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# Peripheral Facial Nerve Palsy Following Spinal Cord Stimulator Trial

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**Background:** Spinal cord stimulation and neuromodulation has led to a vastly increased quality of life in patients since its introduction. Despite this, there remains a variety of potential complications to be aware of.

**Case Report:** The following case presents a patient with postlaminectomy syndrome who developed a right-sided Bell's palsy following a spinal cord stimulator (SCS) trial. He presented to the emergency department with right-sided facial weakness and right ear pain, reporting that the symptoms began a few hours after he returned home from the SCS trial. After an unremarkable neurologic workup, his presentation was found to be most consistent with Bell's palsy. He received appropriate treatment and achieved full resolution of his symptoms at the 2-month follow-up.

**Conclusions:** Peripheral facial nerve palsy can result from a variety of etiologies. Special care is required to eliminate secondary causes before establishing an idiopathic source. Strict infection control remains a significant protective factor against SCS complications.

**Key words:** Spinal cord stimulator, Bell's palsy, peripheral nerve palsy, low back pain, postlaminectomy syndrome

## BACKGROUND

Spinal cord stimulation and neuromodulation have been utilized for the treatment of pain since 1967 (1). It is commonly used in patients with chronic pain as a result of postlaminectomy syndrome, failed back surgery syndrome, vertebral facet arthropathy, and complex regional pain syndrome. Once implanted, the device is able to modulate pain signals generated from the dorsal columns, providing significant relief (1,2). Many patients have benefitted from an increased quality of life since its introduction. Complication rates (3), however, have been reported to be upward of 20-40%. The most common tend to be in relation to mechanical dysfunction, such as lead migration and device failure with a minority due to infection, pain, seroma, and wound complications (4). Lasting neurological complications are the most worrisome (5), typically as a result of epidural hematoma formation. The following case presents a patient with postlaminectomy syndrome who developed a right-sided Bell's palsy following the spinal cord stimulator (SCS) trial and its management following this event.

## CASE PRESENTATION

A 73-year-old man with a past medical history significant for hypertension, hyperlipidemia, hypothyroidism, gastroesophageal reflux disease, obstructive sleep apnea, and depression presented for the management of chronic lower back pain. He had endured constant low back pain since 2015 and had seen multiple physicians, receiving treatments via medication therapy and repeated injections, which provided minimal relief. In 2017, he had an L2-L3 fusion which did improve his pain levels initially before worsening over the next several months. His pain would radiate to the bilateral lower extremities and improved after 30 minutes of activity.

Magnetic resonance imaging of the lumbar spine

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demonstrated L1-L2 facet arthropathy, L2-L3 facet arthropathy with moderate left foraminal stenosis and mild right foraminal stenosis, L3-L4 facet arthropathy with borderline canal stenosis and moderate bilateral foraminal stenosis, L4-L5 anterolisthesis, facet arthropathy, disc bulge, mild canal stenosis, and mild bilateral foraminal stenosis with possible mass effect on the L5 nerve roots, and L5-S1 facet arthropathy, disc bulge, and mild bilateral foraminal stenosis.

After failing medication management and numerous interventions, including lumbar medial branch blocks, sacroiliac joint injections, and lumbar epidurals, the patient opted to proceed with the SCS trial. The procedure was tolerated well, receiving moderate sedation for the anesthetic technique with ability to move and communicate with the operating room team during the entire procedure, and the patient was discharged home with the percutaneous leads and temporary device in place. The following day, he presented to the emergency department with right-sided facial weakness and right ear pain, reporting that the symptoms began a few hours after he returned home from the SCS trial. He denied any other sensory changes, weakness, or numbness of his extremities, or changes in speech or vision. On physical examination, the right tympanic membrane was intact. There was no ear drainage, focal mastoid tenderness, or erythema. Neurological exam was grossly normal, except for right-sided facial droop that did not spare the forehead. There was normal strength and sensation in bilateral upper and lower extremities. Computed tomography with and without angiography of the head and neck was overall unremarkable and revealed no acute process that would otherwise account for these neurologic changes. After consultation discussions between emergency medicine, neurology, and pain management, there was agreement that the patient's presentation was most consistent with Bell's palsy. He began appropriate treatment with prednisone and acyclovir and was discharged home uneventfully. Of note, 9 days previously, he had received his second dose of the Pfizer COVID-19 vaccine.

At the follow-up visit one week later for SCS lead removal, he continued to have the symptoms of right facial weakness. The patient reported a greater than 95% improvement in his pain. His sleep was improved, and he was now able to walk multiple flights of stairs without issue. The SCS trial was deemed successful, and the patient was amenable for SCS implantation. Two months later at the time of SCS implantation, apart from a slight right eyelid droop, the patient now has full resolution of his symptoms and tolerated the SCS implant remarkably well.

## DISCUSSION

The seventh cranial nerve, or facial nerve, supplies motor function to the facial muscles, parasympathetic innervation to the lacrimal, sublingual, and submandibular glands, taste sensation to the anterior two-thirds of the tongue, and provides sensory innervation to the tympanic membrane, external auditory meatus, and pinna. Arising from the pontomedullary junction, the facial nerve travels along with the vestibulocochlear nerve to the internal auditory meatus where it is then enveloped in perineurium and periosteum. After this process, the facial nerve travels via the facial canal to its branches' respective endpoints. The facial canal is comprised 3 segments, namely the labyrinthine, tympanic, and mastoid. The labyrinthine segment is the narrowest, and any swelling of the nerve typically results in compression in this region. Bell's palsy is the designation used for an acute peripheral facial nerve palsy of unknown cause (6). Most instances are caused by the reactivation of herpes simplex virus (7); however, there is no widely accepted confirmatory testing method to establish a viral source. Annual incidence is in the range of 13 to 34 cases per 100,000 persons (8). The pathophysiology suggests an inflammatory process that leads to edema, compression, and demyelination of the facial nerve (9). There is no increased propensity to develop Bell's palsy in any specific race, gender, or ethnicity; however, pregnant women are 3 times more likely to develop Bell's palsy (10), possibly related to increased fluid retention resulting in nerve compression. Patients tend to present with sudden onset unilateral facial paralysis, typically first noticed upon awakening. Both the upper and lower face are affected, and hyperacusis or ear pain may be seen as well. Oral corticosteroids and antiviral therapy are the mainstay of treatment (11), and over 80-85% of patients have complete resolution of symptoms within 6 months. Since this is primarily a clinical diagnosis, it is imperative to rule out secondary causes of peripheral facial nerve palsy (6), such as otitis media, autoimmune disorders, such as sarcoidosis or Sjögren's syndrome, herpes zoster, Lyme disease, Guillain-Barré syndrome, stroke, and tumor. To our knowledge, there have been no reported cases of Bell's palsy following the SCS trial. Perioperative peripheral facial nerve injury has been reported in rare instances

(12), usually due to positioning of the patient or direct trauma to the nerve from operating in close proximity. Sandon et al (13) describe a case of abducens nerve palsy following minimally invasive spine surgery. Demiröz et al (14) also describe a case of facial nerve palsy following thoracic instrumentation and fusion. Similar to the abducens nerve, the facial nerve is subject to mechanical forces of traction or compression, especially with patient placement in the prone position during spinal procedures. Excessive pressure on the mandible or face mask during anesthesia administration has resulted in peripheral facial nerve palsy (15) in some reports. In this case, the patient underwent moderate sedation and would have been able to move or communicate to the operating room team if he was uncomfortable or having any undue pressure on his face or body.

The recent widespread utilization of mRNA vaccines has helped prevent and decrease the symptoms associated with the novel coronavirus-19. These new vaccines have rare (0.6%) side effects of facial paralysis. Of the cases identified to date, most patients are women (68%) with a median onset of 2 days (range 0-79 days) after vaccination administration. These results are not higher than the rates of facial paralysis observed with any other vaccines, and if an association between the COVID-19 vaccine and facial paralysis exists (16), the risk is very low. In this patient, the COVID-19 vaccine could have played a factor in the development of facial paralysis, and the other potential symptoms or risks are unknown due to the fact that these are a new type of vaccination, and we have limited information regarding short- and long-term risks and complications.

Infection remains one of the most serious complications of SCS implantation. Typically, bacterial infections occur more frequently after SCS implantation at the generator pocket site (17), but can occur during spinal cord stimulator trials as well. If bacterial infection is suspected during an SCS trial, leads are removed to avoid spread of the infection to the spine and avoid serious complications, such as meningitis or epidural abscess, and patients are treated with antibiotics. To our knowledge, no recommendations exist for management of the SCS leads during the SCS trial if an acute viral infection occurs. In this case, the patient had no systemic symptoms of viral infection and bacterial infection was ruled out. After discussion with the patient about possible risks of spread of any underlying infection, the decision was made to leave the SCS leads in place and he completed an uneventful 7-day trial.

## CONCLUSIONS

While potentially due to a variety of etiologies, special care is required to eliminate secondary causes of peripheral facial nerve palsy before establishing an idiopathic source. Spine surgery potentially increases risk of facial nerve compression due to patient position during the operation and care should be taken to ensure that no significant pressure points exist on the patient's face. Considerations for optimized patient positioning and facial padding are recommended. Strict infection control remains a significant protective factor against SCS complications. Ensuring that any underlying conditions were ruled out, we present a case of a successful, uneventful SCS trial in the setting of new onset Bell's palsy.

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