FROM ABSTRACT:

The collision of automobiles generally results in either acute flexion or severe hyperextension of the passenger’s neck, depending on the direction of impact.

Direct trauma results to the spinal accessory nerve and to the roots of the cervical nerves, but in addition there are vasomotor disturbances resulting indirectly from damage to the vertebral arteries and to nerve fibers that accompany these arteries in their course through the foramina transversaria.

The result is a varied syndrome of neurological and neurovascular troubles.

Treatment with tranquilizers and psychotherapy is of no avail, and patients become discouraged and resentful.

The procedure outlined here includes heat, manipulation, and traction.

Carefully adapted to the individual case, this plan generally obviates the danger of surgical and psychiatric complications.

THIS AUTHOR ALSO NOTES:

“There is no way to avoid the ever-increasing incidence of whiplash injury.”

Occasionally, after whiplash injuries to the cervical spine, the x-rays may reveal injuries to the bones or joints.

“The disabling and persistent symptomatology in the vast majority of [whiplash] cases is due to involvement of the delicate and vital nerves and blood vessels about the cervical spine.” [Key Point]

A complex neurological and neurovascular syndrome consistently follows whiplash neck sprain.

Since a great percentage of whiplash symptoms are “referred to and arise from disturbance of the central nervous system, I have chosen to name this the ‘craniocervical syndrome’.”
Since the x-ray findings in the whiplash craniocervical syndrome “usually display no bony injury, many of these patients are accused of having functional disorders and eventually go to psychiatrists instead of those expertly trained in physical medicine and rehabilitation, who properly should treat these patients.”

“The origin of the pain and disturbed function lies in the involvement of various cervical roots, the spinal accessory nerve and the cervical autonomic nerve, including the vertebral nerve, and in the transient obstruction or compression of the vertebral artery.” [Important]

**The Role of Cervical Nerve Roots in Producing Pain and Headache**

“A major portion of the headaches associated with this syndrome are derived from a traction injury to the second cervical nerve root.”

The second cervical nerve root is particularly vulnerable to injury because it is not protected by pedicles and facets, as are the other cervical nerve roots.

Also, the second cervical nerve root exits between the atlas and axis, “the point of greatest rotation of the head on the neck.”

The second nerve root becomes the greater occipital nerve, which innervates the majority of the scalp, the side of the upper neck, and portions of the face.

“The physiological communication between the second cervical and the trigeminal nerves in the spinal fifth tract of the medulla [trigeminal-cervical nucleus] involves the first division of the trigeminal nerve [••ophthalmic••] and thereby gives attacks of hemicrania with pain radiating behind the corresponding eye. This is the mechanism whereby a great many chronic and persistent headaches have their true origin in injury to the second cervical nerve,” noting:

“‘Many headaches are not headaches at all, but really a pain in the neck.’” [Key Point]

Since the greater occipital nerve pierces the tendonous attachment of the trapezius muscle at the base of the skull, trapezius spasm aggravates greater occipital nerve (C2) sensory disturbance.

**Persistent Muscle Spasm**

The spinal accessory nerve originates by filaments from the entire length of the cervical spinal cord. “The nerve ascends through the foramen magnum and leaves the skull through the jugular foramen for a long descent to the trapezius muscle.”
“The persistent spasm of the trapezius and sternomastoid muscles is due, therefore, not to primary injury to the muscles but to traction injury to the delicate filaments of origin of the spinal accessory nerve.” [Very Important]

**Nerve Root Irritation in the Intervertebral Foramina**

“When a 3,500 lb. car traveling at 10 mph strikes the rear of another car it may transmit to this car a force of 25 tons.”

“The person’s body (in the car that is struck) continues to move forward, while the head, being hinged at the neck, snaps backwards. The average had weighs about 8 lbs., and the cervical vertebrae are very delicate; the force that is pushing the head backwards is even greater than believed, since the base of the neck acts as a fulcrum and the leverage is applied near the top of the head.”

“Therefore, the head snaps back with the equivalent of several tons of force—without any support, since ‘the muscular control of the neck is caught off guard.’”

“The end-result, with the neck in acute hyperextension, is a momentary posterior subluxation of the various joints with fleeting narrowing of the foramina, so that the nerve root is caught in a pinchers between the superior and inferior facets.” [Very Important, and subluxation is used]

“The head now snaps back in acute flexion—a true ‘whip-snap’ (Mark Twain’s Tom Sawyer and Huck Finn used this method in killing snakes and referred to it as the whip-snap).”

Follow-up x-rays are usually normal, but the nerves are traumatized.

“Careful neurological testing soon after the injury reveals not pain but hypalgesia or anesthesia of the distribution of one or more nerves, since the nerve is temporarily put out of function by the trauma.”

“The pain and muscle spasm appear later, with beginning recovery of nerve function.”

“During injury, hemorrhage within the capsular ligaments gives rise to swelling of the nerves and eventually adhesions between the dural sleeve and the nerve root; these factors give rise to symptoms that may be prolonged for months or even years after the injury.” [Very Important, includes the concept of adhesions (The Fibrosis of Repair)]

Other nerves involved are the spinal accessory, the sympathetic trunk, and the vertebral nerve.
“The vertebral nerve lies within the transverse foramina and travels alongside the vertebral artery. The vertebral nerve originates from the stellate ganglion [superior cervical sympathetic ganglion] and supplies the vertebral and basilar vessels. Injury to this nerve produces spasm of the vertebral arteries and gives rise to disturbed circulation to the pons and portions of the medulla containing the nuclei of origin of the lower seven cranial nerves, with resultant far-flung symptoms.” [Very Important, sympathetic dysfunction]

Foraminal Encroachment

The cervical vertebrae contain “special synovial joints,” the lateral body joints of von Luschka, first described in 1858.

In whiplash injury, the joints of von Luschka play a very significant clinical role.

“With degenerative thinning of the disk after trauma, the processes of the lateral joints are gradually forced outward and laterally, resulting in osteophyte formation.”

Lateral spurs from the joints of von Luschka compress the nerve root in the foramen. When slightly more anterior to the nerve root, joints of von Luschka spurs can encroach on the vertebral artery and the vertebral nerve (sympathetic) within the foramen transversarium. [Important]

“These spurs project even more, since the osteophytes are capped with cartilage and are considerably larger than is revealed by the roentgenogram.” [Very Important]

Vertebral Artery Compression

After passing through the foramen transversarium of the atlas, the vertebral artery turns sharply medially, pierces the thick membrane between the atlas and the occiput, and enters the cranial cavity through the foramen magnum.

“Very little slack exists in the vertebral artery and, during severe hyperextension and hyperflexion and especially during extreme lateral rotation, partial to complete obstruction of the vertebral artery has been demonstrated by arteriography.”

The vertebral artery is the pipeline carrying blood and oxygen to the brain stem.

Angiography has shown constriction or occlusion of the vertebral artery in patients with persistent symptoms of vertigo, ataxia, headache, diplopia, and unsteadiness of gait. “The usual site of occlusion is at the second cervical level, which is the point of greatest rotation of the head on the neck.”
“A great majority of symptoms that have been designated as psychoneurotic, namely, attacks of vertigo, ataxia, diplopia, severe attacks of migraine-like headache, hemicrania with nausea and vomiting, and, at times disturbances of speech and swallowing, are all due to disturbed circulation of the vertebral artery after neck sprain.” [Very Important]

**Treatment**

“If the blood vessel wall has been traumatized during the injury or the vertebral nerve [sympathetic] has been injured, vasospasm persists. The only true, effective measures for tiding over this stage of injury lie in adequate physical therapy.”

“Treatment must be started early and must be administered by those expertly trained in physical therapy and rehabilitation.”

“Those patients not receiving adequate therapy will not improve and will soon become discouraged and resentful.”

“Because of continued complaints, many of these patients finally see a psychiatrist. The couch would serve a better purpose in this instance if it were equipped with a traction apparatus and supplemented by a gentle massage.” [Funny]

“In reviewing the types of treatment with a number of specialists in this field, it is found that, while therapy naturally varies to suit the individual need, it consists primarily of local heat in the form of hot wet packs and cervical traction, followed by very gentle massage and manual rotations.”

“Local hot packs relieve the muscle spasm, increase the circulation, and frequently stop severe occipital pain and headaches.”

“The importance of a carefully planned scheme of treatment must be emphasized to the patient, and treatments must be religiously carried out daily during the first two or three weeks (and then about three times weekly), depending, of course, on the individual case.” [Extremely Important]

“Delay or faulty treatment leads to adhesions about the facets and scarring about the capsular ligaments, persistent spasm, congestive lymph edema, and fibrosis of muscles, swelling, and eventual adhesions of nerves within the nerve root canals.” [Extremely Important: The Fibrosis of Repair]

“The resultant faulty posture in neglected cases enhances the degeneration of the intervertebral disks, as well as spur formation in the lateral co-vertebral articulations, which on the roentgenogram has come to be known as traumatic arthritis.” [Very Important]
“I cannot too strongly emphasize the urgency of early and persistent therapy, always by a specialist in this field.”

Traction relieves muscle spasm and enlarges the intervertebral foramina.

“I wish to emphasize the importance of traction in helping to relieve obstruction to the course of the vertebral arteries.”

“Early and adequate traction may prevent the formation of adhesions between the dural sleeve of the nerve roots and the adjacent structures.”

A cervical pillow gives excellent support to the neck structures during sleep and rest.

“Faulty posture traumatizes the cartilaginous surfaces.” [Important]

“I personally resent the use of the so-called tranquilizing drugs in this type of case, the sole purpose of which is to confuse the mind so that the patient will not complain.”

“Occasionally, a patient is seen with persistent complaints of head, neck, and shoulder pain, who has had on surgical exposure persistent swelling and adhesions of several nerve roots within the dural sleeve of exit. It is most likely that early, persistent, and adequate therapy by those expertly trained in physical medicine will prevent most patients from developing a surgical condition.” [Important]

KEY POINTS FROM DAN MURPHY

1) Whiplash trauma directly injures the spinal accessory nerve and the cervical nerve roots.

2) Whiplash trauma can cause direct injury to the vertebral artery.

3) Whiplash trauma can cause brain stem ischemia resulting in cranial nerve dysfunction through two mechanisms:
   A)) Direct injury to the vertebral artery, causing vertebral artery spasm and reduced blood flow.
   B)) Injury to the sympathetic truck or from injury to the sympathetic vertebral nerve that controls the diameter of the vertebral artery.

4) Treatment of whiplash injuries with tranquilizers and psychotherapy does not work.

5) The best treatment for whiplash injuries includes heat, manipulation, mobilization (manual rotations), massage, and traction.
6) Disabling and persistent whiplash symptoms are primarily caused by “involvement of the delicate and vital nerves and blood vessels about the cervical spine.” [Key Point]

7) This author calls the persistent symptoms from whiplash trauma the “craniocervical syndrome.”

8) The majority of the headaches associated with whiplash syndrome are derived from “traction injury to the second cervical nerve root.”

9) The second cervical nerve root is the most vulnerable to injury because it is not protected by pedicles and facets, and it exits between the atlas and axis, “the point of greatest rotation of the head on the neck.”

10) The second cervical nerve root physiologically communicates with the trigeminal nucleus, giving attacks of hemicrania with pain radiating behind the eye.

11) Many chronic and persistent headaches have their true origin in injury to the second cervical nerve, and “Many headaches are not headaches at all, but really a pain in the neck.” [Key Point]

12) “Persistent spasm of the trapezius and sternomastoid muscles is not due to primary muscle injury, but to traction injury to the delicate filaments of origin of the spinal accessory nerve.” [Very Important]

13) “When a 3,500 lb. car traveling at 10 mph strikes the rear of another car it may transmit to this car a force of 25 tons.”

14) In a typical whiplash mechanism at 10 mph, “the head snaps back with the equivalent of several tons of force.”

15) During whiplash hyperextension, there is a “momentary posterior subluxation of the various joints with fleeting narrowing of the foramina, so that the nerve root is caught in a pinchers between the superior and inferior facets.”

16) “During injury, hemorrhage within the capsular ligaments gives rise to swelling of the nerves and eventually adhesions between the dural sleeve and the nerve root; these factors give rise to symptoms that may be prolonged for months or even years after the injury.” [Very Important, includes the concept of adhesions (The Fibrosis of Repair)]

17) Cervical discs degenerate following whiplash trauma.

18) “With degenerative thinning of the disk after trauma, the processes of the lateral joints are gradually forced outward and laterally, resulting in osteophyte formation.”
19) Lateral spurs from the joints of von Luschka compress the nerve root, can encroach on the vertebral artery and the vertebral nerve (sympathetic) within the foramen transversarium. [Important]

20) The joints of von Luschka are synovial joints with a cartilage cap. [This is important because many chiropractors, including myself, maintain that these joints can be specifically adjusted [classically an anterior adjustment], improving local biomechanics and neurological function, helping patients with chronic syndromes.]

21) Very little slack exists in the vertebral artery and, during the extremes of motion from whiplash, partial to complete obstruction of the vertebral artery can occur causing disturbed brain stem circulation, resulting in symptoms such as: Persistent symptoms of vertigo, ataxia, headache, diplopia, unsteadiness of gait, severe attacks of migraine-like headache, hemicrania with nausea and vomiting, and at times disturbances of speech and swallowing.

22) “Treatments must be religiously carried out daily during the first two or three weeks (and then about three times weekly).” [Extremely Important]

23) “Delay or faulty treatment leads to adhesions about the facets and scarring about the capsular ligaments, persistent spasm, congestive lymph edema, and fibrosis of muscles, swelling, and eventual adhesions of nerves within the nerve root canals.” [Extremely Important: The Fibrosis of Repair]

24) “The resultant faulty posture in neglected cases enhances the degeneration of the intervertebral disks, as well as spur formation in the lateral co-vertebral articulations, which on the roentgenogram has come to be known as traumatic arthritis.” “Faulty posture traumatizes the cartilaginous surfaces.” [Important]

25) Traction relieves muscle spasm and enlarges the intervertebral foramina, helps to relieve obstruction to the course of the vertebral arteries, and may prevent the formation of adhesions between the dural sleeve of the nerve roots and the adjacent structures.

26) Using a cervical pillow is an excellent idea.

27) Tranquilizing drugs to treat whiplash-injured patients is a bad idea because they only “confuse the mind so that the patient will not complain.”

28) Whiplash-injured patients with persistent complaints of head, neck, and shoulder pain, have on surgical exposure persistent swelling and adhesions of several nerve roots within the dural sleeve of exit, indicating an organic basis for their suffering.