

# Celiac Plexus Block – A Palliative Care For Pancretic Malignancy

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## Citation

H Abbas, M Kohli, Murali, S Singh, V Singh. *Celiac Plexus Block – A Palliative Care For Pancretic Malignancy*. The Internet Journal of Anesthesiology. 2010 Volume 29 Number 1.

## Abstract

### INTRODUCTION

The celiac plexus, also known as the solar plexus, is a complex network of nerves (a plexus) located in the abdomen retroperitoneally. The celiac plexus is located near where the celiac trunk, superior mesenteric artery, and renal arteries branch from the abdominal aorta.

The plexus is formed (in part) by the greater and lesser splanchnic nerves of both sides, and also parts of the right vagus nerve. The celiac plexus proper consists of the celiac ganglia with a network of interconnecting fibers. The aorticorenal ganglia are often considered to be part of the celiac ganglia, and thus, part of the plexus. Celiac ganglia vary from 1 to 5 in number, and also located from T12 to L2<sup>1</sup>. The celiac plexus innervates most of the abdominal viscera, including stomach, liver, biliary tract, pancreas, spleen, kidneys, adrenals, omentum, small bowel, and large bowel to the level of the splenic flexure. Coeliac Plexus block can be performed for pain palliation in patients who have chronic abdominal pain related malignancy. Many ways are available for performing the block; blocks which are performed under image guidance has less complication and good success rate.

### METHODS AND MATERIALS

#### DESIGN OF STUDY: PROSPECTIVE CASE STUDY

After getting approval from the Ethical Committee, Chhatrapati Shahuji Maharaj Medical University, Lucknow, UP, an informed consent was taken from the patients. The procedure was performed in 19 patients referred for treatment of chronic abdominal pain due to pancreatic cancer. A subjective evaluation of the degree of pain relief was obtained by retrospectively reviewing the notes of physicians and nurses. The degree of pain relief was graded

from 0 to 4. Blocks that had no effect were graded 0, blocks that provided minimal improvement were graded 1, blocks that clearly reduced pain but did not make the patients comfortable were graded 2, blocks that made the patients comfortable but not pain-free were graded 3, and blocks that rendered the patients entirely free of pain were graded 4. An objective evaluation was also obtained by comparing average daily in-hospital analgesic usage before and after the procedure.

### TECHNIQUE

Before the procedure, in each patient, an intravenous line was established along with ECG, blood pressure, pulse rate and oxygen saturation monitoring. The ultrasonic-guided anterior approach to the coeliac plexus block is used with the patient in the supine position. After setting local cutaneous and subcutaneous anaesthesia, with strict aseptic precautions, a 15-cm-long 25 G-needle is introduced into the epigastrium. The point of the needle is ultrasonographically guided, inserted into the pre-aortic area near the origin of the truncus coeliacus. The position of the needle point is ultrasonographically controlled. After careful aspiration on two levels, 40 ml of absolute alcohol is injected. The spread of the solution is evaluated by ultrasound. If the needle position is correct; a few minutes later the patient has a feeling of warmth in the upper abdominal region.

### RESULTS

Of 19 patients the block was successfully performed in 17 patients. 2 patients refused to give consent. Of the 17 celiac blocks performed, 12 patients had pain relief of grade 3 or 4, three patients had grade 2 pain relief, and two patients had poor pain relief (grade 1 or 0). There was significant reduction in opioid dose was seen in patients with grade 4, 3 and 2 pain relief. There was on an average 81% reduction in

opioid requirement was seen. 2 patients who had poor pain relief showed to continue their opioid without any reduction in dose. These 2 patients also needed supplemental non-opioid also. With the follow up of one year, 5 patients came for second block within 3 months, and 6 patients within 6 months. These patients who had two settings of block had excellent results than patients with single setting. We were able to note few complications during procedure.

Hypotension was seen with 7 patients and this was corrected with fluid administration, none of them needed any vasopressors. 3 Patients developed fever during hospital stay and is due to cholangitis rather than the procedure itself.

### **DISCUSSION**

Percutaneous technique for block of the splanchnic nerves and celiac plexus with local anesthetic was introduced by Kappis in 1914. Celiac plexus block can be performed by various approaches like posterior (classic retrocrural) which was introduced by Kappis, and anterior<sup>2</sup>. Popper (1948) recommended the use of splanchnic nerve block with local anesthetic as a diagnostic tool. Lieberman<sup>3</sup> et al described a posterior transaortic approach in which a single needle is passed through the aorta and the neurolytic agent is just injected anterior to the aorta. This technique avoided two posterior needle insertions. More accurate block can be now a day's achieved by CT guided and ultrasound guided blocks and this is approached anteriorly which has less complication and more accuracy than the classical posterior approach<sup>4,5</sup>

### **TECHNIQUE**

#### **POSTERIOR APPROACH**

The patient is placed in the prone position with a pillow beneath the abdomen. This position increases the distance between the costal margins and the iliac crests and between the transverse processes of adjacent vertebral bodies. The landmarks include the iliac crests, 12th ribs, dorsal midline, vertebral bodies (T12-L2), and lateral borders of the paraspinal (sacrospinalis) muscles. Intersection of the 12th rib and the Lateral border of the paraspinal muscles on each side are connected with lines to each other and to the cephalic portion of the L1 spine, forming an isosceles triangle<sup>6</sup>. Point of needle entry, is about four fingerbreadth (7.5 cm) laterals to the midline, just beneath the 12th ribs. The needles are initially oriented 45 degrees toward the midline and about 15 degrees cephalad. If any bony contact is made, the needles are withdrawn to the level of the subcutaneous tissue and redirected slightly lateral, the left-

sided needle is gradually advanced 1.5 to 2 cm or until the pulsations emanating from the aorta transmitted to the advancing needle are felt<sup>7,8</sup>. The right-sided needle is then advanced slightly farther. Ultimately, the tips of the needles should be just posterior to the aorta on the left and to the anterolateral aspect of the aorta on the right. The needle hubs are inspected for blood, cerebrospinal fluid, thoracic fluid and urine. A small volume of contrast material is injected bilaterally and its spread is observed radiographically. Alternatively, computed tomography (CT) guidance can be used. If contrast material is confined entirely to the retrocrural space, the needles should be advanced to the retrocrural space to minimize the risk of posterior spread of local anesthetic or neurolytic agent to the somatic nerve roots<sup>9</sup>.

#### **ANTERIOR APPROACH**

The anterior technique can be carried out under CT or ultrasound guidance. The patient is placed in the supine position on the CT or ultrasound table. The needle entry site is 1.5 cm below and 1.5 cm to the left of the xiphoid process (Lieberman 1988). A 22 G, 15 cm needle is introduced perpendicular to the skin and advanced to the depth of the anterior wall of the aorta, as calculated using CT or ultrasound guidance. If CT guidance is being utilized, 4 ml of water-soluble contrast in solution is injected to confirm needle placement. If ultrasound guidance is being used, 10 to 12 ml of sterile saline can be injected to help confirm needle position. After satisfactory needle placement is confirmed, diagnostic and prognostic block is carried out using 15 ml of 1.5 % lidocaine or 3.0 % 2-chloroprocaine. An alternative technique uses fluoroscopy to guide the passage of a single needle just to the right of the center of the L1 vertebral body, after which it is withdrawn 1 to 3 cm<sup>10</sup>. Prophylactic antibiotics are administered and needles of no larger than 22 gauge is used.

In our study we were able to see that we recorded 88.2% (15/17) patients showed significant pain relief. 2 patients who showed no pain relief may be due to the anatomic variation in the placement of the celiac plexus. Studies showed that regardless of the approach used there was excellent pain relief in patients who's received celiac plexus block<sup>11,12</sup>.

Our study also showed reduction in opioid requirement in 15 patient's upto an average of 81%. In few previous studies which compared between patients taking only opioids and those who received celiac plexus block, showed significant

reduction in opioid dose in group which received block<sup>13,14</sup>.

Most Common side effects of the block may include back or abdominal pain (96%), diarrhea (44%), and postural hypotension (38%). Rare complications such as paraplegia, bleeding, renal injury, peritonitis, abscess, retroperitoneal hematoma, intestinal ischemia, pneumothorax, and lumbar puncture have been reported depending on various approaches. The complications are most commonly due to incorrect identification of celiac plexus, and can also be due to structural damage to the nerve tissue and due to extravasation of alcohol<sup>15</sup>. Retroperitoneal abscess has also been reported with anterior approach<sup>16</sup>. Hypotension is most commonly due to splanchnic vasodilatation<sup>17</sup>. Subarachnoid injection, injection of the drug into spinal artery is the dreadful complications of posterior approach which can be avoided in anterior approach.

We encountered hypotension in 7 patients, which was easily treated with intravenous fluids.

We used ultrasound guidance in our study which has advantages like, It can clearly delineate the abdominal aorta, the celiac artery and the superior mesenteric artery, Neurolytic agent diffusion can be observed clearly without using any contrast medium, Technique is low in cost, Patient education with respect to the technique is easier. This technique also has few disadvantages like, USG is not able to display retroperitoneal structures, and Anatomical display is operator dependant.

The anterior approach, we used in our study has advantages like, it is relatively ease, speed and reduced peri-procedural discomfort as compared with posterior techniques<sup>18</sup>, quicker and easier to perform, requiring direct vertical puncture with no angulation of the needle, less time consuming than posterior approach, the anterior approach is less painful than posterior approach because it pierces only few structures and also needed only single needle puncture, whereas posterior approach needs two needle puncture, the anterior block can be given during diagnostic procedures. Greatest advantage of the anterior approach is that patients have to be in supine position which avoids problems of prolonged prone position. Needle placement is pre-crural in anterior approach which has less risk of spread of drugs to epidural or subarachnoid spaces.

We have few disadvantages of the anterior approach like infection, abscess, hemorrhage, and fistula formation<sup>19</sup>

More recently, endoscopic ultrasound guided celiac plexus

block was reported as a safe and effective pain management modality in pancreatic cancer patients<sup>20</sup>. This technique being a minimally invasive procedure, gives advantage of less complication.

### CONCLUSION

In our perspective study, we were able to see clearly that advantages outweighs the disadvantages of the anterior approach and we hope that anterior approach shall become the technique of choice for celiac plexus block in the years to come.

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