Celiac plexus neurolysis: an effective alternative for the treatment of persistent abdominal pain

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Resumen

Introducción: La neurólisis del plexo celiaco (NPC) es un procedimiento percutáneo que permite la inyección de un agente neurolítico local, proporcionando una analgesia prolongada en pacientes con dolor abdominal superior persistente o intratable. Hasta un 80% de los pacientes con dolor oncológico de origen esofágico, gástrico, pancreatico o biliar pueden beneficiarse con este tratamiento, disminuyendo el uso de opiáceos y sus efectos adversos. Objetivos: Demostrar el abordaje intervertebral discal posterior guiado por TC para la realización de NPC y describir sus complicaciones. Revisión: El plexo celiaco es un plexo visceral que se localiza en el retroperitoneo. Proporciona inervación simpática, parasimpática y sensitiva a las vísceras del abdomen superior. La TC permite una excelente guía para la inyección de un

Abstract

Introduction: Celiac Plexus Neurolysis (CPN) is a percutaneous procedure performed to inject a local neurolytic agent that provides a prolonged analgesia in patients with persistent or intractable upper abdominal pain. 60 to 80% of patients suffering from oncologic esophageal, gastric, pancreatic or biliary pain can benefit from this technique and reduce the use of opiates and their adverse effects. Objectives: To demonstrate the posterior intervertebral disc CT-guided access path for the performance of CPN and to describe its complications. Revision: The celiac plexus is a visceral plexus located in the retroperitoneum. It provides sympathetic, parasympathetic and sensory innervation to upper abdominal viscera. CT is a precise guide for the injection of a neurolytic agent (phenol or ethanol). The posterior access path through the intervertebral disc is an
Introduction

Celiac Plexus Neurolysis (CPN) is a percutaneous procedure performed to inject a local neurolytic agent. The term neurolysis refers to the destruction of the plexus by means of an injection of ethanol or phenol. It provides relief for prolonged pain, as opposed to the block, which is temporary and uses steroids and analgesics (1-2).

The resulting abdominal pain from abdominal neoplasia is a serious and frequent problem that affects the quality of life and survival of the patient. The management of the oncologic abdominal pain is a complex challenge and it requires high doses of analgesics with its unwanted adverse effects. 60 to 80% of patients suffering from oncologic esophageal, gastric, pancreatic or biliary pain can benefit from this technique (2-4).

The innervation of upper abdominal viscera originates in the splenic nerve and in the celiac plexus (5). An effective way to relieve abdominal pain is to interrupt the impulses of nociceptors at this level. Imaging-guided CPN is an invaluable therapeutical option for pain management in this group of patients (8).

Revision

The celiac plexus, also known as solar plexus, is located in the retroperitoneum on the anterolateral wall of the aorta, between the adrenal glands capsules and around the origin of the celiac trunk and the superior mesenteric artery. It provides sympathetic, parasympathetic and sensory innervation to the pancreas, liver, biliary tract, bladder, spleen, adrenal gland, mesentery, kidneys, stomach and part of transverse colon.

There are two access paths to locate and access the celiac plexus: percutaneous and surgical access. The percutaneous access path requires imaging guidance. Fluoroscopic guidance was described in the 1950s, tomographic guidance in the 1970s, and finally ultrasound guidance was described in the 1990s (1-2, 9). Today, tomographic guidance is more widely used since it offers a better spatial resolution, which helps to assess possible anatomical variants, to control localization and to administer the neurolytic agent. The main indications and contraindications are summarized in Figure 2. The main disadvantage of this procedure is radiation (7).

Neurolytic agents destroy the nerve cell membrane. Agents most used are phenol and ethanol, and their main properties are (9):
Phenol:
- Less effective and more viscous than ethanol.
- It does not produce pain during its administration.
Ethanol:
- It has to be used in concentrations over 50% for it to be effective
- Its administration produces temporary pain that can be treated adding a local anesthetic (bupivacaine) together with iodine contrast to assess its distribution.

The patient has to be positioned in a way that it provides a simple path to perform the procedure (2) (Figure 3).

The access path through the posterior intervertebral disc (which is the first choice at our center) is performed with the patient in prone position entering through the disk D12-L1 or L1-L2. This pathway reduces the risk of injuring viscera. It is especially useful in those cases where it is difficult to access, such as the interposition of transverse apophysis or ribs, or due to a severe thoracic-lumbar arthrosis. It can be unilateral or bilateral requiring an injection of 25-30 ml of the neurolytic agent (2, 8, 10).

Mayor complications of the procedure occur in less than 2% of the patients. Minor complications are much more frequent, but in general, they are temporary and well tolerated (2, 6) (Figure 5).

One of the key points to obtain successful results is to adequately inform the patient and his/her family about the usefulness and limitations of the procedure. Another key point is the timely indication of neurolysis since there are better results when the pain is in initial stages. The most common causes of therapeutic failure are related to a bad propagation of the neurolytic agent in the celiac plexus due to alteration of the anatomy, infiltration, surgery, prior radiation or insufficient dosage (2).

**Conclusion**

CT-guided CPN is a safe procedure with low complication rates and highly effective for the treatment of persistent abdominal pain. Appropriate knowledge of this procedure is key for the multidisciplinary approach in the control of intractable abdominal pain.

**Figure 1. Anatomical diagram of the location of the node (N), their relationship with the celiac trunk (CT) and their sensory afferent fibers.**
**Celiac plexus neurolysis**

<table>
<thead>
<tr>
<th>INDICATIONS</th>
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<tr>
<td>- Primitive or secondary neoplastic disease of (mainly) pancreatic, gastric or esophageal origin.</td>
<td>- Severe coagulopathy or thrombocytopenia.</td>
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<td>- Relief in abdominal pain caused by chronic pancreatitis.</td>
<td>- Local intra-abdominal infection or sepsis.</td>
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<td>- Intestinal obstruction.</td>
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<td>- Poor visualization of anatomical structures.</td>
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*Figure 2. Main indications and contraindications of CPN.*

*Figure 3. CT-guided access paths when performing CPN.*

*Figure 4. Posterior intervertebral disc access path with the patient in prone position.*

A) Planning and measuring of the site that will be punctured (D12-L1). B) Control of the entrance and path of the Chiba 20 G needle through the intervertebral disc D12-L1 with air injection and its diffusion. C) Injection and propagation of the neurolytic agent (phenol with contrast solution).
**Figure 5. Major and minor complications of CPN.**

- **MAJOR**
  - Neurologic damages, monoplegic, bladder or anal sphincter dysfunction.
  - Pneumothorax, pleurisy, pericarditis, arterial damage, local hematomas, temporary hematuria, abscess, intravertebral disc damage.

- **MINOR**
  - Back pain.
  - Orthostatic hypotension (due to reduction in sympathetic activity).
  - Temporary diarrhea.
  - Back pain radiated to the shoulder due to irritation of the diaphragm.
  - Anterior abdominal pain due to peritoneal irritation.

**Bibliography**


