CASE REPORT

The Philippine General Hospital's First Fluoroscopy-guided Retrocrural Celiac Plexus Block as an Alternative to Surgical Management in a Patient with Intractable Pain from Chronic Pancreatitis: A Case Report

Karmi Margaret G. Marcial, MD and Angelo Miguel M. Realina, MD

Division of Pain Medicine, Department of Anesthesiology, Philippine General Hospital, University of the Philippines Manila

ABSTRACT

Intractable pain from chronic pancreatitis is commonly challenging to manage medically. Due to debilitating abdominal pain, quality of life of patients is usually poor. These patients require high doses of strong opioids and even surgical intervention. This paper reports the safe performance of fluoroscopy-guided retrocrural celiac plexus block in a 26-year-old male with chronic pancreatitis. This treatment modality spared him from undergoing total pancreatectomy and the subsequent need for postoperative lifetime insulin and enzyme replacement therapy.

Keywords: celiac plexus, sympathetic nerve block, chronic pancreatitis, pain, fluoroscopy

INTRODUCTION

Chronic pancreatitis is a persistent inflammatory condition of the pancreas marked by irreversible morphologic alterations. This condition often induces pain and/or chronic loss of function.[1] Inadequate pain control affects patient's mood and overall quality of life and leads to poor clinical outcomes, such as increased mortality.[2] Globally, the incidence of chronic pancreatitis ranges from 5 to 12 per 100,000 population. In 20% of patients, it is often severe leading to high morbidity and mortality.[3]

Chronic pancreatitis is a serious health issue that can significantly impact the patients' quality of life and survival. It is significantly associated with work absences, disability, and depression.[4] Chronic abdominal pain is the most prevalent symptom of chronic pancreatitis, affecting up to 80% of patients.[5] Currently, available treatment methods include medical management, interventional procedures, and biopsychosocial therapy. Opioid medication is commonly used to alleviate the discomfort of chronic pancreatitis; however, it might have undesirable side effects. Moreover, pain is frequently refractory to opioids, resulting in dose escalation and opioid-related adverse effects.[6] Thus, interventional pain management includes celiac plexus block (CPB) as part of a multimodal approach to managing pain.

To the authors' knowledge, the commonly employed interventional approaches to target celiac plexus done at Philippine General Hospital (PGH) to date are: 1) through endoscopic-ultrasound guidance and 2) during open surgery.

Corresponding author: Karmi Margaret G. Marcial, MD
Division of Pain Medicine
Department of Anesthesiology
Philippine General Hospital
University of the Philippines Manila
Taft Avenue, Ermita, Manila 1000, Philippines
Email: kgmarcial@up.edu.ph

A fluoroscopy-guided celiac plexus block is another option for delivering therapeutic solution effectively to the target site using a percutaneous approach.

The case presented is the first documented fluoroscopy-guided retrocrural celiac plexus block in PGH. We did not find any other official account of this procedure prior to this publication. This patient with intractable abdominal pain from chronic pancreatitis experienced life-changing pain control that spared him the imminent surgery and the subsequent life-long treatments required thereafter.

CASE PRESENTATION

This is a case of a 26-year-old single male with chronic pancreatitis who had numerous hospital consults over the past 5 years in search of adequate pain control. The patient's pain started after a blunt abdominal trauma in the past inflicted by his uncle. Since then, he had recurring abdominal pain and eventually was diagnosed with pancreatitis. He used to be a heavy alcohol beverage drinker but denied history of any substance misuse. Due to pain, he largely lost appetite and had significant weight loss (weight 58 kg, BMI 19.7). Karnofsky performance status score was 50% (requires help often, requires frequent medical care). Several pain medications in different institutions have been tried in the past with no success, hence, he was referred to our institution.

Upon admission, he presented with continuous, dull, boring pain in the epigastric region radiating to the back. He was comfortable only in fetal position. On abdominal examination, there was tenderness in the epigastric area. Serum amylase (198 units/L, 1.8 times normal) and serum lipase (1515 units/L, 5 times normal) levels were significantly elevated. Abdominal CT scan with pancreatic protocol revealed focal thickening and heterogeneity of the pancreatic tail (measuring 3.6 cm). Surrounding fat stranding was noted. Prominent (short-axis 0.8 cm) rounded lymph nodes are seen in the peripancreatic region. There are calcifications and sub-centimeter non-enhancing hypodense foci scattered throughout the rest of the pancreas.

He was started on medical management and scheduled for total pancreatectomy. Upon referral to Pain Management Service, pharmacological optimization was done by initiating patient controlled analgesia (PCA) with intravenous fentanyl. Titration was done and acceptable analgesia with minimal side effects were achieved with the following PCA settings: Basal rate 100 mcg/hr, Bolus dose 50 mcg/demand, Lockout 10 minutes and Maximum of 4 boluses per hour. However, despite the background hourly dose, he still had frequent episodes of breakthrough pain requiring about 40 to 50 PCA rescues per day. With an opioid requirement of 290 mcg/hour, the patient reported to be more comfortable and he was finally able to lie down supine and get some sleep.

Psychological counseling was offered considering the chronically decreased quality of life and possible ill effects on his mental health. He had a good sense of humor and family support. He mentioned that he may be amenable in the future, but felt that he can manage without psychological intervention. Consequently, due to personal reasons, he opted to delay the surgery. At that point, fluoroscopy-guided celiac plexus block was offered to him as an alternative to surgery for pain control.

On the day of the procedure, his pain score was Numerical Rating Scale (NRS) 4-6/10 while on Fentanyl IV PCA with an opioid requirement of 290 mcg/hour. Standard NPO guidelines were observed. Baseline vital signs were taken BP 180/100, HR: 134, RR: 20 and Oxygen saturation: 97% at room air.

The patient was placed in a prone position with a pillow beneath the abdomen and hips to reduce lumbar lordosis. Standard monitors were applied and minimal sedation was initiated with midazolam and fentanyl. Head, legs, and feet were padded. The back was prepared and draped in standard sterile fashion. T12 vertebral body was initially identified under fluoroscopic guidance. The C-arm was adjusted caudally by 10-15 degrees and obliquely by 20-30 degrees.

The insertion site was identified and initial subcutaneous infiltration with lidocaine 1% was done at the entry point. Then, a 22-gauge, 7-inch Quincke spinal needle was advanced carefully and slowly in the coaxial plane to the caudal margin of the 12th rib (Figure 1). During needle advancement, no blood or air was obtained from constant aspiration. A lateral view was used to guide depth adjustment correlating to the anterior one-third of the T12 vertebral body (Figure 2 and Figure 3A).

Correct needle tip position was confirmed with an injection of 0.5 mL of contrast dye visualized under live fluoroscopy (Figure 3B). A similar procedure was done for the contralateral side using a second needle. AP view confirmed contrast spread within the contours of the spinal column (Figure 4). No vascular uptake was appreciated.

A total of 8 mL of 0.25% bupivacaine with 20 mg methylprednisolone were administered through each needle after negative aspiration (Figure 5). Needles were withdrawn and injection sites were covered with sterile dressing.

After the procedure, the patient was able to comfortably lie down supine and was brought to the recovery area with stable vital signs. No complications such as back pain, bleeding and paraplegia were noted. There was only slight decrease in blood pressure (170/100). Pain score decreased by more than 50% after the procedure with a range of NRS 0-2/10.

Fentanyl IV PCA was initially decreased with a basal rate of 25 mcg/hour and a bolus dose of 25 mcg/demand. Titration was done in the interim based on his total PCA fentanyl requirements. Four days after the intervention, there was ~80% decrease compared to his preprocedural total daily requirement. He was discharged on fentanyl transdermal patch.

Six weeks post-procedure, the patient had a face-to-face follow-up in our Pain Clinic with his wife. He reported minimal to no pain even after discontinuing the patch on

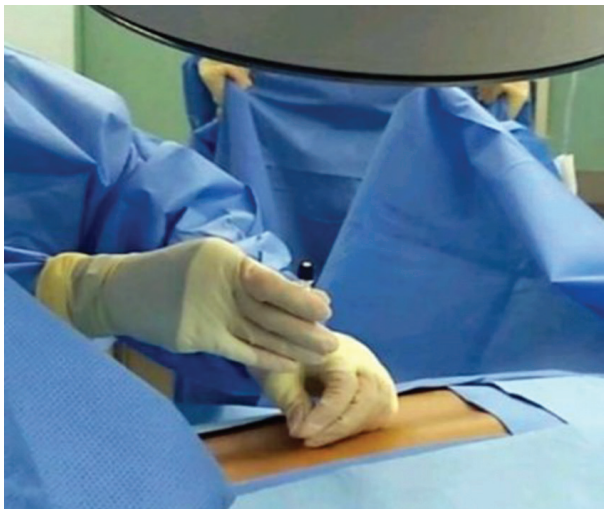

Figure 1. A 22-gauge, 7-inch spinal needle was advanced carefully and slowly under C-arm guidance.

Figure 2. Lateral position of the C-arm. Lateral view was used to guide depth adjustment.

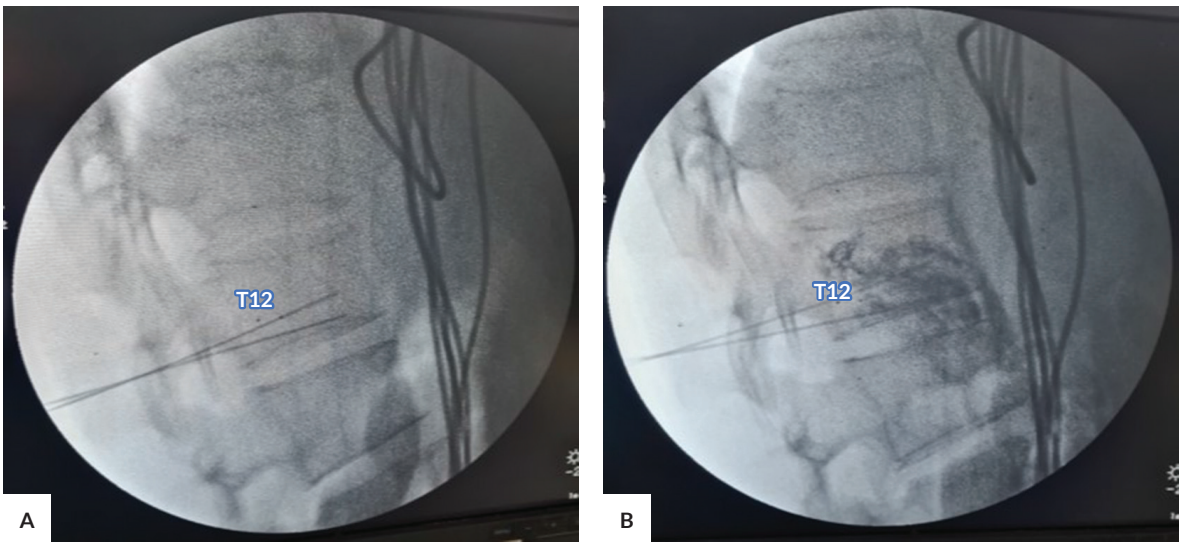

Figure 3. (A) Fluoroscopic images (in lateral view) showing location of needle tip at the anterior 1/3 of T12 vertebral body. **(B)** Subsequent spread of contrast dye at the anterior 1/3 of T12 vertebral body.

his own. He was advised about appropriate down titration until he can eventually discontinue the use of the fentanyl patch. Karnofsky score improved to 100%. He reported to have regained hope which allayed all his anxieties. He went back to working as a mechanic and was able to enjoy married life. His gastroenterologist informed him that if the pain recurs, a repeat block, rather than a surgical intervention will be considered.

DISCUSSION

Chronic pancreatitis is associated with functional abnormalities that arise due to glandular fibrosis and atrophy as a result of acute and chronic inflammation. Complications from disease progression are usually irreversible. Unfortunately, there are no medical therapies that can stop or reverse disease progression, therefore management focuses on early detection and treatment of complications.[1]

Chronic abdominal pain is the most prevalent symptom of chronic pancreatitis, affecting up to 80% of patients. The pain is typically described as epigastric and radiating to the back. This symptom can be debilitating and is closely linked to a lower quality of life, especially when the pain is persistent. Intriguingly, the pattern of morphologic alterations does not correlate with pain patterns, highlighting the complexity of pain in chronic pancreatitis. The source of abdominal pain is parenchymal ischemia resulting from acinar cell damage or pancreatic duct obstruction. Local ischemia produces

inflammation, which in turn causes peripancreatic nerves to experience nociceptive stimulation. Even with intermittent stimuli, repeated stimulation can cause irreversible alterations in the spinal cord and cerebral cortex. This remodeling explains why some patients continue to experience pain despite the elimination of the noxious stimulus like after total pancreatectomy.[7]

Medical therapies, such as nonsteroidal anti-inflammatory drugs and opioids, as well as interventional and biopsychosocial treatments, are currently available. Opioid therapy is typically used to treat chronic abdominal pain caused by chronic pancreatitis; however, its use can be limited by unwanted side effects. In addition, the patient expressed financial limitation to sustain the cost of opioid treatment with fentanyl (intravenous or via high-dose patches). Furthermore, opioid tolerance may make pain refractory even with opioid rotation. Hence, interventional techniques like image-guided celiac plexus block and neurolysis are used as part of a multimodal approach to manage pain.[8]

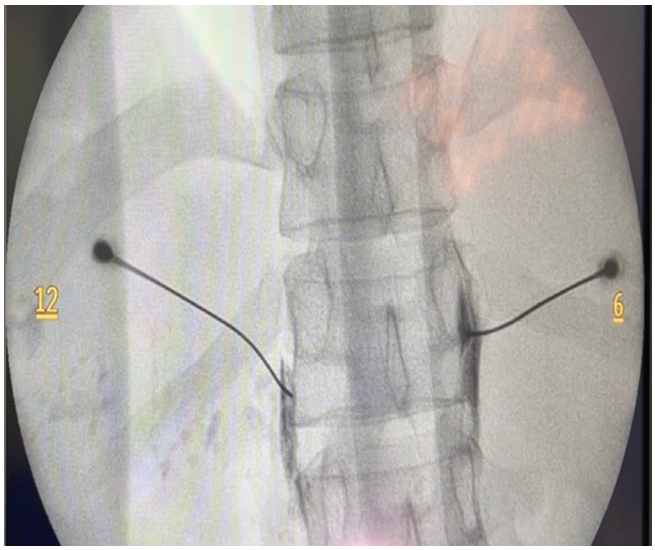

Figure 4. Anteroposterior view confirmed contrast spread.

Figure 5. Administration of 8 mL solution (0.25% bupivacaine + 20 mg methylprednisolone) on each side.

The celiac plexus is a network of nerve fibers that runs from the anterolateral surface of the aorta to the epigastrium, crus of the diaphragm, and posterior to the stomach and pancreas, deep in the retroperitoneal fat. Based on reports from CT evaluations of 200 consecutive patients, the most common locations of the plexus are at the levels of T11/12 (6.5%), T12 (34%), and T12/L1 (31%), and L1 (28.5%).[9] Hence, the target for the performed procedure was the anterior third of the T12 vertebral body to deliver medication to the retrocrural space. The celiac plexus block focuses on visceral afferent pain fibers from the liver, gallbladder, pancreas and digestive tract, starting with the stomach and ending in the mid-transverse colon. The celiac plexus represents the key target point of pain transmission to the upper abdominal organs; therefore, nerve block or neurolysis is an effective method in controlling pain from these organs.

The percutaneous celiac plexus block approach was initially reported by M. Kappis and colleagues in 1914. Since then, numerous procedures for accessing the celiac plexus have been developed, including posterior para-aortic, anterior para-aortic, posterior transaortic, trans-intervertebral disc, and endoscopic approaches. Interestingly, they are conducted under CT, ultrasonographic, fluoroscopic, or magnetic resonance imaging (MRI)-based imaging, with higher success rates and fewer errors.[9] Among the different radiographic guidance, CT-guided approach permits imaging of tissues close to the celiac ganglia and may reduce the probability of accidental needle insertion; however, it does not conveniently permit live contrast injection. In contrast to fluoroscopy, the injection of 1-2 mL of radiographic contrast would highlight a layer on the anterior-lateral surface of the T12 vertebral body into which the steroid and local anesthetic can be injected. When comparing the various approaches, fluoroscopy-guided celiac plexus block is less expensive and easier to perform than CT-guided and endoscopic-guided celiac plexus block.[10]

To our knowledge, the most commonly used approach in PGH to date is the endoscopic-guided celiac plexus block. With the endoscopic-guided approach, the drug tends to be distributed on the left side only while in the percutaneous approach, drug can be administered from both sides.[11] Another usual, but more invasive way of targeting the celiac plexus for pain control is through direct administration of neurolytic solution on the plexus during open surgery. Aside from the risk of hormonal and enzymatic replacement therapy required after the operation, patient opted not to

undergo a more extensive open surgery and postoperative course due to personal reasons.

Among the various posterior percutaneous techniques performed under fluoroscopic guidance, the retrocrural technique is the safest. Lerman and colleagues recommend this approach to be the sole choice if fluoroscopy is the only imaging modality used. Retrocrural approach limits transgression of the needle into soft-tissue structures which are not readily visible under x-ray guidance.[12] After determination of correct needle tip position, the injectate becomes concentrated anterior to the T12 vertebral body and posterior aspect of the aorta. The solution bathes the retroaortic celiac plexus fibers and then diffuses cephalad to reach the splanchnic nerves. With adequate volume diffusing caudad through the aortic hiatus, the injectate further bathes the nerves around the aorta. As the technique does not include piercing through the diaphragm or the aorta itself with the aid of fluoroscopic guidance, the retrocrural approach gives reduced risk for pneumothorax, abdominal organ trauma, and aortic injury.[13] Hence, the retrocrural approach was done for our patient.

The procedure performed was a therapeutic block. The use of local anesthesia with steroids is therapeutic as it interrupts the pain signals and the further progression of sensitization. Neurolysis will offer the same effect but with theoretically longer duration until the nerves regenerate. In some instances, neurolysis may not be indicated anymore when the former block/s had provided adequate relief and pain management goals have been achieved.

When doing a retrocrural celiac plexus block, 40mg of methylprednisolone and 10-15 mL of 0.25% isobaric bupivacaine are used (5-8 mL per side). The dose should be administered in 5 mL or less increments, with frequent aspirations to make sure the needle has not gone into the intravascular space.[10] On the other hand, the use of 0.5 mL dye was adequate to localize the position of the tip of the first needle and made it easy to still visualize the tip of the second needle using lateral x-ray view. Minimal use of dye will also prevent dilution of the therapeutic solution.

CONCLUSION

Our case report is the first to demonstrate the effectiveness of fluoroscopy-guided retrocrural celiac plexus block to manage intractable chronic pancreatitis pain in PGH. The patient was spared from undergoing pancreatectomy, thereby alleviating need for lifetime insulin and pancreatic enzyme replacement therapy. This interventional pain procedure serves as a viable option in improving pain control and overall quality of life for chronic pancreatitis patients.

Informed Consent

The patient provided verbal and written consent for this case report publication.

Statement of Authorship

Dr. Marcial contributed to the conceptualization, initial editing, final editing and approval of this version for publication. Dr. Realina contributed to the conceptualization, drafting, editing, and acquisition of photographs.

Author Disclosure

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REFERENCES

1. Kamisawa T, Shimosegawa T. Definition and classification of chronic pancreatitis. Pancreas. 2010 Jul; 39(5): 701.
2. Cornman-Homonoff J, Holzwanger DJ, Lee KS, Madoff DC, Li D. Celiac plexus block and neurolysis in the management of chronic upper abdominal pain. Semin Intervent Radiol. 2017 Dec;34(4):376-386. doi: 10.1055/s-0037-1608861.
3. Ouyang G, Pan G, Liu Q, Wu Y, Liu Z, Lu W, et al. The global, regional, and national burden of pancreatitis in 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. BMC Med. 2020 Dec 10;18(1):388. doi: 10.1186/s12916-020-01859-5.
4. Machicado JD, Amann ST, Anderson MA, Abberbock J, Sherman S, Conwell DL, et al. Quality of life in chronic pancreatitis is determined by constant pain, disability/unemployment, current smoking, and associated co-Morbidities. Am J Gastroenterol. 2017 Apr;112(4):633-642. doi: 10.1038/ajg.2017.42.
5. Hart PA, Conwell DL. Chronic pancreatitis: managing a difficult disease. Am J Gastroenterol. 2020 Jan;115(1):49-55. doi: 10.14309/ajg.0000000000000421.
6. Urits I, Jones MR, Orhurhu V, Peck J, Corrigan D, Hubble A, et al. A comprehensive review of the celiac plexus block for the management of chronic abdominal pain. Curr Pain Headache Rep. 2020 Jun 11;24(8):42. doi: 10.1007/s11916-020-00878-4.
7. Bouwense SAW, de Vries M, Schreuder LTW, Olesen SS, Frøkjær JB, Drewes AM, et al. Systematic mechanism-orientated approach to chronic pancreatitis pain. World J Gastroenterol. 2015 Jan 7;21(1):47-59. doi: 10.3748/wjg.v21.i1.47.
8. Rana MV, Candido KD, Raja O, Knezevic NN. Celiac plexus block in the management of chronic abdominal pain. Curr Pain Headache Rep. 2014 Feb;18(2):394. doi: 10.1007/s11916-013-0394-z.
9. Yang IY, Oraee S, Viejo C, Stern H. Computed tomography celiac trunk topography relating to celiac plexus block. Reg Anesth Pain Med. 2011 Jan-Feb;36(1):21-5. doi: 10.1097/AAP.0b013e318203067f.
10. Vorenkamp KE, Dahle NA. Diagnostic celiac plexus block and outcome with neurolysis. Techniques in Regional Anesthesia and Pain Management, 2011 Jan; 15(1):28–32. doi:10.1053/j.trap.2011.03.001
11. Yoon WJ, Oh Y, Yoo C, Jang S, Cho S-S, Suh J-H, et al. EUS-Guided Versus Percutaneous Celiac Neurolysis for the Management of Intractable Pain Due to Unresectable Pancreatic Cancer: A Randomized Clinical Trial. J Clin Med. 2020 Jun; 9(6):1666. doi: 10.3390/jcm9061666.
12. Narouze SN. Celiac Plexus Blockade and Neurolysis: Computed Tomography. Multimodality Imaging Guidance in Interventional Pain Management. 2016 Oct; 34(1):420-425.
13. Kamdar MM, Edwards DA, Thabet AM, Volney SJ, Rathmell JP et al. A Novel Modified Retrocrural Approach for Celiac Plexus Block, The Single Needle Retroaortic technique. Reg Anesth Pain Med; 2015 Sep-Oct; 40(5):610-5. doi: 10.1097/AAP.0000000000000290.