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Original Article

Computed tomography-guided celiac plexus neurolysis for intractable pain of unresectable pancreatic cancer

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ABSTRACT

Aim of this study: To appraise the value of CT-guided celiac plexus neurolysis (CPN) as an effective method for alleviating intractable pain in patients with unresectable pancreatic cancer.
Patients and methods: 22 patients (their ages ranged between 45 and 73 years) with severe pain due to unresectable pancreatic cancer were subjected to CT-guided CPN by 25–30 mL of 97% ethanol via anterior approach and single puncture technique. The pain intensity scoring, both before and after the procedure, was done using the Visual Analogue Scale (VAS).
Results: All patients showed a significant pain reduction after CPN ($P < 0.001$), with peak reduction in the first day after CPN. Also, the mean ranks of analgesic requirements showed significant reduction ($P < 0.001$) and this reduction in analgesic requirements was maintained up to 3 months after the CPN. Less than half of the study population (45.5%) had some post-procedural adverse events, which were minimal and transient.
Conclusion: The CT-guided CPN via using anterior median approach and single puncture technique with injection of 25–30 mL of 97% of ethanol is an ideal palliative treatment for controlling severe pain caused by unresectable pancreatic cancer, with a significant reduction in the analgesic requirements.

1. Introduction

Over the last decades, the incidence of pancreatic cancer has increased. It is the seventh most common cause of cancer deaths especially in the developed world [1]. Few of the patients are diagnosed at a resectable stage (12–20%) [2]. About 80% of patients with advanced pancreatic cancer present with the symptoms of severe pain. Achieving effective control of pain is one of the most important goals in their management [3]. Administration of opioids is frequently limited by side effects or insufficient analgesia [4].

Pain from pancreatic cancer is likely mediated via the celiac plexus [3], which is the largest of the three great plexuses of the sympathetic nervous system (the cardiac, celiac, and hypogastric plexuses) [5]. It is located in the upper abdomen, in the retroperitoneal space, posterior to the stomach and pancreas, close to the celiac axis, and anterior to the aorta and the crura of the diaphragm. The celiac plexus consists of a dense network of ganglia nerve fibers, from both sympathetic and parasympathetic systems, surrounding the abdominal aorta, celiac and superior mesenteric arteries [6] (Figs. 1A and 2A–C). The celiac plexus has considerable variability in size (0.5–4.5 cm), number and position [4]. The location of the celiac plexus often varies with regard to bony landmarks (from the 12th thoracic and the 1st lumbar to the middle of the second lumbar vertebrae) and is more reliably found close to the celiac artery, on average 0.6 cm caudal to the celiac artery on the right and 0.9 cm caudal to the celiac artery on the left [5,6].

The afferent sensory inputs from the pancreas, diaphragm, liver, spleen, stomach, proximal part of the transverse and ascending colon, adrenal glands, kidneys, abdominal aorta and mesentery are conveyed through visceral sensory fibers of the celiac plexus. Impulses pass from the plexus to the splanchnic nerves and enter the spinal cord from the 5th to the 9th thoracic segments [7] (Fig. 1B).

Abbreviations: CPN, celiac plexus neurolysis; VAS, visual analogue scale; NSAIDs, non-steroidal drugs.

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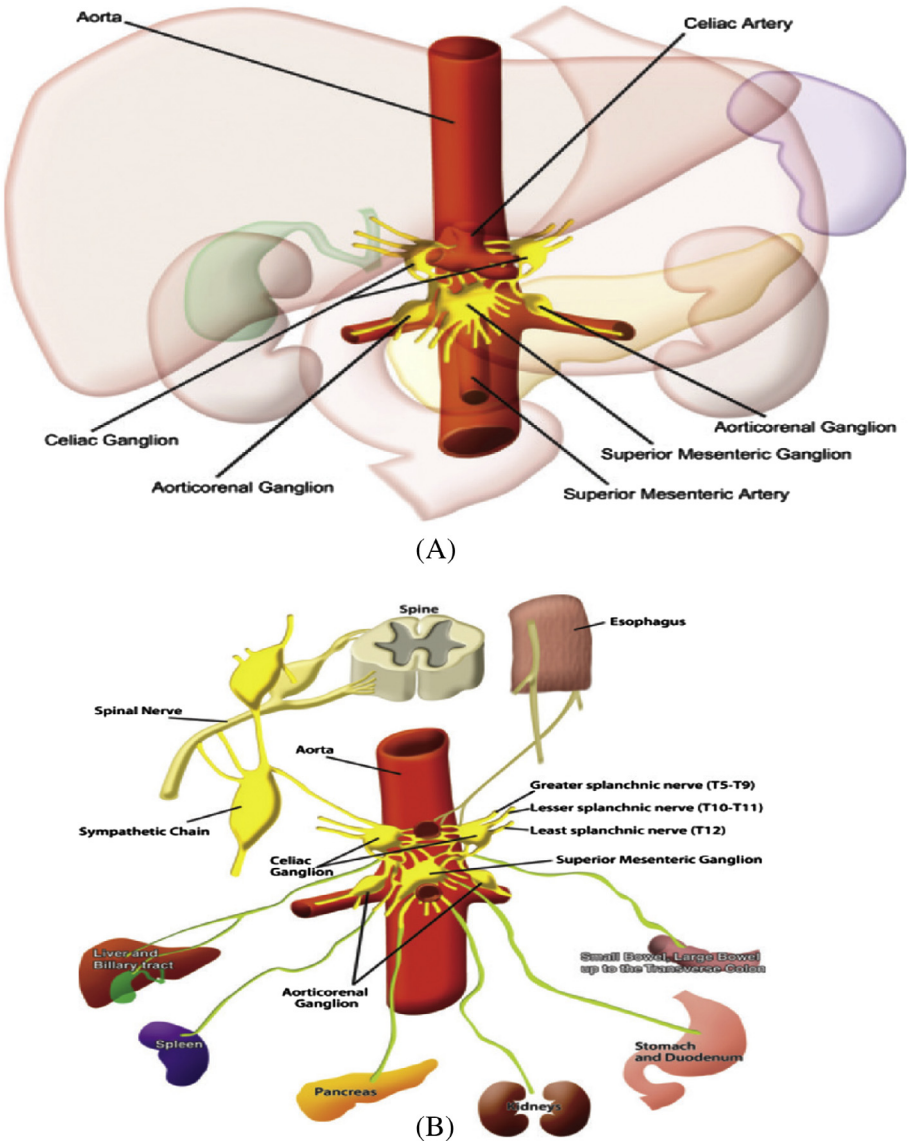

Fig. 1. (A and B): Diagrammatic illustration of the celiac plexus relations to the aorta and celiac artery (A), as well as, its neural connections with the abdominal viscera (B) (Quoted from Kambadakone et al. 2011) [6].

Celiac plexus neurolysis (CPN) is an ablative procedure of the celiac plexus that aims to destroy afferent pain transmitting fibers from abdominal viscera. Celiac neurolysis may target either the plexus or the ganglia. It can be chemical, thermal or surgical, with the chemical method being limited to alcohol or phenol [7]. There are several methods to introduce the neurolytic agents into the celiac ganglion. They include surgery, computed tomography (CT)-guided injection; percutaneous ultrasonography, fluoroscopy or endoscopic ultrasonography-guided (EUS) approaches [6]. The CT-guidance allows for direct visualization of important vascular structures, particularly the aorta, celiac trunk, and superior mesenteric artery. One of the major aspects of CT is its ability to follow the spread of the neurolytic agent and to detect its leakage into the peritoneal cavity [8].

The aim of this study was to appraise the incremental value of CT-guided CPN as an effective method for palliative management of intractable pain related to unresectable pancreatic cancer.

2. Patients and methods

2.1. Study participants and study design

The current study was carried out in the period between October 2015 and October 2016. A total of twenty-two consecutive patients (19 males and 3 females) were the subject of our study. Their ages ranged from 45 years to 73 years, with mean age of 61.21 ± 6.70 years. All of the studied patients were suffering from severe abdominal pain due to unresectable pancreatic cancer. They were referred from the Department of Clinical Oncology to the Radiodiagnosis and Interventional Imaging Department in our institution for CPN as a palliative treatment of progressive intractable abdominal pain; in the mid-epigastrium radiating to the back due to unresectable pancreatic cancer. In all patients, a definite diagnosis of advanced pancreatic carcinoma was achieved through histopathological analysis before deciding palliative treatment