

ALLERGIC DERMATITIS TO SPINAL CORD STIMULATION DEVICE: A CASE REPORT

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Background: Spinal cord stimulation is a safe and efficacious treatment for chronic pain. While there are limited reports in the literature, contact allergy related to these synthetic devices can occur, with nickel being the most common offending agent.

Case Report: We present a 66-year-old woman with chronic lower back pain, failing conservative and surgical treatment measures, who underwent successful permanent spinal cord stimulator (SCS) implantation. Following placement, she developed a rash overlying the implantation site, diagnosed by dermatology as allergic dermatitis. She attempted topical steroid treatments, which aided symptoms; however, she ultimately opted for device removal, despite the SCS providing significant improvement in pain symptoms.

Conclusions: Allergic dermatitis is a potential complication of SCS placement. This should be discussed during the informed consent process and the skin monitored closely following device placement. Allergic symptoms can be significant, even pushing patients towards device explantation despite significant improvement in pain symptomatology.

Key words: Allergy, contact dermatitis, irritant, nickel, rash, spinal cord stimulator

BACKGROUND

Spinal cord stimulation therapy is a modern method using electrical impulses to block pain signaling to the brain. This system uses 3 elements: an electrode implanted in the spinal canal, a pulse generator, and a connector (1). This therapy has been used for several indications, including neuropathic pain from various etiologies. Failed back surgery syndrome has been shown in randomized controlled trials to have favorable long-term results with this treatment (2).

Contact allergy is a possible risk of procedures using synthetic devices, including spinal cord stimulators (SCS); there are limited publications on this topic in the literature. This condition is characterized by the development of an acute erythematous rash with vesiculation, crusting, and weeping; followed by chronic development of scaling, fissuring, and lichenification (3). Most contact dermatitis will fall into 2 categories: irritant and allergic.

Irritant accounts for 80% of contact dermatitis, causing skin damage without prior sensitization of the immune system and chronic effect of exposure to a weak irritant (3). Our patient developed chronic allergic dermatitis related to her permanent SCS device and components; this type IV delayed hypersensitivity reaction begins with sensitization to an antigen followed by the elicitation phase with reexposure. This phase is characterized by inflammation from mast cell and macrophage activation when the offending agent is present (3).

Case

Our patient is a 66-year-old woman with chronic lower back pain after prior lumbar laminectomy following a sledding injury at age 38 and subsequent discectomy. Pain was rated from 4 to 10 of 10, with constant aching in the lower back that was burning in nature and shoot-

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ing down the posterior right lower extremity. Magnetic resonance imaging (MRI) showed postsurgical, scoliotic, and multilevel degenerative disc and facet disease in the lumbar spine resulting in varying degrees of canal and foraminal stenosis.

She had tried multiple medications including non-steroidal anti-inflammatory drugs, acetaminophen, gabapentin, duloxetine, amitriptyline, cyclobenzaprine, and opiates as needed. Pain also had minimal responsiveness to multiple modalities including physical therapy, water therapy, transcutaneous electrical nerve stimulation, chiropractic therapy, and acupuncture. She had also tried trigger point injections, epidural steroid injections, and radiofrequency ablation without relief. Therefore, the patient opted for SCS therapy. Of note, she was on long-term warfarin anticoagulation for atrial fibrillation, which was appropriately paused before procedural intervention.

She was very pleased with results of the initial SCS with 2 percutaneous leads, reporting 50% to 75% reduction in pain with the ability to improve her activity level. She did not have any adverse effects or skin findings noted during the trial period. Therefore, the patient opted to undergo permanent SCS implant (Intellis™ Neurostimulator, Medtronic, Minneapolis, MN). The patient reported satisfaction with the device, noting 50% reduction of pain. She had consistent follow-up in the outpatient clinic with our chronic pain team and the device representative, noting no major issues in the first 2 months following device placement.

Ten weeks following placement of the permanent SCS, the patient developed a pruritic patch of violaceous erythema overlying the SCS generator site medially, while the incision remained approximated and there was no drainage, fluctuance, induration, or pain with palpation. The patient was prophylactically started on cephalexin without relief, followed by triamcinolone 0.1% topical cream. The patient reported feeling the external charger was causing her redness and skin irritation, having an improvement of rash after placing a cloth or shirt between the device and her skin.

Due to the persistence of symptoms for 2 months, she was seen by dermatology, who diagnosed the skin finding as a presumptive nickel allergy and transitioned to betamethasone 0.05% topical cream. While the cream helped symptoms, she continued to have irritation and significant pruritus, so our patient ultimately opted for device removal, which was performed 13 months after the initial placement. Following removal, the patient

had complete resolution of symptoms by the time of her follow-up visit 2 weeks later.

DISCUSSION

There is limited literature describing local cutaneous allergic reactions following implantation of a SCS. However, contact dermatitis is common, affecting approximately 20% to 30% of adults, with metals, including nickel, among the most common offending agents (1). Reactions in SCS have most commonly been reported for metals, as was demonstrated with our patient, although other device components can cause sensitization including silicone, plastics, resins, and glues (4-6).

Skin findings often include erythema, vesicular lesions, erosions, and edema with signs of excoriation due to significant pruritus (1). Our patient developed a rash with similar characteristics. The differential diagnosis for cutaneous erythema following device implantation can include infection and reticular telangiectatic erythema (RTE). RTE is characterized by asymptomatic, erythematous, and blanchable telangiectatic skin lesions overlying the implant site, sometimes being heat-triggered (7). Due to the significant pruritus and prior exposure to nickel earrings, the erythematous rash in our patient was most suggestive of an allergic process.

Interestingly, patients often do not have any prior history of allergies to device components or autonomic dysfunction suggesting a predisposition to skin reactions (1,4), making it challenging to determine which patients may be more at risk for this outcome. Some literature suggests that patients with a clear self-reported history of reactions to metals should be evaluated for allergy sensitization prior to device implants (8). However, other studies note that patch skin testing to detect a contact allergy sensitization has not been shown to be an adequate predictor of who will develop contact dermatitis to SCS hardware (1). This is likely because most contact dermatitis is irritant in nature rather than allergic in nature (3). Therefore, this testing is not currently the standard of care or recommended prior to device implantation. Regardless of whether preprocedural testing is done, discussion about the risk of allergy is critical when obtaining informed consent.

Regarding treatment for contact allergic dermatitis, there have been case reports demonstrating topical treatments that provided short-term resolution of cutaneous allergy symptoms (4). However, this treatment should potentially be used with caution, as topical steroid treatment coupled with an underlying

inflammatory response may lead to reduced tensile strength and increase the potential for poor wound healing. Should this occur, it could lead to development of secondary infections at device placement sites and/or wound dehiscence, requiring explantation (4). Definitive treatment for contact allergic dermatitis is avoidance of the offending agent (3). Due to the severity and persistence of symptoms despite treatment, our patient ultimately opted for explantation of the device to achieve avoidance of exposure, which allowed for complete resolution. While there have been reports of performing cutaneous allergy testing to determine the offending agent and reimplantation of a new, nonreactive system (6), our patient ultimately did not opt for SCS reimplantation.

CONCLUSION

Allergic contact dermatitis is a potential complication of SCS placement, with nickel being a common offending agent. This risk should be discussed during

the informed consent process prior to the procedure and patients should be monitored for skin symptoms suggestive of this condition following SCS placement. Infection may also occur as a complication of poor wound healing from the inflammatory response to device components. Monitoring for each of these should be done in the post-procedural period, even months after device placement. Symptoms of contact dermatitis can be significant, as with our patient, which is why she ultimately opted for device explantation despite significant improvement in pain symptomatology.

Author contributions

ANH: This author contributed to drafting, editing and final approval of case report.

BJK: This author contributed to direct patient care, drafting, editing and final approval of case report.

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