

Endoscopic ultrasound and paracentesis in the evaluation of small volume ascites in patients with intra-abdominal malignancies

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Abstract

The evaluation of ascites in patients with known or suspected malignancy is a critical aspect of preoperative staging. Endoscopic evaluation by ultrasound of low volume ascites and sampling of the ascitic fluid by endoscopic ultrasound guided paracentesis (EUS-P) is both a sensitive and specific modality for the determination of peritoneal implants, which is not only an important prognostic indicator but a crucial factor in determining treatment strategy. It is common practice to utilize EUS for gastrointestinal malignancies such as pancreatic or gastric masses, with the performance of paracentesis during the same procedure for the purpose of imaging the abnormality and possibly performing fine needle aspiration for biopsy of the neoplasm itself. However, given the ability of EUS-P to adequately sample even minimal ascites, detecting much smaller volumes than traditional computed tomography or magnetic resonance imaging, EUS-P may be a useful modality for the standard metastatic workup of any newly diagnosed or suspected malignancy. In this "Field of Vision" commentary, we discuss the role of EUS-P, including the article by Suzuki *et al* reporting their experience with EUS-P using an automated spring-loaded

needle device. We also review the utility of EUS-P for non-gastrointestinal malignancies, such as ovarian cancer, which has a high incidence of malignant ascites.

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Key words: Ascites; Malignancy; Endoscopic ultrasound; Paracentesis; Fine needle aspiration

Core tip: The diagnosis of metastatic disease by evaluation of ascites is crucial in the treatment strategy for suspected malignancy. Endoscopic ultrasound guided paracentesis is an accurate and useful diagnostic tool for the sampling of minimal amounts of ascites and should be considered during the staging workup of known or suspected malignancies.

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INTRODUCTION

Ascites may be benign or malignant. Benign etiologies include cirrhosis, heart failure and tuberculosis. Malignant ascites might be due to mesothelioma, lymphoma, or carcinoma of the stomach, ovary, pancreas, small and large intestine, liver, gallbladder, bile duct, breast, lung, esophageal and urinary tract. It has been well described that the presence of ascites, as a predictor of omental metastases from a known or suspected malignancy, carries a dismal prognosis and often precludes operative management of the primary^[1-3]. As such, the pre-operative evaluation

Table 1 Findings from endoscopic ultrasound guided paracentesis in patients found to have small volume ascites without known intra-abdominal malignancy *n* (%)

Ref.	Number patients	Benign	Malignant	Comment
Allah <i>et al</i> ^[11]	100	36 (58)	26 (42)	Some patients unable to obtain sufficient sample for cytology. Tuberculosis most common benign etiology
Rana <i>et al</i> ^[12]	12	2 (17)	10 (83)	Peritoneal nodules. Tuberculosis most common benign etiology
Wardeh <i>et al</i> ^[10]	101	74 (73)	27 (27)	Twenty-one adenocarcinoma, 1 metastatic small-cell carcinoma of the lung, 1 large-cell lymphoma, 3 adenocarcinoma, 1 plasmacytoma

of ascites in a patient with suspected gastrointestinal malignancy is a critical part of the work up and staging, whether completed by diagnostic laparoscopy, traditional paracentesis, or endoscopic ultrasound guided abdominal paracentesis (EUS-P). A positive cytology result alters the prospect for operative management and affects the prognosis. Diagnosis prior to surgery is necessary to avoid the morbidity of an exploration and surgical resection in patients who would have otherwise been determined to be unresectable. Endoscopic ultrasonography (EUS) has been demonstrated already to be a useful diagnostic tool with greater sensitivity than combined trans-abdominal ultrasound and computed tomography (CT) in detection of ascites^[4,5]. In this “Field of Vision” commentary, we review an article analyzing the benefits of EUS-P using an automated spring-loaded needle device, and review the current literature regarding the utility of EUS for evaluation of potentially malignant ascites.

COMMENTARY ON HOT TOPICS

We read with great interest the article by Suzuki *et al*^[6], which retrospectively reviewed eleven patients for whom EUS-P was performed utilizing an automated spring-loaded powershot needle with a 22 gauge puncture needle. In 7 of their 11 patients, the ascites had been identified on prior CT or ultrasonography (US) imaging; in the remaining 4 patients, the ascitic fluid was an incidental finding during EUS for fine needle aspiration (FNA) biopsy of a pancreatic lesion. In this latter group, the average amount of ascitic fluid obtained was 2.6 mL, demonstrating the ability of their technique to obtain diagnostic results despite low volume ascites. The reported advantage of the spring-loaded needle device was in overcoming the laxity of the mobile gastrointestinal wall with its high puncture speed, which the authors suggest may present difficulty for the traditionally used FNA needle. This proposed laxity is in contrast to when the standard FNA needle is used for aspiration biopsy of a solid organ, since the ascites provides less extramural counterforce. Their series, however, was limited by the small number of patients in whom their proposed advantage was relevant; namely, in their 4 cases of low volume ascites detected only by EUS.

The article by Suzuki *et al*^[6] highlights recent technological advances in ultrasound guided endoscopic biopsy capability. EUS with FNA has been standard of care for preoperative evaluation of suspected gastrointestinal

malignancies, both for the purpose of imaging gastrointestinal tract tumors as well as for guidance of fine needle aspiration biopsy for solid lesions^[7]. The development of EUS-P to detect the existence of malignant ascites has been a more recently advocated adjunct to preoperative staging in cases where there is low volume of ascites or suspicion of peritoneal carcinomatosis^[8,9].

EUS-guided paracentesis is performed after small pockets of fluid are identified during upper endoscopic ultrasound. The tip of the needle is seen traversing the wall of the stomach or duodenum into the fluid, after which negative pressure is applied to the needle. The operator must exercise caution to avoid aspirating within the lumen to avoid contamination of the sample. In addition, a tumor should not be traversed by the needle to avoid possible seeding of the fluid with malignant cells^[10].

Several reports in the literature have described the utility of EUS-P in evaluating patients with ascites but without diagnosis (Table 1) and for evaluating patients with known malignancies, found to have small volume ascites, Table 2.

A prospective case series reported by Kaushik *et al*^[19] described 25 patients in whom EUS-P was performed utilizing an FNA needle for the evaluation of known or suspected malignancy, and who had pathologic or surgical confirmation of the results. Their success rate was 100%, with 24 patients requiring only a single pass with the FNA needle and the remaining patient requiring two passes due to a clogged needle. The mean volume of ascitic fluid obtained in their study was 6.8 mL with a range of 1-20 mL. Their analysis concluded with a sensitivity and specificity of 94% and 100%, respectively, for their technique utilizing an FNA needle. Sixteen of the 25 patients were found to have malignant ascites, and the majority of these (11/16) were from pancreatic cancer. However, their patient selection from which they gathered their 25 patient cohorts was comprised of more than 50% of patients with a suspected pancreatic primary.

Similarly, a retrospective study published by Dewitt *et al*^[20] examined a series of 60 patients who underwent EUS-P utilizing an FNA needle. Sixteen of the 60 patients were found to have positive cytological results, with the majority (9/16) of the source malignancies being a primary pancreatic. Overall, this series carried a suspected pancreatic malignancy of 51%. They reported a complication rate of 3.3% from the procedure, both of which were post-procedural fever.

Both of these studies demonstrate that the utility

Table 2 Findings from endoscopic ultrasound guided paracentesis in patients found to have small volume ascites with known primary intra-abdominal malignancies *n* (%)

Ref.	Primary site	Number with ascites	Benign	Malignant	Comment
Repiso <i>et al</i> ^[13]	Gastric	(21)	6 (29)	15 (71)	7/79 patients without ascites had carcinomatosis
Sultan <i>et al</i> ^[14]	Gastric	21 (1.8)	10 (10)	11 (51)	
Twine <i>et al</i> ^[15]	Esophageal	49 (9)		49 (100)	
Mrzljak <i>et al</i> ^[16]	Hepatocellular	27	9 (33)	18 (67)	Survival in patients with ascites or effusion was significantly shorter when compared with patients without, <i>P</i> = 0.001
Schmidt <i>et al</i> ^[17]	Pancreatic	23 (16)	19 (82)	4 (18)	
Lee <i>et al</i> ^[18]	Gastric	32	23 (72)	9 (28)	
Lee <i>et al</i> ^[4]	Gastric	93 (37)	56 (59)	37 (41)	Positive ascites did not influence the survival outcomes of gastric cancer without peritoneal carcinomatosis. 76% of patients with ascites had peritoneal metastases

of EUS-P in the evaluation of small volume ascites has primarily been used for suspected gastrointestinal malignancies, the majority of which seems to be pancreatic malignancy. Presumably, this is largely due to the fact that the EUS with FNA is usually performed for evaluation of the pancreatic mass, thereby facilitating the use of EUS for paracentesis if ascites is observed on endoscopy. With the ease of use and high success rates even in low volume ascites^[8], however, it may be feasible to utilize this modality for evaluation of ascites for any suspected malignancy. Ayantunde *et al*^[1] published a retrospective study describing the characteristics of 209 patients carrying the diagnosis of malignant ascites. Of the 209 cases, the vast majority were metastatic from an ovarian primary, followed by gastric and pancreatic primaries. While EUS-P has not traditionally been used for evaluation of suspected metastatic ovarian disease, the high success rate shown in the cytological evaluation of malignant ascites may make this a viable diagnostic modality. Given the high success rates reported utilizing either the traditional FNA biopsy needle or the automated spring-loaded needle device, one particular device might not be superior to the other without a trial comparing these devices. While in theory the high puncture speed of the spring loaded needle device could improve the diagnostic capability of EUS-P, the current literature on EUS-P has not described any difficulty in obtaining sufficient ascitic fluid for cytological analysis after it is identified by EUS^[9,20]. Spring-loaded needles for EUS-P tend to cost about 50% more than standard EUS-P needles^[21]. Nevertheless, the development of new technologies enhancing the feasibility of EUS-P may enable clinicians to perform this procedure who may not have otherwise, and the ease of use should be evaluated in further studies including for non-gastrointestinal malignancies.

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