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Mini Review

How to Perform Endoscopic Ultrasound-Guided Fine Needle Aspiration/Biopsy of Pancreatic Lesions?

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ABSTRACT

A endoscopic ultrasound-guided fine needle aspiration/biopsy (EUS-FNA/B) of pancreatic solid and cystic lesions is a modality, which huge numbers of articles has showed its high diagnostic accuracy. The degree of technical difficulty, size and type of needle, endoscopic technique, use of suction to aspirate tissue, use or not use of a stylet in the needle assembly, maneuvers to have high quality tissue, availability of an on-site cytopathologist, and, finally, end sonographer's experience and skills who does the procedure have impact on the EUS-FNA results. Standard 19-G and 22-G fine-needle aspiration needles with or without high negative pressure have proven to be reliable in obtaining high-quality histologic samples in various indications. Twenty-five-gauge (25-gauge) needles provide better diagnostic yield when sampling pancreatic lesions compared with 22-G needles. The novel 19-G and 22-G ProCore™ needles have demonstrated a high yield in obtaining histologic samples, whereas 25-G. ProCore™ seems unsuitable for histology. A cytopathology service should be involved early in the planning process for establishing an EUS-FNA service. Data on the newly developed 20-G ProCore™, SharkCore® and Acquire® needles are limited, but appear very promising. Use of the stylet does not increase the yield of endoscopic ultrasonography-fine-needle aspiration and is more cumbersome to use. In perspective, endoscopic ultrasound-guided fine-needle biopsy (EUS-FNB) is expected to refine differential diagnostic capabilities, favor widespread EUS utilization, and pave the road to targeted therapies and monitoring of treatment response. Approximately 3 to 5 passes should be sufficient to obtain a diagnosis. We need further studies for assessment of the use of Suction, Capillary ("Slow-Pull"), Wet and Fanning techniques.

Keywords
Pancreatic mass; Endosonography; Endoscopic ultrasound-guided fine needle aspiration (EUS-FNA); Tissue aquisition; Stylet; Diagnostic accuracy; Cytology; Endoscopic ultrasound-guided fine-needle biopsy (EUS-FNB).

INTRODUCTION

Endoscopic ultrasound-guided fine needle aspiration biopsy (EUS-FNA) of pancreatic solid and cystic lesions is a modality, which huge numbers of articles has showed its high diagnostic accuracy.[1,2] The degree of technical difficulty, size and type of needle, endoscopic technique, use of suction to aspirate tissue, use or not use of a stylet in the needle assembly, maneuvers to have high quality tissue, availability of an on-site cytopathologist, and, finally, end sonographer's experience and skills who does the procedure have impact on the EUS-FNA results.[3-5]

Indications and Contraindications

Indications for EUS-FNA for tissue acquisition have broadened over time. Tissue sampling is performed most often to confirm suspected cancer,[6] although it may also be useful in benign conditions such as diagnosing sarcoidosis or infections (e.g., tuberculosis, fungal disease).

Contraindications to EUS-FNA are limited. Before performing EUS-FNA, the endosonographic must be certain that there is a reasonable chance that tissue sampling will be clinically useful. As a general rule, FNA should be avoided in patients with significant coagulopathy (international normalized ratio (INR)>1.5,

platelets<100,000, recent use of thienopyridines (e.g., clopidogrel), etc.).[7] However, the use of aspirin or nonsteroidal anti-inflammatory drugs (NSAIDs) is not a problem. Patients receiving anticoagulant therapy such as warfarin or novel oral anticoagulants (NOACs) such as dabigatran should discontinue their medication prior to the procedure (3 to 5-days for warfarin, 48-hours for NOACs). If the patient is at high-risk for thromboembolic events, bridge therapy with low molecular weight heparin should be considered. Patients receiving antiplatelet therapy such as clopidogrel should also withhold them for 7 to 10-days prior to the procedure if they carry a low thromboembolic risk.

Steps for Endoscopic Ultrasonography-Fine Needle Aspiration

Steps for EUS-FNA of pancreas include: verify the indication, localize the lesion and position the echoendoscope, choose the correct needle, insert the EUS-FNA needle into the echoendoscope, position the lesion in the needle path, puncture the lesion and move the needle within the lesion, withdraw the needle and process the aspirate, prepare the needle for subsequent passes, and evolving trends in EUS-FNA such as use of the stylet, use of suction, sampling techniques.[8]

The first retrospective comparisons of the 22-G and 25-G needles showed the 25-G needle to be more sensitive for cancer in pancreatic masses[9] but subsequent, prospective studies failed to show statistically significant advantages. However, a recent meta-analysis showed that, for pancreatic masses, the sensitivity of the 22-G needle is clearly inferior to that of the 25-G needle (85% (95% confidence interval (CI): 82 to 88%) *vs.* 93% (95% CI: 91% to 96%), p=0.0003).10 Given that the 25-G needle is more flexible, and hence easier to manipulate, it appears reasonable to favor the 25-G needle for all cases of solid lesion EUS-FNA when the objective is to obtain material for cytology.[10]

If a cytologist is available, passes should be performed until adequate material or a diagnosis is obtained.[11] If not, the available data suggest that approximately 3 to 5 passes should be sufficient to obtain a diagnosis (if cancer is indeed present).[12-17] There is no absolute limit to the number of passes that can be performed with the same needle. However, it should be changed if it malfunctions, becomes too difficult to reinsert the stylet and so on.

VARIOUS TYPES OF FNA BY ENDOSONOGRAPHY

Use and Not Use of the Stylet

All commercially available EUS-FNA systems include a removable stylet. There are no data clearly demonstrating that the use of a stylet increases the yield of EUS-FNA. Manipulation of the stylet increases the time and energy required to perform EUS-FNA, increases the risks of needle stick injury, and likely increases the costs of EUS-FNA needle systems. We have now five randomized published trials,[18-22] and several retrospective series[23,24] comparing the results of EUS-FNA with and without the stylet. These studies are universally in agreement the stylet does not increase the yield of EUS-FNA.[25] Some studies also showed that stylet use is correlated with a significant increase in sample bloodiness.[20,26] EUS-FNA without the stylet is also technically much simpler and faster, because the stylet withdrawal and reinsertion maneuvers are eliminated. Therefore, it is currently recommended to not use the stylet for EUS-FNA. However, the stylet may be used to unblock the needle during expulsion of the aspirate if needed. The stylet may also be useful in certain select indications, such as preventing a mucosal plug when aspirating cyst fluid, or delivering fiducial markers in solid lesions.

Use of Suction

There are three published randomized trials evaluating suction use when performing FNA of pancreatic masses.[27] These studies showed that applying suction while sampling solid pancreatic lesions produces significantly better specimens. Therefore, for pancreatic lesions, endoscopists may consider applying 5 to 10 cc of suction for a few seconds for all passes or applying continuous suction for the second pass, if the first pass (performed with no suction) appears to have produced insufficient material. Current European Society of Gastrointestinal Endoscopy (ESGE) technical guidelines recommend the application of continuous suction for EUS-FNA of solid pancreatic masses.[28] Traditionally, suction is applied with an empty syringe. More recently, methods involving application of suction using slow withdrawal of the stylet ("slow-pull" or "capillary" technique) or a water-filled syringe ("wet" technique) have gained some attention.

Capillary ("Slow-Pull") Technique

This technique involves slowly removing the stylet after puncturing a lesion, with back and- forth movement of the needle inside the lesion during stylet withdrawal. There is conflicting evidence that this may improve cytological diagnosis[29] or whether it actually provides any actual suction,[30] and there are currently no randomized trials evaluating this technique to FNA with no suction. Moreover, this technique requires that the lesion be punctured with the stylet in the needle, which is more cumbersome than using no stylet.

Wet Technique

This technique consists of removing the stylet and flushing the needle with saline prior to sampling the lesion. A syringe with residual saline is on the proximal part on the needle device. Maximal suction is applied once the needle is passed into the lesion and during the whole FNA sequence. The specimen is then expressed by flushing the material with the stylet or a syringe.[31]

A recent randomized-controlled trial using a 22-G needle comparing standard air-dry specimen expression *versus* wet technique showed significantly better specimen cell-block adequacy (86% *vs.* 75%, p<0.035).[32]

SAMPLING TECHNIQUES

Sampling Different Areas of the Same Lesion: "Fanning" or "Multiple Pass" Techniques

To sample different areas of the same lesion during the same pass, a "fanning" technique may be possible if the lesion is sufficiently

soft. Fanning is obtained by manipulation of the elevator and/or up/down tip deflection to guide the needle into different regions of the target lesion or to orient the needle into the long axis of an oval or oblong lesion—without withdrawing the needle from the lesion.[33]

However, if the lesion is too hard, adequate fanning may be impossible. In this case, the "multiple pass" technique may be used. This involves sampling widely through the lesion many times, before removing the needle from the scope. The needle is moved through the entire diameter of the lesion for 5 to 10 strokes; the needle is withdrawn from the lesion (but not from the intestinal wall if possible) and moved to a different region of the lesion. Approximately five regions per lesion are sampled before processing the sample. The multipass technique differs from the "fanning" technique in that the latter involves trying to sample different regions without removing the needle completely from the lesion.[34]

Some authors favor a "door knocking" movement. The stopper is set at an appropriate distance, and then the handle is moved rapidly back and forth so that it "knocks" on the stopper. There is however no evidence that this technique improves results.[35]

Endoscopic Ultrasound-Guided Fine-Needle Biopsy

Endoscopic ultrasound-guided fine-needle biopsy (EUS-FNB) by novel 19-G and 22-G ProCore™ needles has demonstrated a high yield in obtaining histologic samples, whereas 25-G ProCore™ seems unsuitable for histology. Data on the newly developed 20-G ProCore™, SharkCore® and Acquire® needles are limited, but appear very promising.[36]

In perspective, EUS-FNB is expected to refine differential diagnostic capabilities, favor widespread EUS utilization, and pave the road to targeted therapies and monitoring of treatment response.[37]

CONCLUSION

EUS-FNA is a powerful clinical tool. It can be technically challenging, but often straightforward if the lesion can be located, is sufficiently large, and can be brought in to the needle path with the echoendoscope in a fairly straight position. Many additions to the basic EUS-FNA technique have been described, but none appear to clearly improve the yield other than (1) moving the needle effectively, (2) sampling many different areas of the lesion, and (3) using a smaller (25-G) needle. The stylet should not be used, because all the data show that it does not improve results, but increases procedural complexity. Suction may provide a role in acquiring better pancreatic samples. Quality comparative trials will be required before modifications to the basic FNA technique that have been described above.

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