

Original research article

Comparison of splanchnic nerve block vs celiac plexus block for upper abdominal tumor pain relief and quality of life: A prospective, randomized and comparative study

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Abstract

Background and Objectives: Patients now live longer thanks to advanced cancer treatments and early cancer identification. In this study, the efficacy of celiac plexus and splanchnic nerve blocks for pain management and quality of life in patients with upper abdominal malignancies at three months is compared.

Material and Methods: This prospective, randomized trial compared the efficaciousness of a splanchnic nerve block vs a celiac plexus block for managing excruciating pain, as well as the side effects associated with both neurolytic blocks. This study was carried out at the Department of Anaesthesiology, Kurnool Medical College, Andhra Pradesh, India. From the patients who are part of this investigation, informed permission was acquired. Using data from the pilot study conducted between August 2022 to July 2023, a sample size of 20 was chosen.

Results: Out of 60, a total of 20 patients that were evaluated for eligibility, 10 individuals were found to not meet the necessary inclusion criteria, while an additional 10 patients chose not to partake in the study. A total of sixty patients were randomly assigned to groups over the course of the trial. Group SNB consisted of 10 patients, while Group CPB also included 10 patients. In order to elucidate the descriptive data statistics, the frequency analysis method was employed for categorical variables, while the mean and standard deviation were utilized for continuous variables.

Conclusion: The statistical data and findings of this study demonstrate that a splanchnic nerve block exhibits clinical comparability to a celiac plexus block, but with statistically significant discrepancies that hold little clinical significance.

Keywords: Celiac plexus block, splanchnic nerve block, abdominal tumours

Introduction

The early detection and diagnosis of cancer, as well as the availability of modern therapeutic interventions, have significantly enhanced patients' life expectancy. However, the management of pain in these individuals is a significant concern, since it is a prevalent symptom in 88% of patients with an advanced stage of the disease ^[1]. The study revealed that a significant number of individuals diagnosed with cancer experience insufficient pain management, resulting in a considerable proportion of these people succumbing to mortality while still experiencing agony. The utilization of both interventional treatment with neurolysis and medication is advised as a comprehensive approach for palliative care. The process of neurolysis involves the disruption of pain signals along the neural pathway, resulting in a reduction of pain ^[2,4].

Interventional therapy is indicated for individuals who have experienced inadequate pain management with pharmaceutical interventions or who have encountered adverse effects associated with drug usage. The celiac plexus is an intricate neural network situated within the abdominal region, namely at the point where the celiac trunk, renal arteries, and superior mesenteric artery diverge from the abdominal aorta at the first lumbar vertebra. The utilization of celiac plexus block is advised for individuals suffering from upper abdomen cancer, chronic pancreatitis, abdominal metastases, retroperitoneal tumors, and chronic abdominal pain. This procedure is particularly beneficial for patients who are currently receiving high-dose narcotic analgesia or have shown inadequate response to medication ^[5,7].

The Splanchnic nerves originate from the thoracic sympathetic trunk within the thoracic region and descend at the T₁₁ and T₁₂ levels to connect with the celiac ganglion, thereby supplying sympathetic innervation to the abdominal region. The treatment of severe pain associated with intra-abdominal tumors can be achieved by interrupting the splanchnic nerve at the T₁₁ level. The assessment of quality of life during the follow-up period was conducted utilizing the QLQ-C30 questionnaire ^[8,9]. The European Organization for Research and Treatment of Cancer a version 3.0 of a quality of life questionnaire has

been developed for the purpose of assessing the quality of life in individuals diagnosed with cancer. Both multi-item scales and single-item measures have a scoring range of 0 to 100. A higher scale score indicates a greater level of responsiveness. The attainment of a high score on the functional scale is indicative of a correspondingly high level of quality of life as measured by the global health scale. However, it should be noted that a higher score on the symptom scale is indicative of a worse level of quality of life^[9, 11].

The objective of this study is to conduct a comparative analysis of the efficacy of a splanchnic nerve block and a celiac plexus block in managing pain, as well as examining the impact of these interventions on the quality of life of patients with upper abdominal tumors during a three-month follow-up period after the intervention. The objective of this study is to compare the efficacy of a neurolytic celiac plexus block with a splanchnic nerve block in managing pain and evaluating their impact on the quality of life throughout a three-month follow-up period in patients diagnosed with upper abdominal tumors.

Materials and Methods

This prospective, randomized trial compared the efficaciousness of a splanchnic nerve block vs a celiac plexus block for managing excruciating pain, as well as the side effects associated with both neurolytic blocks. This study was carried out at the Department of Anaesthesiology, Kurnool Medical College, Andhra Pradesh, India. From the patients who are part of this investigation, informed permission was acquired. Using data from the pilot study conducted between August 2022 to July 2023, a sample size of 20 was chosen.

Inclusion Criteria

- Both genders
- Prolonged stomach pain brought on by cancer
- Refractory to opioids and analgesics;
- Patients who provided legitimate informed consent.

Exclusion Criteria

- A patient's denial.
- Individuals with disorders related to coagulation.
- Infections locally.
- The hypertension.

Procedure

The patients underwent a period of fasting, abstaining from oral intake, lasting six hours prior to the commencement of the surgery. Prior to the commencement of the study, all patients were administered a pre-determined volume of 500 milliliters of normal saline solution. The patient was instructed to abstain from consuming any analgesic tablets on the day of the operation. The administration of an oral immediate release morphine tablet was discontinued 4 hours before to the surgery, whereas the administration of the morphine sustained/extended release tablet was discontinued 12 hours prior to the procedure. The administration of analgesics, such as paracetamol tablets, was discontinued for a period of 6 hours prior to the procedure. Similarly, additional non-steroidal anti-inflammatory drugs were discontinued either 12 to 24 hours before the injection. Prior to the surgery, the patient provided informed consent. Following the transfer of the patient to the operating theater, the patient was placed in a prone posture, with a pillow positioned beneath the hip and chest. The strategic positioning of a pillow serves to enhance the visual observation of the vertebral body by reversing the natural curvature of the thoracolumbar region, so increasing the separation between the iliac crests and the rib cage.

Results

Out of 60, a total of 20 patients that underwent assessment for eligibility, 10 individuals were found to not meet the necessary inclusion criteria, while an additional 10 patients chose not to participate in the study. A total of sixty patients were randomly assigned to groups over the course of the trial. Group SNB consisted of 10 patients, while Group CPB also comprised 10 patients. The descriptive data statistics involved the utilization of frequency analysis for categorical variables and the calculation of mean and standard deviation for continuous variables. The unpaired sample t-test and the Mann-Whitney U test were employed to determine the significant difference between the bivariate samples in independent groups. The Friedman test is a non-parametric statistical test employed to assess differences between groups when the dependent variable being measured has an ordinal scale.

Table 1: Demographic Data

	Group	Number	Mean	SD
Age	SNB	10	50.01	10.11
	CPB	10	52.4	12.12
BW	SNB	10	52.84	09.15
	CPB	10	53.2	5.789

The average age of the individuals included in the study was 50.01 years for group SNB and 52.4 years for group CPB, respectively. The paediatric age group has been excluded.

Table 2: Gender

Sr. No.	Sex	SNB	CPB	Total
1.	Male	05	05	10
2.	Female	05	05	10
	Total	10	10	20

Fifty percent of the participants (n=10) were identified as females, while the remaining fifty percent (n=10) were identified as males.

Table 3: Site of Tumour

Sr. No.	Site of tumour	SNB	CPB	Total
1.	Gall bladder	2	1	3
2.	Head of pancreas	1	1	2
3.	Pancreas body and tail	2	1	3
4.	Colon	1	2	3
5.	Liver	1	2	3
6.	Secondary's liver	1	1	2
7.	Stomach	2	2	04
	Total	10	10	20

The pain score is commonly expressed using the Visual Analog Scale. This study aims to compare the visual analogue scores between two groups, namely the SNB group and the CPB group. The data are presented in a table format, displaying the means and standard deviations, as well as the corresponding p-values, for the pre-operative measurements and the measurements taken during the 3-month follow-up.

Table 4: Friedman Test

Sr. No.	VAS	Friedman
1.	SNB	71.28
2.	CPB	81.97

A statistically significant non-parametric Friedman test was undertaken to assess differences among repeated measures. This study aims to compare the incidence of adverse effects that were seen as a result of the surgery.

Table 5: Diarrhoea

Sr. No.	Diarrhoea	SNB	CPB	Total
1.	No	07	06	13
2.	Yes	03	04	07
	Total	10	10	20

Eleven patients who received splanchnic and celiac plexus block experienced self-limiting diarrhea, which spontaneously cleared within a period of 2-3 days without the need for intervention.

Table 6: Hypotension

Sr. No.	Hypotension	SNB	CPB	Total
1.	No	08	07	15
2.	Yes	02	03	05
	Total	10	10	20

Two patients in the SNB group and eight patients in the CPB group experienced postural hypotension.

Discussion

The afferent signals originating from the upper abdomen viscera traverse the splanchnic nerve and celiac plexus. The celiac plexus block is a frequently employed interventional treatment for therapeutic pain reduction, making it an ideal choice for managing cancer-related pain. Currently, the utilization of the thoracic splanchnic nerve block has become prevalent due to the presence of the thoracic splanchnic nerve inside a compact triangle region characterized by distinct anatomical features and boundaries. Therefore, thoracic splanchnic nerve block is more effective in achieving complete nerve blockade with neurolytic solutions when compared to the standard celiac plexus block ^[12, 14].

This study demonstrates that the utilization of a splanchnic nerve block in patients with inoperable upper gastrointestinal tract malignancies yields superior outcomes when compared to a celiac plexus block ^[15, 17]. A significant number of patients exhibited a favorable analgesic response starting from the second week, accompanied by enhancements in overall health status, functional scales, and symptom scales as assessed through quality of life evaluations ^[18]. The findings of this study demonstrate that both groups experienced a decrease in opioid intake and an improvement in Visual Analog Scale scores starting from the second week. However, it was seen that the group receiving splanchnic nerve block exhibited superior outcomes when compared to the group receiving celiac plexus block. Enhancing the immune system and improving quality of life may be achieved through a reduction in opioid intake, as opioids have been observed to exert detrimental effects on cellular levels. Additionally, a reduction in the sedative effects of opioids was seen ^[19, 21].

In their study, Stefaniak *et al.* conducted a comparative analysis to evaluate the efficacy of neurolytic celiac plexus block, thoracic splanchnicectomy, and a control group as conservative treatment. The findings of their study revealed that the neurolytic block intervention led to a substantial decrease in cancer-related pain, as well as notable enhancements in physical well-being, global functioning scale, and social well-being ^[22, 23]. In their study, Ahmed *et al.* conducted an investigation on the efficacy of fluoroscopy-guided splanchnic nerve block for patients with upper abdominal tumors and distorted celiac plexus anatomy. The study included a sample of 21 patients. The findings revealed that the utilization of fluoroscopy guidance for splanchnic nerve block resulted in a notable enhancement in pain intensity, reduced opioid requirement, improved functional status, and enhanced physical components of quality of life following neurolysis. Furthermore, these positive outcomes were observed to persist for a duration of three months ^[24, 26].

In a study conducted by Saipriya Tewari *et al.*, a comparison was made between the Transaortic and Retrocrural approaches for celiac plexus block in upper abdominal cancer patients. The findings revealed that the retrocrural approach group exhibited superior pain relief and a decreased need for opioids when compared to the Transaortic neurolytic celiac plexus group. In the present study, the mortality rate observed in both the SNB and CPB groups was zero. Additionally, mild problems such as temporary back discomfort, hypotension, and self-limiting diarrhea were documented and managed symptomatically. The current study observed a hypotension incidence of 13% in the SNB group and 53% in the CPB group. The incidence of diarrhoea was seen to be 26% in the SNB group and 46% in the CPB group ^[27, 29].

The lower incidence observed in this study, in comparison to previous research, can be attributed to the utilization of imaging guidance and the administration of a local anesthetic prior to the injection of the neurolytic agent. These interventions have been found to greatly decrease the occurrence of problems ^[30, 31].

Conclusion

A splanchnic nerve block appears to be clinically comparable to a celiac plexus block, as shown by the statistical data and outcomes of this study. Despite the fact that statistically significant differences exist between the two, these discrepancies have minimal relevance to clinical practice.

Funding

None

Conflict of Interest

None

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