DOI: 10.7860/IJARS/2021/45477:2585

Original Article

Radiology Section

Efficiency of Image Guided Percutaneous Celiac Plexus Neurolysis in Abdominal Malignancy: A Prospective Interventional Study

SD MADHU[1], NILESH SURYAVANSHI[2], B HARISH[3], K HARISH[4]

ABSTRACT

Introduction: Celiac Plexus Neurolysis (CPN) is an underutilised tool in oncology and interventional radiology setup. Upper abdominal malignancy specifically carcinoma pancreas (CA pancreas), carcinoma stomach which causes intolerable pain, for which patients require a high dose of pain killers. CPN being a day care procedure alleviates the pain in a short duration and its effectiveness may last for months.

Aim: To assess the efficiency of image-guided CPN in alleviating intractable pain in upper abdominal malignancy.

Materials and Methods: A prospective interventional study was conducted on 25 patients with inoperable upper abdominal malignancy with intractable pain referred from the palliative care department. These patients were subjected to Computed Tomography (CT) guided or Ultrasonography (USG) guided CPN using 97% absolute alcohol either via posterior or anterior approach under CT guidance or anterior approach in USG guidance. Pain intensity score was assessed before and after the procedure (1, 3, and 7 days after the procedure) using Visual Analogue Scale (VAS).

Results: There was decrease of the pain intensity significantly in all the patients post-procedure. The VAS score at baseline was 6.48±1.56. One day after CPN, pain severity decreased to 4.16±2.17; three days later, it was 1.68±1.78; Seven days after CPN, pain severity still decreased significantly to 0.58±1.10. Percentage decrease in VAS from pre-procedure to 1, 3 and 7 days after procedure was found to be 39.07%, 76.29% and 90.06% respectively and VAS score reduction was statistically significant at p-value <0.001.

Conclusion: CPN is an underutilised palliative procedure for upper abdominal malignancy which effectively controls pain, thus reducing the need for analgesic medication. Both CT guidance and USG guidance can be used in performing the procedure.

Keywords: Alcohol ablation, Carcinoma pancreas, Interactable pain

INTRODUCTION

In the inoperable upper abdominal malignancy patients, pain is the most common distressing symptom. This causes significant impairment in quality of life and requires high doses of analgesics or opioids/ narcotics to control the pain, which may show serious adverse side effects [1]. One of the best and widely accepted ways to control pain is percutaneous CPN. It shows long-lasting improvements in abdominal pain and reduces the dose of opioids/ narcotics [2,3]. Also, this procedure is minimally invasive and safe with less than 2% incidence of major complications [3]. Celiac ganglion plexus is a network of ganglion that connects nerve fibres to the upper abdominal viscera. The nociceptive impulses from upper abdominal organs like liver, gall bladder, pancreas, spleen, kidneys, adrenal glands, distal oesophagus and bowel until the distal transverse colon are transmitted through these visceral sensory afferent fibres. These plexuses are located along the anterolateral aspect of aorta between the celiac artery and Superior Mesenteric Artery (SMA), origin at the level of T12-L1 disc and L2 vertebra. These plexuses can be reached by different approaches, most commonly by anterior approach and posterior approach [3,4]. Percutaneous CPN is chemical neurolysis or splanchnicectomy of the nerve fibres using alcohol or phenol. Various methods and technique have been described for performing percutaneous CPN in literature including fluoroscopy, CT and USG guidance [3,5-11] either by anterior or posterior approach.

Both CT and USG guidance have their advantages, with CT guidance being safe and most preferred choice that allows visualisation of abdominal anatomy, planning, passage and precise placement of needle tip and observation of contrast and neurolytic agent diffusion along the planes [3]. Both anterior and posterior approach can be employed in CT guidance, however anterior approach is often preferred.

USG guided percutaneous CPN has several advantages including; easily availability, not associated with radiation exposure, can be used to perform bedside procedures and allows direct visualisation of important vascular structures like aorta, celiac artery, SMA and also allows direct visualisation of diffusion of the neurolytic agent without using contrast. The disadvantages of USG guidance include; it is user-dependent and is limited in patients who are obese and in patients with poor window. Fluoroscopy guidance is rarely used as it does not allow visualisation of vital structures. Endoscopic USG guided percutaneous CPN is becoming increasingly popular as it allows direct visualisation of celiac plexus.

The present study was done to assess the efficiency of image guided percutaneous CPN in patients with upper abdominal malignancy with intractable pain and to assess the complications if any.

MATERIALS AND METHODS

A prospective interventional study was carried out from January 2019 till December 2019. About 25 cases of upper abdominal malignancy and chronic pancreatitis with intractable pain referred from the Department of palliative care, and other departments were considered for the study after obtaining the written consent from the patient and their relatives. Clearance was obtained from Institute Ethical Committee and scientific review board (No. KMIO/SRB/23/2018/19). All patients with intractable upper abdominal pain due to upper abdomen malignancy or chronic pancreatitis were included in this study. All the patients who cannot lie down, patients with non-correctable coagulation profile, diffuse non-localised abdominal pain, hypotension and the patients who refused to give a written consent were excluded from the study. All the patients underwent image-guided percutaneous CPN after pre-procedural evaluation.

Pre-procedural Work Up

Due consent was taken from the patients after explaining about the procedure, its benefits and the potential complications involved. Blood investigations including Complete Blood Count (CBC), coagulation profile and serology were performed. In case any of the patients were on anticoagulation medications, then such drugs were stopped before the procedure was initiated. Patient was kept on overnight empty stomach to decrease the bowel gas, specifically if procedure was done under USG guidance. IV analgesics like Tramadol 50 mg in 100mL of NS was given before the procedure, if necessary. Baseline pain (VAS score) assessment was done before the procedure to know the intensity of pain.

Technique

CT guided posterior approach: The patient was positioned in a prone position and a preliminary scan without contrast was done. Another scan was performed after placing the marker over the skin at T12 to L3 vertebral level, and an appropriate point of entry was chosen, most often left side entry in posterior approach was preferred. Chiba needle of 22G size and 15 cm length was passed under intermittent CT guidance from the entry site towards the anterolateral aspect of the aorta between the origin of the celiac artery and SMA, avoiding pleura and kidney. Once the needle tip was in position, suction was applied to confirm negative aspirate. A combination of 5 mL Lignocaine and 5 mL of Bupivacaine with 1 mL iodinated contrast was injected and CT image was obtained. Contrast diffusing along both anterolateral aspect of the aorta was desired for an effective CPN. The temporary block with local anaesthesia would cause a decrease in pain, which would help to assess the adequacy of needle tip placement and also alleviates the brief but significant pain caused due to alcohol injection.

Once the correct needle position was confirmed by contrast diffusion and temporary block, mild IV sedation was given with Fentanyl. About 20 mL of 97% ethanol should be slowly injected through Chiba needle. Further injection of alcohol depends on the pattern of alcohol diffusion. On post-procedure CT scan, the alcohol appears as a hypodense area in the background of hyperdense contrast. After alcohol injection, 5 mL of normal saline was administrated to ensure that alcohol does not accidentally reach the nontarget area while removing the needle [Table/Fig-1] [12].

Computed Tomography (CT) Guided Anterior Approach: In the anterior approach, the patient was placed in a supine position, after taking the preliminary CT scan. Markers were placed over the anterior abdominal wall and the point of entry was identified. A 22 G 15 cm Chiba needle was passed targeting the anterolateral aspect of the aorta between the origin of the celiac artery and SMA targeting the celiac plexus. To reach the target, the needle was safely passed through colon, small bowel, liver, stomach or pancreas. However, after injecting alcohol, normal saline flush should be done before removing the needle, to avoid accidental injection of residual alcohol within the needle into any of the organs along the needle path [12].

Ultrasonography (USG) guided anterior approach: Under USG guidance, the procedure is always done in a supine position. USG guidance has many advantages over CT guidance such as it is real-time, has no radiation hazard, vital vascular structures can be avoided and needle path can be changed in real-time. After draping the site of entry, 22 G Chiba needle was passed into the abdomen targeting the celiac plexus. The needle may pass through the above-mentioned visceral organs without any complications. After placing the needle at the anterolateral aspect of the aorta, Local Anaesthesia (LA) was injected under guidance. The diffusion of the fluid was seen in real-time. After ascertainment of proper diffusion in the appropriate place, 20 mL of alcohol should be injected into the site under guidance.

After the completion of the procedure, the patients were admitted in a palliative ward for a day and observed for any minor and major complications. All the analgesic medications were stopped after the procedure. Pain assessment using VAS score was performed immediately after the procedure and after 24 hours. A follow-up at 1, 3, and 7 days after the procedure for pain assessment was done using VAS score.

- Pre-procedure evaluation with CBC, coagulation profile, rules out any contraindications.
- Assessment of pain using VAS. Pre-procedure image assessment to plan for the approach.
- In posterior approach patient in a prone position, 22G 15cms Chiba needle passed in paraspinal location between T12 ana L1 vertebra, directing the needle tip towards the anterolateral aspect of the aorta between the origin of the celiac artery and SMA.
- In the anterior approach under CT, guidance needle is passed from the epigastric region towards aorta between the origin of the celiac artery and SMA. In anterior approach the needle may pass through small bowel, colon, stomach, liver or pancreas without major complications as the needle size is small.
- After confirming the tip position, suction applied to confirm negative aspiration.
- A 5 mL of lignocaine, 5 mL of bupivacaine and 1 mL of contrast injected and CT scan done which shows the diffusion of contrast around the anterolateral aspect of aorta.
- Followed by injection of 20 mL of 97% alcohol followed by 5 mL of normal saline and needle removed.
- Check scan done to confirm the diffusion of alcohol which appears hypodense.
- In USG guided approach, the needle is passed from the epigastric region. Under real-time USG guidance, the needle is positioned anterior to aorta between the origin of the celiac artery and SMA. Rest of the procedure is as same as CT guided procedure.

[Table/Fig-1]: Key points in CT guided anterior and posterior approach CPN and USG Guided approach.

STATISTICAL ANALYSIS

Descriptive statistics were summarised as means and Standard Deviations (SD) for the continuous variables and as frequencies for the categorical variables. Pre and post-image guided percutaneous CPN pain scores in terms of mean and SD was compared with ANOVA and t-test. Post-procedure pain reduction was calculated as percentage reduction at day 1, 3 and 7 after the procedure and illustrated in bar graphs. The p-value <0.05 was considered statistically significant.

RESULTS

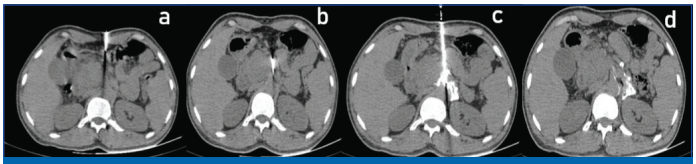
Basic information of 25 patients who underwent image guided (68% CT and 32% USG guided approach) percutaneous CPN is tabulated in [Table/Fig-2]. Mean age of study population was 58.50±5.75 years with minimum age of 45 years and maximum age of 68 years. Majority of the patients in the study group had inoperable pancreatic cancer {10(40%)}, followed by carcinoma of the stomach {6(24%)} [Table/Fig-2]. CT guided percutaneous CPN done in 17 (68%) cases among which 9 (53%) cases had anterior approach and 8 (47%) had posterior approach [Table/Fig-3,4].

The baseline VAS score was 6.48±1.56. After CPN, the observed VAS scores on day 1, 2 and 3 is shown in [Table/Fig-5] respectively. A statistically significant decline of the VAS scores on the first, third and seventh day after CPN was observed when compared with pre-procedure baseline VAS score using ANOVA (p-value <0.001). Further t-test between pre and post values of VAS showed statistically significant decrease in VAS scores with p-value <0.05.

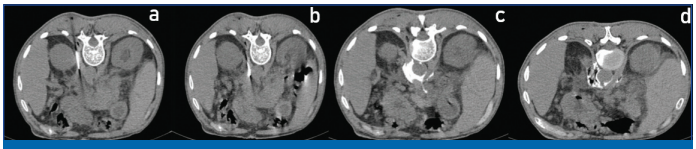
Percentage decrease in VAS from pre-procedure to 1, 3 and 7 days after procedure was found to be 39.07±2.19%, 76.29±24.30% and 90.06±19.77%, respectively [Table/Fig-6]. Comparison of pain reduction on 7th day between patients who had CT and USG image

Factors		N (%)
Age (years)	Mean±SD	58.50±5.75
Gender	Male, N (%)	16 (64.00)
	Female, N (%)	9 (36.00)
Pain score	Mean±SD	6.48±1.56
Diagnosis	Chronic pancreatitis, N (%)	5 (20.00)
	Carcinoma in stomach, N (%)	6 (24.00)
	Carcinoma in pancreas, N (%)	10 (40.00)
	Lymphoma, N (%)	2 (8.00)
	Carcinoma in Gallbladder, N (%)	2 (8.00)
Pre-procedure medications	Tramadol, N (%)	12 (48.00)
	Morphine, N (%)	6 (24.00)
	Fentanyl patch, N (%)	5 (20.00)
	Pregabalin+Tramadol, N (%)	1 (4.00)
	Buscopan, N (%)	1 (4.00)
Imaging modality and the approach	CT guided anterior approach, N (%)	9 (36.00)
	CT guided posterior approach, N (%)	8 (32.00)
	USG guided anterior approach, N (%)	8 (32.00)
Procedure	Unilateral N (%)	15 (60.00)
	Bilateral, N (%)	10 (40.00)
Alcohol injected (mL)	10, N (%)	1 (4.00)
	12, N (%)	1 (4.00)
	15, N (%)	5 (20.00)
	20, N (%)	17 (68.00)
	25, N (%)	1 (4.00)
Number of attempts	1, N (%)	3 (12.00)
	2, N (%)	17 (68.00)
	>2, N (%)	5 (20.00)

[Table/Fig-2]: Basic information of patients who underwent image guided percutaneous CPN (N=25).



[Table/Fig-3]: CT guided percutaneous celiac plexus neurolysis (CPN): anterior approach in a case of CA pancreas; (a) 22G Chiba needle passed from anterior abdominal wall; (b) Needle tip is positioned in anterolateral aspect of aorta next to SMA origin; (c) Contrast mixed with lignocaine and bupivacaine is injected with is wrapping around the anterolateral aspect of aorta; (d) Post alcohol injection CT scan showing hypodensity around the aorta suggesting proper diffusion of alcohol.

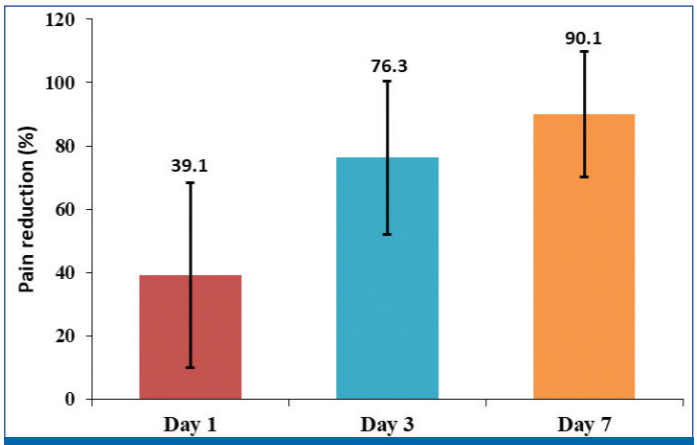


[Table/Fig-4]: CT guided percutaneous Celiac Plexus Neurolysis (CPN): posterior approach in a case of CA stomach; (a) 22G Chiba needle passed from posterior abdominal wall on the left side through posterior pararenal space, crossing the crus of diaphragm; (b) Needle tip is positioned in anterolateral aspect of aorta next to SMA origin; (c) Contrast mixed with lignocaine and bupivacaine is injected with is wrapping around the both anterolateral aspect of aorta; (d) Post alcohol injection CT scan showing hypodensity around the anterolateral aspect of aorta on both sides suggesting proper diffusion of alcohol, obviating the need for another procedure from right side.

Pain score (mean±SD)				p-value*
Pre-procedure	Post-procedure			
	Day 1	Day 3	Day 7	
6.48±1.56[a]	4.16±2.17[b]	1.68±1.78[c]	0.58±1.10[d]	<0.001

[Table/Fig-5]: Comparison pre and post percutaneous Celiac Plexus Neurolysis (CPN) Pain reduction.
*Statistically significant if p-value <0.05; Difference in superscript within a row indicates significant statistical difference (t-test); SD: Standard deviation

guided approach using ANOVA, determined no significant difference statistically with p-value= 0.403 [Table/Fig-7].



[Table/Fig-6]: Percentage reduction of pain at day 1, 3 and 7 after percutaneous Celiac Plexus Neurolysis (CPN).

Percent reduction of pain score (mean±SD)		p-value*
CT Guided (n=17)	USG Guided (n=8)	
88.62±21.81	95.56±9.94	0.403

[Table/Fig-7]: Comparison of percentage reduction of pain at day 7 after percutaneous Celiac Plexus Neurolysis (CPN) between patients who had CT and USG image guided approach.
*Statistically significant if p-value <0.05; SD=standard deviation

According to analgesic drug consumption, majority of patients (80%) post CPN, exhibited significant improvement in pain relief at 24 hours after the procedure. On follow-up of these patients, pain relief was significant till two months. After that they developed disseminated peritoneal deposits and distal metastasis. Five patients developed epigastric pain immediately after the procedure which subsided after IV analgesics (Tramadol and Morphine) and none of other patients had any immediate minor or major complications. Even though there was no complete pain relief in all these cases, there was significant reduction of dose of analgesics or these tablets were completely stopped. In 2 patients who did not get complete pain relief from CPN, small dose oral morphine or fentanyl patch were prescribed, and with these medications' patients were tolerating the pain.

DISCUSSION

Image guided CPN is effective method of pain control in upper abdominal pathologies, which has been studied by various authors through different technique across various institutions [13,14]. Eisenberg E et al., in a meta-analysis reported a good efficiency of CPN with 89% pain relief during first two weeks of the procedure and with 90% reduction in pain relief till the time of follow-up or survival [15], however these patients had metastasis in rest of the peritoneal cavity which was the cause of the persistent pain. Ischia S et al., described three different approaches in image guided CPN in a randomised prospective study in 61 patients and found no significant statistical difference in efficiency, morbidity associated and post-procedure pain relief among different approach to the procedure [16]. Present study also determined that post-procedure pain relief is more effective if the procedure is image guided CPN where both CT (68%) and USG (32%) approaches were employed. For all the patients, there was a significant reduction of pain post-procedure without any severe complications without any significance difference with respect to the approaches. In the current study, for majority of the patients, unilateral approach was done whereas bilateral approach was done in 40% of patient as pain was not relieved by the single approach. Both the approaches were found to be easy with great pain relief in all patients with no major complications encountered. Though Abloodu MC et al., and Tadros MY and Elia RZ, emphasised on single median puncture to reduce the suffering of patients and the amount of the neurolytic

agent used [17,18]. Rana M et al., and Wyse JM et al., preferred the bilateral technique to reduce pain which would adequately expose the celiac ganglia to ethanol [19,20].

Chemical ablation is most preferred modality to interrupt the neural networks of the celiac plexus and ethanol is most commonly used chemical. In this study, image guided CPN was done by injection of 10-25 mL of 97% ethanol. About 68% of patients in the study were administered with 20 ml of alcohol and observed 90% decrease in the pain VAS scores in the seventh day post CPN. Marcy P et al., used 30 ml of 99% ethanol and 79% of patients showed pain relief [21]. Wong GY et al., did image guided CPN in patients with CA pancreas and compared amount of pain relief obtained with CPN and with oral or IV analgesic among cases of CA pancreas, they found a significant improvement in pain relief among patients who underwent CPN [22]. In the present study, 10 cases with CA pancreas displayed significant improvement in pain relief at 24 hours post CPN. On follow-up of these patients, pain relief was significant till two months and then disseminated peritoneal deposits and distal metastasis was observed. With CPN, generally the major complication experienced was epigastric pain after the procedure, in this study five cases experienced epigastric pain after the procedure which was relived with medication. Next common complication explained in the literature is hypotension [4], which happens due to unopposed parasympathetic stimulation after neurolysis of sympathetic fibres. However, in present study we didn't experience any case with hypotension post-procedure.

This study exhibited 100% efficacy in pain reduction by using image guided CPN with no major complications. Present study was in agreement with the study carried out by Elsayed EE et al., who performed CT guided CPN on intractable abdominal pain with significant pain relief in all the patients [23].

Limitation(s)

This study has few limitations. Sample size of this study was small, further analysis with larger sample size is warranted to establish the clinical responders from this procedure. The second limitation was lack of expertise and skill needed to perform this procedure. The interventional Radiologist and the Palliative care specialist should be trained in handling image guidance for proper placement of needle tip. Third limitation was the heterogeneity of this study, as patients included were with all the causes of upper abdomen in this study. Carcinoma pancreas has severe pain compared to other tumours and chronic pancreatitis which results in varied responses to CPN.

CONCLUSION(S)

Image guided CPN for upper abdominal malignancy and chronic pancreatitis is an easy and safe procedure that provides high success rates in alleviating pain. It can be performed on bedside for bedridden patients.

REFERENCES

[1] Bhatnagar S, Gupta M. Evidence-based clinical practice guidelines for interventional pain management in cancer pain. Indian J Palliat Care. 2015;21:137-47.
[2] Kawamata M, Ishitani K, Ishikawa K, Sasaki H, Ota K, Omote K, et al. Comparison between celiac plexus block and morphine treatment on quality of life in patients with pancreatic cancer pain. Pain. 1996;64:597-602.
[3] Kambadakone A, Thabet A, Gervais DA, Mueller PR, Arellano RS. CT-guided celiac plexus neurolysis: A review of anatomy, indications, technique, and tips for successful treatment. Radiographics. 2011;31(6):1599-621.
[4] Wang PJ, Shang MY, Qian Z, Shao CW, Wang JH, Zhao XH. CT guided percutaneous neurolytic celiac plexus block technique. Abdom Imaging. 2006;31(6):710-18.
[5] Jain P, Dutta A, Sood J. Coeliac plexus blockade and neurolysis: An overview. Indian J Anaesth. 2006;50:169.
[6] Montero Matamala A, Vidal Lopez F, Inaraja Martinez L. The percutaneous anterior approach to the celiac plexus using CT guidance. Pain. 1988;34:285-88.
[7] Hilgier M, Rykowski JJ. One needle transcrural celiac plexus block. Single shot or continuous technique or both. Reg Anesth. 1994;19:277-83.
[8] Ina H, Kitoh T, Kobayashi MM, Imai S, Ofusa Y, Goto H. New technique for the neurolytic celiac plexus block the transintervertebral disc approach. J Am Soc Anesthesiol. 1996;85:212-17.
[9] Ischia S, Luzzani A, Ischia A, Faggion S. A new approach to the neurolytic block of the coeliac plexus: The transaortic technique. Pain. 1983;16:333-41.
[10] Lieberman RP, Nance PN, Cuka DJ. Anterior approach to celiac plexus block during interventional biliary procedures. Radiology. 1988;167:562-64.
[11] Lieberman RP, Waldman SD. Celiac plexus neurolysis with the modified transaortic approach. Radiology. 1990;175:274-76.
[12] Nitschke AM, Ray Jr CE. Percutaneous neurolytic celiac plexus block. InSeminars in Interventional Radiology. 2013:30(3):318.
[13] Hameed M, Hameed H, Erdek M. Pain management in pancreatic cancer. Cancers (Basel). 2010;3:43-60.
[14] Gunarathnam NT, Sarma AV, Norton LD, Wiersema MJ. A prospective study of EUS-guided celiac plexus neurolysis for pancreatic cancer pain. Gastrointestinal Endoscopy. 2001;54(3):316-24.
[15] Eisenberg E, Carr DB, Chalmers TC. Neurolytic celiac plexus block for treatment of cancer pain: A meta-analysis. Anesth Analg. 1995;80:290-95.
[16] Ischia S, Ischia A, Polati E, Finco G. Three posterior percutaneous celiac plexus block techniques. A prospective, randomized study in 61 patients with pancreatic cancer pain. Anesthesiology. 1992;76:534-40.
[17] Abloodu MC, Pujari VS, Channasandra TA, Bevinaguddaiah Y. Anterior approach celiac plexus neurolysis for a patient with necrotising fasciitis of the back. Nitte Univ J Health Sci. 2015;5:63–65.
[18] Tadros MY, Elia RZ. Percutaneous ultrasound-guided celiac plexus neurolysis in advanced upper abdominal cancer pain. Egypt J Radiol Nucl Med. 2015;46:993-98.
[19] Rana M, Candido K, Raja O, Knezevic N. Celiac plexus block in the management of chronic abdominal pain. Curr Pain Headache Rep. 2014;18:394-98.
[20] Wyse JM, Chen YI, Sahai AV. Celiac plexus neurolysis in the management of unresectable pancreatic cancer: when and how? World J Gastroenterol. 2014;20:2186-92.
[21] Marcy P, Magné N, Descamps B. Coeliac plexus block: Utility of the anterior approach and the real time colour ultrasound guidance in cancer patient. Eur J Surg Oncol. 2001;27:746-49.
[22] Wong GY, Schroeder DR, Carns PE, Wilson JL, Martin DP, Kinney MO, et al. Effect of neurolytic celiac plexus block on pain relief, quality of life, and survival in patients with unresectable pancreatic cancer: A randomized controlled trial. JAMA. 2004;291:1092-99.
[23] Elsayed EE, Elwarraky MS, Ella TFA, Soliman HMA. Role of computed tomography-guided percutaneous celiac plexus neurolysis in relieving pain caused by abdominal malignancy. Mofia Med J. 2018;31(2):525-30.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor and Intervnetional Radiologist, Department of Radiodiagnosis, Kidwai Memorial Institute of Oncology, Bangalore, Karnataka, India.
2. Postgraduate, Department of Radiodiagnosis, Kidwai Memorial Institute of Oncology, Bangalore, Karnataka, India.
3. Associate Professor, Department of Nuclear Medicine, Kidwai Memorial Institute of Oncology, Bangalore, Karnataka, India.
4. Assistant Surgeon, Department of Pain and Palliative Care, Kidwai Memorial Institute of Oncology, Bangalore, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. SD Madhu,
Flat No 51044, Building 5, Tower 1, Prestige Falcon City, Near Konanakunte Signal, Kanakapura Road, Bangalore-560062, Karnataka, India.
E-mail: sdmadhudoc@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jun 18, 2020
- Manual Googling: Sep 09, 2020
- iThenticate Software: Oct 08, 2020 (01%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jun 18, 2020**
Date of Peer Review: **Jul 08, 2020**
Date of Acceptance: **Sep 09, 2020**
Date of Publishing: **Jan 01, 2021**