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# New Traction Device for Radiography of the Lower Cervical Spine

Donald Boger<sup>1</sup> and Philip W. Ralls<sup>1</sup>

Severe injuries to the lower cervical spine may be overlooked when the shoulders obscure this area in the lateral view. This is a familiar clinical problem and generally it is handled by pulling downward on the arms to lower the shoulders [1-5]. One of us (D. B.) conceived a simple device with which the patient himself exerts the traction by extending his legs. This innovation has certain advantages.

## Technique

The "auto-traction" device is constructed of heavy gauge, flexible material and consists of two T-shaped straps (fig. 1). The short padded parts are wrapped snugly around the wrists and secured by hook-and-loop fastening fabric (Velcro). With the hands to the sides, the knees are bent and the long straps are fastened in a similar manner beneath the feet. When the knees are straightened, traction is applied to the shoulders (fig. 2). Discomfort is insignificant, even if the straps remain in place for an extended period of time. Although radiographic exposures may be made immediately

after application of the auto-traction device, even more caudal displacement of the shoulders is achieved by waiting 1-3 min.

## Representative Case Reports

### Case 1

A 21-year-old man was involved in an auto accident and complained of neck pain when seen at a local emergency facility. A cervical spine series in which the lateral view showed the spine only to the C5-C6 disc space (figs. 3A and 3B) was misinterpreted as normal. The patient had persistent pain and was subsequently seen at LAC/USC Medical Center where views of the cervical spine using manual upper extremity traction (fig. 3C) and the auto-traction device (fig. 3D) were obtained. The latter radiograph demonstrated a vertebral body fracture of C7 and a 2 mm anterior subluxation of C6 on C7, indicating an unstable injury. The patient was immediately

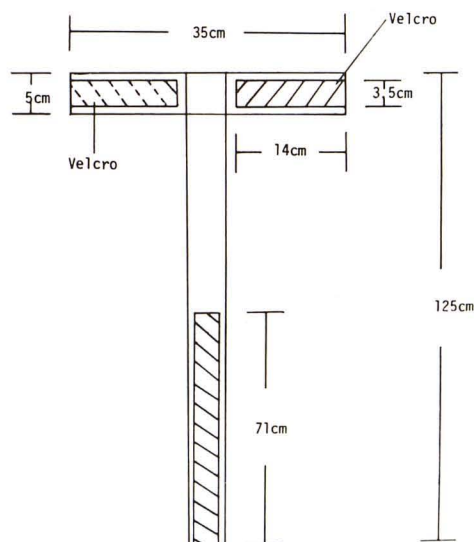


Fig. 1.—Diagram of one strap of auto-traction device.

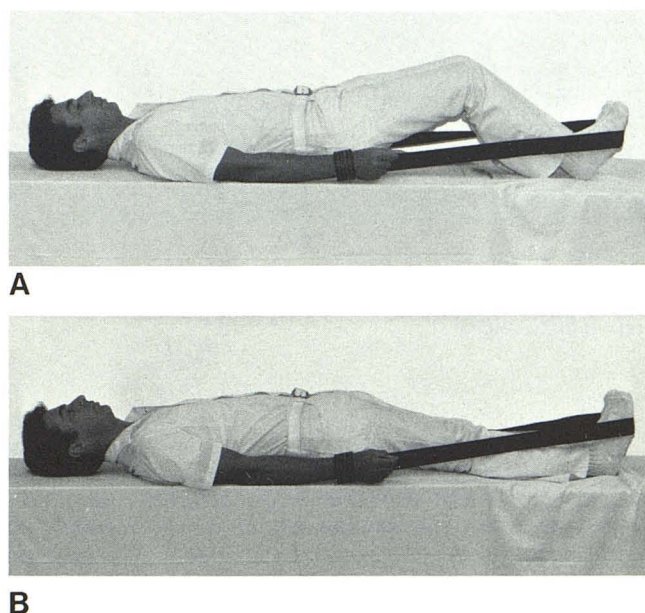


Fig. 2.—A, Auto-traction device in place. B, Traction applied by extending legs.

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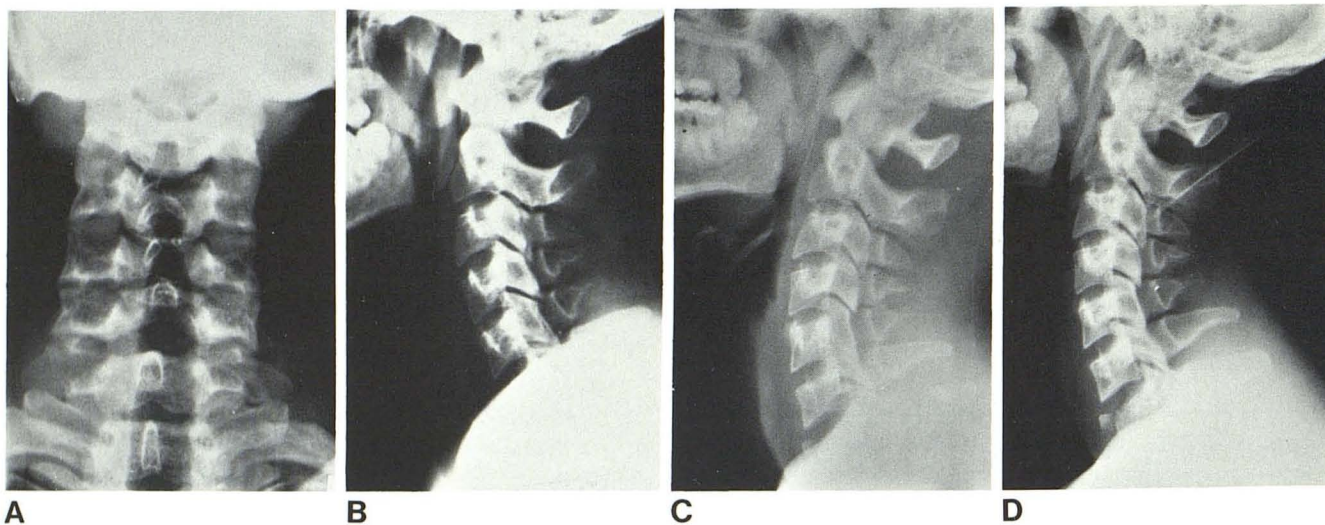


Fig. 3.—Case 1. **A**, AP view cervical spine. Slight widening of interspinous space and malalignment of spinous processes at C6–C7 level, which were not initially appreciated. **B**, Lateral view. Normal to C5–C6 interspace. **C**,

Lateral view with manual traction revealed fracture of C7 body. C6–C7 alignment not visible. **D**, Lateral view using auto-traction device clearly demonstrates body of C7 and anterior displacement of C6 on C7.

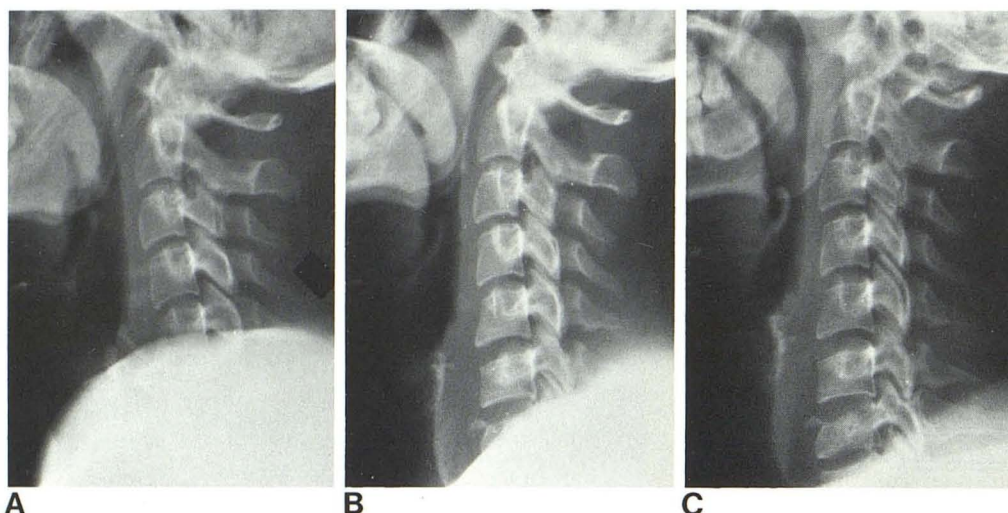


Fig. 4.—Case 2. **A**, Initial lateral view of cervical spine. C6 and C7 obscured by shoulders. **B**, Lateral view with manual traction. Fracture of C7 is seen although C6–C7 alignment is not clear. **C**, Lateral view using auto-traction device demonstrates body of C7 and C6/C7–T1 alignment.

placed in a head halter traction, and a Minerva body cast was applied that evening.

#### Case 2

A 23-year-old man fell 15 steps with subsequent complaints of neck pain, anesthesia, and paralysis of the left lower extremity and transient sensory loss of the right lower extremity. The sensory deficit was present on the left below T8. The upper extremities were normal. Admission cervical, thoracic, and lumbar spine series were reported as negative, and a more adequate lateral view of the cervical spine was requested. About 24 hr later with manual traction on the arms, another lateral view showed the upper body of C7 which was fractured. Since the entire seventh vertebra was not shown, lateral tomography was ordered. Tomography was not immediately available and the auto-traction device was used. These radiographs demonstrated the entire cervical spine and clarified the alignment at the fracture site (fig. 4).

#### Discussion

Patients with neck injuries are often seen in trauma centers. During the 12 month period of July 1978 to July 1979, about 3,900 radiographic examinations of the cervical spine were obtained at LAC/USC Medical Center for evaluation of acute cervical spine trauma. Superimposition of the shoulders over the lower cervical spine on the supine cross-table lateral view was a frequent problem. One hundred randomly selected cervical spine series taken for trauma were studied and 38% were found to inadequately demonstrate C7 on the lateral view. The average lowest level shown on the cross-table lateral view was the mid C6 vertebral body. Factors contributing to the nonvisibility of C7 included recumbent position, advancing age (average age of the non-visible group was 35.4 years, whereas that of the group in which the entire cervical spine was shown was 26.7 years),



neck pain with muscle spasm, and body build (short necks and large shoulders).

Traction on the upper extremities by a physician or attendant is usually used. This often delays the examination, may be done by untrained individuals, and exposes the person applying traction to unnecessary radiation. While lateral tomography is quite helpful, it may not be immediately available. Obtaining an adequate tomographic examination may be technically difficult in an immobilized patient and often leads to undesirable patient manipulation.

Although improvement of visibility of the lower cervical spine was the original motive for development of the auto-traction device, additional applications have been found. These include sustaining traction during shoulder arthrography, lowering the shoulder during therapeutic radiation to the face and neck, and aiding in the evaluation of the acromioclavicular joint of the supine patient. Several intoxicated and/or unconscious patients unable to grasp the straps have been evaluated satisfactorily by passively extending and restraining the legs.

Contraindications to the use of the auto-traction device include significant injury of the clavicle, upper extremity (e.g., humeral or forearm fracture, elbow dislocation), brachial plexus, or both lower extremities. A relative contraindication might include thoracic or lumbar spine trauma which might be aggravated by use of the device. Although exact statistics were not available, clinical experience indicated that few patients who needed better demonstration of the lower cervical spine were prevented from using the traction device by their additional injuries.

The auto-traction device is simple to use, inexpensive, and effective. Experience with 53 patients has shown that

the device increased visibility of the lower cervical spine at least 0.5–1.5 vertebral levels. Within this group were four cervical spine injuries that were not visible on the initial lateral view. These include cases 1 and 2, one patient with a bilateral facet dislocation at C6–C7, and another with a fracture of the spinous process of C7. Design of the device allows for traction of the upper extremities without harmful patient movement, and easy length adjustment for patients of different heights. The device is easily constructed or commercially available (D. C. Medical Devices, P.O. Box 9961, Glendale, CA 91206).

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