EUS 2008 Working Group document: evaluation of EUS-guided celiac plexus neurolysis/block (with video)

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Celiac plexus neurolysis (CPN) has been performed for almost 100 years as a means of alleviating pain of pancreatic or retroperitoneal origin, and a variety of techniques, routes, and chemical agents have been used to maximize efficacy and minimize complications.[1-3] Until recently, CPN has been most commonly performed under fluoroscopic or CT guidance by using either a bilateral posterior or an anterior approach, and numerous studies confirmed the efficacy of the procedure and highlighted potential advantages over opioid therapy.[4,5] In the last 10 years, EUS-guided CPN (EUS-CPN)/EUS-guided celiac plexus block (EUS-CPB) has been described as an alternative approach and is now widely practiced.[6,7] This section of the EUS 2008 Working Group Proceedings evaluates the current evidence and potential for future research in this area.

CURRENT APPROACHES TO CPN

Irrespective of the exact technique and route, CPN/CPB is widely practiced, especially in larger centers that deal with significant numbers of patients with pancreaticobiliary disease. Before development of EUS-CPN, the procedure was usually performed by either radiologists or anesthesiologists working in pain teams. Today, CPN/CPB is still performed in centers according to available expertise; however, although good data on who is performing the procedure (and how) are lacking, in centers where EUS is available, it is now largely performed by this method.

Fluoroscopic-guided CPN

This was the most commonly used method for performing CPN/CPB and is still undertaken in some center. Either an anterior or posterior (retrocrural or transcrural) approach is used and, with guidance from radiologically recognized bony landmarks (vertebral column and ribs), a needle is placed in the approximate region of the celiac plexus and injection is undertaken by mixing alcohol or phenol with a contrast agent. Although data supporting the efficacy and relative safety of this approach exist,[4,5] the limitations are the lack of direct visualization of the celiac trunk, with only approximate accuracy of needle placement and the risk of vascular puncture and of neurologic damage with a posterior approach.

CT-guided CPN

This is an alternative to fluoroscopically guided CPN in some centers that do not perform EUS and the technique, results and limitations are broadly similar to the fluoroscopic route.

Intraoperative CPN

CPN or splanchnicectomy can be performed at the time of surgery, but an operative approach is rarely undertaken solely for this purpose now that alternative, simpler, and safer methods exist.

EUS-CPN AND EUS-CPB

Procedural techniques

The techniques for EUS-CPB (Video 1, available online at www.giejournal.org)and EUS-CPN are identical; the only difference is in the substances injected. When using a curvilinear array echoendoscope, the region of the celiac plexus is visualized from the lesser curve of the stomach by following the aorta to the origin of the main celiac artery and is traced, by using counterclockwise rotation, to its bifurcation into splenic and hepatic arteries, with Doppler US control if needed (Fig. 1). With careful inspection, it will often be possible, with slight rotational movements, to directly visualize the celiac ganglia (Fig. 2) as 1 to 5 elongated hypoechoic structures.[8]

A 22-gauge or 19-gauge EUS FNA needle is usually used, but, in some countries, a dedicated 20-gauge ''spray'' needle with multiple side holes (EUSN-20-CPN; Cook Endoscopy, Winston-Salem, NC) is available and allows solutions to spread over a larger area. The caliber of this needle also means that less force is required to inject the relatively large volumes needed. The tip is placed slightly anterior and cephalad to the origin of the celiac artery or directly into the ganglia if these can be identified as

Abbreviations: CPB, celiac plexus block; CPN, celiac plexus neurolysis; EUS-CPB, EUS-guided celiac plexus block; EUS-CPN, EUS-guided celiac plexus neurolysis; RFA, radiofrequency ablation.

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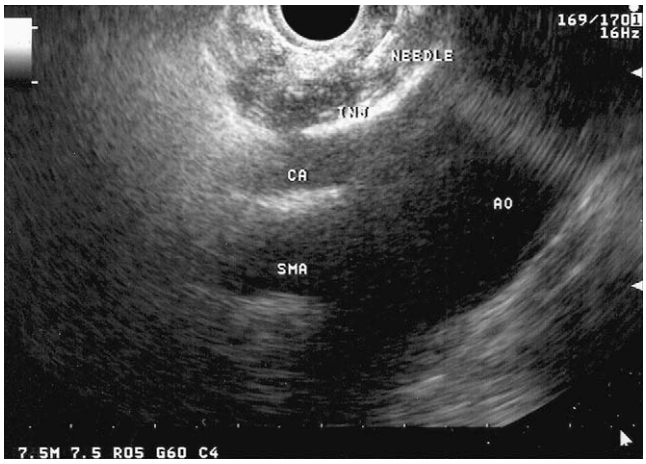

Figure 1. CPN undertaken at the space around the celiac artery.

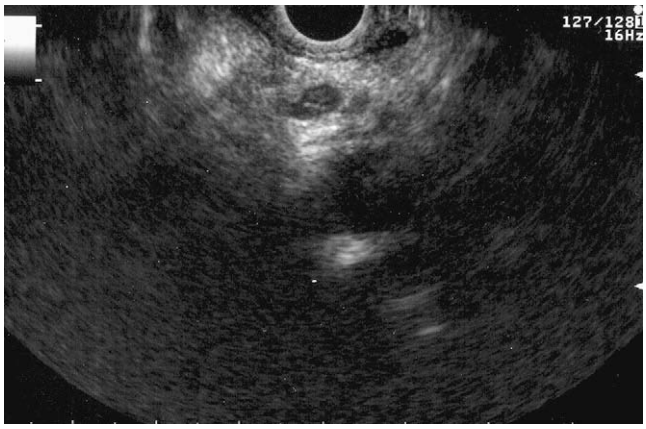

Figure 2. Ganglia seen under EUS guidance in the vicinity of the celiac artery.

discrete structures. Aspiration is first performed to ensure that vascular puncture has not occurred.

Bupivacaine is injected first, followed by alcohol (or triamcinolone for CPB). For actual injection, 1 of 2 strategies can be used in cases in which the ganglia cannot be clearly seen. Injection of the entire solution into the area cephalad of the celiac trunk can be performed or else the echoendoscope is rotated to one side of the celiac artery and half of the solution is injected. The other half is then injected on the opposite side of the celiac artery origin. Patients should be observed for 2 to 4 hours, with careful monitoring of pulse, blood pressure, temperature, and pain scores.

Summary of published data

To date, no randomized trial that compared EUS and radiologic or surgical techniques of CPN has been published in a peer-reviewed journal. Numerous case reports and several prospective case series evaluated the efficacy and safety of EUS-CPN for pain relief in malignancy, and one randomized trial compared EUS with CT-guided CPB in chronic pancreatitis (summarized in Table 1).[8-11] When taken together, the data testify to the relative ease and safety of EUS-CPN/CPB but also highlight both the paucity of good-quality randomized trial data that support one approach over another and the lack of durable pain relief obtained with CPB in chronic pancreatitis.

In a recent retrospective study by Levy et al,[8] 33 patients with pancreatic cancer or chronic pancreatitis underwent CPN or CPB by injection of agents directly into the celiac ganglia.[8] Twelve patients experienced pain during or immediately after the procedure, which the investigators attributed to initial neural destruction. Durable pain relief was more often reported in patients who developed this pain (92%) compared with those who did not (57%). Although no major complications were reported in this study, 3 patients required hospitalization for management of pain after EUS-CPN/CPB. Another notable feature of this study is that, for patients with chronic pancreatitis, 4 of 5 who received alcohol reported better pain relief (80%) versus only 5 of 13 who received steroids (38%).

Limitations of the EUS approach

Limitations of the EUS approach are few, but the inability to visualize anatomical landmarks and to ensure correct needle-tip placement occasionally occurs, especially after previous surgery or because of a large tumor mass. Gross cachexia can result in the loss of the soft-tissue space between the gastric wall and the aorta, with little room to place the needle tip, whereas an ectatic aorta or an eccentric origin of the celiac artery may create difficulties. Celiac ganglia can be difficult to visualize in about 20% of patients, which makes direct ganglia injection impossible.[12] Also, patients with chronic pancreatitis do not experience a durable response to treatment after CPB.

CLINICAL RESEARCH AGENDA

After recent reports of identification of celiac ganglia at EUS and direct targeting of these celiac ganglia during EUS-CPB/CPN,[8] it is intuitive to assume that direct injection into ganglia will be as, or more, effective than current techniques, but this needs to be put to the test in well-designed studies. If superior, then it may reopen the debate about using alcohol to achieve CPN rather than CPB in patients with chronic pancreatitis, thus achieving long-lasting pain relief safely. It may also stimulate research into development of alternative methods of achieving CPN, eg, by radiofrequency ablation (RFA) or radioactive seed implantation. Other research questions include the following:

- Randomized comparison of EUS-CPN versus sham therapy by using well-defined quality-of-life measures with long-term follow-up

TABLE 1. Results of EUS-CPN/CPB studies

Study	Y	Study type	No. patients	CPN/ CPB	Patient group	Improved pain scores (%)	Major complications (%)	Comments
Gunaratnam et al[9]	2001	Prospective case series	58	CPN	Pancreatic cancer	78	0	Additional benefit combined with adjuvant therapy; fewer benefits after 8-12 wk
Gress et al[10]	1999	Prospective RCT, EUS vs CT	18	CPB	Chronic pancreatitis	50 (EUS) vs 25(CT)	0	Small numbers; not blinded; benefit persisted in 30% of EUS patients at 24 wk
Gress et al[11]	2001	Prospective case series*	90	CPB	Chronic pancreatitis	55 (4-8 wk)	1.1% (n = 1, peripancreatic abscess)	Benefits diminished with time
						26 (12 wk)		
						10 (24 wk)		
Levy et al[8]	2008	Retrospective	33	CPN and CPB	Pancreatic cancer and chronic pancreatitis	Pancreatic cancer: 94%; chronic pancreatitis: 50% (2-4 wk)	0	Celiac ganglia injected in all cases; CPN provided better relief than CPB

RCT, Randomized controlled trial.
*Includes 18 patients cited in Gress et al.[10]

- Early (pain onset) versus late (opiate-toxic or resistant) EUS-CPN for pancreatic cancer
- Single versus scheduled multiple injection EUS-CPN

DEVICE DEVELOPMENT

Currently available curvilinear array echoendoscopes are entirely adequate for EUS-CPN/CPB and few, if any, improvements are necessary. Whether the new prototype forward-viewing echoendoscope offers any advantages is unknown at present. The range of currently available EUS needles is also adequate. Dedicated RFA catheters for EUS would be welcome and would allow feasibility, safety, and comparative studies with chemical CPN/CPB.

WORKING GROUP RECOMMENDATION

Although some questions remain to be addressed by high-quality prospective randomized studies, there is evidence that supports the ongoing use of EUS-CPN/CPB and its further development. Randomized trials are required that compare EUS-CPN/CPB and sham therapy by using well-defined quality-of-life measures to assess the true efficacy of this technique. Also, randomized trials are required to identify the most optimal technique for performing CPN/CPB; direct injection into the ganglia versus the space around the celiac artery. The best timing to undertake CPN/CPB in patients (early pain onset vs late onset) with pancreatic cancer has to be determined, and, also, the differences in treatment efficacy between scheduled injections versus as-needed injections have to be determined. The role of CPN to provide durable pain relief in patients with chronic pancreatitis needs to be investigated. Also, the role of alternative modalities, such as radioactive seed implantation and RFA for ablation of the celiac axis needs to be investigated. Because the procedure is clinically beneficial to a large cohort of patients and is practiced widely at most centers, the working group sets the priority at high for fostering clinical research in this area.

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