

# CT-guided Coeliac Plexus Neurolysis for Refractory Pain in Pancreatic Disorders: A Ten-patient Case Series

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## ABSTRACT

Coeliac Plexus Neurolysis (CPN) is a useful interventional technique for managing intractable upper abdominal pain, particularly in patients with chronic pancreatitis and pancreatic cancer. Hereby, the authors present a case series that emphasises the clinical effectiveness of CT-guided CPN in ten patients suffering from severe abdominal pain secondary to either pancreatic cancer or pancreatitis who were unresponsive to conventional analgesics. All patients received a bilateral paravertebral approach to CPN with CT guidance, involving 3-5 mL of 0.25% bupivacaine followed by 13 mL of 60% alcohol for neurolysis. Pain relief was quantified using the Numerical Rating Scale (NRS) at 24 and 48 hours, one week, one month, and even two years, while Quality of Life (QOL) was measured using the Short Form (SF)-12 health survey. All patients experienced significant pain relief within 48 hours following the procedure. Among the four patients available for long-term follow-up, three (75%) experienced sustained pain relief, with NRS scores remaining below 3.0 over a three-month period. These patients also demonstrated improved functional status, including the ability to perform daily activities independently, and a reduction in opioid use by an average of 60% compared to baseline. The SF-12 survey conducted among the four patients revealed mean scores above 50, indicating better physical and mental health status. The procedure was well-tolerated, with no major complications such as hypotension, neurological deficits, or infections reported. Although a small number of patients were lost to follow-up, this case series provides evidence that CT-guided CPN is a safe and effective intervention for both immediate and prolonged relief of chronic upper abdominal pain.

**Keywords:** Analgesia, Chronic pain, Computed tomography, Opioid, Pancreatic neoplasm, Pancreatitis

## INTRODUCTION

The coeliac plexus is the largest visceral autonomic plexus in the human body. It is located anterolateral to the aorta at the T12-L1 vertebra level, in proximity to the origin of the coeliac artery. This plexus of sympathetic and parasympathetic nerves innervates all of the upper abdominal viscera, including the stomach, pancreas, liver, gallbladder, adrenal glands, kidneys, spleen, and segments of the small and large intestines [1,2].

Coeliac Plexus Neurolysis (CPN) is an interventional pain technique designed to inhibit nociceptive transmission from the upper abdominal viscera. Real-time imaging allows for precise needle placement, clear identification of anatomical landmarks, and visualisation of contrast and neurolytic agent spread. Neurolysis is achieved using chemical agents such as absolute alcohol or phenol, which irreversibly damage sympathetic fibers and facilitate prolonged pain relief [3,4].

Intractable abdominal pain is a prevalent and debilitating symptom associated with disorders like chronic pancreatitis and pancreatic cancer. Managing such pain often becomes challenging due to its chronicity, opioid tolerance, and the side effects of analgesics. Patients typically experience considerable physical and emotional distress, loss of appetite, disturbed sleep, and diminished quality of life. Even with extensive analgesic use, pain reduction may be inadequate. Interventional methods like CPN represent a more targeted and effective choice for both diagnostic and therapeutic purposes [5,6].

The present case series describes the application of CT-guided CPN in 10 patients with refractory upper abdominal pain caused by chronic pancreatitis or pancreatic carcinoma. The present series aimed to highlight the utility of CT-guided CPN as an effective component of the multimodal treatment for upper abdominal pain.

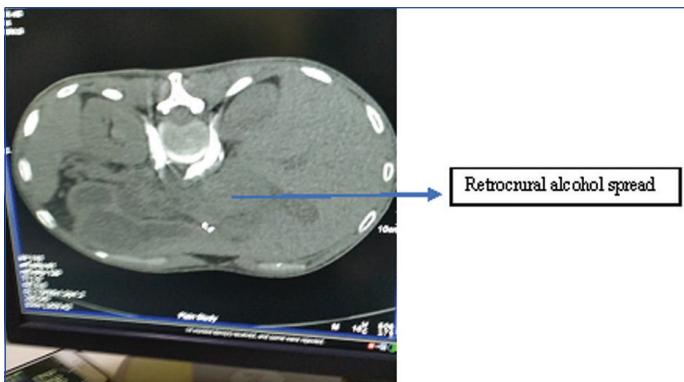
## CASE SERIES

Ten patients with either pancreatic carcinoma or chronic pancreatitis, who presented with intractable pain in the upper abdomen, underwent CT-guided Coeliac Plexus Neurolysis (CPN) after a pre-procedure evaluation. Following six hours of Nil Per Os (NPO), CPN was conducted while monitoring cardiorespiratory parameters using electrocardiography, pulse oximetry, and non invasive blood pressure measurements. The patients were placed in a prone position within the CT suite, and supplemental oxygen was administered.

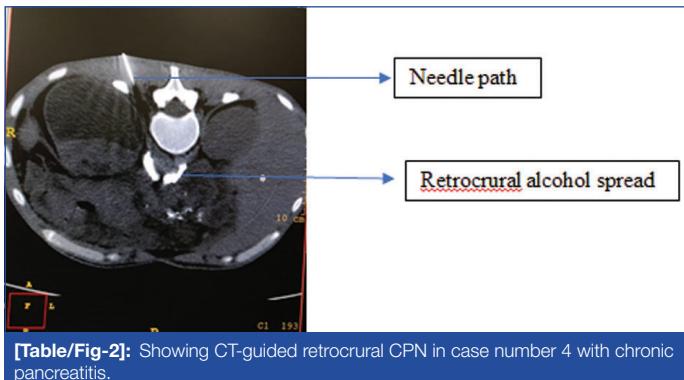
Preprocedure planning involved reviewing images to ascertain the best needle path and injection site. Under CT guidance, the coeliac plexus was located at the L1 vertebral body level, adjacent to the origin of the coeliac artery. A 22G spinal needle was introduced bilaterally via the posterior paravertebral approach into the retrocrural space. After confirming the position of the needle through a contrast injection of 1 mL of Iohexol, 3-5 mL of 0.25% bupivacaine was injected for diagnostic blockade.

After five minutes and reconfirmation of proper positioning, 13 mL of 60% alcohol was injected bilaterally for neurolysis to facilitate better distribution. Alcohol spread was observed through serial CT imaging to confirm sufficient dispersion [Table/Fig-1,2]. Post-procedure, patients were monitored for vital signs, pain relief, and possible complications. Vital parameters included blood pressure, heart rate, respiratory rate, and oxygen saturation, which were closely monitored immediately after the procedure. Particular attention was given to detecting signs of autonomic changes, such as hypotension and bradycardia, which are known transient effects of CPN due to sympathetic blockade.

The SF-12 survey conducted among the four patients who returned after two years revealed mean scores above 50, indicating an improved physical and mental health status [1]. Pain relief was quantified using the Numerical Rating Scale (NRS) at 24 and 48



**[Table/Fig-1]:** Showing CT-guided retrocrural CPN in case number 1 with carcinoma pancreas.



**[Table/Fig-2]:** Showing CT-guided retrocrural CPN in case number 4 with chronic pancreatitis.

hours, one week, one month, and even two years. The patient profile and NRS data are documented in [Table/Fig-3].

Pain from the viscera of abdominal organs is chiefly referred by the splanchnic nerves to the coeliac plexus. Hence, it is an important site for blocking nociceptive pathways in diseases such as pancreatic cancer and chronic pancreatitis, where the pain is characteristically deep, persistent, and unresponsive to opioids or other standard analgesics [7,8]. Coeliac Plexus Neurolysis (CPN) with neurolysis involves the delivery of local anaesthetic or neurolytic medication to interrupt sympathetic fibers. CPN in patients with pancreatic malignancy is especially effective because the pain is predominantly visceral and sympathetically mediated.

In addition to pain reduction, CPN also decreases opioid use, thereby reducing opioid-related side effects such as constipation, sedation, and nausea [2,9]. In present series, a CT-guided posterior paravertebral approach was employed for accurate needle placement and real-time verification of the needle's course and drug distribution. Following a diagnostic dose, 60% alcohol was injected bilaterally to achieve neurolysis. CT imaging also facilitates the detection of anatomical variations, prevents vascular injuries, and reduces procedural complications.

The near-simultaneous onset of analgesia in present series can be attributed to the precision of this targeted treatment. Furthermore, in chronic pancreatitis, where central sensitisation is potentially involved, early CPN may limit the progression of pain chronicity and opioid dependence [10]. Weinstein D et al., noted similar pain relief in a patient with pancreatic cancer [11]. The limitations of present series include the small number of cases and loss of follow-up for many patients, particularly those with advanced malignancies, which is a common issue in palliative care settings. The rapid onset of pain relief and improved long-term outcomes in patients confirm the value of this intervention.

Case No.	Age (in years/gender)	Diagnosis	Preprocedure NRS	NRS @ 24 hr	NRS @ 48 hr	NRS @ 1 week	NRS @ 1 month	NRS @ 1-2 years	Outcome	SF-12 Mean score
1	45/M	Carcinoma pancreas	9	2	1	-	-	-	Dropped out post-discharge	
2	55/M	Chronic pancreatitis	8	2	1	-	-	-	Deceased	
3	38/M	Carcinoma pancreas	9	1	2	1	1	-	Dropped out post-discharge	
4	32/M	Chronic pancreatitis	8	2	2	1	1	0	Stable at 2 years; no analgesics needed	More than 50
5	45/M	Chronic pancreatitis	8	2	2	2	2	2	Improved QOL, moderate activity resumed	More than 50
6	46/M	Carcinoma pancreas	9	2	1	-	-	-	Dropped out post-discharge	
7	23/F	Chronic pancreatitis	7	1	1	1	1	1	Stable at 1 year; minimal pain	More than 50
8	82/M	Carcinoma pancreas	10	2	1	1	-	-	Dropped out post-discharge	
9	48/M	Chronic pancreatitis	9	2	1	1	1	1	Stable at 1 year; improved stamina	More than 50
10	55/F	Carcinoma pancreas	10	2	2	2	-	-	Dropped out post-discharge	

**[Table/Fig-3]:** Patient profile and NRS.

## DISCUSSION

The present case series describes the utility of CT-guided CPN in providing pain relief for patients with intractable upper abdominal pain resulting from chronic pancreatitis and pancreatic cancer. All patients reported significant pain relief immediately following the procedure. Of the four patients available for long-term follow-up, pain relief was substantial, with them experiencing near-total relief and considerable improvement in functional status and QOL. The procedure was well tolerated, with no significant complications reported.

## CONCLUSION(S)

Computed tomography-guided CPN is an effective and safe method for controlling intractable upper abdominal pain, especially in patients with chronic pancreatitis and pancreatic cancer. It induces both immediate and long-term pain relief, reduces the consumption of opioid analgesics, and enhances QOL. Although further investigation with larger groups and a prospective design is needed, the present case series reaffirms the position of CPN as a mainstay in the multidisciplinary treatment of chronic abdominal pain.

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