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Outcome and Evaluation of Celiac Plexus Block (CPB) Enhancement Level of Well-Being in Patient's Pancreatic Cancer Pain: Study on Tertiary Hospital in Bangladesh

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Abstract **Original Research Article**

Background: Malignant pancreatic cancer has a high death rate, and it is difficult to treat because of the excruciating agony it causes. Opioids and adjuvants are commonly used to alleviate severe stomach pain. ***Objectives:*** CPB is a type of neural therapy treatment. Limited and inconsistent research has been done on the impact of QoL on patients. We hoped to find a solution to this problem with this investigation. ***Materials and Methods:*** Multicenter non-randomized quasi-experimental prospective study has been conducted in Rajshahi Medical College Hospital and tertiary care Hospital Rajshahi, Bangladesh. From January 2019 until July 2021.We studied a total of 16 patients with severe abdominal pain who had failed to react to combination systemic analgesic treatment or who had adverse effects that made it impossible to continue with the current dosage. A 35-day follow-up study looked at the effectiveness of CPB as a palliative analgesic. The VAS questionnaire was used to see if pain intensity could be altered as a primary result. The SF-36 questionnaire enhanced QoL secondary outcomes. We closely monitored the pain medications for any undesirable side effects. ***Results:*** Patients' VAS pain scores dropped significantly (P=0.002) after CPB, and their need for opiates dropped as well. When the extent of the impact is taken into consideration, their QoL scores also increased (P<0.001). During the research period, no side effects associated with CPB were found. There were also no negative medication responses. ***Conclusion:*** Our findings provide early evidence that CPB may be beneficial in individuals with advanced pancreatic cancer who are also receiving conventional pain medication. CPB appears to enhance QoL in these individuals at least 5 weeks after the Intervention, according to this research.

Keywords: Pancreatic Cancer, Cancer Pain, Celiac Plexus Block, Rajshahi Medical College Hospital.

INTRODUCTION

The illness is growing increasingly frequent and is now among the top five main causes of death from cancer in those countries. Pancreatic cancer is becoming more common worldwide; It affects males more frequently than women (2:1), and is more common in individuals aged 55–75, smokers, and those who drink heavily on a daily basis. Aggregation in families, genetics, and obesity are other causative variables. It's estimated that just [1] percent of patients survive long enough to be considered survivors [2, 3].Weight loss, epigastric or upper stomach discomfort, icterus, pruritus, and anorexia are frequently the first signs to appear. 73% of patients already have stomach discomfort before they are diagnosed [4]. There aren't many choices for treating the excruciating discomfort that comes with advanced pancreatic cancer.

Pathogenesis of tumor pain

It is not uncommon for patients with pancreatic cancer to have band-like pain in the epigastrium that radiates to the back. Its origin is murky, although it might be caused by an obstruction in the pancreatic duct, increased parenchymal pressure, or a combination of these three factors all working together in concert. The neuropathic pain associated with cancer cell infiltration of the nerves and perineal invasion is the most significant mechanism at the nociception level, accounting for 70% - 90% of the total. Transduction, transmission, modulation, and perception are all parts of the pain neural processing chain [5]. When a person has chronic pain, it might lead to central pain syndrome [6].

Celiac plexus neurolysis

With regard to invasive pain treatment, CPN is the most effective option for those with pancreatic cancer [7]. In 1914, Kappis presented the results of a percutaneous method for blocking the splanchnic nerve and the celiac plexus [8]. Although the study has undergone a number of technical changes, it is still considered the "gold standard" [9]. In the early stages of cancer, a plexus block using local anesthetics is helpful, but only for a limited time. Neurolysis has a success rate of about 80% and can reduce pain for weeks or months at a time [10]. For example, CPN can be done via laparotomy, thoracoscopy, or a variety of percutaneous techniques, including: an anterior or posterior paraspinal approach, an intradiscal approach, a retrocrural and transcrural approach, a single-needle placement technique, and a bilateral needle placement technique. 33–36 Fluoroscopy, ultrasonography, or computed tomography are just a few of the imaging methods that may be utilized to conduct these procedures precisely [11,12].

Table-1: Treatment of cancer-related pain

Pain intensity				
	1. Step	**2. Step**	**3. Step**	**4. Step**
VAS	1–3 Mild pain	4–6 Moderate pain	7–10 Severe pain	7–10 Severe pain
Medications	No opioid analgesics: paracetamol, NSAID-s, salicylate, selective cOX-2 inhibitors	Drugs from first step + mild opioids: codeine, hydro codeine, tramadol	Drugs from second step +strong opioids: morphine, hydromorphone, fentanyl, oxycodone, pethidine	Drugs from third step + neurolysis, nerve block, spinal cord stimulations, implanted opioid pumps, radiofrequency lesioning, cryotherapy
	Adjuvant medications (antidepressants, anticonvulsants, antispasmodics, corticosteroids, local anesthetics antiemetic's)	Adjuvant medications (antidepressants, anticonvulsants, antispasmodics, corticosteroids, local anesthetics antiemetic's)	Adjuvant medications (antidepressants, anticonvulsants, antispasmodics, corticosteroids, local anesthetics antiemetic's)	Adjuvant medications (antidepressants, anticonvulsants, antispasmodics, corticosteroids, local anesthetics antiemetic's)

OBJECTIVES

Complications are less common when CPB is performed using the retrocrural method [13, 14] A few studies have used the retrocrural method, but they are few and far between [15,16]. Because of this, we sought to determine if retrocrural CPB provided analgesic benefit in patients with relapsed pancreatic cancer by tracking changes in analgesic drug usage, effective pain management, and treatment-related adverse effects Because the impact of CPB on patient QoL is still debatable [17,18]. We set out to address it in this study.

MATERIALS AND METHODS

Selection of patients

If a patient with pancreatic cancer came to our pain clinic and satisfied the following inclusion criteria, they were included in the research.

INCLUSION CRITERIA

- Finding out you have a dangerous kind of pancreatic cancer;
- For the preceding two weeks, a high-dose combination of pain medications (opioids and NSAIDs) had been taken, or there was a contraindication to increasing the dose because of adverse drug responses.
- Pain intensity of 7 or more on VAS;
- The patient was able to comprehend and consent to the procedure that was explained to him.

EXCLUSION CRITERIA

- Oral anticoagulant treatment for a coagulation problem.
- Neural treatment is not recommended in the following conditions:

Evaluation and Outcomes

Primary outcomes

- A VAS was used to gauge the patient's level of pain before and 35 days after the intervention was carried out. VAS is a simple way to measure the severity of pain, ranging from 0 (no feeling of pain) to 10 (very painful) (maximum perceived pain). There is no objective way to measure therapy success; nevertheless, a comparison of numerical data before and after treatment does [19].
- Patients' analgesic drug use was tracked throughout the research, including kind, dose form, and route of administration.

Secondary outcomes

The SF-36 questionnaire was used to gauge participants' overall well-being. The SF-36 is a well-known and widely used quality-of-life questionnaire that was developed in Hungary and is now used across the world [20]. Individuals completed the questionnaire twice, once before therapy and once after 35 days. In general, the survey takes around 20 minutes to administer, and patients can complete it on their own with little or no help from an interviewer. Results from the "after" therapy were compared to those from the "before" treatment. Patients' responses were shown in eight different ways, with a 0–100 scale for each dimension. A person's vitality, physically functioning, emotional functioning, social functioning, and mental health are all accounted for in the vigor scale. More points in each area equals a healthier response for the respondent [21].

Side effects and complications

Complications and side effects were closely observed.

Perioperative preparations

When required, patients' conditions were examined and adjusted before the intervention (such as electrolyte and fluid balance and coagulation parameters). Professional advice led to the invasive procedure being carried out. There was no iodinated contrast agent and peripheral intravenous cannulation was utilized. After the procedure, patients were monitored for one hour in a surgical step-down unit.

Procedure

The doctors and patients were in constant communication during the operation. Blood pressure, heart rate, and oxygen saturation were all tracked. Patients were positioned supine on the surgical table. A horizontal line was drawn on both sides across the midline of the L1 vertebral body and down to the inferior border of the 12th rib in all instances, and retrocrural penetration was carried out. On both sides, a line was drawn from the spinous processes of Th12 to these. 7.5 cm laterally to the midline right behind the 12th set of ribs, these lines come together and form an entrance point. The anesthetized regions are punctured bilaterally with 22 gauges, 13–15 cm stilted needles. To "walk off" the lateral side of the L1 vertebral body, the needle is placed medially at 45 degrees from the midline. When the aortic pulses are felt, the left-side needle is slowly lowered 2–4 cm deeper into the aorta. The needle on the right is placed 2–3 cm deeper, past the L1 vertebral body's point of contact. The inferior vena cava may be seen running from the needle to the right side of the body.

Finally, the needles' tips should be near the aorta's anterolateral margins. Injecting 2–2 mL of contrast material bilaterally and observing its spread on radiographs takes around 20 minutes. Confusion can be minimized on the fluoroscopic anteroposterior view by using contrast material that stays near the Th12-L1 vertebral body. In the lateral view, a smooth posterior contour is visible in front of the vertebral body. It was then decided whether or not aspirates were coming out of the needles, and then 5mL of 1 percent lidocaine was injected into each side. The neurolysis was carried out with 20–20 mL of 70% ethyl alcohol if it didn't cause degeneration or spinal block [22] Figure 1 shows the results of the intervention [23].

Pain relief treatment CPB by our team

RESULTS

We used CPB on 16 people with pancreatic cancer. Before and throughout the research period, no participants were excluded or dropped.

Baseline characteristics

The research participants were split evenly between men and women, with a mean age of 57 years for the males and 66 years for the women. Table 2 depicts the comorbidities in further detail.

Primary outcomes

- The analgesic ladder had them at step three five days before the trial began. Each patient was prescribed a high dose of main opioid analgesics as well as adjuvant analgesics and was on them continuously. Due to intolerable side effects, increasing the analgesic dosage was not an option. According to the WHO, intrusive pain treatment is the next analgesic step. In comparison to the pretreatment period, pain intensity reduced considerably after treatment (Wilcoxon's test $P<0.001$; effect size: 0.632 and chi squared test: $P<0.001$; Figure 2), according to VAS.
- After NCPB, patients were still need to use oral analgesics, although the doses were lower than they had been before. No patients required a dose increase even though morphine was replaced by dihydrocodeine and opioids could not be omitted due of metastatic pain. However, each patient's prior requirement for pain medication was reduced, either in strength (morphine could be withdrawn and replaced by dihydrocodeine) (Table 3).

Secondary outcomes

After applying Bonferroni–Holmes correction to Wilcoxon's test results, it was discovered that in five of the eight aspects measured by the SF-36 questionnaire, pain reduction had improved considerably ($P<0.05$) (Table 4 and Figure 3). With the median impact sizes, all but three dimensions rose considerably.

Side effects and complications

Researchers found less adverse effects with retrocrural CPB than other methods of doing CPB. A frequent side effect is pain that results from the intervention [24, 25]. Only a short-term local discomfort at the injection site of alcohol was seen

during our research with the minimally invasive therapy. All patients experienced a brief decrease in blood pressure following neurolysis that resolved within 5–10 minutes. This ratio was less than 10% of the baseline value and had no effect on the subject's state of mind. Spontaneous or intravenous fluid delivery usually helped to get blood pressure back to normal; in a few cases, 5 mg of ephedrine hydrochloridum did the trick. There were no cases of diarrhea 13,16] post bleeding, neurological symptoms, acute stomach symptoms, or any other serious side effects or problems as described in the literature.

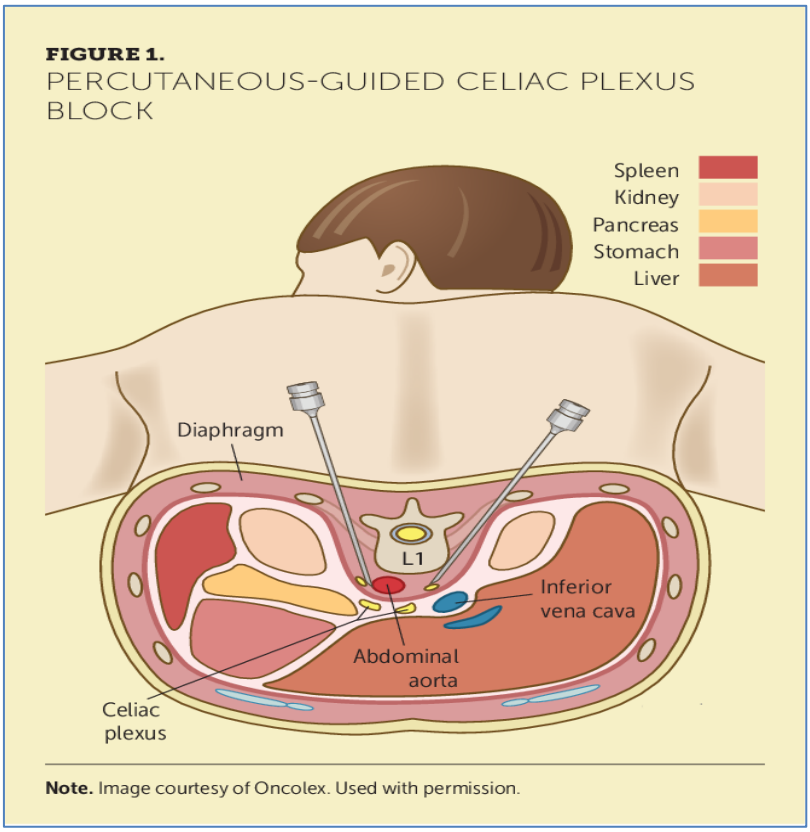

Fig-1: Anatomy of percutaneous retrocrural neurolytics celiac plexus block.

Table-2: Comorbidities of treated patients

Gender/ number of patients	Age (years), rounded mean and range	SD	Comorbidities							
			CHD	PAD	HTN	DM (type 1)	cHL	Obesity	Smoking	Depression
Male/5	57 (45–81)	15.2	1	4	4	0	4	1	4	1
Female/11	66 (38–86)	13.4	5	0	7	1	2	2	7	4

Note: Obesity, BMi = 30–39.9 kg/m^2.

Abbreviations: chD, coronary heart disease; chl, combined hyperlipidemia; DM, diabetes mellitus; hTn, hypertension; PaD, peripheral artery disease.

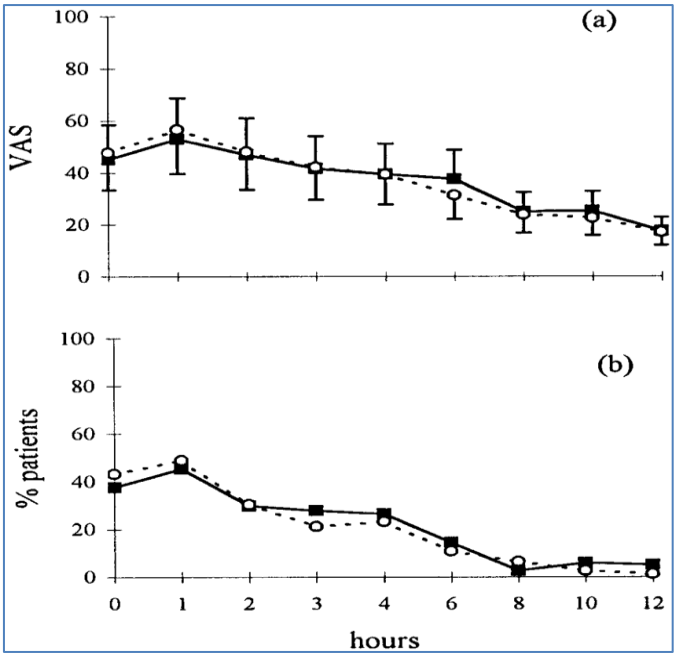

Fig-2: Pain intensity on Vas scale before and after treatment

Table-3: Oral and transdermal analgesic medication of the patients with daily oral morphine equivalent dose (DOMeD)

Analgesic	N (%)patients before CPB	N (%) patients after CPB
2x 500 mg acetylsalicylic acid tab.	10 (62.5)	10 (62.5)
3x 500 mg acetaminophen (paracetamol) tab.	6 (37.5)	6 (37.5)
2x 100 mg (4 x 50 mg) tramadol tab. (DOMeD= 20–80 mg morphine tab.)	0	13 (81.25)
2x 60 mg oxycodone hcl tab. (DOMeD= 180–360 mg morphine tab.)	4 (25)	3 (18.75)
100 µg/h fentanyl transdermal patch system (DOMeD = 720–1,000 mg morphine tab.)	12 (75)	0

Abbreviations: CPB, percutaneous retrocrural neurolytics celiac plexus block; tab., tablet.

Table-4: sF-36 dimensions before and after treatment by all 16 patients

SF-36 dimensions	Effect size	Two-sided probability	Median	Mean	SD	25th percentage	75th percentage
FP-1	0.604	*P*=0.001[a]	22.500	27.187	21.132	13.75	36.25
FP-2			42.500	48.438	20.143	37.5	70.0
RP-1	0.364	*P*=0.039	0.000	0.000	0.000	0	0
RP-2			0.000	12.500	22.361	0	25.0
BP-1	0.629	*P*=0.001[a]	0.000	5.125	8.065	0	12.0
BP-2			43.000	43.313	13.001	34.0	45.25
gh-1	0.289	*P*=0.102	10.000	9.688	9.031	3.75	11.25
gh-2			10.000	10.750	10.847	3.75	12.5
VT-1	0.502	*P*=0.005[a]	12.500	15.625	12.500	7.5	30.0
VT-2			30.000	28.125	19.847	10.0	41.25
sF-1	0.629	*P*=0.001[a]	0.000	7.000	11.136	0	15.25
sF-2			50.000	46.813	14.721	43.75	50.0
Re-1	0.306	*P*=0.083	0.000	4.125	11.272	0	0
Re-2			0.000	10.313	15.621	0	33.0
Mh-1	0.544	*P*=0.002[a]	18.000	21.750	13.061	12.0	32.0
Mh-2			32.000	33.000	16.621	23.0	44.0

Note: 1 – Before therapy; 2 – after therapy. [a]Significant difference.

Abbreviations: BP, bodily pain; FP, physical functioning, physical health problems; gh, general health perceptions; Mh, mental health, emotional well-being; Re, emotional role functioning, emotional health problems; RP, physical role functioning; sF, social role functioning; sF-36, short Form-36; VT, vitality, energy/fatigue.

DISCUSSION

Main findings

1. For patients with severe pain, the research used systemic combination analgesic dosages that had not been increased because of the lack of bearable side effects, but the severity of the pain necessitated the use of stronger analgesics.
2. At a modest financial and material expense, a minimally invasive procedure was carried out in real-life outpatient conditions.
3. The effectiveness of the treatment was evaluated using tried-and-true techniques.
4. The decrease of pain and the enhancement of QoL might both be important effects.
5. After the intervention, the dosage of analgesic drugs (mainly morphine) may be decreased.
6. The patient had no additional problems, adverse effects, or hospitalization.

Interpretation and comparison with previously published work

Patients with pancreatic cancer have a relatively low life expectancy and suffer from excruciating pain that impairs their quality of life in the long run. In the treatment of chronic, refractory, and visceral celiac plexus related pain, the CPB is an effective palliative therapy[25, 26] When analgesic medicines don't work, this is the next step. Only a few studies have looked at the impact of CPB on patients' QoL, and the results are mixed [13, 27]. Preliminary findings from this trial suggest that CBP may be helpful in managing pain while also increasing quality of life, suggesting that CPB may be beneficial for patients with pain associated with advanced pancreatic cancer who is suffering.

CONCLUSION

Preliminary data and our clinical experience over the past two decades suggest that CPB may assist end-stage pancreatic cancer patients reduce pain and improve quality of life (QoL).

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