ORIGINAL ARTICLE

Approach to management of bleeding during EUS-guided liver biopsy: salvage therapy using absorbable gelatin sponge

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Background and Aims: EUS-guided liver biopsy (EUS-LB) has emerged as a reliable alternative to interventional radiology–guided biopsy, offering comparable specimen adequacy. Bleeding remains the most common adverse event. We describe a novel use of absorbable gelatin sponge slurry for hemostasis during EUS-LB and propose a stepwise management approach.

Methods: Liver biopsy was performed using a dynamic suction technique with a 19-gauge fine-needle biopsy needle. After biopsy, e-Flow Doppler was used to evaluate for bleeding. Since Doppler flow persisted, initial management included leaving the needle in place for 4 minutes and performing a blood patch technique. For bleeding extending beyond the liver capsule, a gelatin sponge slurry was prepared by macerating absorbable gelatin pledgets into a thick gel using the Tessari technique. The slurry was injected into the bleeding tract while withdrawing the needle under EUS guidance.

Results: Application of this stepwise approach during EUS-LB successfully achieved hemostasis without the need for surgical or radiologic intervention. The gelatin sponge slurry effectively sealed the bleeding tract, with no significant postprocedural hematoma or ongoing hemorrhage observed.

Conclusions: The use of an absorbable gelatin sponge slurry represents a promising salvage technique for managing bleeding during EUS-LB when conventional methods fail. (VideoGIE 2025;10:364-7.)

EUS-guided liver biopsy (EUS-LB) has been well described over the past decade. Studies have demonstrated it as a reliable alternative over interventional radiology–guided liver biopsy, given the adequacy of specimens obtained, its enhanced safety profile, and the convenience of performing multiple procedures in a single session for endohepatology workup.[1,2] The most common adverse event of EUS-LB is bleeding. In a recent meta-analysis, Mohan et al[3] reported a pooled rate of bleeding of 1.2% and rare case reports of life-threatening bleeds.

Abbreviation: EUS-LB, EUS-guided liver biopsy.

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Our group previously published about a "blood patch" technique that facilitates hemostasis and prevents postliver biopsy hemorrhage during EUS-guided liver biopsy.[4] Although not a validated technique, this technique has achieved hemostasis by reinserting a portion of the liver specimen and blood clot in the biopsy needle into the liver tract. In cases in which hemostasis is not achieved using this blood patch technique, there are limited endoscopic interventions available. Use of an absorbable gelatin sponge slurry has been described since 1996 to assist in hemostasis after percutaneous liver biopsy.[5] In this video article, we describe a novel technique of using a gelatin sponge slurry with EUS-LB to aid in periprocedural hemostasis. In addition, we outline a stepwise approach to bleeding prevention and management during EUS-LB.

TECHNIQUE

Video 1 (available online at www.videogie.org) provides comprehensive instruction for approaching bleeding during EUS-LB and preparation of the absorbable gelatin sponge technique for achieving hemostasis. Liver biopsy was performed using the dynamic suction technique, which uses a modified wet heparin technique and involves

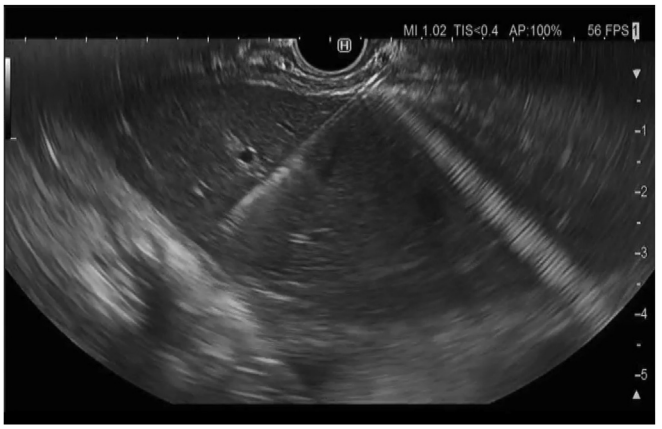

Figure 1. Dynamic suction technique involving 1 pass with 3 actuations using a 19-gauge fine-needle biospy needle.

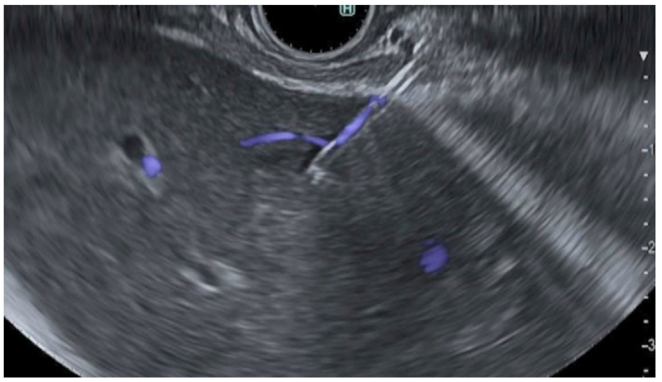

Figure 2. e-Flow Doppler is applied to evaluate for blood in the track. If present, leave needle in the track for a total of 4 minutes to allow blood to clot within the track.

1 pass with 3 actuations with an 19-gauge fine-needle biopsy needle[6] (Fig. 1). Following the last actuation, e-Flow Doppler is applied to evaluate for blood flow within the needle tract and in the extracapsular space, which could signify a patent tract of active bleeding[7] (Fig. 2). During biopsy of the liver, there may be some flow within the liver tract, but we do not consider this bleeding. For the purposes of our discussion, we clinically define bleeding as the presence of blood escaping the liver capsule, evidenced by Doppler flow either above or beneath the liver capsule.

To achieve hemostasis, the first step is to leave the needle within the tract for 4 minutes. This provides time for the blood within the bore of the needle and the liver biopsy tract to clot and achieve hemostasis. If e-Flow persists, the next step is to perform the blood patch technique (Fig. 3). This technique involves reinserting the stylet and pushing about 25% to 50% of the distal needle contents back into the liver biopsy tract. The blood patch functions as a mechanical barrier to achieve hemostasis within the tract. If the needle is removed from the liver and e-Flow demonstrates bleeding through the tract

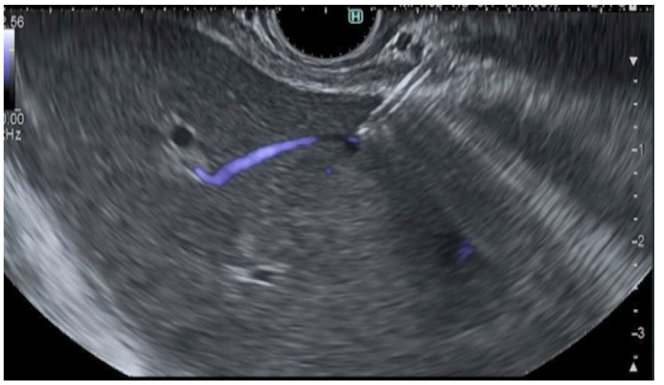

Figure 3. If e-Flow persists after needle in track, the blood patch technique can be performed by reinserting the fine-needle biospy stylet into the needle and pushing 25% to 50% of the distal needle contents, which acts as a mechanical barrier to facilitate hemostasis.

Figure 4. With needle removal from the liver, e-Flow demonstrates bleeding through the tract and up to the level of the liver capsule, indicating that bleeding is occurring underneath or outside of the liver capsule.

and up to the level of the liver capsule, this could indicate that bleeding is occurring underneath or outside of the liver capsule (Fig. 4). In this situation, injecting an absorbable gelatin sponge can be considered. The process to prepare the gelatin sponge for injection is as follows: with the use of a sterile technique, the absorbable gelatin sponge is cut into tiny pledgets and placed into a 10-mL syringe. The filled syringe is then attached to a 3-way stopcock with an attached 10-mL syringe with 5 mL of normal saline. The Tessari technique is used, and the pledgets are macerated into a thick gel slurry[8] (Fig. 5). If the consistency of the gel slurry is not thick enough, additional pledgets are added to the system to thicken the gel slurry. If the consistency of the gel slurry is too thick, additional normal saline is added to dilute the gel slurry. The ideal consistency of the slurry is thin enough to flow freely through the needle and to the location of the bleed but not too thick that it could clog the needle. Once the gel slurry is prepared, the liver is repunctured with either a new 19-gauge fine-needle aspiration or the previously used fine-needle biopsy needle after the sample has been expressed, targeting the bleeding

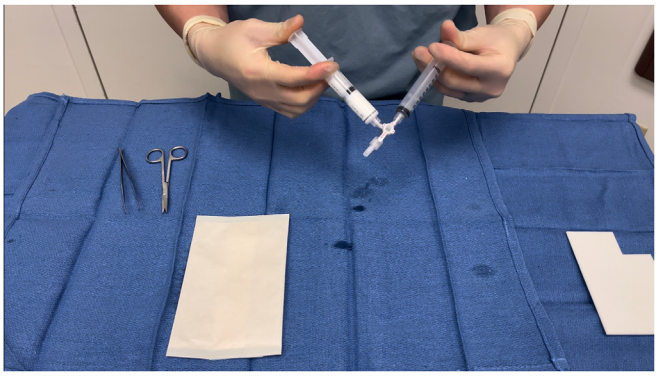

Figure 5. Gelatin slurry can be prepared by cutting sterile absorbable gelatin sheets into pledgets and placing them into a syringe. Connect the syringe to a 3-way stopcock prepared with another with 5 mL of normal saline. Perform the Tessari technique to macerate the pledgets until a thick slurry consistency is achieved.

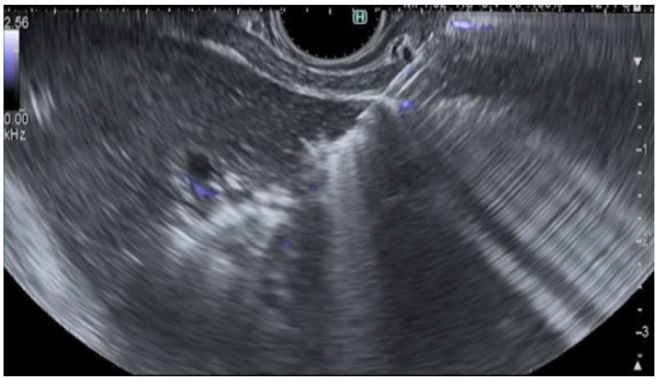

Figure 6. The liver is re-punctured with a 19-gauge fine-needle aspiration/fine-needle biospy needle targeting the bleeding track. With the stylet removed, the absorbable gelatin slurry can be injected into the track while slowly withdrawing from the liver capsule.

tract on EUS. The stylet is then removed, and the gelatin slurry is injected into the tract with the needle as it is slowly withdrawn from the liver capsule (Fig. 6). A total of 5 mL of Gelfoam slurry is administered, in increments of 1 mL.

CASE DESCRIPTION

A 61-year-old woman with a medical history of T3N1 pancreatic adenocarcinoma status post-Whipple procedure and FOLFOX chemotherapy was referred for endohepatology workup as the result of discordant findings of F0/F1 fibrosis on elastography and cross-sectional imaging and advancing cirrhosis with portal hypertension. She underwent EGD, EUS, shear-wave elastography, portal pressure gradient, and liver biopsy. During the procedure, however, blood flow was seen within the needle tract and into the liver capsule, and the aforementioned stepwise approach to management of bleeding was used (Video 1).

RESULTS

The patient was subsequently admitted for monitoring. The patient's hemoglobin remained stable, and computed tomography later that night demonstrated residual blood product and gas seen in the biopsy tract, without significant hematoma or active bleeding. Liver biopsy revealed nodular regenerative hyperplasia consistent with oxaliplatin-induced portal fibrosis. Pathology reported 22 complete portal tracts with the longest specimen length 3.5 cm and total length of 5.3 cm.

DISCUSSION

As EUS-LB becomes increasingly used, endoscopists should have a stepwise approach to prevention and management of a potential bleeding adverse event. The use of absorbable gelatin sponge slurry for routine biopsy tract embolization has been well described in percutaneous liver biopsy procedures by interventional radiology with its co-axial needle system.[9] When the co-axial needle system is used, tract embolization can occur routinely because the system allows removal of the specimen while still maintaining access to the tract. The use of absorbable gelatin sponge for EUS-guided liver biopsy likely should occur on a more selective basis, given there is a need to re-puncture the liver. We believe, at this time, this novel technique of using absorbable gelatin sponge for hemostasis should function as a salvage method for intraprocedural liver biopsy bleeding when other steps, such as leaving the needle within the needle tract and the blood patch technique, have failed. This technique also may be considered in patients with a bleeding diathesis who are at greater risk for a bleeding adverse event. This technique should be performed by an experienced endoscopist such that accurate targeting of the original tract can be achieved with Doppler and mapping. In addition, Gelfoam should not be directly injected into a vessel for risk of embolization and should not be given to people with allergies to porcine collagen.

PATIENT CONSENT

The patient in this article has given written informed consent to publication of the case details.

DISCLOSURE

J. Samarasena has served as a consultant for Medtronic, Olympus, ConMed, Applied Medical, Neptune Medical, and Boston Scientific and shareholder for Satisfai Health. K. Chang has served as a consultant for Olympus, Cook

Medical, Endogastric Solutions, and Medtronic. The other authors disclosed no financial relationships.

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