Reanimating the Paralyzed Face

Following surgery and radiation therapy in 1992 to treat a skull-based glomus tumor, a now 64-year-old male experienced gradual, progressive, and ultimately total left-sided facial paralysis. His altered appearance together with functional impairments caused by the pull of muscles from the non-paralyzed right side of his mouth that resulted in difficulty speaking and eating, made him self-conscious about being seen in public and clinically depressed. He was referred to Clarian Health for a consultation.

What is the Indiana Clinic?

The Indiana Clinic is a partnership between the Indiana University School of Medicine (IUSM) faculty physicians and Clarian Health. It’s a multi-specialty practice group that includes primary and specialty care physicians from Indiana University Hospital, Methodist Hospital, Riley Hospital for Children, and other Clarian-affiliated facilities.

The goal of the Indiana Clinic is to provide seamless patient care through an integrated and coordinated delivery health system. It will also improve access for patients and referring physicians, provide an excellent environment for world-class scientific research, and further our academic commitment to tomorrow’s health care professionals.

Facial paralysis, the result of injury to the facial nerve and commonly caused by Bell’s palsy, stroke, tumor, trauma, or infection, occurs in approximately 40,000 Americans each year and has a devastating personal impact.

“Facial expressions are the way we interact with the world and gauge the reactions of others,” explains Taha Shipchandler, MD, facial plastic and reconstructive surgeon and assistant professor of clinical otolaryngology-head and neck surgery at Indiana University School of Medicine. “Yet for persons with facial paralysis, sadness, shock, surprise, and happiness are all expressed with the same blank stare.”
“This loss of facial expression and drooping of the affected side (most cases of facial paralysis are unilateral) together with difficulty speaking and eating typically result in intense self-consciousness and social withdrawal,” he continues. “The long-term implications of distorted facial morphology are significant and include fewer job opportunities, lower income, and even a reduced likelihood of finding a life partner. Not surprisingly, many patients with facial paralysis become clinically depressed.”

Rehabilitation of facial paralysis is one of the greatest challenges facing reconstructive surgeons today. No procedure is capable of fully restoring normal appearance and function. Nonetheless, the belief held by many patients and physicians that nothing can be done, particularly for those with longstanding facial paralysis, is completely inaccurate. According to Dr. Shipchandler, advances in surgical techniques that have occurred over the past five years now make it possible to achieve life-changing improvements in appearance and function.

Acute Facial Paralysis
Although it is never too late to intervene, patients should ideally be evaluated very soon after the onset of facial paralysis, stresses Charles Yates, MD, assistant professor of otolaryngology-head and neck surgery. Components of the evaluation include examination of the head and neck and the cranial nerves; audiologic assessment (when indicated); electrical testing (i.e., electromyoneurography, electromyography [EMG]); and, in some cases, CT or MRI imaging.1 Acute management may involve facial nerve decompression surgery or primary facial nerve repair or grafting. When definitive surgery is not indicated, at least initially, certain reversible surgical procedures can facilitate recovery.

“Facial paralysis may cause serious ophthalmic complications, including dry eye and corneal exposure owing to the loss of the blink reflex, upper and lower eyelid retraction resulting from the loss of orbicularis tone, and lagophthalmos.1,2” Dr. Yates reports. “To protect the cornea, preserve vision, and allow the eye to completely close, eyelid weights should be placed within the first few weeks. Traditionally, gold eyelid weights have been used. But today, platinum chains and other lower-profile implants that adapt to the shape of the cornea and have lower reactivity than that seen with gold are increasingly employed.”

Bell’s palsy accounts for about three-quarters of all cases of facial paralysis. More than 70 percent of affected patients recover spontaneously. Nonetheless, their faces may be distorted for a period of several months, causing significant distress.

“A percutaneous sling is a reversible technique that, when performed in the early stages of Bell’s palsy, corrects facial sagging and drooping and improves a patient’s appearance until the facial nerve is reinnervated,” Dr. Shipchandler says.

Facial Reanimation Surgery
The surgical treatment of unilateral, established facial paralysis requires a comprehensive treatment plan to achieve two goals: 1) restore facial symmetry, and 2) partially reestablish facial movement—specifically, a natural smile and complete eyelid closure.”

Intermediate Duration Facial Paralysis
Some patients with intermediate duration (up to two years) facial paralysis have anatomically intact facial nerves that have been permanently damaged. For example, the facial nerve may have suffered a stretch injury during surgery to remove an acoustic neuroma. When the native facial musculature is still viable, a nerve transfer or nerve crossover procedure is the treatment of choice for reanimating the face.

A variety of donor nerves have been used for nerve transfer surgery, including the hypoglossal, spinal accessory, masseteric branch of the trigeminal nerve, and motor branches of the cervical plexus.3 The most commonly used technique, the classic XII-VII (hypoglossal-facial) cranial nerve transfer, involves transection of the hypoglossal nerve distal to the ansa cervicals and coaptation to the main trunk of the facial nerve. Depending on the patient’s anatomy, Drs. Shipchandler and Yates perform a modification of the XII-VII transfer, in which about 30 to 40 percent of the hypoglossal nerve is divided longitudinally for several centimeters and approximated to the lower division of the facial nerve.4

“Compared with the classic XII-VII transfer, split hypoglossal-facial nerve neurorraphy provides similar reinnervation of the facial nerve while minimizing morbidity to the ipsilateral tongue (i.e., dysphagia, dysarthria).”4

Dr. Shipchandler, right, and surgical assistant operate on patient John Gray.

“Comprehensive evaluation of the patient’s face and neck revealed left-sided brow prosis, which caused a unilateral lack of forehead creases; lagophthalmos; ectropion; lower lid laxity and thinning; midface wasting; lip-thinning; and skin and muscle sagging and redundancy (jowls) (Photo 1, Page A6). In addition, the lips and nose had shifted toward the non-paralyzed right side, resulting in drooling, muffled speech, and the inability to breathe from the left nostril. An EMG showed silence of activity, indicating complete denervation of the ipsilateral muscles of facial expression. Reanimation surgery was discussed, and an operation was scheduled.”

Facial Reanimation Surgery-Part 1
**Longstanding Facial Paralysis**

“Nerve transfer or cross-face nerve grafts are considered the best methods for achieving bilateral, symmetrical, and natural-appearing mimetic function,” states Dr. Shipchandler. “However, because paralyzed facial muscles atrophy over time, nerve transfer procedures usually cannot be performed in patients whose facial paralysis has persisted for more than two years. Dynamic muscle transfer is an excellent option for facial reanimation in cases of longstanding facial paralysis, and the temporalis muscle transfer technique is frequently used.”

Orthodromic transfer of the temporalis muscle insertion is a relatively new approach to the treatment of chronic facial paralysis, described in the literature in 2007. The procedure involves release and mobilization of the temporalis tendon at its insertion onto the coronoid process of the mandible (Figure 1). The temporalis tendon is then transferred to the oral commissure to elevate the lip and recreate the natural smile crease on the cheek (Figure 2). This technique effectively eliminates depression in the temple and tissue protrusion around the zygomatic arch associated with the classic technique for temporalis muscle transfer/sling.

“Another advantage of temporalis tendon transfer surgery is that the results are apparent fairly immediately (Photo 2, Page 6),” Dr. Yates points out. “In contrast, the outcome of a nerve crossover procedure can only be determined after a prolonged period of nerve regeneration (nerves grow at a rate of just one millimeter per day).”

Microvascular free-tissue transfer, typically using a gracilis flap with or without other tissue (e.g., skin flap), is another procedure performed by Dr. Shipchandler for patients with longstanding facial paralysis. Free-tissue transfer offers the possibility of synchronous, mimetic movement but, like nerve crossover surgery, has a prolonged healing time compared with dynamic muscle transfer.

During a 12-hour surgery, the patient underwent temporalis tendon transfer to provide movement to the paralyzed left side of his face. Several additional procedures were performed to restore facial symmetry, including brow ptosis correction, placement of a platinum chain eyelid weight, lower lid blepharoplasty, lower eyelid retraction surgery, midface and neck lifts, septoplasty to repair nasal valve stenosis, and lip commissuroplasty and the tunneling of tissue through the lips to pull them back to midline.

The patient was hospitalized for five days. He went out in public on the tenth postoperative day, and within two weeks, an estimated 80 percent of facial swelling had resolved. Rehabilitation consists of the patient spending five minutes in front of the mirror in the morning and again at night relearning how to smile by biting down on his back molars.
Facial Paralysis: A Patient’s Perspective

John Gray, the patient shown in the photos, is an IU Bloomington alumnus and retired professor of educational leadership at the University of Southern Indiana in Evansville. Both he and his wife, Sue, have regularly traveled the 140 miles between their homes in Washington, IN and Indianapolis to receive specialty care at Clarian Health. This care has included two surgeries for John to remove glomus tumors from the left temporal region of his skull. By the summer of 2009, nearly 20 years after the second operation and a course of radiotherapy, slowly advancing unilateral midface wasting; lip thinning; and skin redundancy resulting in lack of forehead creasing; lagophthalmos; and tenderness, but he says it’s improving, and he’s happy with his appearance.

“I have some voluntary movement on the left side of my face, my eye opens and closes correctly, and I no longer have the facial sagging and dropping that affected my voice, speech, and eating,” he says. “Certainly, I don’t look like the same person that I did before the paralysis, but I’m getting better and doing better. And I’m learning to be patient with the pace of my recovery, which I realize is still in its early stages.”

John’s plans for the near future include resuming pro bono work as a human resources consultant to the city of Washington; making another visit to colonial Williamsburg with Sue; playing with his two black Labs, Ginger and Tess; and expanding his model electric train set-up.

“While I was hospitalized at Clarian North, I had excellent pain control and received wonderful care from the hospitalists and nursing staff,” he says. “Dr. Shipchandler checked in on me regularly and gave me his home phone, cell phone, and pager numbers to call if I had any problems. Whenever he was unavailable, he always returned my calls as quickly as possible.”

John reports his recovery is proceeding well. He continues to have some residual facial pain, swelling, and tenderness, but he says it’s improving, and he’s happy with his appearance.

References


Photo 1. Patient at initial presentation
The patient’s face shows left-sided eyebrow drooping, resulting in lack of forehead creasing; lagophthalmos; midface wasting; lip thinning; and skin redundancy (jowls). Note the shift of the lips and nose to the non-paralyzed right side of the face.

Photo 2. Patient at the one-week postoperative visit
One week after surgery, postoperative swelling is reduced by approximately 25 percent. The patient is now able to control the smile on the left side of his face by biting down on his back molars.

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Dr. Shipchandler is a graduate of the IU School of Medicine. He completed a residency in otolaryngology at the Cleveland Clinic and a fellowship in facial plastic and reconstructive surgery at Johns Hopkins University Hospital in Baltimore, MD. He has special interests in the surgical treatment of facial paralysis, congested/blocked nasal breathing, and head and neck skin cancers; head and neck reconstruction after trauma and cancer; and all cosmetic procedures of the face and neck.

Dr. Shipchandler is a member of the American Academy of Facial Plastic & Reconstructive Surgery and the American Academy of Otolaryngology. He regularly presents cases and discusses his research at national meetings.

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Dr. Yates received his medical degree and completed residency training in otolaryngology-head and neck surgery at the IU School of Medicine, after which he did a fellowship in neurotology and skull-base surgery at the Ohio State University. Dr. Yates is a member of the American Academy of Otolaryngology-Head and Neck Surgery, the Triological Society, and the Medical School Advisory Committee for the National Board of Medical Examiners. He has authored journal articles in the areas of otology, neurotology, and vestibular schwannoma and serves as a reviewer for several otolaryngology-focused journals.