



Postsurgical inflammatory neuropathy: A report of five cases



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ABSTRACT

Background: Clinical and pathologic descriptions of postsurgical inflammatory neuropathy have been reported but this condition is still under recognized.

Methods: We reviewed 5 cases of a biopsy-proven inflammatory neuropathy that occurred within 30 days after surgical procedures. These patients were seen at one center in a 2-year period.

Results: All patients developed neuropathy symptoms with time delay between the surgery and the neuropathy onset. In all, the symptoms progressed up to the time of evaluation. Electrophysiological studies revealed mononeuropathy or asymmetrical polyneuropathy with active denervation. Nerve biopsies showed ischemic injury and perivascular inflammatory collections in all cases. All patients were treated with intravenous methylprednisolone and four of them showed clinical improvement. The non-responsive patient did not receive immunotherapy until 2 years after neuropathy onset.

Conclusions: The report illustrates that focal or asymmetrical neuropathy is typical of postsurgical inflammatory neuropathy and has a favorable outcome after intravenous corticosteroid treatment. The report underscores the importance for considering potentially treatable inflammatory neuropathies in the post-surgical setting.

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1. Introduction

Postsurgical inflammatory neuropathy has recently been described with pathological confirmation of the inflammatory infiltrates; it is likely underdiagnosed as few postsurgical neuropathy cases get nerve biopsies [1]. Little has been written about it although polyneuropathy occurring after surgery was recognized as occasionally occurring in the 1960s [2]. Inflammatory processes and altered immunity are considered to play a role in the pathogenesis of the neuropathy. The three clinical patterns of postsurgical inflammatory neuropathy that are reported include focal neuropathies (mononeuropathy or unilateral radiculo-plexus neuropathy), multifocal neuropathy (more than one limb involved) and diffuse polyneuropathy [1]. In order to establish a temporal relationship between the surgery and the subsequent neuropathy, the neuropathic symptoms are required to start within 30 days after surgery. Because mechanical causes are possible, a nerve biopsy showing inflammatory infiltrates is required to confirm the diagnosis although cases can be suspected without a nerve biopsy. Axonal degeneration, perivascular inflammation and ischemia are the usual pathological findings in this clinical entity. The occurrence of neuropathy after

surgery can raise suspicion that the neuropathy might have been caused by stretch, compression or transection of the nerve during the surgical procedure. However, it is important to emphasize the role of inflammation as an alternative pathogenesis of neuropathy after surgery. The nerve biopsy is helpful in differentiating mechanical from inflammatory causes. Even though a case series of postsurgical inflammatory neuropathy has been previously published, many newly ascertained cases of postsurgical inflammatory neuropathy seen at one institution in a short period of time support this clinical entity must be more common than recognized.

2. Methods

Medical records of all patients who attended the Peripheral Nerve Clinic at the University of Nebraska Medical Center (UNMC) between 2010 and 2012 were reviewed. Five patients who received a diagnosis of postsurgical inflammatory neuropathy were identified. All of them were seen by one of the authors (PT). Information was obtained retrospectively. Routine blood tests included complete blood count, blood chemistries, endocrine/inflammatory, autoimmune/infectious diseases and vitamin deficiencies. Toxicology and paraneoplastic studies were obtained in selected cases. Lumbar puncture with cerebrospinal fluid analysis and radiologic studies were performed if indicated. All of the patients underwent electrophysiologic studies and nerve biopsies. All nerve biopsies were performed at UNMC but the specimens were sent

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to the Peripheral Nerve Center at Mayo Clinic in Rochester, Minnesota for processing and pathological examination (PJBBD).

3. Results

We identified 5 patients who developed postsurgical inflammatory neuropathy confirmed by inflammatory infiltrates on nerve biopsy. Of our five patients, three were women (60%). Their ages ranged from 35 to 68 with a median age of 61 years. All patients developed acute or sub-acute onset of symptoms in one or both lower extremities within 30 days after surgery or experienced ongoing neurological worsening during the post-operative period. The surgical procedures included lumbar spine (2 patients), hip (1 patient), ankle (1 patient) and foot (1 patient) surgeries. The symptoms included foot weakness, numbness, pain and walking difficulty. Patients subjectively reported persistence of the symptoms, with two of five reporting significant progression. Four patients were seen and diagnosed with postsurgical inflammatory neuropathy within one year after the onset. One patient (who did not improve with immunotherapy) was seen in the second year after the neuropathy onset.

3.1. Case 1

A 63-year-old Caucasian male with a past medical history of Parkinson's disease underwent lumbar fusion surgery for low back pain. Two weeks postoperatively he started to develop bilateral foot drop, more severe on the right than on the left side, foot numbness, increased sensitivity to touch in the skin and hyporeflexia. Blood and CSF studies were unremarkable. Electrophysiologic studies revealed bilateral nonlocalizable peroneal neuropathies with active denervation. Superficial peroneal nerve biopsy revealed a generalized decrease in myelinated nerve fiber density and epineurial perivascular inflammatory infiltrates (Fig. 1A), neovascularization (Fig. 1D), and perineurial thickening (Fig. 1C). Teased fiber preparations showed increased rates of segmental demyelination and axonal degeneration. The results were suggestive of an inflammatory process. The patient was treated with intravenous methylprednisolone 1 g daily for 5 days followed by 1 g weekly for 12 weeks. A follow-up visit 10 months after the treatment showed complete resolution of the left foot drop on the left side with significant improvement of the right foot drop. The patient was able to walk by himself without braces.

3.2. Case 2

A 35-year-old Caucasian female without significant past medical history developed a left foot drop, pain, swelling and discoloration 10 days following ipsilateral ankle surgery. The surgery was performed under general anesthesia with a prolonged tourniquet time of 71 min. The symptoms persisted for two years before evaluation. Neurological examination showed a complete left foot drop. Blood tests and magnetic resonance imaging (MRI) study of the spine were unremarkable. Electrophysiologic studies showed a left sciatic mononeuropathy with active denervation. Sural nerve biopsy revealed a multifocal decrease in fiber density (Fig. 1E), regenerating clusters of nerve fibers, increased empty nerve strands and epineurial perivascular inflammatory infiltrates. The results were suggestive of an inflammatory process. The patient received intravenous methylprednisolone 1 g daily for 5 days followed by 1 g weekly for 12 weeks. However, a follow up examination 4 months after the start of treatment did not show any improvement.

3.3. Case 3

A 61-year-old Caucasian female without significant past medical history, developed a right foot drop and paresthesia after right total hip replacement. Her symptoms started on post-operative day one. A few days later, she experienced squeezing and shooting pain in her right

leg. Physical examination showed profound weakness in right foot dorsiflexion and eversion. Blood tests were unremarkable. Electrophysiologic studies revealed a right sciatic neuropathy affecting predominantly the right common peroneal nerve branch with active denervation. Sural nerve biopsy showed multifocal fiber loss, multiple small collections of epineurial and endoneurial perivascular inflammatory cells, and increased axonal degeneration in teased nerve fiber preparation. She was treated with intravenous methylprednisolone 1 g a day for 5 days and once a week for 12 weeks. Her foot drop had completely resolved at follow-up 3 months after the start of treatment.

3.4. Case 4

A 45-year-old Caucasian female with a past medical history of hypothyroidism and hypertension developed weakness, paresthesia and sensory loss in her left foot after ipsilateral bunionectomy. She received popliteal and saphenous nerve blocks at the time. Right after the nerve blocks, she felt numb from the left knee down. However, after surgery, the numbness seemed to persist on the bottom of her left foot and it continued to progress in the post-operative period. In less than one year, the symptoms progressed up to the ankle level. At times, she felt that she 'dragged' her left foot while she was walking. Physical examination showed mild distal weakness in the left foot, absent left ankle reflex, and diminished pin, touch and vibratory senses in the left foot. Blood tests and MRI were unremarkable. Electrophysiologic studies revealed a left sciatic mononeuropathy with active denervation above the sites of local anesthesia. Sural nerve biopsy showed a mildly decreased nerve fiber density, scattered but multiple endoneurial inflammatory cell infiltrates and an increased rate of axonal degeneration. Her condition improved significantly after treatment with 1 g daily for 5 days followed by 12 doses of weekly intravenous methylprednisolone.

3.5. Case 5

A 68-year-old Caucasian male without significant past medical history underwent spinal surgery for low back pain. He had persisting left foot drop and numbness of his left leg 6 months before the surgery. His postoperative period was complicated with a 23-pound weight loss and deep venous thrombosis of the right leg. After the surgery, the back pain and numbness were improved; however, his left-sided foot drop persisted. Two weeks after the surgery, he developed right-sided foot drop. His neurological examination showed new-onset proximal and distal muscle weakness and foot drop, as well as decreased sensory perception and deep tendon reflexes on the right. These new symptoms were present for five months before evaluation. Blood tests were unremarkable. Electrophysiologic studies revealed a bilateral, severe, active axonal sensory-motor neuropathy. A right sural nerve biopsy showed multifocal nerve fiber loss (Fig. 1F), endoneurial edema, focal perineurial thickening, increased axonal degeneration, and multiple perivascular inflammatory infiltrates with punctuate endoneurial and epineurial perivascular hemosiderin deposits (Fig. 1B). The patient was treated with methylprednisolone 1 g daily for 5 days followed by 1 g weekly for 12 weeks. On follow-up examination, his foot drop had subsided and he was able to walk by himself.

4. Conclusions

The concept of postsurgical inflammatory neuropathy was recently introduced and defined as a specific condition usually resulting from ischemic injury and inflammatory infiltrates in nerves [1]. The true incidence and causes of these processes are uncertain. The condition seems to occur after various types of surgical procedures and is probably under diagnosed since a nerve biopsy is required to establish the diagnosis. Multiple factors such as stress from surgery [3], subclinical pre-existing inflammation, genetic predisposition [4], use of anesthetic agents [5,6], blood transfusion [7,8], underlying medical conditions

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