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FACIAL NERVE PROBLEMS

WHAT IS THE FACIAL NERVE, AND WHAT IS ITS FUNCTION?

The facial nerve is a specific type of motor nerve (a nerve which tells certain muscles to contract) that controls the facial muscles on the same side of the face. It allows us to show expression, smile, cry, and wink. Injury to the facial nerve causes a socially and psychological devastating physical defect that may require multiple rehabilitative procedures.

The facial nerve is the seventh of the twelve cranial nerves, which have been named as such because they all exit the brainstem through the base of the skull. Everyone has two facial nerves, one for each side of the face. The facial nerve travels with the hearing nerve (cranial nerve eight) as it travels in and around the structures of the middle ear. It exits the front of the ear at the styloidmastoid foramen (a hole in the skull base), where it then travels through the parotid gland. In the parotid gland it divides into many branches which provide motor function for the various muscles and glands of the head and neck.

WHAT TYPES OF PROBLEMS AFFECT THE FACIAL NERVE?

A disorder of the facial nerve may result in facial muscle paralysis, weakness, or twitching of the face; dryness of the eye or the mouth; or alteration of taste on the affected side. However, the finding of one of these symptoms does not necessarily imply a specific facial nerve problem, it is only after a careful investigation that one is able to make a precise diagnosis. The cause of a facial nerve disorder can be many, and include.

- **Trauma:** Examples are birth trauma, skull base fractures, facial injuries, middle ear injuries, or surgical trauma.
- **Neurologic:** Examples are the Opercular syndrome, Millard-Gubler syndrome.
- **Infection:** Examples are infections of the ear or face, Herpes Zoster infection of the facial nerves (the Ramsey-Hunt syndrome).
- **Metabolic:** Examples are Diabetes and pregnancy.
- **Tumors:** Examples are acoustic neuroma, schwannoma, cholesteatoma, parotid tumors, glomus tumors.
- **Toxins:** Examples are alcoholism, carbon monoxide poisoning.
- **Bell's Palsy:** Also called idiopathic facial nerve paralysis (see below).

HOW ARE THESE PROBLEMS DIAGNOSED?

Someone with a facial nerve disorder is usually given one or more of the following tests to help determine the cause and likelihood of recovery. In a significant number of cases, no cause will be identified and often it will resolve without intervention, whereas in other cases, the condition may have a specific treatment and perhaps it can be life-threatening. Therefore, a careful and systematic search must be made to determine the cause of the facial nerve problem.

1. **Hearing tests:** Hearing tests are done to assess the status of the hearing (auditory) nerve which travels with the facial nerve. Also a branch of the facial nerve, which supplies motor fibers to one of the muscles in the middle ear, can be tested (stapedial reflex test).
2. **Balance tests:** Balance tests may help to determine if this part of the auditory nerve is involved. They are infrequently utilized.

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3. **Tear tests:** The loss of the ability to form tears may help to determine the location and severity of a lesion on the facial nerve.
4. **Taste tests:** The loss of taste in the front of the tongue may help to determine the location and severity of a lesion on the facial nerve.
5. **Salivation test:** Decreased flow of saliva may help to determine the location and severity of a lesion on the facial nerve.
6. **X-ray tests:** Imaging studies are used to visualize the nerve along its path to help determine if there is infection, a tumor, a bone fracture, or any other abnormality. These studies are usually a CT scan and/or a MRI scan.
7. **Electrical tests:** During this test, the nerve is stimulated by an electrical current applied to the skin overlying the nerve. Function is graded by the amount of current required to cause excitation of the nerve and contraction of the facial muscles. This test is often repeated several times to determine extent of injury and progression of the disease. For example, if testing indicates equal muscle response on both sides of the face, the patient can be expected to have complete return of facial function in 3-6 weeks without significant deformity.

WHAT IS BELL'S PALSY, ITS TREATMENT, AND ITS CLINICAL COURSE?

Bell's palsy is thought to be caused by a viral infection of the facial nerve. The most likely virus is the herpes simplex virus. Other names for this condition are "idiopathic facial palsy" or Antoni's palsy. Bell's palsy is usually a self limiting, non-life threatening, and spontaneously remitting within 6 weeks. The incidence is 15-40 new cases per 100,000 population per year. There is no predominate age or racial predilection, however it is 3.3 times more common during pregnancy and slightly more common in menstruating females. In general, the incidence increases with advancing age. The diagnosis is made when in the typical clinical presentation (see below) no other cause can be identified.

The typical clinical presentation includes:

- The paralysis is acute in onset, and involves only one side of the face.
- The paralysis is "peripheral" meaning that all muscles are involved including the forehead.
- There is often numbness or pain of the ear, face, neck or tongue in 50% of patients (sensory cranial polyneuritis).
- There is a preceding viral illness in 60% of patients.
- There is a family history of Bell's Palsy in 10% of patients.
- Less than 1% of patients have bilateral problems.
- There may be a change in hearing sensitivity (often increased sensitivity).

The proposed mechanism of injury is:

- Primary viral infection (herpes) sometime in the past.
- The virus lives in the nerve (trigeminal ganglion) from months to years.
- The virus becomes reactivated at a latter date.
- The virus reproduces and travels along the nerve.
- The virus infects the cells surrounding the nerve (Schwann cells) resulting in inflammation.
- There is an autoimmune response to the damaged Schwann cells which ultimately causes inflammation of the nerve and subsequent weakness or paralysis of the face.
- The clinical course of the paralysis and the recovery will depend upon the degree and amount of damage to the nerve.

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TREATMENT OPTIONS OF FACIAL PARALYSIS

Corticosteroids are the best treatment for Bell's palsy, and it is recommended that all patients be treated. The usually amount is 1 milligram per kilogram body weight of prednisone (or steroid alternative) per day. Recently, antiviral medications like acyclovir given in a dose of 200-400 milligrams five times per day for five days have been demonstrated to increase recovery. If the paralysis is improving after five days of treatment, the acyclovir is stopped and the steroids can be tapered to zero over the next five days. If the paralysis is still complete after five days, then the same dose of both medications are continued for another five days, then the steroids are tapered over the next five days.

Physical therapy and electrotherapy probably have no significant benefit. Surgical facial nerve decompression remains to be controversial. It may be considered by some to be indicated during the first two weeks in those patients showing the most severe nerve degeneration.

EYE CARE OF PATIENTS WITH FACIAL PARALYSIS

Patients with facial nerve paralysis have difficulty keeping their eye closed because the muscle which closes the eye (orbicularis oculi muscle) can not work. Serious complications can occur because the cornea (the clear covering) of the eye becomes too dry. The following are important in preventing eye complications.

- Manually close the eye with a finger to keep it moist. You should use the back of your finger rather than the tip to insure that the eye is not injured.
- Wear protective glasses to prevent dust from entering the eye.
- Use artificial tears to keep the eye dry.
- Tape or patch your eye closed with paper tape while asleep, and use an ointment to keep the eye lubricated.
- A temporary or permanent narrowing of the eye opening (tarsorrhaphy) may be necessary.

RECONSTRUCTIVE OPTIONS AVAILABLE TO THE PATIENT WITH FACIAL PARALYSIS

Reconstructive options for patients with facial muscle weakness or paralysis include one or more of the following.

- **Nerve repair or nerve grafts:** Facial regeneration occurs at a rate of one millimeter per day. If a nerve has been cut or removed, direct microscopic repair is the best option. Sensory nerve like the Great Auricular or Sural nerves can be employed to fill in any gaps.
- **Nerve transposition:** Often the tongue nerve (hypoglossal nerve) or the other facial nerve can be connected to the existing facial nerve. For example, the patient can train themselves to move their face by moving their tongue.
- **Muscle transposition or sling procedures:** The temporalis muscle or masseter muscle, which are one of the only muscles on the face not supplied by the facial nerve, can be moved down and connected to the corner of the mouth to provide movement of the face.

- **Muscle transfers:** Free muscles from the leg (gracilis) can be used to provide both muscle bulk and function. Often a cross facial nerve transposition is done to provide similar nerve supply to the donor muscle flap.
- **Ancillary eyelid or oral procedures:** In addition to one of the above, often it is necessary to include a brow or facelift, partial lip resection, eyelid repositioning, lower eyelid shortening, upper eyelid weights, or eyelid springs.

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