A Rare Case of Vincristine-Induced Neuropathy Presenting as Foot Drop in the Postoperative Period

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Patients with cancer receiving chemotherapy are at risk of neuropathy development. Many of them may have subclinical neuropathies, which may be missed before planning anesthesia, especially in emergency scenarios. This case report highlights the importance of a thorough neurologic examination in patients with subclinical neuropathy to avoid any complications and medicolegal issues. A patient with a diagnosis of diffuse large B-cell lymphoma being treated with vincristine-based chemotherapy was scheduled for an emergency laparotomy. There was no history of any neurologic deficit before surgery. The surgery was done using general anesthesia, and intrathecal morphine was given for postoperative analgesia. This patient experienced bilateral foot drop postoperatively. A bilateral lower limb and upper limb sensory-motor neuropathy was detected on a nerve conduction study, probably due to vincristine-induced peripheral neuropathy. The literature is deficient regarding manifestations of neurologic complications in previously asymptomatic patients in the immediate postoperative period. These patients pose a diagnostic dilemma perioperatively that may lead to medicolegal challenges to the anesthesia provider. Anesthesia providers should be wary of the possibility of exacerbation of any subclinical neuropathy in patients with cancer receiving neurotoxic chemotherapy and should probably avoid any neuraxial intervention in such patients if possible.

Keywords: Foot drop, neuraxial anaesthesia, subclinical neuropathy, vincristine.

N eurologic injuries after regional anesthesia and analgesia are rare. Cauda equina syndrome, transverse myelitis, arachnoiditis, and anterior spinal artery syndrome are some of the complications leading to neurologic deficits after central neuraxial anesthesia. 1 Direct trauma to the spinal nerve, drug-related adverse effects, intraoperative hypotension leading to spinal ischemia, or exacerbation of preexisting neurologic deficits are contributing factors that can lead to postoperative neurologic complications. 1,2

Patients with cancer coming for surgery are a special subgroup of patients with specific risk factors. A patient who has received preoperative chemotherapy may have an underlying neuropathy due to direct toxic effects or indirect metabolic effects of chemotherapeutic drugs. 3,4 However, many of these patients may have subclinical neuropathies, and especially in emergency cases, the diagnosis may be missed because of inadequate time for assessment. The absence of clinical neurologic deficit does not rule out a nerve injury, and neurophysiologic test results may show abnormalities even in the absence of clinical findings.

This case report aims to present an unusual case of a patient with large diffuse B-cell lymphoma who was operated on for a bleeding gastric ulcer and manifested foot drop in the postoperative period.

Case Summary
A 65-year-old man presented to the emergency department with abdominal pain and melena. The patient had a known diffuse large B-cell lymphoma of the gastrointestinal (GI) tract. He had received 2 cycles of vincristine-based chemotherapy; the last cycle of chemotherapy was given 20 days before the current symptoms. Upper GI endoscopy revealed an ulcer in the antropyloric region, so it was decided to perform an emergency laparotomy. The results of the preoperative laboratory workup showed a hemoglobin value of 8 g/dL, a normal platelet count, and a prolonged prothrombin time with an international normalized ratio (INR) of 1.7. Fresh frozen plasma was transfused to reduce the INR to 1.3.

On the patient’s arrival in the operating room, an intravenous line was inserted, and monitors including non-invasive blood pressure, electrocardiogram, and pulse oximeter were placed. The anesthetic plan for the patient...
was general anesthesia with a subarachnoid block with morphine for postoperative analgesia. The patient had stable vital signs, and the INR had normalized, giving us sufficient time to perform the subarachnoid block. The patient was placed in the left lateral decubitus position, and the subarachnoid injection was given in the L3-L4 space using a 23-gauge Quincke needle. Clear cerebrospinal fluid (CSF) flow was obtained after 1 attempt, and 300 µg of preservative-free morphine was given.

Anesthesia was induced with fentanyl (100 µg), propofol (100 mg), and atracurium (25 mg). Anesthesia was maintained with oxygen, air, and desflurane. The surgery was done with the patient in the supine position. The patient’s vital signs remained stable during the procedure. The patient was extubated uneventfully at the end of surgery.

On the second postoperative day, it was noticed that the patient had bilateral foot drop (Figure). The patient denied any history of preexisting neurologic deficit. Neurologic examination findings revealed decreased sensations in the L4, L5, and S1 dermatomes. Motor examination findings showed decreased power (1/5) in the bilateral lower limbs on dorsiflexion with absent deep tendon reflexes. No sensory or motor deficit was found in either upper limb. Contrast-enhanced computed tomography (CT) of the spine was done, and results were found to be normal.

The neurologist made a diagnosis of drug-induced neuropathy by history and clinical findings. A nerve conduction study (NCS) of median, ulnar, peroneal, and tibial nerves was obtained to confirm the diagnosis. The NCS results showed motor defects in the left ulnar and bilateral peroneal nerves and sensory deficits in the bilateral median, ulnar, and sural nerves (Table). Thus, a diagnosis of vincristine-induced mixed sensory and motor neuropathy was made on the basis of these findings. The patient was put under regular neurologic follow-up care and was discharged with splints supporting both feet.

Discussion

We are reporting a rare case of vincristine-induced neuropathy presenting with neurologic deficit in the postoperative period after subarachnoid anesthesia. To the best of our knowledge, there are no reports of neurologic complications due to previous neurotoxic chemotherapy reported in the immediate postoperative period. Nerve injuries in the perioperative period not only cause functional disability to the patient but also can lead to litigation for the medical personnel. Examination of an American Society of Anesthesiologists closed claims survey showed that 15% of all claims were related to perioperative nerve injury.5 Perioperative nerve damage is often underreported and may be dismissed, especially after oncologic surgeries because it may appear minor to the treating physician compared with the primary disease. Also, perioperative neurologic deficits may be mistaken as self-limiting lesions with spontaneous recovery.6

Nerve lesions following surgery and anesthesia have been documented in the literature due to various causes.5,6 Some factors may predispose a patient to nerve damage; these include any preexisting peripheral neuropathy and systemic factors such as hypovolemia, hypotension, dehydration, hypoxia, electrolyte disturbances, and hypothermia.6 Incorrect patient positioning during surgical procedures, direct needle trauma due to regional anesthesia techniques, thermal insults from diathermy, and mechanical compression due to prolonged use of tourniquets may cause nerve damage in the perioperative period.6,7

Patients undergoing oncologic surgeries or those with a history of cancer chemotherapy for other surgical procedures may be particularly vulnerable because of preoperative exposure to neurotoxic chemotherapeutic agents. Commonly used chemotherapeutic drugs such as platinum analogs (cisplatin, oxaliplatin) cause predominantly sensory neuropathies, vinca alkaloids (vincristine, vinblastine) cause mixed sensory motor neuropathy, and taxanes (paclitaxel, docetaxel) cause predominantly distal symmetrical sensory neuropathy.3,4,8

In our case, neurologic deficits developed on the second postoperative day, despite an atraumatic first-pass clear CSF flow with no paresthesia being reported by the patient during the block. Initially it was thought that needle trauma or spinal hematoma was the cause, but a contrast-enhanced CT scan of the spine was found to have normal...
results. Moreover, if the injury were due to spinal anesthesia, the NCS findings would be normal in the upper limbs and even in the lower limbs it would take some time to show abnormal results. The surgery was done with the patient in the supine position, and intraoperatively no hypoxia or hypotension was seen and there was minimal blood loss. There was no history of postoperative fever, neck rigidity, or vomiting. Therefore, a diagnosis of spinal cord ischemia, chemical or irritant meningitis, or patient position–related nerve injury was ruled out.

The patient had received vincristine-based chemotherapy for his malignancy but had no history of neurologic deficit preoperatively. Considering the possibility of vincristine-induced peripheral neuropathy, it was decided to obtain an NCS. The NCS results showed a mixed sensorimotor deficit in both the upper and lower limbs on the second postoperative day, which itself was highly suggestive of a possible diagnosis of vincristine-induced nerve damage.

Vincristine is a vinca alkaloid with a wide range of uses in lymphoid malignancies, Wilms tumor, Ewing sarcoma, neuroblastoma, and other cancers. A dose-limiting factor in vincristine use is neurotoxicity. Old age, preexisting neurologic deficit, and a history of hereditary neuropathies are risk factors for development of vincristine-induced neuropathy. Vincristine-induced neurotoxicity most commonly presents as mixed sensorimotor neuropathy of distal variety. Features of toxicity may appear immediately following treatment and may persist after cessation of therapy. Symptoms may vary from sensory deficit to motor, autonomic, and cranial nerve involvement. Both small and large nerve fibers are affected, nerve involvement is symmetrical, and lower limbs are affected more severely compared with upper limbs. Vincristine disrupts tubules and myelin, affects the calcium metabolism, activates the immune system, and causes inflammation of neurons. This leads to remodeling of peripheral neurons and loss of large myelinated fibers.

The earliest symptoms are paresthesias manifesting as tingling and numbness in the toes and fingers. These may progress to motor involvement presenting as muscle weakness and impairment of deep tendon reflexes. Motor weakness usually involves extensors of the hands and dorsiflexors of the feet, thus presenting as wrist drop and foot drop, respectively. Severe motor neuropathy may lead to muscle wasting and formation of contractures in hands and feet.

Routine assessment of vincristine-induced peripheral neuropathy is often skipped in busy clinical settings and emergency surgical situations. Our patient had no symptoms of nerve damage in the preoperative period. The perioperative neurologic injury is multifactorial and may be due to multiple contributing factors such as anesthesia, surgery, positioning, and central or peripheral nerve block. It is difficult to pinpoint that the neurologic deficit in our patient occurred because of preexisting chemotherapy-induced neuropathy only. The possibility

<table>
<thead>
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<th>Site</th>
<th>Latency, ms</th>
<th>Amplitude, mV</th>
<th>Velocity, m/s</th>
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<tr>
<td><strong>Motor NCS</strong></td>
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<td></td>
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<tr>
<td>L Median: APB, wrist</td>
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<td>1.5</td>
<td>40</td>
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<td>5.26</td>
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<tr>
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<td>NR</td>
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<td>Right</td>
<td>NR</td>
<td>NR</td>
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<tr>
<td>Peroneal: EDB</td>
<td>NR</td>
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<td>NR</td>
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<tr>
<td><strong>Sensory NCS</strong></td>
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<tr>
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<td>NR</td>
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<tr>
<td>Sural: ankle (calf)</td>
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Table. Motor and Sensory Nerve Conduction Study (NCS) Report
Abbreviations: ADM, abductor digiti minimi; AH, abductor hallucis; APB, abductor pollicis brevis; EDB, extensor digitorum brevis; NR, no response.
of a preexisting subclinical vincristine-induced neuropathy that worsened in the postoperative period cannot be ruled out. Objective tests for nerve function should be routine rather than the exception in the preoperative visit to exclude subclinical neuropathy, which may be missed in the preoperative period.

**Conclusion**

In patients who have received chemotherapy, the features of nerve damage may be missed by subjective assessment and reliance on patient history alone. Objective neurologic assessment studies such as a nerve conduction study should be done in every patient with a history of receiving neurotoxic chemotherapy, to diagnose and document any preexisting neurologic deficit and avoid any medicolegal issues. Even if the patient shows no deficits preoperatively, a close watch on neurologic function should be kept in the postoperative period, to detect and treat any new-onset deficit in a patient exposed to neurotoxic chemotherapy.

**REFERENCES**


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**DISCLOSURES**

The authors have declared no financial relationships with any commercial entity related to the content of this article. The authors did not discuss off-label use within the article.