Cervical Spinal Stenosis: Understanding the Debate

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While debate among professionals is commonplace, and perhaps essential to the validation of scientific discoveries, such discourse within the medical profession is often met with concern and confusion on the part of allied health professionals. Such may be the case with the current debate regarding the topic of cervical spinal stenosis.

The two principal players in this ongoing deliberation are virtual icons in the field of athletic therapy: Joseph S. Torg, MD, and Robert C. Cantu, MD.

It would be difficult indeed to find a published document that addresses the general topic of neurological problems related to sports without coming across the names of these two practitioners, either as authors or referenced heavily throughout the document. So it is not difficult to understand why there is confusion within the athletic therapy community as to who is right in this debate.

The athletic therapist, who is often directly involved in the initial management of suspected spinal injury, may be asked for advice regarding medical options. This is most certainly the case when athletes are weighing the benefits and risks of returning to sport after having suffered a spinal related injury. Thus the athletic therapist must be able to rely on the medical community for good information when making such recommendations to athletes, and sometimes to parents, coaches, and school administrators.

The intent of this article is to identify the major differences in medical opinion between Dr. Torg and Dr. Cantu regarding cervical spinal stenosis as well as to highlight areas in which they seem to agree. Certainly the topic of neurological injury is an important one for the athletic therapist. Therefore a thorough understanding of the pathology and the major points of contention in this debate is imperative.

The Pathology

Cervical spinal stenosis is defined as a deformation of the spinal cord within the vertebral foramen or a loss of cerebrospinal fluid surrounding the cord (Cantu, 1993b). When this condition is present in an athlete involved in a sport in which neck trauma is possible, neurological symptoms may develop subsequent to a traumatic episode.

Symptoms resulting from this condition range from short-term (10-15 min) sensory and/or motor deficit in the extremities, bilaterally, to more extreme cases of transient quadriplegia that may last more than 24 hrs. The term “neuropraxia” is used to describe the condition.

Cervical spinal stenosis can occur secondary to a variety of traumatic or degenerative conditions in the spine such as acquired bony osteophytes, ligamentous laxity, intervertebral disk protrusions, or related bony degeneration. It has also been reported that cervical spinal stenosis may occur as an isolated pathology unrelated to any of the conditions cited above (Torg, 1995). The specific pathogenesis in this case has been described by Penning as the “pincher mechanism.”

Under conditions of either extreme flexion or extension of the cervical spine, the distances between a vertebral body and a corresponding superior or inferior spinolaminar line results in transient compression of the cord (Penning, 1962).

Torg (1995) reported an incidence rate of 6 per 10,000 for transient paraesthesia and 1.3 per 10,000 for transient quadriplegia in a population of tackle football participants. While these numbers may be reason enough for alarm, even more sobering are the data from Odor et al.’s (1990) radiographic study of football players. They reported that of 124 professional players studied, 32% had significant stenosis (Torg ratio of 0.80 or less), while in 100 rookies...
it was 34%. It is at this point in the discussion, however, that the first major difference of opinion emerges between Torg and Cantu.

**Stenosis or Not Stenosis?**

Traditionally the diagnosis of cervical spinal stenosis has been made using standard (lateral view) radiographs measuring the sagittal diameter of the cervical spinal canal. This was done by measuring the distance between the mid-posterior surface of the vertebral body to the corresponding spinal laminal line (Pavlov et al., 1987). But this technique has been plagued with measurement inaccuracies due to variations in the distance between the patient and the X-ray source ("target distance") and inconsistencies in the choice of landmarks used for making measurements (Torg, 1995).

Torg and colleagues published papers in the late 1980s describing an alternative radiological technique for determining cervical spinal stenosis (Pavlov et al., 1987; Torg et al., 1986). Dubbed "Torg's (or Pavlov's, depending on the author) ratio," the sagittal diameters of the vertebral body (denominator) and the corresponding spinal canal (numerator) were used to compute a ratio.

Normally this ratio should be 1:1, and according to the "ratio" proponents, significant stenosis exists when the ratio falls to 0.80 or less. Torg's ratio method of measurement is shown in Figure 1.

While no one seems to argue that the Torg ratio is an improvement over previous techniques, Cantu and others question the reliability and accuracy of this new technique. Cantu points out that standard X-ray fails to show the actual size of the neural tissue in relation to the spinal canal. He further points out that the diameter of the spinal cord has been found to be quite variable, ranging from 5 mm to 11.5 mm (Cantu, 1993a). Cantu advocates the use of MRI in determining cervical spinal stenosis, as it allows for assessing the relative amount of cushion of cerebrospinal fluid (functional reserve) surrounding the spinal cord (see Figures 2 and 3).

Another criticism of the ratio method involves the fact that the diameters of the vertebral bodies have been found to be highly variable as well, especially when comparing athletes to other populations. For example, studies of athletes mistakenly diagnosed as having asymptomatic cervical spinal stenosis revealed that these athletes had normal diameter spinal canals but abnormally large vertebral bodies (Herzog et al., 1991).

To be fair, even Cantu recommends standard radiographs as part of the initial workup on a patient with symptoms of neuropraxia, including the calculation of the Torg ratio. Cantu (1993a) concedes that while relying on the ratio alone for the diagnosis may lead to a large number of false positives, it is also true that for patients with true spinal stenosis, the ratio is almost always abnormal.

**Return-to-Play Guidelines**

While the relative efficacy of a particular medical procedure should in all probability be continually evaluated and weighed against the effectiveness of new protocols, what to do once the diagnosis is made remains a serious dilemma in this instance. It is on this question that this professional debate progresses past the diagnostic phase to the prognosis phase.

Torg has recently recommended that in athletes with uncomplicated cervical spinal stenosis but otherwise stable spines, return to full participation is indicated. Further, he concludes that his data show no correlation between football related cervical spine instabilities and preexisting cervical spinal stenosis. In a recent paper (Torg, 1995) he reports that in a population of 117 quadriplegics recorded by the National Football Head and Neck Injuries Registry, none had reported a previous episode of transient neuropraxia. Further, of 45 patients with a history of transient neuropraxia, none had become quadriplegic.

In view of this, he recommends that in the absence of a potentially complicating condition such as