Early Ultrasound-Guided Neurolysis for Pain Management in Gastrointestinal and Pelvic Malignancies: An Observational Study in a Tertiary Care Center of Urban India

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Abstract: Patients with advanced gastrointestinal and pelvic malignancies commonly present with pain of varying severity. In a majority of these patients, pain can be effectively managed using an integrated systemic pharmacological approach with oral morphine being the cornerstone of treatment. However, with escalating doses, intolerable side effects of oral morphine may lead to patient dissatisfaction. When oral pharmacotherapy fails to adequately address the issue of pain or leads to insufferable side effects, neurolytic blocks of the sympathetic axis are usually used for pain alleviation. As these blocks may reduce oral analgesic requirement, a reevaluation of their timing is merited. This article presents our hospital-based in-patient palliative care unit experience with early ultrasonography-guided neurolysis of celiac plexus, superior hypogastric plexus and ganglion impar. Of the 44 patients we studied, 20 underwent celiac plexus neurolysis, 18 superior hypogastric plexus neurolysis, and 6 ganglion impar neurolysis. Their pain was being managed with oral morphine before neurolysis, but only 11.4% patients required oral morphine for satisfactory pain control, 2 months after neurolysis. The mean Visual Analog Scale score before block placement was 5.64 ± 0.69 and fell to 2.25 ± 1.33 at 2 months post neurolysis (P < 0.001). We suggest that bedside ultrasonography-guided sympathetic axis neurolysis may be employed early in patients with incurable abdominal or pelvic cancer. Its use as a first-line intervention for achieving pain control with minimal complications warrants further consideration and investigation.

Key Words: pain, imaging, neurolysis, ultrasound guidance, celiac plexus, superior hypogastric plexus, ganglion impar

INTRODUCTION

In gastrointestinal (GI) and pelvic malignancies, compression, invasion, or distension of visceral structures can result in a poorly localized noxious pain. Patients
experiencing visceral pain often describe the pain as vague, deep, squeezing, cramping, or colicky. In addition to oral analgesic therapy (opioid and nonopioid), neurolytic blocks of the sympathetic axis are also effective in ameliorating visceral cancer pain.\textsuperscript{1–15} Celiac plexus neurolysis (CPN) can be employed for pain originating from the liver, pancreas, gallbladder, stomach, spleen, kidneys, intestines, and adrenal glands. Analgesia for pelvic organ involvement is possible with superior hypogastric plexus neurolysis (SHPN). Ganglion impar neurolysis (GIN) works best for poorly localized peri-anal pain that is frequently accompanied by sensations of burning and tenesmus. However, indications for and timing of application of neurolytic blocks remain obscure at the best.\textsuperscript{16} Although a variety of techniques have been described for performing celiac plexus,\textsuperscript{17–24} superior hypogastric plexus\textsuperscript{25–30} and ganglion impar block,\textsuperscript{31–36} ultrasonography (USG)-guided techniques offer the convenience of bedside performance of these blocks.\textsuperscript{8,13,15} This study details our experience with early USG-guided sympathetic plexus neurolysis for pain alleviation in patients with advanced GI and pelvic cancers.

METHODS

The study was commenced after obtaining approval from the Ethics Committee. The option of neurolysis was discussed with patients with incurable GI neoplasm or pelvic cancer having severe pain, being treated or presenting for pain management at our palliative care outpatient clinic between January 2006 and September 2009. Patients having a Visual Analog Scale score (VAS) of 7 or more at presentation to the pain clinic, and on daily morphine doses of 30 mg or more for a period of at least 3 days but less than 30 days were considered for “early neurolysis.”

After commencing oral pharmacotherapy for pain in accordance with the WHO ladder, we followed patients weekly on an outpatient basis in our pain clinic. Step 1 therapy consisted of oral nonsteroidal anti-inflammatory drugs (NSAIDs) with or without adjuvants. Step 2 therapy consisted of oral tramadol prescribed to a maximum dose of 100 mg four times a day, with or without NSAIDs and adjuvants. Step 3 therapy consisted of oral morphine at a minimum dose of 30 mg/day with or without NSAIDs and adjuvants. We commenced Step 3 therapy for all patients who received maximum oral doses of tramadol (Step 2 therapy) for at least 1 week or those who had excessive nausea while on tramadol. Informed consent was obtained from all patients and a detailed discussion regarding their pain management options was carried out so that they had a complete understanding of the advantages and pitfalls accompanying oral pharmacological therapy and neurolytic blocks.

The procedure was explained to all the patients and they were reassured that any residual pain after neurolysis would be managed optimally, in line with WHO guidelines. Patients who consented for neurolysis had their computed tomographic (CT) scans reviewed by a radiologist for assessment of anatomy and feasibility of administering the block under ultrasound guidance. Those with favorable anatomy were admitted in our palliative care unit where all blocks were carried out under USG guidance at the bedside. Favorable anatomy was defined according to the feasibility of approaching celiac or hypogastric plexus with a needle under ultrasound-guidance based on the CT scans (eg, plexus not surrounded by lymph nodes, etc.). Before initiating the block, diagnostic or neurolytic, resuscitation equipment was checked and kept ready and an oxygen analyzer was used to verify that the oxygen wall outlet connected to the central pipeline was delivering at least 95% oxygen.

Exclusion Criteria

Patients with pre-existing respiratory, metabolic, or neurological disease and those having a history of cardiac, hepatic, or renal failure were excluded. Patients with above-mentioned problems were typically at very advanced stage of diseases with poor general condition; these patients by definition were not “early neurolysis” candidates and were excluded.

Patient Monitoring

During block placement standard monitoring was applied which included:

1. Continuous 5-lead electrocardiography (ECG).
2. Continuous pulse oximetry (SpO2).
3. Noninvasive oscillometric blood pressure measured at 5-minute intervals (NIBP).

Treatment

Following a fasting period of 8 hours, intravenous access was established and 1000 mL normal saline
(NS) was administered. VAS score at first presentation to the clinic and immediately before initiation of the diagnostic block was recorded. A diagnostic block was carried out with 0.25% bupivacaine and if successful, was followed by a neurolytic block the next day with the same technique. A successful diagnostic block was defined as one that reduced VAS to < 50% of baseline value within 30 minutes. In the event of a failed diagnostic block, the patient was excluded from the study and treated with oral opioids in accordance with WHO guidelines.

**Celiac Plexus Neurolysis (CPN).** A SonoSite® MicroMaxx® ultrasound system (SonoSite INC, Bothell, WA, U.S.A.) with a C60e/5-2 MHz transducer was employed in the long axis for locating the origins of celiac trunk and superior mesenteric artery in the supine position.

Following this, the transducer was rotated to image the origin of celiac trunk along with its division into common hepatic artery and splenic artery (Figure 1). After local infiltration with 3 to 5 mL of 2% lidocaine, a 15-cm 22 gauge (G) Chiba needle was introduced into the epigastrium, right or left lateral to midline with the ultrasound transducer using a short axis view.

The tip of the needle was advanced into the space between the abdominal aorta and the celiac trunk. Once intravascular placement was ruled out by a negative aspiration, a diagnostic block was performed with 10 mL of 0.25% bupivacaine bilaterally. If the injection successfully relieved pain (a decrease in VAS to 50% or more of baseline value), 15 mL of 50% ethanol in 0.25% bupivacaine was injected bilaterally on the next day. The spread of the injectate (local anesthetic or neurolytic agent) was visualized sonographically in real-time to ensure correct placement (Figure 2).

**Superior Hypogastric Plexus Neurolysis (SHPN).** Patients were prepared for the block using the standard protocol as outlined above. Special preparation included:

1. Activated charcoal and bisacodyl were given orally the night before the procedure to clear the bowels.
2. Preprocedure micturition was encouraged to empty the bladder.

A SonoSite® MicroMaxx® ultrasound system (SonoSite INC) with a C60e/5-2 MHz transducer was used in the long and short axis for locating the division of abdominal aorta into common iliac arteries in the supine position. The transducer was then rotated to image the body of fifth lumbar vertebra and at that level the bilateral common iliac vessels were seen leaving the midline (Figure 3). After local infiltration with 3 to 5 mL 2% lidocaine, a 15-cm 22 G Chiba needle was introduced into the hypogastrium, using short axis view with ultrasound probe. The tip of the needle was advanced into the retroperitoneal area between the fifth lumbar vertebra and the common iliac vessels. A midline position of the needle was achieved with its tip abutting the anterior most point of the fifth lumbar vertebral body. The needle was then withdrawn 1 mm and after confirming a negative aspiration for blood, a diagnostic block was performed by injecting 10 mL of 0.25% bupivacaine. If the injection successfully relieved pain, 10 mL of 50% ethanol in 0.25% bupivacaine was injected on the next day.

Real-time sonography was employed to ensure a midline injection and to visualize the uniform spread of the drug along the anterior curve of the fifth lumbar vertebral body (Figure 4).
Ganglion Impar Neurolysis (GIN). The standard preparation protocol was followed. A SonoSite® MicroMaxx® ultrasound system (SonoSite INC) with a HFL38/13-6 MHz transducer was used for sono-

graphic guidance.

Patients were placed in a lateral position and the inter-gluteal area was cleaned and draped in a sterile fashion. After local infiltration with 3 to 5 mL 2% lidocaine, a 22 G Chiba needle was introduced and directed cephalad through the anococcygeal ligament. Under ultrasonographic assistance (sagittal image of the median plane) the tip of needle was placed in the retroperitoneal space between the rectum and the coccyx (Figure 5). To allow the spread of the injectate solution towards the anterior surface of the coccyx and away from rectum, the needle was rotated through 180° to position the bevel posteriorly (towards the coccyx).

After confirming a negative aspiration for blood, a diagnostic block was administered using 4 mL of 0.5% bupivacaine. Spread of the solution was evaluated by ultrasound. After a successful diagnostic block, neurolysis was achieved with 4 mL of 50% ethanol in 0.25% bupivacaine.

**Patient Assessment**

After the diagnostic or neurolytic block was performed, noninvasive blood pressure (NIBP), pulse rate (PR), and respiratory rate (RR) were recorded at 10 minute intervals for the first hour and then at 1 hour intervals for the next 23 hours. Signs and symptoms such as hypotension (drop in mean blood pressure of more than 20% of baseline “at admission blood pressure” or an absolute systolic pressure of less than 90 mmHg), diarrhea (increase in stool frequency or volume; subjectively reported by the patient), dyspnea, lower limb paresis or paralysis, loss of sphincter control, foot drop, hematuria, and back pain were evaluated at an hourly basis for the first 48 hours after the neurolytic block. Hypotension was treated initially with a NS bolus of 500 mL over 15 minutes. If persistent, another bolus of 500 mL NS was administered. If still persistent, central line insertion via the peripheral route (PICC) was done to measure the central venous pressure (CVP) and guide further fluid management. Urinary catheterization was done as required. Vasopressor therapy (titrated noradrenaline infusion) was
started for intractable hypotension, once the CVP exceeded 15 mmHg.

Postneurolysis pain relief was assessed on the second day (D2), first week (W1), first month (M1), and second month (M2). All patients with residual pain were treated initially with oral NSAIDs with adjuvants (Step 1) for one day. If pain relief was found to be inadequate, they were moved up the WHO ladder to Step 2 (oral tramadol along with a NSAID and adjuvants) for one day. If patients reported unsatisfactory pain control on Step 2 therapy, they were given oral morphine along with NSAID and adjuvants and doses were titrated to achieve a VAS score of < 4 at discharge at W1. The VAS score at first presentation to the clinic, preblock and postblock VAS scores at D2, W1, M1, and M2 were recorded. The percentage change in VAS scores at M2 from the preblock stage was also documented. Daily oral morphine requirement, Karnofsky performance status (KS), linear quality of life score (QoL), and constipation score (CS) were assessed at the preblock stage and at M2.

The linear QoL was assessed on a scale similar to VAS score, with values ranging from 0 to 10; 0 being the poorest quality of life imaginable and 10 being a quality of life associated with a normal life. Constipation was scored on a scale of 0 to 3; 0 being no constipation, 1 being constipation requiring stool softeners, 2 being constipation requiring stimulants and 3 being constipation requiring manual evacuation. The oral drug treatment (NSAID, tramadol, morphine, gabapentin, and combination therapy) at M2 required to achieve satisfactory pain control was recorded along with the KS, QoL, and CS score. Categorization of pain was done using the character of pain. Visceral pain was defined as a dull aching gnawing pain whereas any pain with a shooting, lancinating, and electric character was classified as neuropathic. Muscular and bony pain was categorized as somatic pain mixed pain was considered to be a combination of visceral or neuropathic varieties. Pain mechanisms were not used for categorization. The type of pain present before neurolysis and at M2 was also studied and in the case of mixed pain, the contribution from visceral and neuropathic components was recorded on a 5-point percentage scale.

**Statistical Analysis**

The data were analyzed using SPSS 15 (SPSS Inc., Chicago, IL, USA) for Windows. Nonparametric Wilcoxon Signed Ranks test was applied for ascertaining the significance of alteration in VAS, KS, QoL, and CS scores after neurolysis. The comparisons among three groups were done by applying one-way ANOVA/Kruskal–Wallis test followed by post hoc comparison by Bonferroni method. The comparisons both pre- and postneurolysis were done using paired samples t-tests or Wilcoxon Signed Ranks test where applicable. The changes over time analyses were done by applying repeated measure analysis (two-way ANOVA) followed by multiple comparisons by the LSD (Lent Signed Deviation) method. The change in percentage contribution of neuropathic and visceral components to the pain of the nine patients who had presented with mixed pain after neurolysis was also analyzed with paired samples t-test. P value < 0.05 was considered significant.

**RESULTS**

Of 100 patients interviewed, 56 agreed to undergo neurolysis. However, 8 patients did not have feasible anatomy for a celiac plexus block and were excluded. Of the remaining 48 patients, 22 patients were considered for CPN, 19 for SHPN, and 7 for GIN. Diagnostic block failed in two participants in the CPN group and one each in the SHPN and GIN group. These patients were excluded from study. All the other participants underwent neurolysis (20 for CPN, 18 for SHPN, and 6 for GIN) and there were no dropouts during the study period. No technical difficulty was encountered in any case and correct needle placement and drug dispersion were easily identified on ultrasound. The mean age of patients undergoing CPN, SHPN, and GIN were 47.3 ± 10.19, 50.17 ± 10.86, and 42.33 ± 4.59 years, respectively, and were comparable (P = 0.25, Table 1). Ratio of male and female patients (P = 0.004) and other characteristics were also comparable among the groups (Table 1). The most common indication for CPN was carcinoma gall bladder (75%), followed by pancreatic carcinoma (15%). Seventeen of the eighteen patients undergoing SHPN had cervical carcinoma. Half the patients who underwent GIN had rectal carcinoma and the other half, locally invasive cervical carcinoma (Table 2). Across all groups, visceral pain emerged as the commonest type of pain encountered (80%, 83.3%, and 66.7% in group CPN, SHPN, and GIN, respectively), followed by mixed pain (20%, 16.67%, and 33.3% in the same group, respectively) and no patient had pure
neuropathic pain or somatic pain. All patients were receiving oral morphine for pain control at the beginning of this study and there was insignificant difference in morphine requirement among the groups as the dose of oral morphine was 58.5 ± 28.3, 55.0 ± 21.2, and 55.0 ± 21.2 for CPN, SHPN, and GIN group, respectively (P > 0.05).

Our primary outcome measures were improvement in pain score and quality of life. Patients who underwent neurolysis exhibited a decrease in their VAS scores at all measured time points from baseline as well as from pre-intervention measurements (D2, W1, M1, and M2) (P < 0.05). In Group CPN, VAS scores at presentation to the outpatient clinic and at the preblock stage were 9.10 ± 0.85 and 5.9 ± 0.72, respectively. At M2, pain scores had decreased to 2.10 ± 0.79 (Table 3, Figure 6, P < 0.001), representing a fall of 63.74 ± 15.10%. For patients in Group SHPN, the VAS scores at presentation and the preblock stage were 8.5 ± 0.86 and 5.33 ± 0.49, respectively. At M2, VAS scores had fallen to 2.33 ± 1.53 (Table 3, Figure 6, P < 0.001), representing a fall of 56.48 ± 27.57%. Patients belonging to Group GIN had VAS scores of 9.17 ± 0.75 at initial presentation and 5.67 ± 0.82 at the preblock stage (Table 3). At M2 their average VAS score had decreased to 2.50 ± 2.17 (Table 3, Figure 6, P < 0.001), representing a 59.21 ± 32.75% fall. The VAS scores were lowest at D2 after neurolysis (1.25 ± 1.02, 1.11 ± 1.02, 1.5 ± 1.38 for CPN, SHPN, and GIN, respectively). The scores progressively increased over 2 months but were still < 3 at M2 in all the groups. Although the VAS scores were lowest at D2 after neurolysis in each group, the overall pain relief was slightly delayed in Group GIN. Finally, VAS scores were < 3 at M2 in all the groups (Table 3).

The Karnofsky score improved postneurolysis (P < 0.05, Table 4). Quality of life of the patients in Groups CPN and SHPN were improved (P < 0.05), but did not show any improvement for GIN group (Table 5, P > 0.05). All patients complained of varying degrees of constipation preblock (1.55 ± 0.51, 1.28 ± 0.46, and 2.0 ± 0.35 in groups CPN, SHPN, and GIN). However, postneurolysis only patients in groups CPN and SHPN experienced significant relief from constipation (0.6 ± 0.5 and 0.72 ± 0.46, respectively, P < 0.001, Table 5).

Table 1. Comparison of Baseline Characteristics

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameter</th>
<th>Group CPN (n = 20)</th>
<th>Group SHPN (n = 18)</th>
<th>Group GIN (n = 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age (years)</td>
<td>47.3 ± 10.9</td>
<td>50.17 ± 10.86</td>
<td>42.33 ± 4.59</td>
</tr>
<tr>
<td></td>
<td>mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Male/Female (%)</td>
<td>55/45</td>
<td>5.6/94.4</td>
<td>50/50</td>
</tr>
<tr>
<td>3</td>
<td>Baseline VAS</td>
<td>9.1 ± 0.85</td>
<td>8.5 ± 0.86</td>
<td>9.17 ± 0.75</td>
</tr>
<tr>
<td>4</td>
<td>Pre block QoL</td>
<td>4.95 ± 1.19</td>
<td>5.39 ± 1.09</td>
<td>5.0 ± 0.63</td>
</tr>
<tr>
<td>5</td>
<td>Pi KS</td>
<td>46.50 ± 10.4</td>
<td>51.67 ± 9.24</td>
<td>43.33 ± 5.16</td>
</tr>
</tbody>
</table>

CPN, celiac plexus neurolysis; SHPN, superior hypogastric plexus neurolysis; GIN, ganglion impar neurolysis; QoL, quality of life; Pi, pre-intervention; KS, Karnofsky score.

Table 2. Distribution of Diagnostic Categories

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Neurolytic Block and Total Number of Patients (n)</th>
<th>Diagnosis (Carcinoma)</th>
<th>Number of Patients</th>
<th>Percentage of Total Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CIN, n = 20</td>
<td>Gall Bladder</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pancreas</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Esophagus</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bile duct</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Renal cell</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>SHPN, n = 18</td>
<td>Cervix</td>
<td>17</td>
<td>94.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rectum</td>
<td>1</td>
<td>5.6</td>
</tr>
<tr>
<td>3</td>
<td>GIN, n = 6</td>
<td>Cervix</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rectum</td>
<td>3</td>
<td>50</td>
</tr>
</tbody>
</table>

CPN, celiac plexus neurolysis; SHPN, superior hypogastric plexus neurolysis; GIN, ganglion impar neurolysis; Cj, confidence interval.

Table 3. Baseline, Pre- and PostIntervention VAS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameter</th>
<th>Group CPN</th>
<th>Group SHPN</th>
<th>Group GIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Baseline VAS</td>
<td>9.1 ± 0.85</td>
<td>8.5 ± 0.86</td>
<td>9.17 ± 0.75</td>
</tr>
<tr>
<td>2</td>
<td>Pi VAS</td>
<td>5.90 ± 0.72</td>
<td>5.63 ± 0.49</td>
<td>5.67 ± 0.82</td>
</tr>
<tr>
<td>3</td>
<td>D2 VAS</td>
<td>1.25 ± 1.02</td>
<td>1.11 ± 1.02</td>
<td>1.5 ± 1.38</td>
</tr>
<tr>
<td>4</td>
<td>W1 VAS</td>
<td>1.45 ± 0.89</td>
<td>1.28 ± 1.02</td>
<td>1.5 ± 1.38</td>
</tr>
<tr>
<td>5</td>
<td>M1 VAS</td>
<td>1.7 ± 0.92</td>
<td>1.72 ± 1.13</td>
<td>2.17 ± 1.94</td>
</tr>
<tr>
<td>6</td>
<td>M2 VAS</td>
<td>2.10 ± 0.79</td>
<td>2.33 ± 1.53</td>
<td>2.50 ± 2.17</td>
</tr>
</tbody>
</table>

| P value | < 0.001 | < 0.001 | < 0.001 |

Pi, pre-intervention; D2, second day; W1, first week; M1, first month; M2, second month; CPN, celiac plexus neurolysis; SHPN, superior hypogastric plexus neurolysis; GIN, ganglion impar neurolysis; VAS, visual analog scale score; KS, Karnofsky score.

Figure 6. Change in Visual Analog Score over time in three groups.
Analysis of drug intake and type of pain experienced at M2 was done after combining data from all patients who underwent neurolysis, irrespective of the type of sympathetic blockade they received. Of the 44 patients studied, 35 patients (79.55%) with 95% CI (64.7% to 90.2%) had visceral pain exclusively, both before and after neurolysis while 9 patients (20.45%) with 95% CI (9.8% to 35.3%) had mixed pain, both before and after neurolysis. Interestingly, patients with mixed pain at M2 had a more pronounced neuropathic component, whereas preneurolysis their mixed pain had a more prominent visceral component. Although all patients were on oral morphine pre-intervention, only 11.36% (5 of 44) patients required oral morphine at M2 for satisfactory pain relief. Residual pain in most patients (39/44) was adequately addressed with Step 1 or Step 2 therapy. All five patients requiring morphine at M2 had a ≥50% decrease in their morphine requirements ($P < 0.001$).

Other than hypotension, diarrhea, and back pain, no complications were observed in any patient. The incidence of hypotension, diarrhea, and back pain was 15% (3 of 20 patients), 55% (11 of 20 patients), and 85% (17 of 20 patients), respectively in Group CPN. Patients in Group SHPN or Group GIN did not develop any complication. Whereas hypotension was successfully treated after infusion of 1 L 0.9% NS, diarrhea and back pain resolved with supportive care in 48 hours. Oral replenishment of fluids was done to prevent dehydration.

**DISCUSSION**

Pain is possibly the most dreaded feature of cancer. In order to enhance the patient's quality of life, physicians need to satisfactorily alleviate this pain.\(^3^7\) Traditionally, cancer pain has been managed in accordance with WHO guidelines\(^3^8\) which stress oral pharmacotherapy for pain relief. At least 30% of patients with GI malignancies have pain at the time of diagnosis and 65% to 85% patients have severe pain with their disease becoming advanced.\(^3^9\) Up to 85% to 95% of these patients can be effectively treated by oral drugs.\(^3^8\) However, although oral pharmacotherapy is very effective and easy to administer, in our opinion, pain physicians should be familiar with various neurolytic procedures and incorporate them judiciously but in a timely fashion against pain.\(^1^4\)

Typically, neurolytic blocks are performed later in the course of disease when side effects from oral drugs become intolerable or conventional oral pharmacotherapy fails to adequately address the issue of pain.\(^9\) There is no specific consensus regarding indications and timing for application of these blocks.\(^1^6\) Recently, this issue of timing has been revisited and authors are suggesting an early role for neurolysis.\(^5\)

We undertook this study in an effort to present our experience with early neurolysis in cancer patients. Ours is a tertiary referral center, located in the capital of the country and we are actively involved in pain management of nearly 1,000 new cancer patients annually. Most of our patients are extremely poor, present to us in advanced stages of malignancy and have limited access to oral morphine. Jain et al. demonstrated the effectiveness of early use of celiac plexus neurolytic blockade and its role in reducing opioid consumption.\(^7\)

A variety of techniques have been described for performing a celiac plexus block\(^1^7\) since the original description by Kappis in 1914,\(^2^3\) but precise indications have not been clearly elucidated. Although it is usually employed for pancreatic cancer pain, it can be used for relieving pain in a variety of intra-abdominal cancers. We chose to use a bedside USG-guided anterior approach for CPN as it is a simple and effective technique that avoids unnecessary discomfort.

Our patients who underwent CPN demonstrated significant decreases in their VAS scores and opioid consumption. Their KS scores increased significantly, and there was significant improvement in the QoL.

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**Table 4. Pre- and PostIntervention Karnofsky Scores**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameter</th>
<th>Group CPN $n = 20$</th>
<th>Group SHPN $n = 18$</th>
<th>Group GIN $n = 6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pi KS</td>
<td>46.50 ± 10.4</td>
<td>51.67 ± 9.24</td>
<td>56.67 ± 5.16</td>
</tr>
<tr>
<td>2</td>
<td>M2 KS</td>
<td>60 ± 7.26</td>
<td>57.78 ± 5.49</td>
<td>56.67 ± 5.16</td>
</tr>
<tr>
<td>3</td>
<td>$P$ value</td>
<td>&lt; 0.0001</td>
<td>0.004</td>
<td>0.007</td>
</tr>
</tbody>
</table>

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**Table 5. Pre- and PostIntervention Quality of Life and Constipation Scores**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameter</th>
<th>Group CPN $n = 20$</th>
<th>Group SHPN $n = 18$</th>
<th>Group GIN $n = 6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Preblock QoL</td>
<td>4.95 ± 1.19</td>
<td>5.39 ± 1.09</td>
<td>5.0 ± 0.63</td>
</tr>
<tr>
<td>2</td>
<td>Postblock QoL</td>
<td>5.35 ± 1.22</td>
<td>5.83 ± 1.04</td>
<td>5.33 ± 0.81</td>
</tr>
<tr>
<td>3</td>
<td>Preblock CS</td>
<td>1.55 ± 0.51</td>
<td>1.28 ± 0.46</td>
<td>2.0 ± 0.35</td>
</tr>
<tr>
<td>4</td>
<td>Postblock CS</td>
<td>0.6 ± 0.5</td>
<td>0.72 ± 0.46</td>
<td>1.5 ± 0.55</td>
</tr>
<tr>
<td>$P$ value</td>
<td>&lt; 0.0001</td>
<td>&lt; 0.0001</td>
<td>&lt; 0.0001</td>
<td>0.06</td>
</tr>
</tbody>
</table>

QoL, quality of life; CS, constipation score; CPN, celiac plexus neurolysis; SHPN, superior hypogastric plexus neurolysis; GIN, ganglion impar neurolysis.
Wong et al.\textsuperscript{6} and Jain et al.\textsuperscript{7} reported similar findings in their studies. In their meta-analysis, Eisenberg et al.\textsuperscript{2} found that 90\% of patients had adequate pain relief at 3 months post CPN. In our study, all patients had good pain relief at their 2 month follow-up visit. The reported incidence of diarrhea varies from 60\%\textsuperscript{39} to 44\%\textsuperscript{2} after celiac plexus block. This was similar to the 55\% incidence of diarrhea that we found. Eisenberg et al.\textsuperscript{2} also reported a 96\% incidence of local pain and 38\% incidence of hypotension in their meta-analysis. Although 85\% of our patients who underwent CPN complained of local pain, only 15\% (group CPN) developed hypotension. This was probably due to the preloading regimen (1000 mL NS) that we used before block administration.

Various studies have demonstrated the efficacy of superior hypogastric plexus block in alleviating pain of pelvic cancers.\textsuperscript{25–30} Use of an anterior approach to superior hypogastric plexus block using CT guidance has been reported.\textsuperscript{26–29} We first described the technique of USG-guided anterior approach to SHPN in 2008 and since then have used it successfully in many patients.\textsuperscript{13} In our current study, we found a significant decrease in opioid consumption and VAS scores. Quality of life of the patients exhibited an improvement in performance status. While success rates of 69\%\textsuperscript{11} and 72\%\textsuperscript{12} have been reported, all our patients had significant pain relief. This was probably due to the fact that in earlier studies\textsuperscript{11,12} SHPN had been employed when pain became unresponsive to oral opioids, whereas we administered neurolysis at an early stage. Although the possibility of visceral injury with the anterior approach exists, appropriate preprocedure bowel and bladder preparation may aid in avoiding serious consequences resulting from such injury, as collapsed viscera tend to fall away from the needle. In concurrence with other authors,\textsuperscript{11,12} we did not observe any complications post SHPN.

Plancarte et al.\textsuperscript{13} first described the technique of ganglion impar block in 1990. Newer techniques to access ganglion impar have been suggested over the years.\textsuperscript{32–36} We have successfully modified the original technique using ultrasound assistance.\textsuperscript{15} We found a significant fall in VAS scores and opioid consumption in patients undergoing GIN, along with a rise in performance status, but quality of life remained unaffected. Agarwal-Kozlowski et al.\textsuperscript{14} used a CT-guided approach to ganglion impar block. Their patients did not report any block related complications and had adequate pain relief at 4 months follow-up. Our patients also did not report any complications from the block. Nine of forty-four (20.45\%) patients in our study had mixed pain at presentation and continued to have mixed pain post neurolysis at M2. However, the quality of pain had changed post neurolysis, as they reported a greater relief in their visceral component as compared to the neuropathic component. Mercadante et al.\textsuperscript{12} highlighted the issue of type of pain amenable to sympathetic neurolysis in their study and concluded that visceral pain is better relieved than the neuropathic variety. Since mechanisms for neuropathic and visceral pain differ, it is probably incorrect to expect neurolysis to address both types of pain equally.

Constipation is a major issue in GI and pelvic cancers, as it not only worsens pain, it also affects the patient’s QoL adversely.\textsuperscript{30} A decrease in constipation may possibly be another advantage of early neurolysis as oral morphine typically causes constipation.

Our study has certain limitations. This study was prospective in nature and although there have been randomized trials comparing CPB with conservative therapy, few authors\textsuperscript{5,7} have addressed the issue of early neurolysis. Further studies are required to clearly define and establish the role of early neurolysis. Secondly, our follow-up of patients was limited to 2 months. A long-term follow-up would be better regarding the time period of the demonstrated efficacy of neurolysis. Thirdly, we have used USG guidance for all blocks and these skills have been learnt over years with active participation from skilled interventional radiologists. We acknowledge that equipment and expertise of this sort may not be freely available. Fourthly, we have not employed a standardized QoL scale. Consequently, all parameters that may affect QoL uniquely in GI and pelvic cancer patients have not been examined.

In conclusion, we recommend that early USG-guided neurolysis be considered for achieving satisfactory pain control with minimal complications in patients with GI and pelvic cancers as it may be a feasible alternative to oral morphine therapy; its role warrants further investigation.

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