Correlating Cellular and Diagnostic Yield of Endobiliary Brush Cytology to Fine Needle Aspiration Using a New Large Caliber Endobiliary Brush in Suspected Pancreaticobiliary Malignancies - a Single Center Retrospective Review

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Correlating Cellular and Diagnostic Yield of Endobiliary Brush Cytology to Fine Needle Aspiration Using a New Large Caliber Endobiliary Brush in Suspected Pancreaticobiliary Malignancies - a Single Center Retrospective Review

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Background

- Endoscopic ultrasound guided fine needle aspiration (EUS-FNA) is used increasingly for the cytologic diagnosis of pancreaticobiliary malignancies. While some studies have suggested that EUS-FNA of malignant biliary stricture is superior to conventional endoscopic brushing,[1] other literature claims that either procedure alone is insufficient for reliable diagnosis.[2]
- Despite the growing use of EUS-FNA, endobiliary brush sampling during endoscopic retrograde cholangiopancreatography (ERCP) is a useful diagnostic tool and remains an initial method for evaluating biliary duct strictures (Figures 1 and 2), especially where no mass is visible on imaging.[3]
- However, traditional endobiliary brush sampling is known to have poor diagnostic yield and a variable sensitivity between 27-66%.[4]
- The US Endoscopy Infinity® ERCP sampling device is "built for collecting substantial and quality samples" by employing two types of bristles, spaces for collecting cells, a stiffer drive wire, and larger diameter brush.[5]
- The aim of our study is to investigate if results obtained from endobiliary brush cytology with the US Endoscopy Infinity® ERCP sampling device correlate to results obtained from EUS-FNA in patients with a suspected pancreaticobiliary malignancy.

Methods

- A systematic retrospective chart review at a large tertiary care referral center was performed.
- Over 200 patients underwent EUS-FNA and/or ERCP by two interventional endoscopists from January 1, 2013 to July 5, 2014.
- The procedures performed due to concern for pancreaticobiliary malignancy were reviewed and only patients who underwent both procedures were included. Patients with previously known gastrointestinal malignancy were excluded leaving a total population of 29 patients.
- Endobiliary brush cytology and EUS-FNA results were reviewed and compared for sample quality and diagnostic correlation.
- Sample quality was classified as adequate or inadequate for diagnosis and then stratified according to result as negative, atypical, suspicious, or diagnostic for malignancy.
- All endobiliary brush cytology was performed using the US Endoscopy Infinity® ERCP sampling device.

Results:

- Twenty-nine patients underwent both ERCP with endobiliary brush cytology and EUS-FNA due to concern for potential pancreaticobiliary malignancy. Twenty-one were combined procedures.
- Endobiliary brush cytology with the US Endoscopy Infinity® ERCP sampling device resulted in an adequate sample 97% of the time, whereas 76% of EUS-FNA were adequate.
- Only 52% of patients had correlating studies and this only improved to 62% when less than optimal and inadequate samples were removed.
- When one study was diagnostic for malignancy, the other study correlated only 50% of the time.
  - After correcting for inadequate quality:
    - When EUS-FNA was diagnostic for malignancy, brush cytology correlated in 64% of cases.
    - When brush cytology was diagnostic for malignancy EUS-FNA had 70% correlation.
- On two occasions brush cytology was diagnostic for malignancy where EUS-FNA was not:
  - One less than optimal sample resulted as atypia (pancreatic adenocarcinoma) and one negative result (cholangiocarcinoma).

Patient Characteristics	
Age at Time of Study	Mean: 69.6 Range: 56-89
Gender	Male: 15 Female: 14
Race	Caucasian: 29
Mass Seen on Prior Imaging?	Yes: 9 No: 20
Transaminases and Total Bilirubin	Abnormal: 23 Normal: 1 Not Available: 5

Table 1. Baseline characteristics of patients included in our study.

Study Results	
Brush Quality	Adequate: 28 Less Than Optimal: 1
Brush Result	Positive: 10 Suspicious: 1 Atypical: 7 Negative: 11
FNA Quality	Adequate: 22 Les Than Optimal: 3 Inadequate: 4
FNA Result	Positive: 11 Atypical: 4 Negative: 10 No Result/Inadequate: 4
Tumor Diagnosis	Pancreatic Adenocarcinoma: 13 Cholangiocarcinoma: 2 Hepatic Angiosarcoma: 1 No Malignancy Identified: 13

Table 2. Results of endobiliary brush cytology and EUS-FNA and final tumor diagnosis based on either endoscopic procedure or surgical pathology.

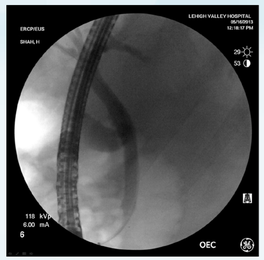

Figure 1. Cholangiogram during ERCP demonstrating a distal common bile duct stricture.

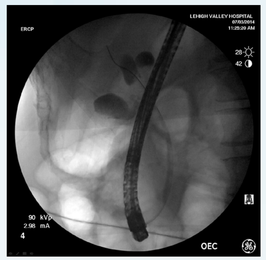

Figure 2. Cholangiogram demonstrating a high-grade obstructing intraluminal mass in the common hepatic duct in a patient found to have cholangiocarcinoma.

Discussion:

- EUS-FNA and endobiliary brush cytology are both used in evaluation of potential pancreaticobiliary malignancies. However, as our data demonstrates, the results of these studies can have suboptimal correlation.
- Many factors can play into obtaining an adequate diagnosis with brush cytology: type of tumor,[2] location of the tumor,[6] categorization of results,[3,7,8] pathologist experience,[9] sampling technique,[6,10] and type of brush.[9]
- The literature has also suggested that brush cytology may be superior for biliary strictures and EUS-FNA for pancreatic masses.[2]
- Previous studies have demonstrated that newer technologies do not increase detection rates compared to traditional brush cytology.[2,9]
- In our study the US Endoscopy Infinity® ERCP sampling device resulted in an adequate cellular yield in 97% of cases. This is much higher than previous literature has shown.
- We have also highlighted two cases where endobiliary brush cytology was able to diagnose malignancy where EUS-FNA was not: one pancreatic adenocarcinoma and one cholangiocarcinoma.
- Our study supports the claim that endobiliary brush cytology and EUS-FNA should be used in a complementary fashion[2] and suggests that brush cytology should remain the initial diagnostic test of choice for biliary strictures[8] even where EUS-FNA is available, especially if a mass is not visualized on imaging.[3]

References:

1. Hammoud, GM, Almashhrawi, A, and Ibdah, JA. Usefulness of endoscopic ultrasound-guided fine needle aspiration in the diagnosis of hepatic, gallbladder and biliary tract lesions. World J Gastrointest Oncol 2014 Nov 15;6(11):420-429.
2. Rosch, T, et al. ERCP or EUS for tissue diagnosis of biliary strictures? A prospective comparative study. Gastrointest Endosc 2004;60:390-396.
3. Eiholm, S, et al. Endoscopic brush cytology from the biliary duct system is still valuable. Dan Med J 2013;60(7):A4656.
4. Victor, DW, et al. Current endoscopic approach to indeterminate biliary strictures. World J Gastroenterol 2012 November 21;18(43):6197-6205.
5. US Endoscopy Infinity® ERCP sampling device. http://www.usendoscopy.com/~/media/Files/Documents/Spec-Sheet-US/infinity_ss_us_760699C.pdf
6. Uchida, N, et al. Utility of pancreatic duct brushing for diagnosis of pancreatic carcinoma. J Gasteroenterol 2007;42:657-662.
7. Lee, JG, et al. Benign, dysplastic, or malignant – making sense of endoscopic bile duct brush cytology: results in 149 consecutive patients. Am J Gastroenterol 1995 May;90:722-726.
8. Alizadeh, MAH, et al. Biliary brush cytology in the assessment of biliary strictures at a tertiary center in Iran. Asian Pacific J Cancer Prev 2011;12:2793-2796.
9. Fogel, EL, et al. Effectiveness of a new long cytology brush in the evaluation of malignant biliary obstruction: a prospective study. Gastrointest Endosc 2006;63:71-77.
10. Shieh, FK, et al. Improved ERCP Cytology Brush Design and Standardized Specimen Handling Yields More Tissue and Gives Higher Diagnostic Sensitivity in the Diagnosis of Malignant Biliary Strictures. Poster Presentation – Geisinger Health System, Danville, Pennsylvania. http://www.usendoscopy.com/~/media/Files/Documents/Poster/Diehl-Infinity-Poster-2013.pdf