

## Case Report

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# Acute Respiratory Failure as a Rare Complication of Celiac Plexus Block in a Patient with Adenocarcinoma of the Ampulla of Vater

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Celiac and splanchnic plexus blocks are considered as terminal approaches for pain control in end stage pancreatic cancer. It may be done temporarily (using local anesthetics) or as a permanent act (using alcohol and/or phenol).

Like every other interventional procedure, celiac plexus block has its own potential complications and hazards among them pneumothorax and ARDS are very rare.

In this case report we present an end stage patient with adenocarcinoma of ampulla of Vater with involvement of both abdomen and thorax who presented with severe intractable abdominal pain.

Bilateral celiac plexus block in this patient resulted in left side pneumothorax and subsequent development of ARDS. We discuss the rare complications of celiac plexus block as well.

**Key words:** Celiac plexus block, Acute Respiratory Distress Syndrome (ARDS), Pneumothorax

## INTRODUCTION

Pancreatic cancer is a malignant neoplasm causing unbearable pain for the patient at its advanced stages. The pain is so intense that makes normal life impossible for such patients. Conventional pain control methods like administration of sedatives, anti-inflammatory drugs, opioids, anticonvulsants and similar medications are no longer effective for these patients (1). They usually present to pain clinics in a very tragic state and insist on alleviating the pain rather than treating the cancer.

Celiac plexus block especially in advanced stages of cancer can greatly help in pain control and result in relative improvement of patient's condition (2- 4).

Celiac plexus block can be done in 2 forms:

- A. Short term and temporary block using local anesthetics: The goal of this block is firstly to decrease patient's pain temporarily and secondly to evaluate the success rate of block in order to perform a permanent block
- B. Permanent block: performed through plexus neurolysis with necrotizing agents like alcohol or phenol. In most cases, both blocks are performed one after the other in order to obtain better results (3, 5, 6). Each of these blocks can be performed through various techniques. Two main techniques that have the highest indications are discussed below (5).

1- Performing the block under CT scan guidance: in this technique, patient is placed in prone position. The needle is inserted in its appropriate location. This location is found using anatomical points and CT scan guidance. In order to make sure the needle is inserted in its correct location, a small amount of contrast material (dye) is injected. After reassuring about the site and method of injection, the necrotizing agent is injected (4, 6- 9).

The same is performed for the other side of the body. For anesthetizing the skin and subcutaneous tissues celiac plexus block is usually performed in association with splanchnic plexus block. For each side, after injection at the celiac plexus location, needle's position is changed to block the splanchnic plexus as well (4- 6).

2- Performing the block under ultrasound guidance: In this technique the patient is placed in supine position which is more comfortable. Location of vertebral column, large vessels and celiac and splanchnic plexuses is determined using ultrasound guidance. Using a long needle like Chiba under ultrasound guidance, site of injection is found and first local anesthetic and in case of success necrotizing agent is then injected (10, 11).

Each of these techniques has its own advantages and disadvantages. The first technique has the advantage of being easy to perform and no organ is in the way of finding the plexus and patient's position is suitable for the practitioner. The second technique has the advantages of not requiring X-ray and patient's suitable positioning (7, 10). Advantages of each technique can potentially be the disadvantages of the other one (12).

Like every other interventional technique, celiac plexus block can be associated with potential complications. These complications are categorized into two groups. First group of complications are those occurring due to the block itself and the second group are those related to the type of technique used, level of expertise of the practitioner and his/her experience in this matter (8, 4, 13). These complications include failure of block, pain at the site of injection, impairment of physiologic functions like postural (orthostatic) hypotension, diarrhea, impaired ejaculation and complications following the block induction like

anesthesia of lumbar somatic nerves, injecting the drug into the epidural space, subarachnoid space or vascular space, renal damage, chlothorax, paraplegia, vascular trauma, thromboembolism, peritonitis, retroperitoneal hematomas, urinary system anomalies, pneumothorax, etc. Incidence rate of these complications is small but due to their significance special attention should be paid to prevent them and manage them in case of their occurrence. Pneumothorax and acute respiratory failure are among the very rare complications of celiac plexus block which are predictable and preventable if adequate precision is maintained during the procedure. In this study we report a case of pneumothorax and following complications as ARDS due to bilateral celiac plexus block.

## CASE SUMMARIES

The patient was a 42-year-old man who presented with severe upper abdominal pain to a private pain clinic. He underwent temporary bilateral celiac plexus block for management of pain due to cancer. About 16 hours after the procedure he was hospitalized in the same center due to severe chest pain, cyanosis and respiratory distress. The next day he was transferred to our center with the diagnosis of ARDS.

The onset of disease in this patient was about 2 years ago. He developed upper abdominal pain, loss of appetite and weight loss. After thorough evaluations, he was diagnosed with adenocarcinoma of the Ampulla of Vater (stage II B) and underwent Whipple surgery. He had to undergo another surgery 1 week later due to the upper GI bleeding. Six courses of chemotherapy and one course of radiotherapy in a time period of 6 months were performed for him.

About 1 year after Whipple surgery, signs of lung metastasis were detected in a control CT-scan of the lungs. The patient had no clinical respiratory symptoms at the time. Further evaluations and lung needle biopsy confirmed the metastasis and he underwent another 2 cycles of chemotherapy.

About 5 months later, the patient developed GI pain and the physician prescribed some GI medications and NSAIDS for him.

By aggravation of the GI pains, the patient presented to a private pain clinic. At first, fentanyl skin patch (Duragesic) was prescribed for the patient but due to no success, he became a candidate for bilateral celiac plexus block. Right celiac plexus block was performed by administration of 6 ml bupivacaine solution 125% apparently with no complication. Similar block in the left side was performed successfully on the third attempt after 2 unsuccessful attempts (and probably entering the pleura). Patient's pain score was controlled for about 3 hours and after making sure of the adequate pain control the patient was discharged.

About 16 hours later, the patient presented again to the emergency unit of the same center complaining of severe dyspnea, cyanosis, hypoxia and chest pain. After primary evaluations and obtaining a chest x-ray air entrapment in the left pleural space (pneumothorax) was detected. Chest tube was inserted for him and he was monitored in the emergency unit. A few hours later his dyspnea and chest pain worsened and he developed tachypnea, cyanosis, respiratory distress, and electrolyte imbalance. He was intubated with the diagnosis of ARDS and transferred to the ICU for more precise monitoring. The next day he was transferred to our ICU as a respiratory referral center.

Primary evaluations in our center indicated severe progressive ARDS probably due to the primary trigger of pleural and pulmonary manipulation (pneumothorax). Aggressive and invasive treatment of ARDS was performed for the patient according to international protocols and guidelines but unfortunately the progressive course of disease continued and the patient passed away in less than 12 hours later due to respiratory failure and acid-base imbalance.

## DISCUSSION

Celiac plexus block is an accepted method frequently used for alleviation of severe pancreatic pains especially cancer pains in this area (1- 4). Chronic severe pains due to pancreatic head tumors are considered among the most severe cancer pains. Sometimes these pains are so unbearably severe that affect the patient's normal life and interfere with simple every day activities. Pain control for these patients is a major goal during their course of

treatment. Although some of these patients may not have a long-term survival, pain control and re-instating their normal or close to normal life is a matter of utmost importance. Conventional pain control methods like administration of sedatives, anti-inflammatory drugs and opioids are not efficient in many cases and cannot alleviate the pain (8). Celiac plexus block at advanced stages of disease can greatly improve pain control and patient's relative condition (4, 8). Celiac plexus block can be performed in 2 forms of temporary and short term with the use of local anesthetics or permanent through neurolysis of celiac plexus by agents like phenol and alcohol (8, 14). In most cases, a combination of both methods-usually consecutively- is applied to cause analgesia. In order to induce adequate local anesthesia in the skin, etc. celiac plexus block is often performed in association with splanchnic plexus block. For easily accessing this plexus CT scan, ultrasound, C-Arm, radiologic and fluoroscopic guidance are employed (8, 15). Like every other medical procedure, this nerve block method has its own advantage and disadvantages. Celiac plexus block has potential complications that although rare, are noteworthy (8, 16). These complications should be prevented and treated in case of occurrence. Pain and block failure are the simplest complications that may occur. Some of these complications are due to impaired physiologic function. These complications that include postural (orthostatic) hypotension, diarrhea and impaired ejaculation are more prevalent than the others but are self limited and improve spontaneously. Other complications may include anesthesia of lumbar somatic nerves and their dysfunction, injection of drug into the epidural, sub-arachnoid or intravascular spaces, renal damage, chilo thorax, paraplegia (17-19), vascular trauma, thromboemboli, injections inside the intervertebral disk or inside the psoas muscle, abscess formation, peritonitis, retroperitoneal hematomas and urinary system disorders (4). Occurrence of pneumothorax following celiac plexus block is a rare complication. However, since medial reflection of pleura is usually extended from the inferomedial to T12 or L1, risk of pneumothorax should always be considered during the procedure of celiac plexus block (13). The pneumothorax that occurs is usually relatively mild because of the small

trauma caused by entering the needle and in most cases monitoring the patient and precise care are the only measures need to be taken (14). However, insertion of a chest tube and evacuating the air should always be considered where pneumothorax is clinically significant (4, 8). Occurrence of ARDS following celiac plexus block is very rare. We could not find any case of ARDS following celiac plexus block reported in the literature. But since lung pathologies can be a trigger for occurrence of ARDS, its potential risk should always be considered. Theoretically, clinically important pneumothorax resulting in development of clinical signs and symptoms may potentially result in inflammation and ARDS eventually through the process of causing respiratory distress, gas exchange impairment and relative stimulation of lung tissue. Occurrence of ARDS with any etiology requires prompt care, quick and in-time diagnosis, and rapid proper treatment. In case of rapid diagnosis, the disease can be controlled through adequate treatment. However, in case of no or late diagnosis and treatment or if the primary pathologic lesion is so severe that makes its management impossible, risk of serious complications and morbidity and mortality would be extremely high.

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