Severe trauma to the head involving brain damage or injury to the major cranial nerves can result from a broad variety of causes. The most common impairments resulting from brain injury are sensory and motor disturbances, communication disturbances, emotional or behavioral disturbances, complex integrated cerebral function disturbances, and episodic neurological disorders. Whether cerebral damage is the result of head trauma, birth injury, or cerebrovascular accident, the resulting impairments are the same. Damage may also involve any of the major cranial nerves, which emerge from the base of the brain.

Introduction

Brain damage to the major cranial nerves can be the result of head trauma, birth injury, or cerebrovascular accident. The actual mechanism of insult to the brain is not as relevant as the areas of the brain, which have been impaired, and the extent of injury. These factors will in the end dictate the functional impairments to be expected.

In addition to the more common impairments resulting from brain injury and/or cranial nerve injury, the following complications may also be involved: depression, contracture deformities, bowel and bladder dysfunction, urinary tract infection, pneumonia, a range of cardiorespiratory impairments.

Injuries to Cranial Nerves

Traumatic injuries to the cranial nerves may occur secondary to head trauma; isolated injuries occur rarely. The vocational implications of isolated injuries, if any, must be assessed on an individual basis.

Head injury may also result in damage to the major cranial nerves. This reading assignment will focus on the fifth cranial nerve (trigeminal), the seventh cranial nerve (facial), the ninth cranial nerve (glossopharyngeal), the tenth cranial nerve (vagus), the eleventh cranial nerve (spinal accessory), and the twelfth cranial nerve (hypoglossal).

Damage to these cranial nerves tends to be rare in the medical field and even more rare in rehabilitation. It is also unusual for these entities to be encountered in personal injury litigation; typically when they are, they tend to be secondary rather than primary considerations. As always, each case must be judged individually to determine potential vocational handicaps and to develop an appropriate rehabilitation program.

Trigeminal Nerve

Trigeminal neuralgia (tic douloureux) is a condition of the fifth cranial nerve represented by sudden and severe onsets of pain, which many patients describe as similar to electric shock. The acute pain episodes typically end as suddenly as they are initiated. Characteristic facial movements such as sudden contractures of the facial muscles or twitching of the eye may be seen. The actual cause remains unknown although the medical literature does provide several possible alternatives. Individuals suffering from
this disorder are primarily in the 45- to 60-year-old age group. A variety of treatment alternatives exist including medication, alcohol injections, surgical intervention, and radio frequency trigeminal gangliolysis. Most patients obtain relief of pain without reduction in proprioceptive function or sensory function.

During the course of the acute pain episodes vocational implications can be significant. They may result from limitations secondary to the severe pain and also may be secondary to the facial paralysis and characteristic twitch, which occurs. Once treatment is undertaken, relief of the symptoms is usually found. It is rare to have permanent vocational handicaps and functional limitations as the result of this disorder.

**Facial Nerve**

Seventh cranial nerve (facial nerve) is the major motor nerve serving the musculature of the face. Damage to this nerve can result in three separate types of facial paralysis including peripheral, nuclear, and upper motor neuron. The specific type of facial paralysis, which is involved, depends upon the site of damage to the seventh cranial nerve.

Peripheral facial paralysis is more commonly the result of direct trauma or may occur as a result of an infection of the parotid gland. Peripheral facial paralysis is generally manifested as complete paralysis of the face on the same side as the lesion. The mouth is drawn toward the normal side and the eye on the paralyzed side remains opened with its upper lid drooping. The patient is unable to puff out the cheek, close the mouth, or bare the teeth on the paralyzed side.

The primary goals of treatment are maintenance of facial muscle tone and prevention or minimization of denervation. The disorder is typically characterized by spontaneous recovery occurring within three to five weeks in most instances. Steroid therapy may be given to reduce inflammation and edema, which is considered by many to be the primary cause of the disorder. Facial pain usually accompanies this type of impairment but it is typically controlled with medication. Although medication is typically sufficient for treatment, surgical decompression of the facial nerve may at times be necessary. This disorder is rarely a precipitator of permanent vocational handicaps or limitations. Temporary impairment may have an impact on employment but this usually is not lasting.

Nuclear facial paralysis and upper motor neuron facial paralysis are more likely to have permanent characteristics than peripheral facial paralysis. In these disorders, patients find that they are unable to force a smile no matter how hard they try, although a smile will come spontaneously if the patient is amused. Usually only the muscles of the lower half of the face become paralyzed, leaving the muscles around the eyes and forehead unaffected. Although the symptomatology tends to be permanent, it is a rare instance in which this results in significant, permanent handicap. The vocational implications are considered generally minimal.

**Glossopharyngeal Nerve**
Glossopharyngeal paralysis is manifested in limitations in swallowing and results in an anesthesia affect of the upper portion of the pharynx. There may be a loss of taste over the posterior third of the tongue on the same side as the lesion. This type of paralysis usually is the result of brain tumors. Surgical intervention may be necessary. Significant permanent vocational handicaps can occur although they are rarely seen and confronted by the rehabilitation counselor. It is more likely that vocational impairments will result from glossopharyngeal neuralgia, which is characterized by a severe pain radiating from the base of the tongue into the ear. This is usually treatable through surgery with positive results. Accordingly, vocational limitations typically last only until appropriate treatment can be undertaken.

**Vagus Nerve**

The tenth cranial (vagus) nerve serves the voluntary muscles of the throat and larynx. It also supplies the parasympathetic nerves to the lungs, the stomach, the esophagus, and all other abdominal organs. It is also involved in the slowing of the rate of heartbeat. Tenth cranial nerve neuritis may be precipitated by pneumonia and influenza or result from the ingestion of alcohol, lead and/or arsenic. Other precipitating factors can also include external injuries to the base of the skull. When paralysis of this nerve results, it is possible that a concomitant paralysis of the larynx will occur resulting in impaired speech, difficulty in swallowing, and possibly changes in heart rate and heart rhythm. Vomiting, abdominal pain and anorexia may also be temporary symptoms. When both vagus nerves are paralyzed, permanent tachycardia will result.

In the instance of impairment or paralysis of the larynx resulting in speech impairment, significant vocational handicaps can occur. Loss of speech will have a substantial impact on work groups as well as the specific vocational tasks and jobs contained within those groups. Most severely affected will be work groups involving sales or requiring direct communication between workers or employees and customers. Restrictions will include a limitation of lucidity in expression; ability to motivate people; ability to relate to people in a manner to win their confidence; ability to communicate ideas and influence others; and in the instance where both vagi are affected, a restriction of physical stamina and endurance.

**Spinal Accessory Nerve**

The eleventh cranial (spinal accessory) nerve supplies the sternomastoid muscle and the upper portion of the trapezius muscles. Any injury or disease affecting the eleventh cranial nerve will weaken these muscles, limiting the individual's ability to rotate the head to the side opposite the area of damage. This may cause a slight drooping of the shoulder on the side of the lesion. This type of paralysis is generally a result of penetrating wounds, although it may occur as a result of a disease process as well.

Although it may affect the client's appearance, it generally does not produce substantial vocational handicaps. It may impact individuals in heavy laboring positions but this is a rare occurrence and not frequently encountered in the practice of vocational rehabilitation.
Hypoglossal Nerve
The twelfth cranial (hypoglossal) nerve supplies the muscles of the tongue. Penetrating wounds, infections resulting in abscesses, and tumors are the most likely precipitating factors in damage to this nerve which will result in paralysis of one side of the tongue. The tongue in this instance will deviate toward the weak side when it protrudes in the mouth. It can affect speech, mastication, and swallowing.

When it affects speech, it impacts vocational potential. The vocational handicaps and implications are similar to those listed for the tenth cranial nerve.