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ADVANCED MEDICAL IMAGING CONSULTANTS, PC

Pain Management in Upper Abdominal Malignancy:

Celiac Plexus Neurolysis

By Alistair Jordan, DO

Abdominal pain related to abdominal malignancy such as pancreatic cancer is often challenging with heavy patient dependency on opioids. This has a detrimental impact on a patient's quality of life. Celiac plexus neurolysis can often significantly improve cancer related pain with upper abdominal malignancy. This article will briefly describe the anatomy, indications and techniques used for celiac plexus neurolysis.

The celiac plexus is the largest visceral plexus and is located deep in the retroperitoneum near the origins of the celiac artery and superior mesenteric artery. It is a large nerve plexus that is predominately comprised of sympathetic nerve fibers. These play a critical role in generating pain response in the upper abdominal viscera. This includes the pancreas, liver, biliary tract, gallbladder, spleen, adrenal glands, kidneys, mesentery, stomach, and the small and large bowels proximal to the transverse colon.

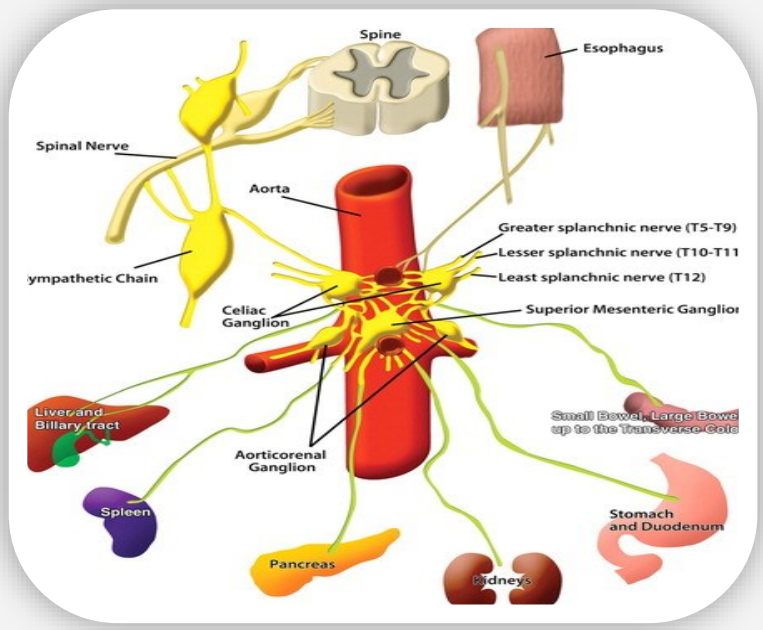


Figure 1: Innervation of the celiac plexus

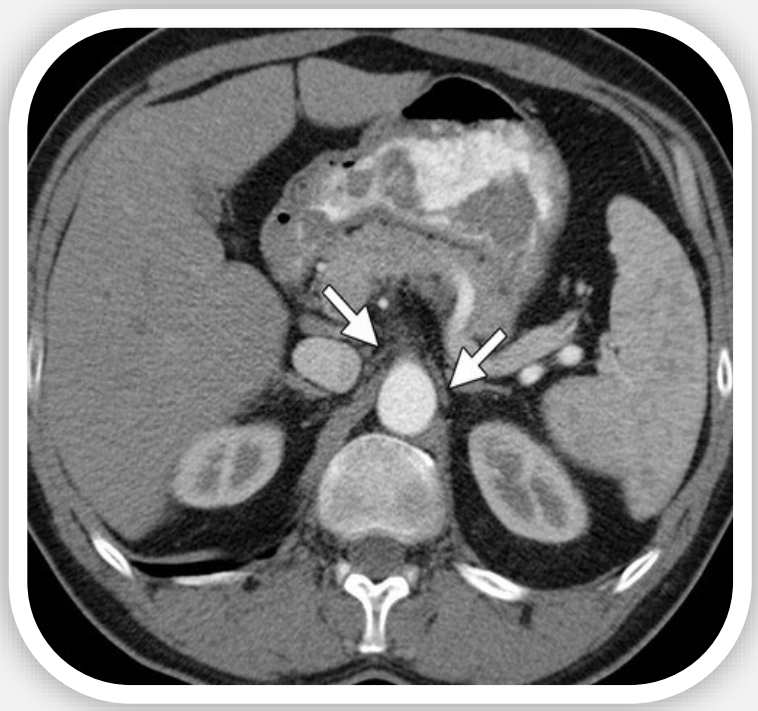


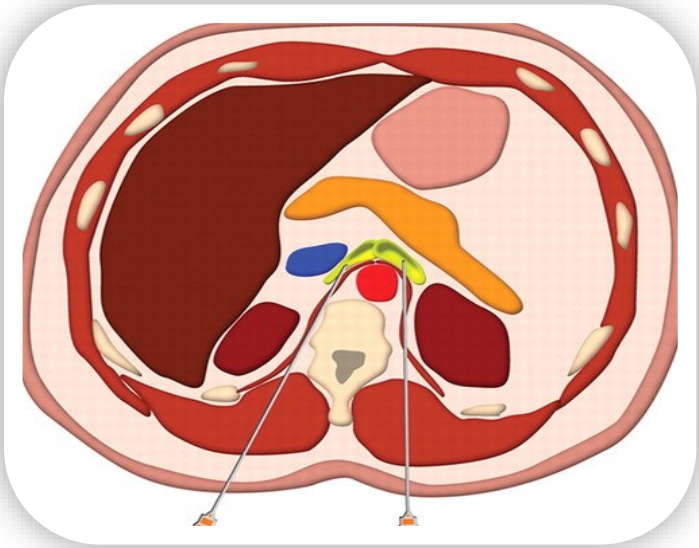
Figure #2: Contrasted CT demonstrating the typical appearance of the celiac plexus

Indications for celiac plexus neurolysis is multifaceted. Typically, the procedure is performed in patients with persistent and intractable abdominal pain caused by pancreatic, gastric, esophageal, or biliary malignancy, as well as metastatic liver cancer and malignancy associated with retroperitoneal lymph node metastasis. Interestingly, it can also improve severe nausea and vomiting in patients with pancreatic cancer. Finally, celiac plexus neurolysis has been used for patients with pain relating to chronic pancreatitis. Its usefulness should be factored into the background of the patient's clinical condition and cancer stage. Thus, a multidisciplinary team approach that includes the primary care physician, oncologist, surgeon, radiation oncologist, anesthesiologist, and radiologist is critical.

Pain Management in Upper Abdominal Malignancy Continued...

There are few contraindications to performing celiac plexus neurolysis. These include severe uncorrectable coagulopathy or thrombocytopenia because of an increased risk for bleeding. Abdominal aortic aneurysm can pose difficult access problem due to the proximity of the enlarged aorta. Finally, active infection; especially intraabdominal infection is considered a relative contraindication.

There are several procedural approaches to performing celiac plexus neurolysis. The most commonly used approach is via CT with the patient positioned prone. Percutaneous path for needle placement in celiac plexus neurolysis is then evaluated. If possible, a posterior paravertebral antecrural approach is utilized. Through the bilateral access needles; dilute contrast is then administered to confirm appropriate access. Next, a neurolytic agent is injected targeting the celiac plexus. Several agents exist for neurolysis, but most physicians use absolute alcohol mixed with dilute contrast.



Figure#3: Needle positioning for the procedure

Pain relief from the procedure at minimal will last for 2 months; often significantly longer. Complications can arise from the procedure and are often minor. Back pain and diarrhea resulting from celiac plexus neurolysis is usually self-limiting in nature. Chronic diarrhea is rare and often refractory to treatment. Neurologic complications are uncommon when celiac plexus neurolysis is performed with CT guidance.

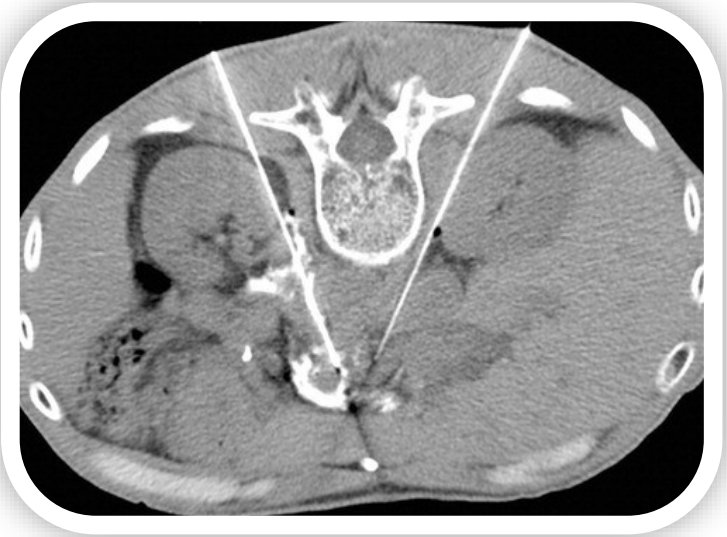


Figure #4: CT image demonstrating contrast and absolute alcohol in the region of the celiac plexus

In conclusion, celiac plexus neurolysis improves survival in patients with cancer by reducing opiate requirements, diminishing drug-induced sedation, and enhancing the ability of patients to perform day-to-day activities that are necessary to extend life, such as feeding and ambulating. The procedure is a safe and effective tool for palliative pain management with a relatively low rate of complications. Celiac plexus neurolysis should be offered to patients with abdominal malignancy in the setting of a multidisciplinary team approach for control of oncological abdominal pain.

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Contrast Reactions

By Nicholas Statkus, MD

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Reactions to contrast media is a relatively infrequent phenomenon. An allergic reaction occurs in approximately 0.6 % of injections of iodinated contrast material for CT. Allergic reactions occur following gadolinium injections for MR as well but at a lower frequency. Allergic reactions occur in 0.01-0.22 % of all gadolinium injections.

The etiology of contrast reactions has not been completely elucidated. The majority of reactions are felt to be related to histamine and other immune mediator release from basophils and eosinophils. No antibody formation has been consistently found in those with contrast reactions thus no prior exposure to the contrast agent is necessary to have a reaction.

The biggest risk factor for having an allergic reaction is if the person has had a prior allergic reaction to a contrast agent when that exact same contrast is used for the following exam. Other risk factors including asthma or additional allergies do increase the risk of a contrast reaction but not enough to routinely recommend steroid premedication in these people. Shellfish or Betadine allergy is not a risk factor for the usage of iodinated contrast material which is a common misconception. Prior reaction to a gadolinium agent does not increase the risk of reaction to iodinated contrast agents used for CT (and vice-versa). Interestingly, contrast reactions are more common in middle-aged adults and less frequent in children, neonates and the elderly. In the past the commonly used iodinated contrast agents used for CT were ionic and hyperosmolar which were associated with higher rates of contrast reactions. Non-ionic low osmolarity iodinated contrast agents, such as isovue 370 (iopamidol), are now routinely used for CT and have a lower rate of contrast reactions.

There are two types of reactions, physiologic and allergic, which can occur with both iodinated contrast and gadolinium contrast agents. Physiologic symptoms are usually of no significance and include warmth, flushing sensation, anxiety, headache, nausea, vomiting, and taste sensations. These are not allergic reactions, which is an important distinction to make when regarding the need for steroid premedication for future studies. Allergic reactions have an immune etiology, and as discussed above, most commonly relate to histamine release following the contrast exposure.

Allergic contrast reactions are grouped into mild, moderate, and severe categories. Mild allergic contrast reactions include localized hives, localized edema, itchy throat, nasal congestion, and sneezing. Moderate allergic contrast reactions include diffuse hives, diffuse edema, throat tightness without dyspnea or hypoxia, and wheezing without hypoxia. Severe contrast reactions are life-threatening and include diffuse edema with dyspnea, hypotension, laryngeal edema with hypoxia, wheezing with hypoxia, and anaphylactic shock (hypotension and tachycardia).

The majority of contrast reactions are mild. Life-threatening contrast reactions are rare. Severe allergic contrast reactions occur in 0.04% (one out of every 10,000) of iodinated contrast injections for CT. Severe allergic contrast reactions occur in 0.008% of gadolinium contrast injections. The fatality rate for iodinated contrast injections is approximately 1 out 100,000 injections.

Pre-medication with steroids is recommended in those who have had a prior contrast reaction. Oral steroid prep with 50 mg oral prednisone 13 hours, 7 hours and 1 hour prior to the study, with additional 50 mg oral Benadryl 1 hour prior to the study is recommended for those who have had a prior minor contrast reaction. For those who have had a prior severe contrast reaction, iv steroid preparation is recommended with either methylprednisolone (Solu-Medrol) 40 mg iv, or hydrocortisone (Solu-Cortef) 200 mg iv 5 hours, and 1 hour prior to the study, with additional 50 mg iv Benadryl 1 hour before the study. An alternative to this regimen is a single iv steroid (either Solu-Medrol or Solu-Cortef) 4 hours before the contrast injection along with iv Benadryl 1 hour prior to the contrast injection.

If an urgent contrast study is required in a patient with a history of a minor contrast reaction, the iv steroid regimen can be used to decrease the time when the scan can be performed. It is important to note that there is scant supportive literature regarding steroid premedication in relation to decreasing the rate of contrast reactions. One important note is that no study has documented the effectiveness of steroid usage when used only 2 hours before the study, i.e. using steroids only 2 hours prior to the exam may have no impact on decreasing a potential contrast reaction. The most conservative estimates for safety of scanning after iv steroid usage is 4-5 hours post steroid administration. At least one study has shown reduction of histamine in leukocytes 4 hours after iv steroid injection (which is the basis for the 4 hour time mark for the iv steroid prep).

There may be situations where an urgent scan is needed in a patient with a prior contrast allergy. In these cases most clinicians will treat with an iv steroid and iv Benadryl and do the scan shortly thereafter, however as noted above there is no data available to support the effectiveness of this. The steroid needs time to diminish the histamine response and steroid usage in these emergent situations, and though most people will receive it, it may not be effective. In these cases it behooves all involved to have a practitioner skilled at resuscitation available at the scan in the rare instance where the patient may have a severe contrast reaction which may need to be treated urgently.

Source:

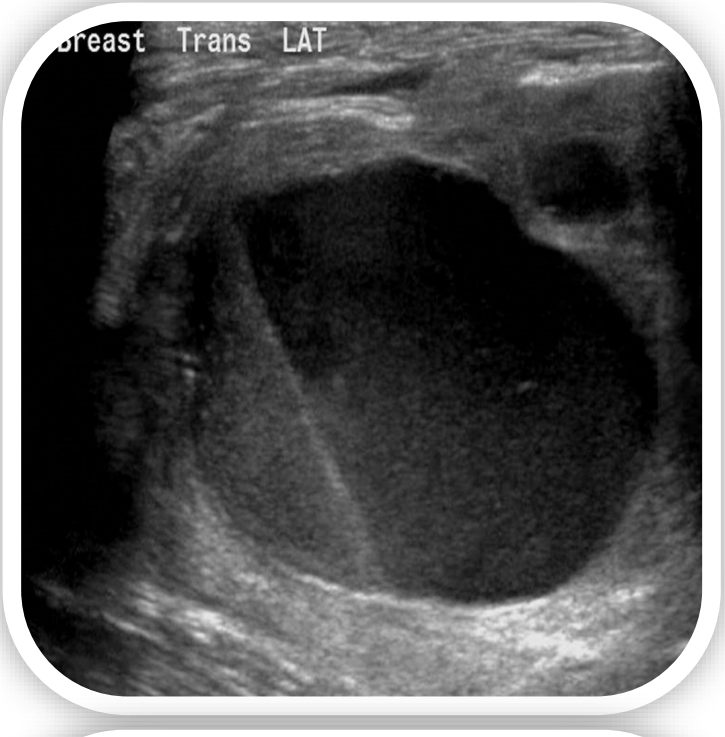
ACR Manual of Contrast Media. 2017. Version 10.3.

Nicholas Statkus, MD

Breast Emergencies

By Kenneth Cicuto, MD

The most common emergent breast pathology encountered by the interventionalist is breast abscess. A breast abscess is usually a complication of infectious mastitis. Mastitis is an inflammation of the breast, most commonly caused by Staphylococcus aureus. As mastitis progresses to an abscess, a defined collection of infected fluid or pus forms. Mastitis and abscess are broadly categorized as either lactating or nonlactating. Lactating mastitis or abscess usually occurs in younger patients, within 3 months of childbirth, whereas nonlactating mastitis or abscess is usually seen in older patients. Abscesses are also encountered in the recently postoperative patient population, whether from mastectomy, lumpectomy, or reconstruction. Yet another group is those with posttraumatic hematoma that later becomes superinfected.



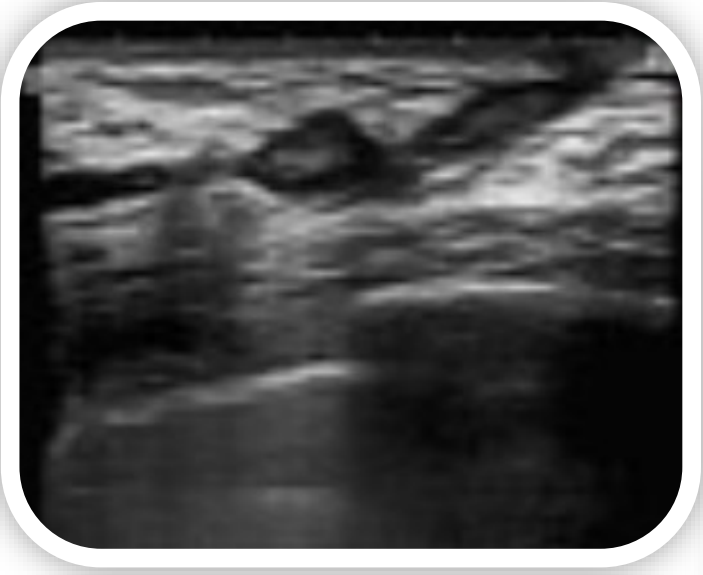
Imaging evaluation of an abscess is primarily by ultrasound. Ultrasound characteristics of an abscess include a focal collection of variable shape and size, often with posterior acoustic enhancement. The collection is usually hypoechoic, but hyperechoic mobile debris, internal septations, and air with dirty shadowing can be seen in the collection. The associated inflammation can lead to a thick echogenic rim and increased vascularity surrounding the collection on color flow imaging, but there is no internal vascularity. Alternatively, findings of tissue heterogeneity and dilated ducts without a focal fluid collection are consistent with mastitis rather than abscess. A breast abscess can also be identified by computed tomographic (CT) or magnetic resonance imaging (MRI) as a rim-enhancing fluid collection.

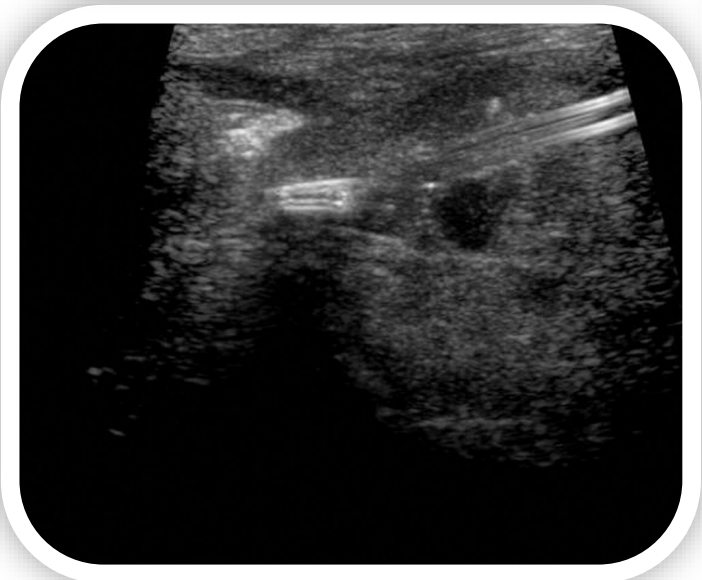
Treatment:

Oral antibiotics should be included in the treatment of any abscess. Antibiotics should be tailored based on cultures of abscess aspirate material but are often begun empirically. Some empiric choices include dicloxacillin 500 mg orally 4 times daily or cephalexin 500 mg orally 3 times daily. For patients with a penicillin allergy, options include clindamycin 300-450 mg orally 4 times daily, doxycycline 100 mg orally twice daily, or trimethoprim-sulfamethoxazole 160/800 mg orally twice daily. However, doxycycline should not be given if the patient is breast-feeding, and trimethoprim-sulfamethoxazole should not be taken if the breast-fed infant is younger than 2 months.

Breast Emergencies Continued...

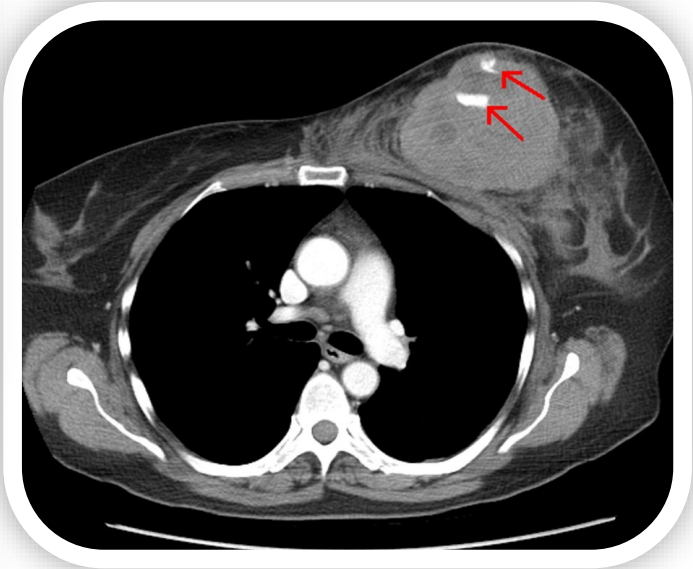
Abscesses less than 3cm in size can be considered for aspiration alone; greater in size requires a drain placement. Physicians must be cognizant of the shortness approach in a lactating female to avoid milk fistula which could lead to the cessation of breast feeding. Most patients can be managed as outpatients. The patient should be instructed to irrigate the abscess 3 times a day with saline. Follow-up is generally every 2-3 days but can be extended as the patient progresses. The catheter is removed once there is minimal output (4 ml) and the abscess cavity is no longer visible on ultrasound.





If aspiration and catheter placement fail, referral for surgical incision and drainage (I&D) is indicated. This had previously been the first line of treatment, but greater scarring, the need for general anesthetic, and open packing for approximately 6 weeks have made it a less desirable option. The recurrence rate also remains relatively high after surgical I&D (28%). Patients with nonlactating abscesses are more likely to require I&D, as well as those with larger abscesses and longer-standing symptoms before initial treatment.

Uncontrolled hemorrhage or pseudoaneurysm which does not resolve with manual pressure is rare but can be seen with significant trauma or seatbelt injury.



The primary blood supply to the breast (60%) is from the second to fifth superomedial perforators of the internal thoracic artery via the subclavian artery. The remaining blood supply is from the lateral thoracic artery via the axillary artery, the thoracromial artery, and branches of the serratus anterior and intercostal arteries. Superselective angiography can be performed with embolization if ongoing extravasation is noted.

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