# Outcomes of Endoscopic Ultrasound-Guided Fine Needle Biopsy Using a Novel Hydrostatic Stylet Technique

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## Introduction

- Endoscopic ultrasound-guided fine needle biopsy (EUS-FNB) is increasingly utilized for the diagnostic evaluation of solid gastrointestinal (GI) lesions.
- The optimal technique for tissue acquisition using core biopsy needles has not been defined.
- We report the outcomes of a novel hydrostatic stylet (HS) technique for core biopsy acquisition and evaluate its diagnostic yield, efficacy, and safety compared to the conventional stylet slow-pull (SP) technique.

## Methods

- Retrospective analysis of all patients who underwent EUS-FNB with core biopsy of solid GI lesions via HS or SP from 01/2020 – 04/2022.
- Exclusion criteria: cystic lesions, non-lesional liver biopsies, and specimens sent for cytological analysis only.
- Primary outcome: diagnostic adequacy as defined by acquisition of a biopsy sample sufficient tissue to obtain a pathological diagnosis.
- Secondary outcomes: number of needle passes, diagnostic yield characteristics (sensitivity, specificity, PPV, NPV), adverse events.
- Stepwise progression of HS technique demonstrated in Figure 1.

## Results

- Total of 272 procedures with 138 in HS group vs. 134 in SP group.
- Similar anatomic distribution and size of lesions in both groups.
- Higher diagnostic adequacy using HS vs. SP (97.8% vs 83.6%, p<0.001)
- Higher sensitivity (p=0.03), higher diagnostic accuracy (p=0.04), and lower mean number of passes (p<0.001) using HS vs. SP
- Comparable rates and severity of adverse events in HS and SP groups (p=0.63).

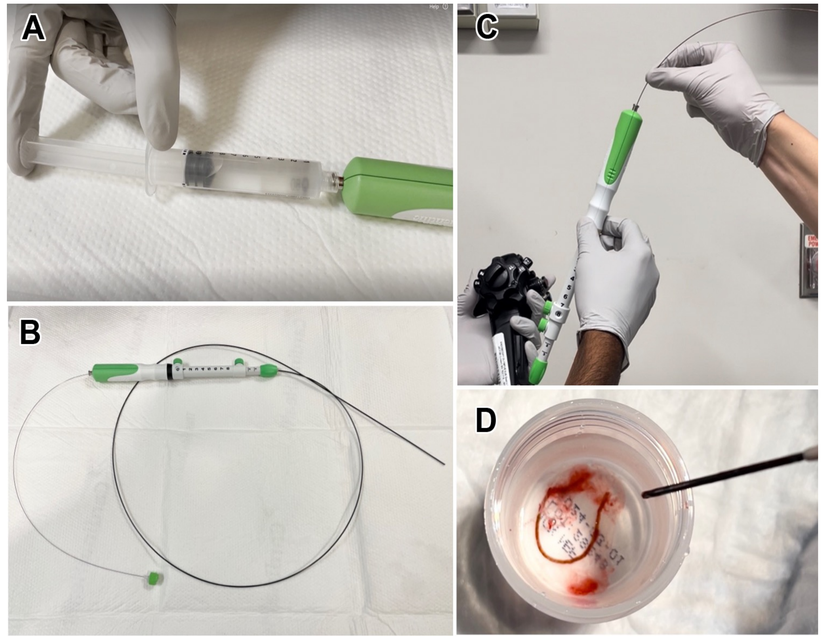
**Table 1.** Patient and Lesion Characteristics for 272 EUS-FNB Procedures via Hydrostatic Stylet (HS) or Stylet Slow-pull (SP) Techniques

| Characteristics | Total (n = 272) | HS (n = 138) | SP (n = 134) | P value |
|---|---|---|---|---|
| **Age, mean ± SD, years** | 65.5 ± 14.5 | 64.9 ± 13.5 | 66.2 ± 15.5 | 0.48 |
| **Male gender, n (%)** | 138 (50.7) | 80 (58.0) | 58 (48.3) | 0.015 |
| **Lesion location, n (%)** | | | | |
| Pancreas head | 72 (26.5) | 32 (23.2) | 40 (30.0) | 0.20 |
| Lymph node | 46 (16.9) | 28 (20.3) | 18 (13.4) | |
| Liver mass | 35 (12.9) | 23 (16.7) | 12 (9.0) | |
| Stomach | 29 (10.7) | 11 (8.0) | 18 (13.4) | |
| Pancreas body | 27 (9.9) | 10 (7.3) | 17 (12.7) | |
| Pancreas tail | 20 (7.4) | 9 (6.5) | 11 (8.2) | |
| Biliary duct | 11 (4.0) | 7 (5.0) | 4 (3.0) | |
| Pancreas neck | 11 (4.0) | 7 (5.0) | 4 (3.0) | |
| Pancreas uncinate process | 9 (3.3) | 5 (3.6) | 4 (3.0) | |
| Duodenum | 6 (2.2) | 4 (2.9) | 2 (1.5) | |
| Left adrenal gland | 4 (1.5) | 2 (1.5) | 2 (1.5) | |
| Esophagus | 2 (0.7) | 0 (0) | 2 (1.5) | |
| **Lesion size, mean ± SD, mm** | | | | |
| Major diameter | 23.0 ± 11.5 | 22.5 ± 12.1 | 23.5 ± 10.9 | 0.55 |
| Minor diameter | 18.0 ± 9.9 | 16.8 ± 8.9 | 19.4 ± 10.7 | 0.07 |
| **Size of needle used, n (%)** | | | | 0.03 |
| 19-gauge | 23 (8.4) | 17 (12.3) | 6 (4.5) | |
| 22-gauge | 242 (89.0) | 116 (84.1) | 126 (94.0) | |
| 25-gauge | 7 (2.6) | 5 (3.6) | 2 (1.5) | |
| **FNB puncture site, n (%)** | | | | 0.22 |
| Gastric wall | 136 (50.0) | 63 (45.7) | 73 (54.5) | |
| Duodenal wall | 131 (48.1) | 73 (52.9) | 58 (43.3) | |
| Jejunal wall | 1 (0.4) | 1 (0.7) | 0 (0) | |
| Esophageal wall | 4 (1.5) | 1 (0.7) | 3 (2.2) | |

**Table 2.** Procedural Characteristics and Outcomes for 272 EUS-FNB Procedures Using the HS and SP Techniques

| Characteristics | Total (n = 272) | HS (n = 138) | SP (n = 134) | P value |
|---|---|---|---|---|
| **No. of passes, mean ± SD** | 2.3 ± 1.5 | 1.2 ± 0.5 | 3.5 ± 1.4 | <0.001 |
| **Adverse events, n (%)** | 5 (1.8) | 2 (1.5) | 3 (2.2) | 0.63 |
| **Diagnostic adequacy, n (%)** | 247 (90.8) | 135 (97.8) | 112 (83.6) | <0.001 |
| **Diagnostic yield, % (95% CI)** | | | | |
| Sensitivity | 93.5 (90.4-96.6) | 97.1 (94.3-99.9) | 89.7 (84.1-95.3) | 0.03 |
| Specificity | 100 (100-100) | 100 (100-100) | 100 (100-100) | 0.999 |
| PPV | 100 (100-100) | 100 (100-100) | 100 (100-100) | 0.999 |
| NPV | 78.3 (73.2-83.5) | 91.4 (86.7-96.2) | 60.0 (50.9-69.1) | 0.004 |
| Accuracy | 94.7 (91.2-97.2) | 97.8 (93.6-99.5) | 91.2 (84.2-95.6) | 0.04 |

**Figure 1.** Endoscopic ultrasound-guided fine needle biopsy hydrostatic stylet technique stepwise progression. A, Flushing needle with sterile water. B, Partial reinsertion of stylet. C, Coordination with assistant during puncture. D, Expression of obtained specimen.




## Conclusions

- The novel HS technique demonstrated excellent biopsy sample adequacy and diagnostic yield while requiring fewer passes to obtain diagnostic specimens compared to a conventional EUS-FNB approach.
- The HS technique appears to be an efficacious and safe alternative to other widely utilized sampling methods.
- Further prospective evaluation will allow for future procedural standardization and optimize EUS-FNB acquisition techniques.