nucleus pulposus, and a peripheral annulus fibrosus. The nucleus pulposus is made up of a muco-gelatinous material and it is jelly like. The annulus fibrosus is made up of fibrous tissue and it surrounds the nucleus pulposus. If the jelly like nucleus pulposus slips out through the annulus fibrosus this condition is called a prolapse intervertebral disc, and the problem is that when the disc prolapses it puts pressure on the nerve root which is existing from that for a minute. It is not a one time change generally sudden trauma does not cause a disc prolapse.

However, sequential repetitive increased forces on the spine may cause the disc to prolapse. A fall from height is the commonest mode of spinal injuries in developing countries. In developed countries, road traffic accidents account for the maximum number. Other modes may be a fall of a heavy object on the back, sports injuries etcetera.

Let us talk about something called stable and unstable injuries. If the spine is injured, we need to know as early as possible whether the spine is stable or unstable. A stable injury is one where the two vertebral bodies may not be displaced any further, because the mechanical linkages are intact. An unstable injury is one where further displacement can occur, because of serious disruption of the structures which are responsible for stability. If it is difficult to decide whether the spine is stable or unstable, please treat them as unstable injuries because that is more safer.

There is something called the three column concept of the spine for stability. Now, the spinal cord and its surrounding structures are divided into three columns for the purpose of gauging the stability. What we simply do is draw a line down the center of the vertebral body. Anything in front of the line is the anterior column. Then draw a line joining the posterior margins of the vertebral body. Anything between the midline and this line is called the middle column; and draw a line passing through the tips of the spinous processes. Anything behind the middle column and in front of this line is called the posterior column. So, this is something called the three column concept. It is very simple. You have to know that you draw these three four lines and divide the spine into an anterior column, a middle column and a posterior column. When only one column is depressed or disrupted, the spine is stable. If two columns are disrupted, the spine is considered unstable and if all three columns are disrupted, the spine is always unstable, that is if there is a dislocation of a vertebra.

There is a mechanism of injury and based on the mechanism of injury we can do the classification of spinal injuries. This is important because each injury is different, the treatment is different and the management becomes different.

Flexion injury: This is the commonest type of spinal injury. Can be caused by a heavy blow across the shoulder by a heavy object or if you fall from a height on your heels, or on your buttocks. It results in a sprain or a tear of the ligaments and the muscles, compression fracture of the vertebral body, dislocation of one vertebra over another or a wedge compression fracture of a vertebra. If the compression of the vertebrae anteriorly is less than 50 percent of the posterior margin, then the fracture is a stable injury. If it is more than 50 percent, the fracture becomes an unstable injury.

Flexion rotation type of spinal injury: This is the worst type of spinal injury. It leaves the spine in a highly unstable position and is associated with a high incidence of neurological damage. The mechanism is a heavy blow on one shoulder causing the trunk to flex and rotate to the opposite

side or if you fall or if you get a blow on the posterior lateral aspect of the head, again you may get a flexion rotation type of spinal injury. It results in dislocation of the facet joints of both sides or one side, fracture dislocation of the vertebra and extensive damage to the neural arch and the posterior ligament complex. It is a highly unstable type of spinal injury.

Vertical compression type of spinal injury: It is another common spinal injury that may be caused by a blow on top of the head by something falling on your head or if you fall on your head in an erect position. Results in a burst fracture of the vertebra and pieces of bone or vertebra may get displaced into the spinal canal and cause a spinal cord injury also. It is also an unstable injury.

Extension type of spinal injury: This injury is most commonly seen in the cervical spine in motor vehicle accidents and during diving in shallow water. Especially, if the head is forced into hyperextension and you get a trauma, you get this type of spinal injury. It results in a chip fracture of the anterior rim of a vertebra, and this injury is maybe stable but may also be unstable sometimes.

Flexion distraction type of spinal injury: This is a very typical type of injury which is seen when you are sitting and wearing a seat belt or a lap belt, and you get into an automobile accident. The upper part of the body is forced forward and the lower part is tied together by the seat belt. The flexion force thus generated has a component of distraction with it and it results in a horizontal fracture extending into the posterior elements and involving a part of the body of the vertebra. It is also called a Chance fracture, and is an unstable injury.

Direct injury: Rare type of spinal injury caused by bullets or a lathi or a wooden or a metal protuberance hitting the spinous processes of the cervical vertebra. Any part of the vertebra may be smashed by the bullet. However, a lathi blow causes a fracture of the spinous processes only.

Violent muscle contractions: People who are well built, who have good strong musculatures, if something causes them to have a sudden violent contraction of the muscles around the spine, there are fractures of the transverse processes of multiple lumbar vertebra and this may result in a huge retroperitoneal hematoma. A retroperitoneal hematoma is nothing but a collection of blood behind the peritoneum around the muscles, and around the spine. This is a rare injury, but commonly seen in people with well-built musculature.

The treatment of spinal injuries can be divided into three phases, as in other injury. Phase one is emergency care at the scene of an accident or in the emergency department. Phase two is definitive care in the emergency department or in the ward, and phase three is rehabilitation.

Phase one: we will be discussing mainly phase one because this is a basic course and we do not have the wherewithal to discuss phase two and phase three. So, phase one treatment of spinal injuries usually occurs at the sign of the accident. An acute pain in the back following an injury is to be considered a spinal injury unless proven otherwise. I repeat; any pain in the back or the spine or the cervical region following an injury, you will please consider it a spinal injury unless it is proven by X-ray CT scan or MRI that it is not. All suspected spinal injuries should be considered unstable unless their stability is confirmed on subsequent investigation. I repeat, all spinal injuries irrespective of whether you know the mechanism, you know it is a type of injury which cannot be unstable does not matter.

You please consider it an unstable injury till investigations can be performed. Avoid any movement of the injured segment. At the site of the accident, when you are moving a patient with a suspected spine injury, one person should hold the neck in traction by keeping their head pulled. The rest of the body is supported at the shoulder, pelvis and legs by three other people. Whenever required, the whole body is to be moved in one piece so that there is no movement occurring at the spine.

This technique is called the log roll. If you look at that, there are five people who are attending to the casualty with a suspected spine injury. The team leader is always at the head, and he is keeping the head pulled in traction, because they are not using a rigid cervical collar. If you have a rigid cervical collar, apply the rigid cervical collar as soon as possible and keep the head stable with either traction or with sandbags on the side of the head. The other three people are holding the shoulder, the waist and the legs of the patient.

The assistant is pushing the stretcher below the patient. So, when the command is given, the three members, they roll the patient onto one side in unison, in a single action. Number four will push the stretcher below the patient and the patient will be rolled back onto the stretcher in one single motion. This technique is called the log roll, and if you use this technique for moving a suspected spinal injury patient, there is no risk of causing any further spinal injuries. If you use any other technique for moving such patients, you will definitely cause further spinal cord injuries in these patients.

So, let us discuss what we learned in this lecture so far. Spine injuries are uncommon. They are common in certain sports and certain activities, but by and large they are uncommon, and spine injuries are usually traumatic. Spine injuries may be stable or unstable. You should be knowing the types of the spinal injuries, the type of mechanism of these spinal injuries and which spinal injuries are stable and which are unstable.

You must be aware of the type of the spinal injuries and its implications. The basic implication of a spinal injury is; it is very close to the spinal cord and any alignment loss will cause the

spinal cord to get damaged. Please ensure that on-site care is proper for all these patients of spinal injuries. Do not move these patients without proper care, and always use log roll technique when you have to move these patients from one place to another.

Treat all spine injuries as unstable. If you are in doubt, treat them as unstable injuries and take maximum spine protection precautions. These are the references which I have used for this lecture. I strongly urge you to go through them to improve your knowledge and to gain further clarifications on this topic. I thank you for your time and your patience. Ladies and gentlemen, thank you for listening.

I will be glad to answer any questions you put in the comments or you send an email, and we will get back to you as soon as possible. Thank you for listening ladies and gentlemen and Jai Hind.