suggest some indication for interbody fusion of the upper, instable, part of the cervical spine.

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**k-8. Surgical Treatment of Barré-Léion Syndrome due to whiplash injury**

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Most whiplash injured cases are cured by conservative treatment. However some disabling cases remain. Most of these disabling cases have head, eye, ear symptoms. The pathology of these symptoms (Barré-Liéou syndrome or bulbo-opontine symptoms) due to whiplash injury are not completely clarified. The pathogenesis concerning the disabling case and its surgical treatment are presented.

The sinu-vertebral nerve (recurrent meningeal nerve), which includes sympathetic fibers and has nerve endings into the disc, posterior longitudinal ligament and epidural tissue, has connection with the posterior cervical sympathetic system consisting of a vertebral nerve and of a superior vertebrobasilar plexus.

It is supposed that traumatic pathologic lesions implicating the cervical spine or other anatomic structures in the cervical region may stimulate elements of the posterior cervical sympathetic system through the sinu-vertebral nerve, and thus which may provoke vasomotor reactions in the vertebrobasilar vascular tree.

Thus injuries of disc and ligamentous structures may responsible for the dysfunction of the autonomic nervous system. Existence of disabling cases due to bulbo-pontine lesion, however, is undeniable.

It is our opinion to use surgical treatment of disabling cases due to whiplash injury. The instability of cervical spine resulting from the injury should be stabilized. Forty-four disabling cases which have evident cervical disc lesion as the man cause of dysfunction of autonomic nervous system are treated by anterior disc excision with intervertebral body fusion (Cloward).

In a series of 44 cases, discography, electroencephalography, electromyography, plethysmography, angiography of vertebral artery and mecholyl test for autonomic nerve are performed, and also electronmicroscopic study is done on the removed cervical disc.

The symptoms due to this injury can be effectively relieved by this procedure on the upper cervical levels, especially at the levels of C3–C4 and C4–C5.

**CONCLUSIONS**

1. Sinu-vertebral nerve and posterior cervical sympathetic system are responsible for the onset of disabling cases of whiplash injuries of cervical spine.
2. Traumatic pathologic lesions implicating the cervical structures may cause instability and thus may stimulate elements of the posterior cervical sympathet-
tic system through the sinu-vertebral nerve.

3. It is reasonable to stabilize the cervical instability by surgical treatment of Barré-Liéou syndrome to whiplash injury.

4. The symptoms due to this injury can be effectively relieved by Cloward procedure, especially at the levels of C₃-C₄ and C₄-C₅ as shown in a series of 44 patients.

5. A hypothesis of pathogenesis of the Barré-Liéou syndrome is strengthened by the effective results shown in our cases of anterior cervical spin fusion.

k-10. Cervical Sprain as a Cause of Chronic Symptoms After Head Injury

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For the past 5 years we have studied the cause of posttraumatic chronic headache and other complaints after head injury, reaching a conclusion that concurrent cervical sprain plays an important role in manifestation of posttraumatic chronic symptoms. Discussion will be focused on the relation between cervical sprain and chronic syndrome after head injury.

Diagnosis of cervical sprain was made as follows. Patients who are struck-on the head frequently have multiple tender spots on various portions of their cervical spine such as the intervertebral foramen, joint capsule, ligament and spinous process. Such tenderness is asymmetrical, and decreases progressively upward and downward within a certain distance from the most tender spot. This maximum tender segment frequently coincides with the most marked findings on functional radiogram of the cervical spine, which can be regarded as the sign of cervical sprain of 1st grade. The patients are not always aware of the neck pain. In more severe cases, there is tenderness on the nerve trunk at the intervertebral foramen of injured spines. Limitation of neck movement, abnormal tension of corresponding muscle bundles, fine hyper- and hypoesthesia on the corresponding distribution of the skin, positive neck traction test and other root signs can be detected.

1. One third of 116 out patients who consulted us within 1 month after head injury for thorough examination had cervical sprain in 35%, but only one half of them were conscious of pain.

2. About two third of the patients who were admitted on an emergency basis had headache of various origins at the beginning of hospitalization. The headache subsided gradually in some, and worsened gradually in others. In the former group the headache was caused by local scalp pain by trauma, sub-