Case Report
Paravertebral Cervical Nerve Block in a Patient Suffering from a Pancoast Tumor

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Abstract
In patients with aggressive tumors resistant to conventional pain treatment, regional anaesthesia frequently becomes an alternative therapy. Cervical paravertebral nerve block among several access options to the brachial plexus is barely ever used. We present a case with severe shoulder and upper extremity pain owing to an expanding Pancoast tumor exhibiting compression upon the brachial plexus. Continuous intrathecal morphine infusion and adjuvant treatment was not sufficient to render the patient pain-free. With the addition of paravertebral nerve blockade the patient’s pain improved substantially, however without impacting his longevity.

Key Words. Brachial Plexus Injury; Paravertebral Cervical Nerve Block; Cancer Pain; Pancoast Tumor

Introduction
The posterior approach to the brachial plexus was first described in 1912. Thereafter, Pippa [1] reintroduced this approach in clinical practice in about 1990. The technique described was easy to perform and effective. However, it never really gained popularity. Posterior neck pain after this technique could be a reason.

A modification of the classical approach has been recently described. In this modified technique, penetration through the posterior extensor muscles of the neck is avoided, thereby reducing posterior neck pain. A continuous infusion catheter is placed while the nerves are stimulated through both the needle and the catheter.

A 44-year-old male suffering from a lung tumor resistant to conventional oral and/or intrathecal pain treatment commonly used in cancer patients came to our chronic pain department.

The patient underwent partial upper right lung lobectomy and mediastinal lymph node metastasis excision in October of 2004, owing to extensive infiltration of a lung adenocarcinoma. Surgery included first to third left rib resection and partial fourth to seventh cervical vertebral body resection. An implantation of Harrington rods due to bone infiltration became necessary. The postoperative tumor rating was stage IIIB. Following surgery, the patient underwent radiotherapy and chemotherapy. In 2005, a local recurrence was diagnosed and treated again with chemotherapy.

A year later, the patient was re-evaluated in our Chronic Pain Department, presenting with mixed nociceptive and neuropathic pain. When asked, he reported nine out of 10 on a verbal analog scale (VAS). He reported allodynia, burning, itch, aching, and tingling pain in his right shoulder, arm, and hand. He further reported a score of 26 on Leeds Assessment of Neuropathic Pain Symptoms and Signs. He described a continuous paraesthesia radiating to the right shoulder and right upper arm. The pain worsened in the upright position and became better supine. His pain treatment consisted of gabapentine 3 g/day, diclofenac retard 100 mg/day, dexamethasone 8 mg/day, pregabalin 150 mg/day, oral morphine sulfate 400 mg/day and
transmucosal fentanyl 1,200 μg/day as rescue medication. Still, the pain increased over time.

In January of 2006, a chest CT and abdominal scan revealed a mass in the upper right rib cage. Images showed a 5-cm mass in the right supraclavicular and lateral neck area with infiltration of the brachial plexus. Cervical paravertebral muscles, sixth and seventh cervical vertebral bodies and transverse process were also affected (Figure 1). CT abdominal scans revealed pancreatic and retroperitoneal metastases.

A surgical palliative intervention was considered not feasible. Alternatively, a palliative radiotherapy as part of a multidisciplinary treatment was taken into consideration, again not feasible, as the patient had already experienced a maximum radiation dose since the initial diagnosis. We opted for an intrathecal drug administration. An intrathecal 0.5 mg morphine test dose showed no adverse effects during twenty four hours. A lumbar intrathecal catheter was implanted and advanced to the cervical level under fluoroscopy [2]. By means of an intrathecal port (Celsius®, Braun), morphine and bupivacaine were continuously delivered at 2 mg and 2.5 mg/24 hours, respectively. The continuous intrathecal infusion rate was 2 mL/24 hours.

Forty-four hours later the patient still suffered from moderate to severe pain (VAS 8–9). Neuropathic pain was still predominant, with burning sensations, itch, aching, and tingling as the leading symptoms. We thought a regional analgesia technique to be more efficacious for treatment of this neuropathic component. Eventually, a cervical paravertebral nerve blockade at vertebra 6/7 was performed. With this approach, damage to the posterior extensor muscles was avoided (Figure 2). A catheter was inserted under sterile conditions. To ensure proper final catheter placement, continuous nerve stimulation (Plexygon, Nerve Stimulator, Vygon®) through both the needle and the catheter was performed (Multiplex Catheter, Vygon®). Motor responses of the biceps were obtained at 0.5 mA. Final catheter position was confirmed under fluoroscopy by means of contrast medium (Iopamid D, Isovue-M®, Figures 3 and 4). Levobupivacaine 12.5 mg was administered as bolus doses according to need. The combined intrathecal morphine/bupivacaine in conjunction with paravertebral levobupivacaine substantially improved the patient’s pain (VAS 3–5, Figures 4–5). This analgesic treatment was continued for approximately 7–8 weeks until the patient died. No side effects or catheter-related complications such as dislodgement, leakage, or inflammation at the entry site were observed. The patient’s out-of-hospital care was shared with the oncology department, a general practitioner, and a home nursing service. Beside our chronic pain management and a psychological support, no further supervision became necessary.

**Discussion**

The present report describes a case of severe cancer pain. Neuropathic symptoms prevailed and resisted to conventional oral and intrathecal pain treatment. Ensuing
Deafferentiation mechanisms might be explained by the overall poor pain control in this cancer patient.

Deafferentiation pain denotes a type of pain that results from complete or partial interruption of afferent nerve impulses caused by lesions of either the central or peripheral nervous system. Patients with deafferentation pain usually display varying degrees of sensory loss characterized by disturbances in pain and temperature sensation. Many patients also experience abnormal sensory phenomena such as allodynia, hyperalgesia, dysesthesias, and hyperpathia.

Ziconotide therapy is an option to treat refractory chronic pain. It is considered appropriate for management of severe neuropathic pain in patients intolerant or refractory to other treatments, such as systemic analgesics or intrathecal morphine. However, we refrained from using it. The present patient’s life expectancy and difficulties in obtaining the drug ziconotide were taken into consideration. Eventually, we decided that a regional technique could be an option in this case.

The posterior approach to the brachial plexus was initially described by Pippa [1]. The patient is placed in an upright position with the head bent forward. A short-bevelled needle attached to a nerve stimulator is introduced 3 cm lateral to the midline at the level of the spinous processes of C6/C7, then advanced perpendicular to the skin in a sagittal plane until triceps muscle contractions could be elicited at a depth of 6 cm. A catheter was then inserted through the needle and its proper position confirmed by injection of contrast medium. This posterior approach...
avoids the lateral region of the neck where damage to various vascular and neural structures could occur.

Interscalene brachial plexus block could be an alternative approach in shoulder pain. No comparative studies have yet been performed between a paravertebral and interscalene approach but motor function appears to be less affected with the latter approach [3].

Continuous cervical paravertebral block has previously been criticized for causing pain at the catheter or needle entry site. Boezaart [3] recently addressed this issue suggesting a modified access to the paravertebral space. The needle is entered between the anterolateral border of the trapezius muscle and the posteromedial border of the levator scapulae muscle. This way, the extensor muscles of the neck are avoided. The needle is then directed toward the suprasternal notch. The patient described in Boezaart’s report had no pain on needle and catheter insertion. Naja et al. [4] have studied failure rates and complications following thoracic and lumbar paravertebral blocks in adults and children. Failures only occurred in adults (6.1%). Complications in adults consisted of inadvertent vascular puncture (6.8%); hypotension (4.0%); hematoma (2.4%); pain at site of skin puncture (1.3%); signs of epidural or intrathecal spread (1.0%); pleural puncture (0.8%); pneumothorax (0.5%). As previously mentioned, a major advantage of posterior paravertebral brachial plexus blockade is avoidance of inadvertent vascular injection and inadvertent epidural blockade.

In a cancer patient resistant to conventional pain therapy, we performed a cervical paravertebral block as a court of last resort. We thereby minimized pain at the needle entry point, reduced upper extremity motor block as well as vascular and neural damage risk. This analgesic regimen was used for several weeks until the patient’s death. It rendered his final stage more comfortable and no adverse effects occurred.

References