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Localizing the Pain: Continuous Paravertebral Nerve Blockade in a Patient with Acute Pancreatitis

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Patient: Female, 41-year-old
Final Diagnosis: Pancreatitis
Symptoms: Abdominal pain • nausea • vomiting
Medication: —
Clinical Procedure: —
Specialty: Anesthesiology

Objective: Unusual or unexpected effect of treatment

Background: Acute pancreatitis is the leading gastrointestinal cause of hospitalization in the United States. The associated pain, for which opioids are commonly prescribed, can result in complications of respiratory dysfunction secondary to impaired abdominal wall movement. Paravertebral nerve blockade has shown substantial efficacy in treatment of abdominal and thoracic pain, but its utility for pancreatitis pain and role in reducing hospital length of stay and narcotic use has not been well studied.

Case Report: A 41-year-old woman with longstanding history of recurrent pancreatitis controlled with celiac plexus blocks and oxycodone was admitted for severe left upper quadrant abdominal pain. The patient was admitted, made NPO, and started on IV morphine. She underwent a left-sided T12-L1 paravertebral single shot injection and catheter placement, and experienced immediate relief. A Marcaine infusion was continued for 3 days and the patient required no additional narcotics while the catheter was in place. On hospital day 6, the catheter was removed and the patient was discharged.

Conclusions: Our case illustrates the successful use of continuous thoracic paravertebral nerve blockade in a patient with pancreatitis. This intervention resulted in a significant reduction in narcotic requirements. As the number of hospitalizations and mean cost for acute pancreatitis has increased over the years despite an in-house mortality decrease, targeting cost reduction via length of stay reductions is key. Optimizing pain management in these patients is one way in which we can reduce LOS and thereby cost. We believe paravertebral nerve blockade is a viable analgesic option worth exploring in this patient population.

Keywords: Acute Pain • Nerve Block • Pancreatitis

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/934189

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Background

Acute pancreatitis (AP) is the leading gastrointestinal cause of hospitalization in the United States, with a reported annual incidence of 40 to 50 per 100 000 people. [1] Along with fluid resuscitation and nutritional support, treatment consists of management of pain, which can be severe and result in complications of respiratory dysfunction secondary to impaired abdominal wall movement [2]. Opioids are commonly prescribed for this purpose. Despite this longstanding relationship, deleterious effects have been associated with their use, including an increased risk of acute pancreatitis attacks [3,4]. To reduce such effects, several alternatives have been successfully utilized for analgesia in AP. For inpatient treatment, thoracic epidural analgesia has been shown to improve pancreatic perfusion and exert an anti-inflammatory effect [5]. A study on 1003 ICU patients with severe acute pancreatitis showed reduced mortality at 30 days in 46 patients who received epidural analgesia versus systemic therapy [6]. Celiac plexus blocks have also been used in acute and chronic pancreatitis, with mixed results [7,8]. In regional anesthesia, paravertebral nerve blockade has shown substantial efficacy in treatment of abdominal and thoracic pain [9], but its utility for acute pancreatitis-related pain and specified role in reducing hospital length of stay and narcotic use has not been well studied. In 1948, the paravertebral nerve block was theorized as having a therapeutic role in AP [10]. Additionally, there is 1 case report describing the successful use of the erector spinae plane (ESP) block for AP pain in the ED [11]. In addition to somatic analgesia, an ESP block is thought to offer visceral analgesia via sympathetic blockade, and its success is partially attributed to incidental spreading of local anesthetic into the paravertebral space [12]. One may hypothesize then that a paravertebral block would carry a higher success rate for coverage of sympathetic-mediated pain. The following case illustrates the use of continuous thoracic paravertebral nerve blockade as part of a multimodal treatment strategy for a patient with acute pancreatitis.

Case Report

A 41-year-old obese woman with history of recurrent pancreatitis was admitted for a 3-day history of severe left upper quadrant abdominal pain. She had a longstanding history of acute pancreatitis with related hospital admissions, but reported the pain had been well controlled for a year with intermittent celiac plexus blocks and 5 mg of oxycodone twice daily. Recently, she stopped receiving the blocks as her insurance no longer offered coverage, and the pain subsequently returned. The patient was admitted for management of acute pancreatitis, made NPO, and started on 4 mg IV morphine every 4 h. The patient endorsed mild improvement with this regimen. On hospital day 3, the anesthesia pain service was consulted for the patient's persistent abdominal pain despite IV analgesia. On hospital day 4, she underwent a left-sided T12 paravertebral single shot injection with 0.5% Marcaine with epinephrine and catheter placement. The patient experienced immediate relief, reporting a reduction of pain from 10 to 0. A thoracolumbar XR confirmed placement of the catheter at the T12-L1 interspace. Infusion of 0.125% Marcaine was continued for 3 days and the patient required no additional narcotics while the catheter was in place. Moreover, as the patient's abdominal pain subsided she was able to tolerate enteral nutrition following block placement. On hospital day 6, the catheter was removed and the patient was discharged on the same day.

Discussion

The use of paravertebral nerve blockade resulted in a significant reduction in narcotic requirements. In comparison to epidural analgesia, paravertebral catheter use can offer potential benefits, including less risk of hypotension [13], which is particularly important in severe acute pancreatitis. It may be preferred in patients with hemodynamic lability, pre-existing neurological disease, or challenging thoracic spine anatomy. It may also confer less risk and resource utilization than use of a celiac plexus block for the inpatient setting [7]. While the erector spinae block, similar to a paravertebral block, is theorized to block the ventral and dorsal rami of the spinal nerves and the rami communicantes, which transmit sympathetic fibers [14], the paravertebral block resulted in immediate 0/10 pain in our patient, who required no opioids during catheter infusion. This appears to be superior to the ESP block performed in the case report described above, in which opioid administration was still required after block placement. Since local anesthetic spread during an ESP block is dependent on indirect spread from the erector spinae plane, cadaveric studies have shown inconsistent spread to both the ventral rami and paravertebral space [14]. This would be the likely explanation in cases where desired analgesia is not achieved with an ESP block.

Since its use cannot predictably ensure all local anesthetic enters the paravertebral space [12], an ESP block's success rate for visceral sources of pain may be variable. It should be noted that an ESP block has successfully been used to treat visceral pain [15]. Therefore, the superiority of a paravertebral nerve block is likely more pronounced in cases of multifactorial pain, in patients with low pain thresholds, and in patients with a history of opioid dependence, as was the case with our patient.

There are a few discussion points in regards to location of catheter placement and ideal duration. Although the paravertebral catheter was placed at T12-L1, the level of the celiac plexus, it seems the spread of local anesthetic was sufficient to cover the lower thoracoabdominal nerves, which would explain

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why the patient experienced relief despite the catheter being placed low relative to the origin of these nerves. This is consistent with reports of multisegmental longitudinal spread found with paravertebral blockade, including 1 case report showing 8-thoracic segment spread after Iopamidol injection [16]. Moreover, a study of 28 patients found that injections made in the more ventral part of the thoracic paravertebral space anterior to the endothoracic fascia versus dorsal using nerve-stimulator guided technique resulted in more multisegment spread [17]. This suggests precision of placement in the paravertebral space makes a significant difference in ensuring local anesthetic spread and thereby predictable analgesia.

The optimal duration of indwelling catheter placement is unclear. Long-term use of PVB catheters have been reported, including a 1-year period for persistent mastodynia [18]. Similarly, post-herpatic neuralgia was successfully treated with 3 weeks of intermittent injections via a thoracic PVB catheter with no complications reported, and no pain at 8-months follow-up [19]. Long-term catheter placement has some limitations, including slight infection risk, catheter migration, and need for patient oversight [20], but is an option worth exploring.

From a public health perspective, the innovation and creativity inherent to implementing regional methods into the acute pain setting play a large role in mitigating the propagation of opioid dependency in the U.S. [21]. Developing alternative strategies like this one is integral to this process. One limitation of this case report is the impact of the paravertebral block on length of stay (LOS). Our patient's LOS was longer than the average for a patient with mild pancreatitis (6 vs 4.7 days) [22], although this was likely confounded by other variables, including that significant pain relief was not achieved until after catheter placement on hospital day 3. The patient also had severe anxiety, which required inpatient psychiatry consultation. As the number of hospitalizations and mean cost for acute pancreatitis has increased over the years despite an in-house mortality decrease [23], targeting cost reduction via LOS reductions is crucial. Optimizing pain management in these patients is one way in which we can reduce LOS and thereby hospital costs, as it facilitates early return to enteral nutrition (<48 h), a factor that has been associated with earlier discharge [24].

Conclusions

Our case illustrates the successful use of continuous thoracic paravertebral nerve blockade in a patient with pancreatitis-induced pain. Specifically, it demonstrates the role of paravertebral nerve blockade in even the most challenging of patients, in this case one with long-term opioid dependency. We believe paravertebral nerve blockade could be an effective analgesic option worth exploring in this patient population. It represents an opportunity for further research on comparison with current treatment modalities and the subsequent impact on patient outcomes.

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