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

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**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-
arachnoid hemorrhage, intracranial hypertension due to brain edema, intracranial hematoma which was not so massive as to interfere with level of consciousness etc., while in the latter group it resulted from the above mentioned cervical sprain, excepting a small number of patients with chronic subdural hematoma. This is explained as the result of secondary aseptic inflammatory process in the hyper-streained soft tissue around the spine, and gradual ambulation with general improvement will add intermittent oaks on the tissue before complete healing. This will later bring repeated stimulation to the nerve roots, sympathetics and vessels. Those who complained of severe headache, vomiting, dizziness and numbness of both arms immediately after injury were treated as acute cervical sprain syndrome by absolute bed rest, showing better cure rate than expected without becoming chronic.

3. Subjective and objective symptoms of the patients with cervical sprain aggravate on standing up or walking for long time and by joggling of vehicles, but regress temporarily by bed rest. Neck traction of 4–5 kg. (which is almost equal to weight of human head) in sitting position brings transitory alleviation of the pain symptoms.

4. No chronic headache syndrome developed later in 79 cases of head injury without findings of cervical sprain. Among 88 cases with cervical sprain without subjective symptom, no chronic headache developed in those who adhered to the instruction of bed rest (27 cases), while headache developed later in 11 cases (46%) out of 24 patients who did not keep a rest. Among 37 cases with cervical sprain with corresponding subjective symptoms, headache disappeared without bed restriction in only 20%, while 93% of those who adhered to the instruction of bed rest in early stage showed a recovery within a year with the average duration of bed rest of 2 months.

5. When the duration from injury to beginning of bed rest is longer than 1 month, cure rate decreases markedly. (1–3 month; 42% and more than 3 month; 26% of cure rate). This observation conflicts with the view point that early ambulation is advisable in prevention of posttraumatic neurosis.

6. Thus collected data of chronic headache with duration of more than 3 months after head injury showed that 70% of them were caused by improper treatment of concurrent cervical sprain. About half of them had concomitant vascular headache mainly of intracranial origin which can also be sequelae of cervical sprain because such vascular pain did not develop in non-sprained cases.

CONCLUSION

Majority of cases with chronic headache and other complaints after head injury are considered to represent sequelae of incomplete healing of concurrent cervical sprain. More than 90% of them can be prevented from transition to chronic symptoms by a bed rest in the early stage which is the only definitive therapeutic measure.