Techniques for Endoscopic Ultrasound-Guided Fine-Needle Biopsy

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KEYWORDS

• Endoscopic ultrasonography • Fine-needle aspiration • Fine-needle biopsy
• Tissue acquisition • Histology • Core biopsy

KEY POINTS

- Although endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) is accurate, it cannot fully characterize certain neoplasms, and lack of cytology expertise may result in a limited perceived usefulness of EUS.
- EUS Tru-Cut biopsy does not offer any clear advantage compared with EUS-FNA and is technically demanding, with a low transduodenal yield.
- Standard 19-G and 22-G FNA needles with or without high negative pressure have proved to be reliable in obtaining high-quality histologic samples in various indications.
- The novel 19-G and 22-G ProCore needles (Cook Medical, Bloomington, IN, US) have shown a high yield in obtaining histologic samples, whereas 25-G ProCore seems unsuitable for histology.
- EUS-FNB is expected to refine differential diagnostic capabilities, favor widespread EUS use, and pave the road to targeted therapies and monitoring of treatment response.

INTRODUCTION

Since its initial description in 1992,[1] endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) has emerged as the procedure of choice to obtain samples to reach definitive diagnosis of lesions of the gastrointestinal (GI) tract and of adjacent organs.[2] Although EUS-FNA is accurate, especially when on-site cytopathology evaluation is available,[3–5] cytology does require a high degree of expertise rarely found outside high-volume tertiary-care centers.[6] This situation has created a barrier to the dissemination of EUS in the community and in many countries, because the lack of cytology expertise results in low diagnostic accuracy and therefore limits the overall usefulness of EUS.[7]

The obtainment of a tissue biopsy specimen for histologic examination may overcome this main limitation of EUS-FNA. A tissue core biopsy with preserved

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architecture is critical to diagnose and fully characterize certain neoplasms, such as lymphomas and GI stromal tumors. Moreover, tissue specimens for histologic examination also provide the opportunity (1) to easily immunostain the tissue, further increasing differential diagnostic capabilities; (2) to reach a specific diagnosis for benign diseases not always obtainable with a cytologic sample, thus sparing patients from more invasive and risky sampling procedures or costly and unnecessary follow-up examinations, and (3) to potentially perform tissue profiling or cell culture needed to guide targeted therapies for individualized treatment of patients with cancer of the GI tract.[8–10]

In the past, the ability to obtain fragments of tissue for histologic examination with FNA needles of various diameters had been tested,[11–13] and a Tru-Cut biopsy needle dedicated for EUS-guided fine-needle biopsy (EUS-FNB), the Quick-Core® needle (Cook Medical, Bloomington, IN, US), was developed but without meaningful advantages over EUS-FNA.[14–16] More recently, a new technique called EUS fine-needle tissue acquisition (EUS-FNTA), using standard 22-gauge and 19-gauge needles, has been developed and evaluated in few studies,[17–19] and a new needle, the ProCore needle (Cook Medical, Bloomington, IN, US), specifically designed to obtain histologic samples has become available and tested in clinical practice.[20–23] It is desirable that these new techniques and needles coupled with refinements in specimen processing will move the practice of EUS from cytology to histology, thereby facilitating the expansion of EUS use throughout the world.

This article reviews the EUS-FNB techniques developed so far, the clinical results, and their limitations as well as their future perspective.

EUS-GUIDED TRU-CUT BIOPSY

Background

Large-caliber cutting needles to acquire tissue core biopsy specimens with preserved architecture to allow for histologic examination have been used for many years to perform percutaneous (under conventional ultrasonographic or computed tomographic guidance), intraluminal (transanal, transrectal, transvaginal, transjugular), and surgical (laparoscopic, open) biopsies.[24–26] Based on these experiences, it appeared reasonable to translate this needle technology to develop a needle able to perform Tru-Cut biopsy under EUS guidance. In 2002, Wiersema and colleagues[27] presented the first experience using the Quick-Core, a 19-gauge needle capable of collecting an 18-mm tissue specimen sufficient for histologic examination. These investigators conducted a study in swine models reporting the safety and feasibility of EUS-guided Tru-Cut biopsy (EUS-TCB) using the Quick-Core needle that enabled histologic sampling from the liver, spleen, left kidney, and body of the pancreas through a transgastric approach.[27] A few months later, the same group reported the results of the first study in humans in which 19 patients with intestinal and extraintestinal lesions were evaluated.[28] Patients underwent both EUS-TCB and EUS-FNA. Overall, EUS-TCB was found to be more accurate than EUS-FNA (85% vs 60%), with a significantly reduced number of needle passes required for diagnosis (mean 2.0 vs 3.3, $P<.05$). No complications were encountered.

Since then, several studies have been conducted in order to examine the feasibility and safety of EUS-TCB, as well as to compare its performance with other EUS-guided sampling techniques.[14–16,29–46]

Design and Technique

The EUS-TCB device has a spring-loaded mechanism built into the handle of the needle, making possible automated acquisition of biopsy specimens (**Fig. 1**). The