



# Clinical Clip

EUS FINE NEEDLE ASPIRATION PROCEDURE

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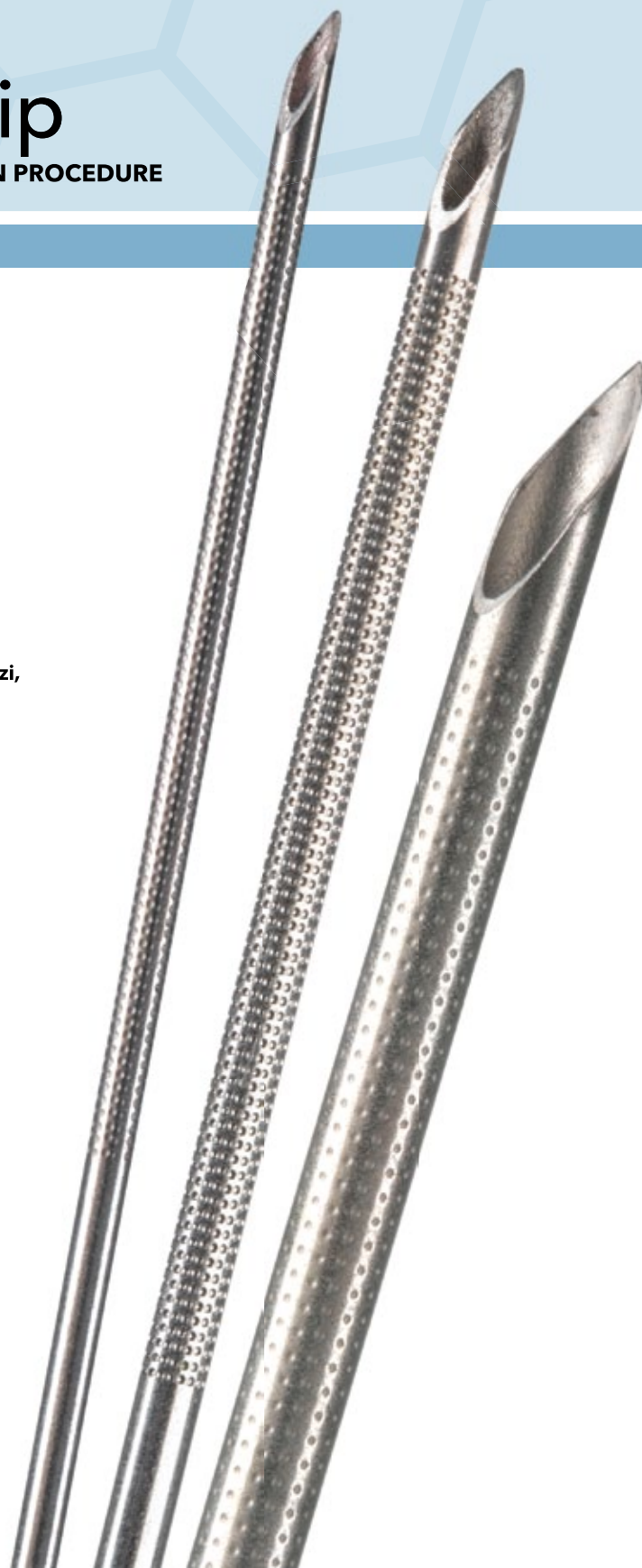
**Raffaele Manta, Alessandro Messerotti, Emanuele Dabizzi,  
Helga Bertani, Rita Conigliaro**

Endoscopy Unit  
Nuovo Ospedale Civile Sant'Agostino Estense  
Baggiovara, Modena, Italy

Corresponding author:

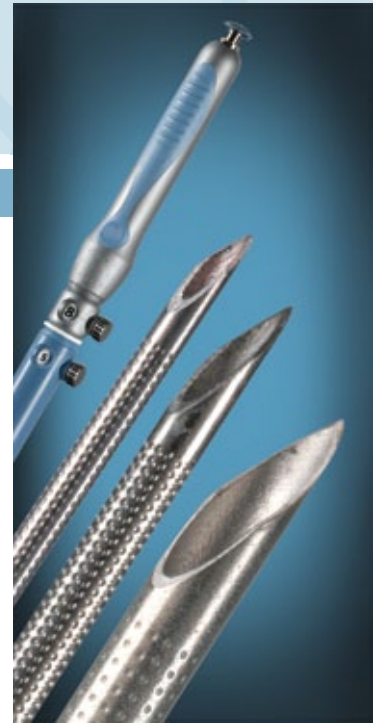
**Raffaele Manta MD**

Endoscopy Unit  
Nuovo Ospedale Civile Sant'Agostino Estense  
Baggiovara, Modena, Italy  
e-mail: [r.manta@libero.it](mailto:r.manta@libero.it), [r.manta@ausl.mo.it](mailto:r.manta@ausl.mo.it)  
phone: 0039-059-3961220; 0039-059-3961752  
fax: 0039-059-3961216



## INTRODUCTION

Since the early development of endoscopic ultrasound (EUS) mechanical radial scanning in the 1980s, in spite of excellent imaging resolution development, a widespread agreed method was lacking until these last years, when the diffusion of EUS-guided fine needle aspiration biopsy (EUS-FNA) absolutely required it.<sup>1,2</sup> Actually EUS-FNA is performed routinely at many endoscopic centers and it has a pivotal impact on the therapeutic management of patients due to obtaining a definite tissue diagnosis from lesions.<sup>3,4,5</sup> It is obvious that EUS-FNA is not exclusively for gastroenterologists; in well-skilled hands EUS-FNA can replace many other more invasive and risky diagnostic procedures, such as mediastinoscopy, diagnostic laparoscopy and even laparotomy or thoracotomy usually performed by a related specialist.<sup>6,7</sup> However, the technique is not easy to master and considerable energy and effort has to be invested before the practitioner reaches an acceptable success rate. This is reported in the literature to be about 90-95%, with an overall sensitivity and specificity of 90% and 100%, respectively.<sup>7-14</sup> Even minute lesions down to a size of 5 mm may be imaged and consequently biopsied. Moreover, contrary to what should be expected, the size of the lesions (small  $\leq 25$  mm or large  $> 25$  mm) does not necessarily influence the overall diagnostic yield, sensitivity, specificity or accuracy of the method.<sup>15</sup> Consequently, the EUS-FNA accuracy of the method is variable in the literature between 85 and 95% and it relies on several factors including: presence of experienced on-site cytopathologist, endosonographer skill according to his learning curve, and lesion characteristics. The limitations and complications of the procedure stressing the low rate of complications (below 1-2%), most of them being minor and self-limiting. Currently endosonography has strengthened its position as a diagnostic and staging method, especially after establishing the method of FNA biopsy. Thus, EUS-FNA is very useful to establish an initial tissue diagnosis of malignancy; it allows the clinician to accurately stage the patients preoperatively, influencing the decision-making process and reducing the morbidity and mortality rate in inappropriate surgical interventions in patients with advanced cancer.



## EUS-FNA TECHNIQUE

### Preparation

Apply the same preparation as in ordinary upper GI endoscopic examinations. Before EUS-FNA, it is recommended to check that the patient does not have any bleeding tendency or is on anticoagulants. Sedation is required to avoid sudden movements, preventing injuries and to allow the patient to tolerate the procedure.

### Right position

Some lesions are technically easier to biopsy by EUS-FNA than others. Lesions which can be visualized with the scope withdrawn into a "straight or short use position" are more easily sampled. The best position is achieved when the path of the needle into the lesion does not require use of the elevator, although it is common to use the elevator to help attain the best needle direction. Once the lesion is visualized, deflect the scope tip up against the lesion and aspirate air to minimize the distance between the lesion and the scope in order to perform more accurate EUS-FNA needle passage into the target lesion. (See *figs 1-2*)

### Aspiration technique

1. Before puncturing, visualize the lesion in the B-mode image of the ultrasonic endoscope and confirm the absence of interposed blood vessels using color doppler ultrasound evaluation. By changing scope tip transducer position (longer/shorter or slight tip deflection/change), it is usually possible to find a plane without interposed vessels. (See *figs 3-4*)
2. Check the ultrasound or endoscopic image to confirm that the sheath of the aspiration needle is projecting from the instrument channel. If significant resistance is encountered when inserting the aspiration needle through the channel, adjust scope angulation until the aspiration needle can be easily inserted without resistance. One trick to help the needle exit through the scope is to deflect the scope tip down in straight position in order not to damage the biopsy channel with the needle. Therefore attention is needed to push out the aspiration needle when its tip is out of the echoendoscope's operative channel. (See *figs 5-6*)
3. Measure the distance from the projecting, distal end of the needle tube to the puncture target so that the aspiration needle does not overshoot the puncture target. (See *figs 7-8*)

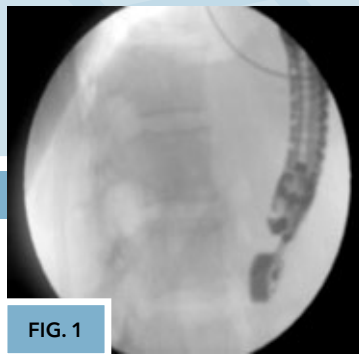


FIG. 1

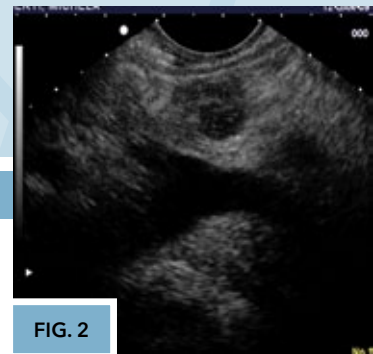


FIG. 2

Right position (X-rays) to minimize distance between mass and scope

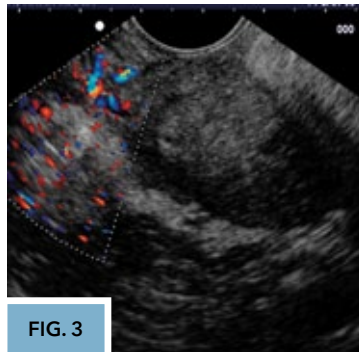


FIG. 3

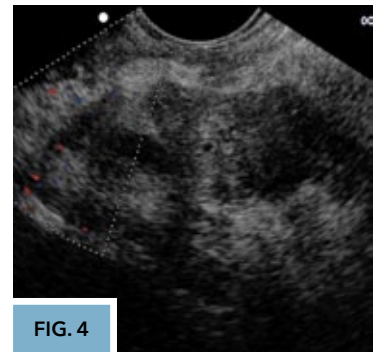


FIG. 4

With (left) and without (right) interposed vessels

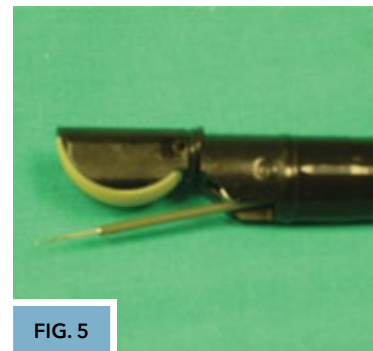


FIG. 5

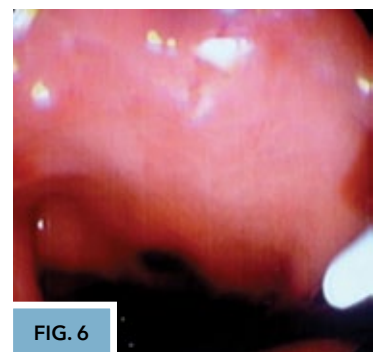


FIG. 6

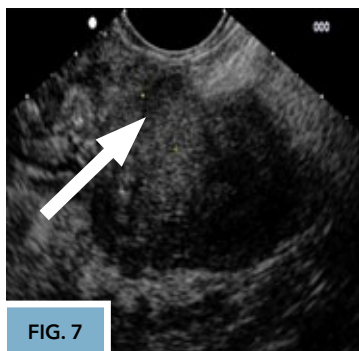


FIG. 7



FIG. 8

4. Advance needle through the mucosa and into the lesion under EUS guidance. (See fig 9)
5. Withdraw the stylet completely, attach a syringe to the aspiration needle, apply negative pressure and move the needle to and fro inside the lesion. Gently move handle in small increments back and forth within biopsy site.  
**Note:** Do not remove needle from biopsy site during cell collection. (See fig 10)

Because the scope will often move with needle movements, it is advisable to have an assistant hold the scope shaft, in order to have the needle always in ultrasound view throughout the procedure. (See figs 11-12)

6. Remove negative pressure, pull the needle tube back inside the sheath and remove the aspiration needle from the scope.
7. The specimen can be pushed out from the needle sheath by reinserting the stylet and flushing it with air or saline. (See figs 13-14)
8. Submit the specimens for cytology and cell block preparation for histology per hospital guidelines.

In the last 3 years, several papers recommend the presence of pathologist in the endoscopy room in order to confirm that a sufficient specimen has been obtained to avoid performing a lot of needle passes into the lesion. In the absence of an on-site cytopathologist, a decision should be made on the number of passes used for the diagnosis. It is currently agreed that the aspiration site (primary tumor, lymph node, metastasis, ascites) can be used to direct the number of passes.<sup>21-23</sup> Consequently, in order to obtain sufficient cytology material, experience suggests 3-6 passes for solid pancreatic masses, 2-3 for lymph nodes or liver metastases and one for ascites, cystic lesions or pleural fluid.

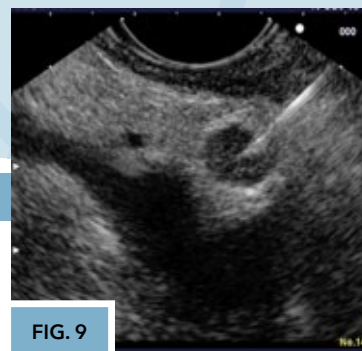


FIG. 9



FIG. 10

Withdraw stylet



FIG. 11

Attach syringe

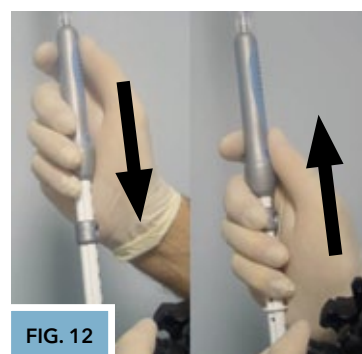


FIG. 12

Reciprocate needle (stroking)



FIG. 13

Pushing out with stylet



FIG. 14

Pushing out with air



## BIOPSY NEEDLES AND THE RIGHT CHOICE

Aspiration needles from various manufacturers are available for use in endoscopic ultrasound guided fine needle aspiration (EUS-FNA). The basic aspiration needle has a four-layer configuration: a) a handle assembly for controlled advancement of the needle with a dedicated port for the needle stylet and an attachment for a vacuum syringe; b) a semi-rigid protective sheath; c) a hollow needle that may come in one or more sizes; d) a stylet to avoid perforation of the spiral and damage of the working channel.

### The potential uses for EUS-FNA include:

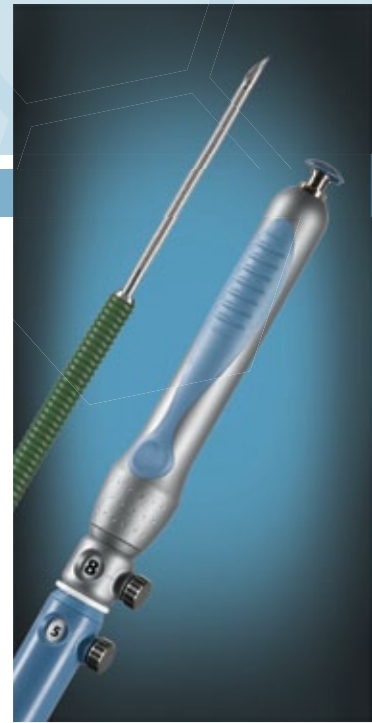
- 1 Pancreatic mass
- 2 Mediastinal lymph nodes (metastasis for esophageal and lung cancer)
- 3 Celiac lymph nodes in association with a known upper GI cancer or in a patient suspected of having cancer of lymphoma
- 4 Intra-abdominal lymph nodes in association with a known (or suspicion of) cancer
- 5 Peri-rectal lymph node/mass
- 6 Posterior mediastinal mass of unknown etiology
- 7 Intrapleural/intra-abdominal fluid

In addition to the lesions indicative for EUS-FNA mentioned above, the indications have been expanded to:

- 1 Peri-pancreatic mass
- 2 Submucosal masses
- 3 Small liver lesions
- 4 Left adrenal mass
- 5 Suspected recurrent cancers in and adjacent to surgical anastomosis.

FNA needles are available in 19, 22 and 25 gage sizes with adjustable ones that can be advanced between 1 to 8 cm in order to adapt to multiple brands of echoendoscopes. There are also special aspirations ones with spring-assisted automatic puncture function and Trucut biopsy (TCB) needles aiming at histological diagnosis.

The main consideration to optimize the results of EUS-FNA procedure is to acquire enough tissue samples with minimal number of passes and risk of injury to surrounding tissue. Therefore the most commonly used needles for diagnostic FNA are 22 or 25 gage sizes. The latter, that is the finest one, can be used to perform FNA of highly vascularized mass such as lymph nodes in which you can have cytological samples by a capillarity principle not by aspiration avoiding bleeding complication. Finer needles are often preferred unless there are reasons to use bigger needles, as in acquisition of a pathological specimen when such specimen is required rather than cytological samples. In this case a larger core needles are more suited for this kind of application for which there are dedicated larger core histological needles of 19 gage size available.



A more advanced one is the 19 gage Quick-Core EUS needle (manufactured by Cook Medical) which has a handle with a spring loaded shot mechanism to facilitate the penetration of the needle into the lesion allowing more efficient tissue samples to be obtained. It is usually used in special applications such as core biopsy sampling.

EUS-TCB is emerging as a method to overcome the limitation of EUS-FNA by providing a core tissue biopsy specimen.<sup>16</sup> Several studies have suggested that there is a documented higher yield with EUS-TCB over EUS-FNA for GI stromal tumor (GIST), lymphoma and necrotic tumor, with 100% accuracy rate, but this was not shown in pancreatic malignancy.<sup>17, 18, 19</sup> Only a case series has shown improved accuracy of EUS-TCB over EUS-FNA in autoimmune pancreatitis, chronic pancreatitis and cystic pancreatic tumors.<sup>20, 21, 22</sup>

The use of EUS-TCB for tissue sampling in accessible pancreatic masses should be reserved for selected patients that failed diagnosis by EUS-FNA, particularly if the mass is located in the body and tail where EUS-TCB can be easily performed.<sup>23</sup>

Moreover the 19 gage Quick-Core EUS needle could not be used in sampling through any normal pancreatic parenchyma to reduce the risk of acute pancreatitis or pancreatic duct injury, knowing that adding EUS-TCB does not significantly improve the yield of EUS guided biopsy.<sup>16, 21</sup>

Many other characteristics of the lesion can influence the needle choice by expert endosonographers: the type and site must be considered before sampling the lesion by EUS-guided FNA; if the lesion is solid or cystic and if the needle passage into the mass requires it to transverse through resistant tissue in order to avoid angles and bending of the needle.

Apart from special applications such as core biopsy sampling, the use of the finest needle should well serve the purpose of most EUS-guided needle acquisition of cytological specimens from easily accessible soft targets. Very few comparative studies on needles of different sizes, carried out recently, have shown either no difference or only small difference in the efficacy. The impact of needles size could be just the difference between 22 and 25 gage size needles, much less than the difference between functionally distinct needle types. But needle size actually matters in cases where a difference in the size means a significant difference in the risk as well as the diagnostic yield and accuracy in order to obtain a successful EUS-FNA. The 22 and 25 gage EchoTip needles are available for diagnostic FNA. The 25 gage may get relatively more diagnostic material and less blood but it sometimes may be too flexible to enter firm masses unlike the 22 gage needle. Both are flexible enough to be advanced through a moderately deflected scope. They also have superior echogenicity and when they are inserted into the lesions they can be identified and followed easily even in cases of deeper penetration.

**WARNING:** Not for use in the heart or vascular system.

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**COOK ENDOSCOPY**

4900 Bethania Station Road, Winston-Salem, NC 27105 U.S.A.  
Phone: 336 744-0157, Toll Free: (USA) 800 457-4500, Fax: 336 744-5231

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