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Neurolysis of the sympathetic axis for cancer pain management

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Neurolytic blocks of sympathetic axis was a procedure that was widely used in the past for the control of upper abdominal pain or pelvic pain in patients with cancer. However, new studies suggest that these blocks are not effective in treating pain that is not visceral in origin. Consequently, when there is evidence of disease outside of the viscera, such as patients with lymphadenopathy, the success rate decreases significantly. Moreover, a controlled randomized study has shown that, even in the best-case scenario, the length of full pain control is no more than 2 months. Thus, we should re-consider our indications for these procedures, and when indicated, they should be performed early in the course of the disease.

Stretching, compressing, invading, or distending visceral structures can result in a poorly localized noxious pain, visceral pain. Patients experiencing visceral pain often describe the pain as vague, deep, squeezing, crampy, or colicky. Other signs and symptoms include referred pain (for example, shoulder pain that appears when the diaphragm is invaded with tumor) and nausea/vomiting due to vagal irritation.

Visceral pain associated with cancer may be relieved with oral pharmacologic therapy that includes combinations of nonsteroidal antiinflammatory drugs (NSAIDs), opioids, and coadjuvant therapy. In addition to pharmacologic therapy, neurolytic blocks of the sympathetic axis are also effective in controlling visceral cancer pain and should be considered as important adjuncts to pharmacologic therapy for the relief of severe pain experienced by cancer patients. These blocks rarely eliminate cancer pain because patients frequently experience coexisting somatic and neuropathic pain as well. Therefore, oral pharmacologic therapy must be continued, albeit at lower doses. The goals of performing a neurolytic block of the sympathetic axis are to maximize the analgesic effects of opioid or nonopioid analgesics and reduce the dosage of these agents to alleviate side effects.

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Since neurolysis techniques have a narrow risk-benefit ratio, undesirable effects due to neurolytic blocks can be minimized with sound clinical judgment and by assessing the probable effect of the technique on each patient. A detailed description of the techniques for these blocks is beyond the scope of this review but is available elsewhere.[1] This report describes several different approaches to achieve neurolysis, including the celiac plexus block, superior hypogastric block, and ganglion impar block.

Celiac plexus block

The celiac plexus is situated retroperitoneally in the upper abdomen. It is at the level of the T12 and L1 vertebrae, anterior to the crura of the diaphragm. The celiac plexus surrounds the abdominal aorta and the celiac and superior mesenteric arteries. The plexus is composed of a network of nerve fibers, from both the sympathetic and the parasympathetic systems. It contains two large ganglia that receive sympathetic fibers from the three splanchnic nerves (greater, lesser, and least). The plexus also receives parasympathetic fibers from the vagus nerve. Autonomic nerves supplying to the liver, pancreas, gallbladder, stomach, spleen, kidneys, intestines, and adrenal glands, as well as blood vessels, arise in the celiac plexus.

Neurolytic blocks of the celiac plexus have been used for malignant and chronic nonmalignant pain. In patients with

acute or chronic pancreatitis, the celiac plexus block has been used with significant success.[2] Likewise, patients with cancer in the upper abdomen who have a significant visceral pain component have responded well to this block.[3]

Three approaches to block nociceptive impulses from the viscera of the upper abdomen include the retrocrural (or classic) approach, the anterocrural approach, and neurolysis of the splanchnic nerves. With all of these approaches, the needles are inserted at the level of the first lumbar vertebra, 5 to 7 cm from the midline. Then, the tip of the needle is directed toward the body of L-1 for the retrocrural and anterocrural approaches and to the body of T-12 for neurolysis of the splanchnic nerves. More recently, computed tomography and ultrasound techniques have allowed pain specialists to perform neurolysis of the celiac plexus via a transabdominal approach. This approach is frequently used when patients are unable to tolerate either the prone or lateral decubitus position or when their liver is so enlarged that a posterior approach is not feasible.

Drugs and dosing

For neurolytic blocks, 50% to 100% alcohol is used. Injected by itself, alcohol can produce severe pain. Thus, it is recommended to first inject 5 to 10 mL of 0.25% bupivacaine, 5 minutes before the injection of alcohol or to dilute 100% alcohol by 50% with local anesthetic (0.25% bupivacaine). Phenol in a 10% final concentration may also be used; this has the advantage of being painless on injection. Both agents seem to have the same efficacy. The dose of alcohol or phenol administered varies with the approach to be used. For the retrocrural approach, 20 to 25 mL of alcohol is used on each side. The need to inject this high volume precludes the use of phenol in the retrocrural approach. For the anterocrural approach, 10 mL of either neurolytic agent is used per side. For the splanchnic nerve blocks, 6 to 8 mL of phenol is recommended.

Complications

Complications associated with celiac plexus blocks appear to be related to the technique used: retrocrural,[4] transcrural,[5] or transaortic.[6] In a prospective, randomized study of 61 patients with cancer of the pancreas, Ischia and coworkers[3] compared the efficacy and incidence of complications associated with these three approaches to celiac plexus neurolysis. Orthostatic hypotension occurred more often when the retrocrural (50%) or splanchnic (52%) technique was used than when the anterocrural approach (10%) was used. In contrast, transient diarrhea was more frequent with the anterocrural approach (65%) than with the splanchnic nerve block technique (5%) but not the retrocrural approach (25%). The incidence of dysesthesia, interscapular back pain, reactive pleurisy, hiccups, or hematuria was not statistically different among the three groups.

The incidence of complications from neurolytic celiac plexus blocks was recently determined by Davis[7] in 2730 patients having blocks performed from 1986 to 1990. The overall incidence of major complications (for example, paraplegia, bladder, and bowel dysfunction) was 1 in 683 procedures. However, the report does not describe which approach or approaches were used to perform the blocks.

Following are several aspects in the diagnosis and management of specific complications.

Malposition of the needle is avoided with radiologic imaging before the injection of a neurolytic agent, as the tip of the needle may be intravascular, in the peritoneal cavity, or in a viscus. Imaging techniques currently used include biplanar fluoroscopy, computed tomography, or ultrasound guidance. However, no study has evaluated the superiority of one technique over the others. Wong and Brown[8] suggested that the use of radiologic imaging does not alter the quality of the block or the incidence of complications based on a retrospective study of 136 patients with pancreatic cancer pain treated with a celiac plexus block with or without radiologic control of the position of the needle's tip. However, it is not clear how many of those patients had radiologic imaging. Assuming that half of the patients did not, the upper 95% confidence limit for complications is 5%.[9]

Orthostatic hypotension may occur up to 5 days after the block in 1% to 3% of patients. Treatment includes resting in bed, avoiding sudden changes in position, and replacing fluids. Once compensatory vascular reflexes are fully activated, this side effect disappears. Wrapping the lower extremities from the toes to the upper thighs with elastic bandages has been successful in patients who developed orthostatic hypotension and thus needed to walk during the first week after the block.

Backache may result from local trauma during the needle placement resulting in a retroperitoneal hematoma, from alcohol irritation of the retroperitoneal structures, or from injury to the lumbar plexus. Patients with a backache should have at least two hematocrit measurements at a 1-hour interval. If there is a decrease in the hematocrit, radiologic imaging is indicated to rule out a retroperitoneal hematoma. A urine analysis positive for red blood cells suggests renal injury.

Retroperitoneal hemorrhage is rare; however, in patients who present with orthostatic hypotension, the possibility of hemorrhage must be ruled out before assuming that it is a physiologic response to the block. Patients who present with backache and orthostatic hypotension after a celiac plexus block should be admitted to the hospital for serial hematocrit monitoring. If the hematocrit level is low or decreasing, patients should undergo radiologic evaluation to rule out injury to the kidneys, the aorta, or other vascular structures. A surgical consult should be obtained as soon as feasible.

Diarrhea may occur due to the sympathetic block of the bowel. Treatment includes hydration and antidiarrheal agents. Oral loperamide is a good choice, although any anticholinergic agent may be used. Matson and coworkers[10] reported near-fatal dehydration from diarrhea following this block. In debilitated patients, diarrhea must be treated aggressively.

Abdominal aortic dissection has also been reported.[11,12] The mechanism of aortic injury is direct damage with the needle during the performance of the block. As expected, the anterocrural approach is more frequently associated with