ORIGINAL ARTICLE

Opioid-Sparing Effect of Fluoroscopy-Guided Neurolytic Coeliac Plexus Block in Advanced Upper Abdominal Malignancy: A Prospective Comparative Study in Bangladesh

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Abstract

Background: Pain associated with advanced upper abdominal cancer is frequently intense, chronic, and difficult to manage. Although opioids remain the cornerstone of treatment, increasing dosages can produce drowsiness, nausea, constipation, and cognitive impairment, compromising patients' functional status and quality of life. Neurolytic coeliac plexus block disrupts visceral pain transmission, which may offer long-term analgesia while lowering opioid use and treatment-related side effects. However, comparable data is sparse in resource-constrained areas like Bangladesh.

Objective: To compare fluoroscopy-guided NCPB with conventional opioid-based therapy for pain relief, opioid consumption, quality of life and adverse events in adults with advanced upper abdominal malignancy.

Methods: This prospective observational comparative study was conducted at Bangladesh Medical University from July 2025 to June 2026. Thirty consecutively enrolled adults with confirmed advanced upper abdominal malignancies and moderate-to-severe pain (VAS e"5) were included. Based on clinical decision-making, 15 underwent fluoroscopy-guided bilateral NCPB with 50% alcohol, while 15 received conventional opioid therapy. VAS scores, opioid consumption in morphine milligram equivalents per day (MME/day), EORTC QLQ-C30 scores, and adverse events were assessed at baseline, Day 7, 1 month, and 3 months. Group differences and changes during follow-up were analysed, with $p<0.05$ considered statistically significant.

Results: Baseline characteristics were comparable between the groups. At 3 months, the NCPB group had significantly lower VAS scores (4.2 ± 1.5 vs 7.4 ± 1.6) and opioid consumption (38.00 ± 13.47 vs 101.67 ± 19.61 MME/day) than the conventional opioid group (both $p<0.001$). NCPB also produced greater improvement in EORTC QLQ-C30 functional and quality-of-life scores, with lower pain and fatigue scores (all $p<0.001$). Nausea/vomiting, constipation, and sedation were less frequent after NCPB, although procedure-related pain was more common.

Conclusion: Fluoroscopy-guided NCPB provided superior, sustained pain relief, marked opioid sparing and better quality of life than conventional opioid therapy, with a favourable safety profile.

Keywords: Neurolytic coeliac plexus block; Cancer pain; Upper abdominal malignancy; Opioid-sparing; Quality of life

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Introduction

Cancer is a leading cause of death worldwide, with nearly 20 million new cases and close to 10 million deaths estimated in 2022[1]. Upper

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abdominal malignancies—those arising from the pancreas, stomach, liver, biliary tract and gallbladder—are frequently detected at an advanced, unresectable stage, when cure is no longer attainable and symptom control becomes the principal goal of care[1]. Severe, unrelenting visceral pain is among the most disabling consequences of these tumours, produced by infiltration of the coeliac plexus and surrounding retroperitoneal structures, and it profoundly undermines patients' physical and emotional wellbeing[2].

Pain affects approximately half of all patients with cancer and up to two-thirds of those with advanced or metastatic disease[3,4]. Yet cancer pain remains widely undertreated, with roughly one-third of patients still receiving analgesia disproportionate to their pain intensity[5]. The World Health Organization analgesic ladder, with opioids at its core, is the mainstay of pharmacological treatment[6]. However, progressive opioid escalation is commonly accompanied by dose-limiting adverse effects—constipation, nausea, vomiting and sedation—that themselves diminish quality of life[7]. These difficulties are compounded in low- and middle-income settings such as Bangladesh, where regulatory and supply constraints restrict opioid access across much of Asia[8].

Neurolytic coeliac plexus block (NCPB) interrupts nociceptive transmission from the upper abdominal viscera by chemically ablating the coeliac plexus, providing a targeted, opioid-independent route to analgesia[9]. A quantitative meta-analysis and a landmark randomized trial demonstrated meaningful, durable pain relief with reduced opioid consumption after NCPB,[10,11] and a Cochrane review confirmed its analgesic benefit in pancreatic cancer[12].

Advances in imaging technology have substantially improved the technique of coeliac plexus block. The procedure can now be performed under endoscopic ultrasound, computed tomography, conventional ultrasound, or fluoroscopic guidance[13].

Nevertheless, the existing evidence derives predominantly from patients with pancreatic cancer in high-income countries, and much recent work has centred on endoscopic-ultrasound-guided techniques. Data on fluoroscopy-guided NCPB across the wider spectrum of upper abdominal malignancies—and on its opioid-sparing and quality-of-life impact in South Asian populations— remain scarce, with no comparative study reported from Bangladesh. In this study, NCPB denotes fluoroscopy-guided bilateral retrocrural chemical neurolysis with 50% alcohol, and moderate-to-severe pain a VAS score ≥5.

This prospective comparative study therefore aimed primarily to compare the change in VAS pain score from baseline to three months between fluoroscopy-guided NCPB and conventional opioid-based therapy in adults with advanced upper abdominal malignancy. The secondary objectives were to compare daily opioid consumption (morphine milligram equivalents), health-related quality of life (EORTC QLQ-C30), and treatment-related adverse events between the two groups.

Materials and Methods

This was a prospective observational comparative study conducted to compare pain relief following fluoroscopy-guided Neurolytic Coeliac Plexus Block with conventional opioid-based therapy among patients with upper abdominal malignancies. As this was an observational study, treatment was selected according to clinical assessment and discussion between the treating physician and the patient; no random allocation was performed.

The study was conducted at the Division of Pain Medicine and Regional Anaesthesia, Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangladesh Medical University, Shahbagh, Dhaka, Bangladesh. The study was conducted over one year, from July 2025 to June 2026. The study population comprised 30 adults with histologically or radiologically confirmed advanced upper abdominal malignancies and moderate-to-severe abdominal pain. Upper abdominal malignancies included cancers of the pancreas, stomach, liver, biliary tract, gallbladder, and related structures. Of the participants, 15 underwent fluoroscopy-guided neurolytic coeliac plexus block, while 15 received conventional opioid-based therapy.

Eligible patients who provided written informed consent were recruited consecutively until the required sample was obtained. Consecutive

recruitment was used to reduce avoidable selection bias. Participants were categorized into two groups according to the pain-management modality selected by the treating physician in consultation with the patient.

Group A—Conventional opioid therapy group: Patients receiving conventional opioid-based pain management.

Group B—NCPB group: Patients undergoing fluoroscopy-guided Neurolytic Coeliac Plexus Block.

Study Procedure

Patients with confirmed upper abdominal malignancies who attended the study centre with abdominal pain were screened for eligibility. Potential participants received an explanation of the study objectives, procedures, expected benefits, and possible risks in a language they understood. Written informed consent was obtained before enrolment.

Baseline information included age, sex, type and stage of malignancy, duration of pain, presence of metastasis, previous cancer treatment, comorbidities, baseline pain intensity, baseline opioid consumption, and baseline health-related quality of life measured with the EORTC QLQ-C30.

Participants were subsequently categorized into the conventional opioid therapy group or the NCPB group according to the treatment selected as part of routine clinical care.

Conventional opioid-based therapy

Participants in Group A received conventional analgesic treatment based on standard clinical practice and the World Health Organization analgesic ladder.

Opioid medication was selected and titrated according to pain severity, previous opioid exposure, clinical response, adverse effects, and the treating physician's judgment. Non-opioid analgesics and adjuvant analgesics were administered when clinically indicated.

Antiemetics, laxatives, and other supportive medications were provided when required. Opioid dose adjustment or opioid rotation was permitted when pain control was inadequate or adverse effects became clinically significant. All opioid doses were converted into morphine milligram equivalents per day to allow comparison between participants and treatment groups.

Participants in Group B underwent fluoroscopy-guided bilateral Neurolytic Coeliac Plexus Block under strict aseptic precautions.

Before the procedure, relevant clinical findings, coagulation status, allergies, medication history, and imaging findings were reviewed. Intravenous access was established, and baseline blood pressure, pulse rate, oxygen saturation, and other relevant physiological parameters were recorded. The patient was positioned according to the selected posterior approach. Under fluoroscopic guidance, two needles were advanced bilaterally at approximately the T12–L1 vertebral level toward the retrocrural region.

After satisfactory needle placement had been confirmed and aspiration was negative for blood or cerebrospinal fluid, 5 mL of 2% lignocaine was administered as a test dose. This was followed by the slow administration of 10 mL of 50% alcohol on each side for chemical neurolysis.

Patients were monitored for at least two hours following the procedure. Blood pressure, pulse rate, oxygen saturation, pain intensity, neurological status, and immediate complications were assessed during the observation period. Hypotension was managed using intravenous fluids and vasopressors when clinically necessary. Other adverse events were treated according to standard clinical protocols. Participants in the NCPB group continued to receive rescue analgesia when required. Their total daily opioid consumption was recorded throughout follow-up.

Follow-Up Assessments

Participants were assessed at baseline, Day 7, one month, and three months after treatment. At each assessment, pain intensity using the Visual Analog Scale, health-related quality of life, daily opioid consumption in morphine milligram equivalents, rescue analgesic use, opioid dose escalation, treatment-related adverse events, procedure-related complications, treatment crossover, withdrawal, and loss to follow-up were recorded.

Quality-of-Life Assessment

Health-related quality of life was assessed using the 30-item European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30), version 3.0, at baseline and each follow-up. The instrument includes a global health status/quality-of-life scale, five functional scales, three symptom scales, and six single-item symptom measures.

Scores were calculated according to the EORTC scoring manual and transformed to a 0–100 scale. Higher global health and functional scores indicate better health status or functioning, whereas higher symptom scores indicate greater symptom burden. The domains analysed were global health status/quality of life, physical functioning, emotional functioning, fatigue, and pain. Multi-item scale scores were calculated when at least half of the corresponding items were completed; otherwise, the score was treated as missing, without item-level imputation.

Outcome Measures

The primary outcome was change in Visual Analog Scale (VAS) pain score from baseline to Day 7, one month, and three months. Pain was rated from 0 (no pain) to 10 (worst imaginable pain), with a reduction of at least 2 points considered clinically significant.

Secondary outcomes included daily opioid consumption in morphine milligram equivalents, EORTC QLQ-C30 scores, sustained pain relief, opioid dose escalation, rescue analgesic use, NCPB-related complications, and opioid-related adverse effects.

Data Collection Procedure

After ethical approval and written informed consent had been obtained, baseline demographic and clinical information was recorded using the structured Case Record Form.

Pain intensity and health-related quality of life were measured using the Visual Analog Scale and the EORTC QLQ-C30, respectively, at baseline, Day 7, one month, and three months. Opioid consumption was documented at the same assessment points and converted to morphine milligram equivalents per day.

Adverse events were recorded throughout the follow-up period. Any treatment crossover, withdrawal, loss to follow-up, or protocol deviation was documented together with the reason.

Completed data-collection forms were checked regularly for completeness, consistency, and accuracy.

Statistical Analysis

Data were analysed using SPSS version 25. Continuous variables were presented as mean ± standard deviation and categorical variables as frequencies and percentages. Between-group comparisons used the independent-samples t-test for continuous variables and the chi-square for categorical variables. Changes in pain scores, opioid consumption, and EORTC QLQ-C30 domain scores over time were analysed using repeated-measures analysis of variance, including group, time, and group-by-time interaction effects. Appropriate non-parametric tests were used when assumptions were not met. A difference of approximately 10 points in QLQ-C30 scores was considered potentially clinically meaningful. All tests were two-sided, with $p < 0.05$ indicating statistical significance.

Results

Baseline demographic and clinical characteristics were well balanced between the NCPB and opioid groups, with no significant differences in age, sex, malignancy type, disease stage, pain intensity, or daily morphine requirement (all $p > 0.05$). (Table I)

Table I: Baseline Characteristics of the Study Groups (N=30)

Variable	NCPB Group (n = 15)	Opioid Group (n = 15)	p-value
Age (years), Mean±SD	53.5±10.7	53.1±8.8	0.91
Age Range (years)	34–68	36–70	—
Sex		0.71	
Male	9 (60.0%)	10 (66.7%)	
Female	6 (40.0%)	5 (33.3%)	
Type of Malignancy			0.88
Pancreatic	6 (40.0%)	5 (33.3%)	
Gastric	3 (20.0%)	4 (26.7%)	
Liver	4 (26.7%)	3 (20.0%)	
Biliary	2 (13.3%)	3 (20.0%)	
Disease Stage			0.71
Stage III	5 (33.3%)	4 (26.7%)	
Stage IV	10 (66.7%)	11 (73.3%)	
Baseline VAS Score, Mean ± SD	8.41±0.87	8.30±0.91	0.74
Baseline Morphine Daily Dose (mg/day), Mean ± SD	68.33±12.20	70.67±11.47	0.48

Data expressed as Mean ± SD and absolute number, within parenthesis percentage over column total

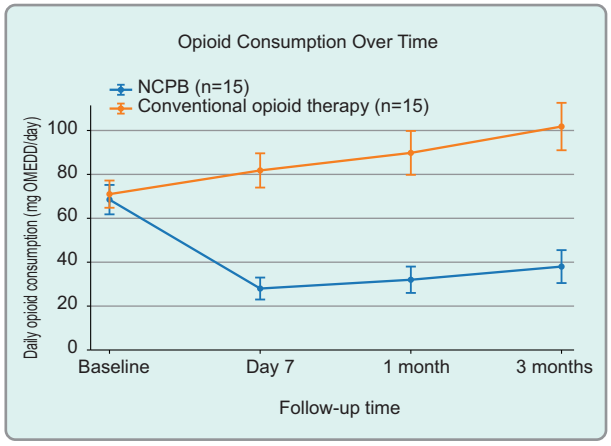

Figure 1: Mean daily opioid consumption over time

Figure1 demonstrates that the baseline opioid consumption was comparable between groups. Thereafter, opioid requirements decreased markedly in the NCPB group but increased progressively with conventional opioid therapy, with significantly lower consumption after NCPB at Day 7, 1 month, and 3 months (all $p < 0.001$).

Table II: Opioid Consumption over time (MME/day)

Time Point	NCPB Group (Mean ± SD)	Opioid Group (Mean ± SD)	*p*-value
Baseline	68.33 ± 12.20	70.67 ± 11.47	0.48
Day 7	28.00 ± 9.22	81.67 ± 14.47	<0.001
1 Month	32.00 ± 10.99	89.67 ± 18.07	<0.001
3 Months	38.00 ± 13.47	101.67 ± 19.61	<0.001

Data expressed as Mean ± SD

Baseline opioid consumption was comparable between the NCPB and opioid groups (68.33 vs 70.67 mg/day; $p = 0.48$). After treatment, opioid requirements were significantly lower in the NCPB group at Day 7, 1 month, and 3 months (all $p < 0.001$). At 3 months, consumption remained 44.4% below baseline in the NCPB group, whereas it increased to 101.67 mg/day in the opioid group. (Table II)

Table III: Pain Scores Over Time (VAS)

Time Point	NCPB Group (Mean ± SD)	Opioid Group (Mean ± SD)	*p*-value
Baseline	8.41 ± 0.87	8.30 ± 0.91	0.74
Day 7	3.2 ± 1.1	6.5 ± 1.2	<0.001
1 Month	3.5 ± 1.3	6.9 ± 1.4	<0.001
3 Months	4.2 ± 1.5	7.4 ± 1.6	<0.001

Data expressed as Mean ± SD

Baseline VAS scores were comparable between groups (8.41 vs 8.30; $p = 0.74$). Following treatment, pain scores were significantly lower in the NCPB group at Day 7, 1 month, and 3 months (all $p < 0.001$). At 3 months, the NCPB group maintained a 50% reduction from baseline, compared with a VAS score of 7.4 in the opioid group. (Table III)

Overall quality-of-life scores improved more markedly in the NCPB group than in the conventional opioid therapy group, increasing from 45.00 ± 9.00 at baseline to 65.99 ± 7.01 at 3 months, compared with 44.00 ± 8.90 to 54.00 ± 8.00, respectively ($p<0.001$). (Table IV)

Table IV: Comparison of Quality-of-Life Outcomes (EORTC QLQ-C30) Between NCPB and Conventional Opioid Therapy Groups

Domain	Baseline NCPB	Baseline Opioid	Day 7 NCPB	Day 7 Opioid	1 Month NCPB	1 Month Opioid	3 Months NCPB	3 Months Opioid	p-value
Global Health Status	42.00 ± 9.02	41.00 ± 8.95	50.01 ± 8.90	46.00 ± 8.80	58.00 ± 8.50	49.00 ± 8.60	65.01 ± 7.99	51.00 ± 8.50	<0.001
Physical Functioning	47.99 ± 10.00	47.00 ± 9.85	55.00 ± 9.50	50.00 ± 9.30	63.00 ± 8.50	53.00 ± 8.40	70.00 ± 6.98	55.00 ± 8.00	<0.001
Emotional Functioning	50.01 ± 8.00	49.00 ± 7.95	56.00 ± 7.50	52.00 ± 7.60	62.00 ± 6.80	54.00 ± 7.20	67.99 ± 6.00	56.00 ± 7.00	<0.001
Fatigue	64.99 ± 9.98	65.00 ± 10.01	54.00 ± 9.00	62.00 ± 9.50	44.00 ± 8.00	58.00 ± 8.80	35.00 ± 6.99	55.00 ± 8.00	<0.001
Pain Subscale	72.01 ± 9.02	71.00 ± 9.20	56.00 ± 8.50	62.00 ± 9.00	42.00 ± 8.00	52.00 ± 8.50	30.01 ± 7.99	45.00 ± 8.50	<0.001
Overall Quality of Life	45.00 ± 9.00	44.00 ± 8.90	53.00 ± 8.50	48.00 ± 8.60	60.00 ± 8.00	51.00 ± 8.30	65.99 ± 7.01	54.00 ± 8.00	<0.001

Data expressed as Mean ± SD

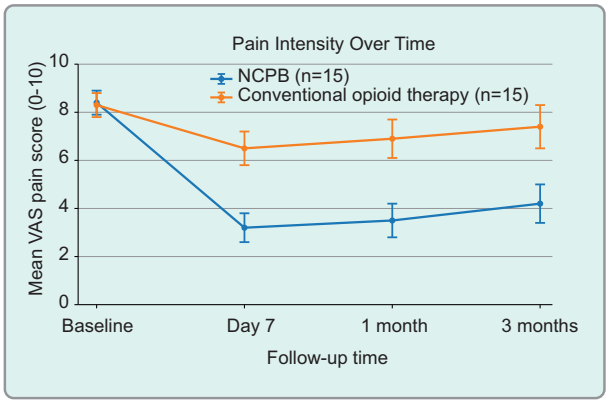

Figure 2: Mean VAS pain score over time

Figure 2 shows that baseline VAS scores were comparable between the NCPB and conventional opioid therapy groups. VAS scores were significantly lower in the NCPB group at Day 7, one month, and three months than in the conventional opioid therapy group (all $p < 0.001$).

Figure 3 illustrates that the NCPB group experienced greater improvement in quality of life and functioning, together with greater reductions in pain and fatigue, than the conventional opioid therapy group over the 3-month follow-up period. Differences were most pronounced at 3 months (all $p<0.001$).

Nausea/vomiting, constipation, and sedation were significantly more frequent in the opioid therapy group than in the NCPB group ($p \leq 0.01$). Procedure-related pain was more common following NCPB (26.7% vs 0%; $p = 0.03$). Differences in hypotension and diarrhea were not statistically significant ($p > 0.05$). (Table V)

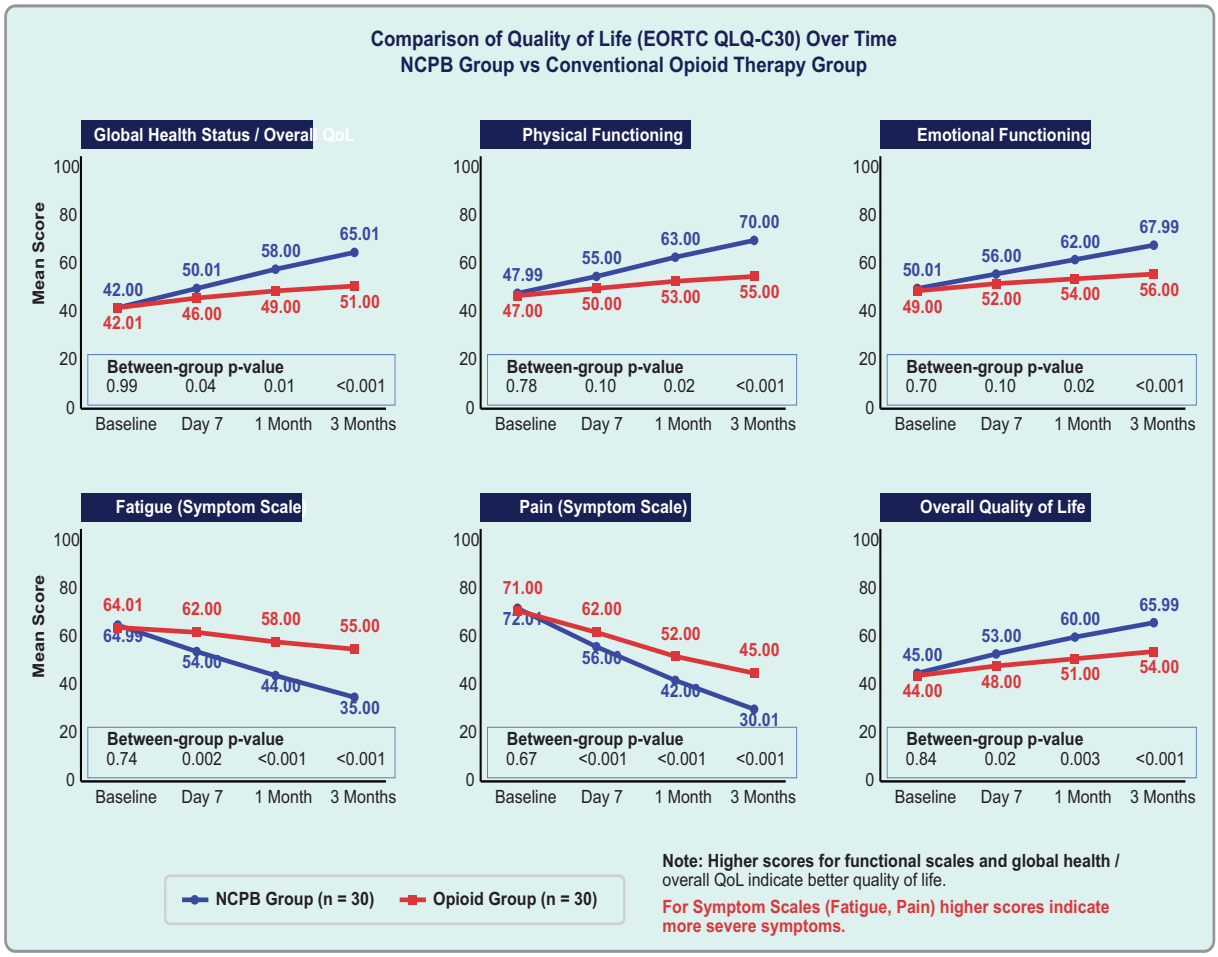

Figure 3: Comparison of Quality of Life (EORTC QLQ-C30) over time NCPB Group vs Conventional Opioid Therapy Group

Table V: Adverse Events

Event	NCPB Group (n= 15)	Opioid Therapy Group (n = 15)	p-value
Hypotension	3 (20.0%)	0 (0.0%)	0.07
Nausea/Vomiting	2 (13.3%)	9 (60.0%)	0.01
Constipation	1 (6.7%)	11 (73.3%)	<0.001
Procedure Pain	4 (26.7%)	0 (0.0%)	0.03
Sedation	1 (6.7%)	8 (53.3%)	0.01
Diarrhea	2 (13.3%)	0 (0.0%)	0.14

Data expressed as absolute number, within parenthesis percentage over column total

Discussion

In patients with advanced upper abdominal cancer, this prospective comparison trial showed that fluoroscopy-guided NCPB significantly reduced pain more than traditional opioid treatment. By three months, the NCPB group's VAS score had decreased by almost 50%, whereas the opioid group's pain increased despite increasing dosages. These results build on the Wong et al. experiment, where NCPB outperformed systemic analgesia alone in pain alleviation[11]. The findings of the present study are consistent with the review by Paul and Borkar, who noted that neurolysis of the coeliac plexus and related sympathetic pathways may relieve abdominal cancer pain, reduce narcotic use, and improve daily functioning and quality of life. This supports the potential clinical value of fluoroscopy-guided neurolytic coeliac plexus block as an interventional option for patients with advanced upper abdominal malignancy[14].

The most striking result was the divergence in opioid requirement. Consumption fell to about 38 MME/day after NCPB but rose to over 100 MME/day with conventional therapy—a near-threefold between-group difference by three months. This opioid-sparing effect corroborates the systematic review of Yan and Myers, which linked NCPB to reduced Opioid use and constipation,[9] and the durable benefit of chemical splanchnicectomy reported by Lillemoe et al[15]. Because opioid dose correlates directly with the burden of adverse effects, this reduction is clinically consequential rather than merely pharmacological.

Although baseline VAS scores were comparable (8.41 vs 8.30), pain was significantly lower after NCPB than with opioid therapy at Day 7 (3.2 vs 6.5), one month (3.5 vs 6.9), and three months (4.2 vs 7.4; all $p < 0.001$). The approximately 50% reduction from baseline at three months indicates sustained analgesic benefit. These findings are consistent with Wong et al., Zhang et al. and who reported improved pain control following neurolytic coeliac plexus block compared with medical therapy[11,16].

Image-guided coeliac plexus block significantly reduced pain and opioid consumption, improved opioid-related adverse effects, and caused no major complications. These findings support fluoroscopy-guided coeliac plexus block as an effective intervention with an acceptable safety profile for upper abdominal cancer pain[17].

NCPB was associated with significantly greater improvement across all assessed EORTC QLQ-C30 domains than conventional opioid therapy (all $p < 0.001$). At three months, global health status/QoL increased from 42.00 to 65.01 in the NCPB group, compared with 41.00 to 51.00 in the opioid group. Physical and emotional functioning improved, while fatigue and pain scores declined more markedly after NCPB. Similar quality-of-life benefits following neurolytic coeliac or sympathetic blockade have been reported[18,19].

Opioid therapy was associated with significantly higher rates of nausea/vomiting (60.0% vs 13.3%; $p = 0.01$), constipation (73.3% vs 6.7%; $p < 0.001$), and sedation (53.3% vs 6.7%; $p = 0.01$). Conversely, NCPB was more often accompanied by transient procedure-related effects, including hypotension, diarrhoea, and local procedural pain. This pattern is consistent with previous reports that coeliac plexus neurolysis may reduce opioid-related adverse effects, while hypotension, diarrhoea, and transient local pain remain recognized complications of the procedure[9].

The timing of intervention may also be relevant. Evidence that earlier neurolysis limits pain progression and preserves function[20] supports our practice of offering NCPB before opioid requirements become unmanageable, rather than reserving it as salvage therapy. Although analgesia may attenuate over time as disease advances,[21] the sustained benefit observed here across three months is encouraging.

Overall, these findings suggest that fluoroscopy-guided NCPB may provide sustained analgesia, reduce opioid requirements, and improve quality of life across advanced upper abdominal malignancies. By including several tumour types, this study adds context-specific prospective comparative evidence from Bangladesh and supports consideration of NCPB within multimodal palliative care. Larger multicentre studies are needed to define optimal patient selection, timing, and long-term safety.

Limitations

This study has several limitations. It was conducted at a single centre and included only 30 patients, which may limit the strength and generalisability of the findings. Because treatment was not randomized, selection and confounding bias cannot be ruled out, although consecutive recruitment and similar baseline characteristics helped reduce these concerns. Follow-up lasted only three months, and blinding was not possible; therefore, the long-term effects and patient-reported quality-of-life results should be interpreted with caution.

Conclusion

In adults with advanced upper abdominal cancer, fluoroscopy-guided neurolytic coeliac plexus block provided more profound and longer-lasting pain relief, significant opioid sparing, and clinically meaningful improvements in quality of life compared to conventional opioid therapy, while shifting the adverse-event burden from systemic opioid toxicity to transient, self-limiting procedural effects. Integrating NCPB earlier into the pain pathway, rather than leaving it as a last resort, might significantly enhance palliative treatment for this group in resource-constrained settings.

Declaration:

Ethics approval: The study was approved by the Institutional Review Board (IRB) of Bangladesh Medical University, Dhaka, Bangladesh (Reg. no.; BMU/2025/11283).

Author contributions

Conception and development of the idea: AKMA, SAT
Writing: AKMA, KMA, MMK, CSC, SAT
Data analysis: AKMA, KMA, MMK, CSC, SAT
Data collection: AKMA, KMA, MMK, CSC, SAT
Review and Editing: AKMA, KMA, MMK, CSC, SAT

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