

laboratory liver toxicities in a subset of patients. To date, no study has evaluated safety and efficacy of locoregional therapy (LRT) with radiofrequency ablation (RFA), transarterial chemoembolization (TACE) and radioembolization (TARE) during and after SBT. We present our early single center experience.

**Materials:** Patients that underwent LRT with RFA, TACE and/or TARE after completing SBT or within 30 days of initiating SBT were retrospectively reviewed. Patient demographics and performance data were obtained from medical records. Toxicity was evaluated during sofosbuvir treatment and within 30 days of LRT using CTCAE criteria. Tumor response was evaluated using mRECIST criteria on all available follow-up CT/MRI.

**Results:** Twenty-one patients (age  $62 \pm 6.3$  y; ECOG 0:6, 1:14, 2:1; Child Pugh A:17, B:4) with HCC were treated between 2/2014 and 7/2015 with RFA (n=5), TACE (n=19) and TARE (n=16) during or after sofosbuvir (n=12) or ledipasvir-sofosbuvir (n=9) therapy. Total SBT course was 12 weeks (n=4) or 24 weeks (n=16); 1 patient terminated SBT at 10 weeks due to persistent abdominal pain. AEs attributable to SBT included grade 1 (n=1) and grade 2 (n=1) hyperbilirubinemia, grade 2 thrombocytopenia (n=1), grade 1 pancytopenia (n=1) and grade 1 headache (n=1). AEs within 30 days of LRT included grade 1 hypertransaminasemia (n=1), grade 1 nausea (n=2) and grade 1 abdominal pain (n=2) after TACE and grade 1 fatigue (n=1) after TARE. Objective response rate was 73% (CR:15, PR:4, SD:4, PD:3). Disease control rate was 88%.

**Conclusions:** Locoregional therapy with RFA, TACE and TARE during or after sofosbuvir-based therapy for HCV is safe and effective. Treatment with SBT should not be delayed due to planned LRT for HCC. Continued study is required to evaluate long term efficacy and overall survival.

#### Reference

1. Eric Lawitz, et al. Sofosbuvir for Previously Untreated Chronic Hepatitis C Infection. *N Engl J Med* 2013; 368(20):1878-1888.

## Scientific Session 40

### Nonvascular: Abscess, Biliary, and Chest

Wednesday, April 6, 2016

3:00 PM – 4:30 PM

Room: 205/206

3:00 PM

Abstract No. 387

#### ■ FEATURED ABSTRACT

**Histotripsy liquefaction and subsequent fine-needle aspiration of large hematomas: feasibility study**

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of Washington, Department of Applied Physics, Seattle, WA; <sup>3</sup>University of Washington, Seattle, WA.

**Purpose:** Abdominal and muscular hematomas can have serious clinical consequences including abdominal or extremity compartment syndrome, abscess formation, and Page Kidney. Large, acute/sub-acute, hematomas usually cannot be adequately evacuated with percutaneous drains due to their viscosity. Indwelling drains may result in infection of a previously sterile hematoma. Histotripsy is mechanical fractionation using successive high intensity ultrasound pulses. The goal of this work was to evaluate histotripsy techniques for rapid ultrasound-guided liquefaction of large volume hematomas with subsequent 21 gauge needle aspiration.

**Materials:** The histotripsy methods—cavitation histotripsy (CH) and boiling histotripsy (BH) or a combination thereof—were applied to liquefy in vitro hematoma phantoms, fresh bovine blood poured into 50 ml molds and allowed to clot. 1 and 1.5 MHz ultrasound transducers were developed with low duty cycles to prevent heating while allowing short treatment times. The large areas of liquefaction, created by translating the focus within the sample in a 2D rectangular grid, were subsequently aspirated with a 21 gauge needle. The contents of the lysate were analyzed by histology and by sizing in a Coulter counter.

**Results:** The peak instantaneous power to achieve BH was lower (at 1.5 MHz) or equal to (1 MHz) to that required to initiate CH. BH lysis was 1.5-2 times larger than with CH. The lysates contained minute amount of debris larger than 70  $\mu$ m and 99% of particulates were smaller than 10  $\mu$ m. The contents of the large anechoic area of liquefaction produced by histotripsy were successfully aspirated using a 21 gauge needle under ultrasound guidance, yielding 8 cc (for 1.5 MHz treatment) to 30 cc (for 1 MHz) of lysate with less than 10 minutes of histotripsy. CH-aided liquefaction was slower, but the areas of liquefaction were more regularly shaped, facilitating easier aspiration.

**Conclusions:** Histotripsy is optimized for liquefaction of large extravascular hematomas allowing for rapid fine needle aspiration under ultrasound guidance, without the need for chronic indwelling catheters or open surgical evacuation.

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Abstract No. 388

**Three-dimensional printing of an abdominal compression device to facilitate CT-fluoroscopy-guided interventional procedures**

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**Purpose:** Percutaneous biopsies or drainages of deep intraperitoneal or retroperitoneal targets may be problematic due to intervening critical structures or long skin-to-target

distances. We describe the design modification, three-dimensional (3-D) printing and clinical use of a manual compression device to facilitate CT-fluoroscopy-guided percutaneous interventional access.

**Materials:** A commercially available fluoroscopic compression device (F spoon) was modified with a cutout in the spoon portion. The modified F spoon was initially used for CT-fluoroscopy-guided procedures, but improvements were needed. Computed Tomography scanning of the device provided a 3-D dataset for design modifications using Slicer 4.4 (open source) and Meshmixer (Autodesk Inc) software. The redesigned device was 3-D printed from nylon using a fused deposition modeling printer.

**Results:** The new shape and contour of the compression device enabled easy application of a sterile ultrasound probe cover. The right-handed design was modified for ambidextrous use. A forearm aperture improved device stability. The keyhole cutout in the spoon was shaped to allow for easy needle placement and application of rubber bands to retract the probe cover from the open cutout. The modified F-spoon was used in five patients and the 3-D printed device was used in three patients to successfully displace intervening bowel or blood vessels, steer the needle, and shorten skin-to-target distance. Technical success was achieved in all cases. No complications occurred.

**Conclusions:** Design modifications using software and 3-D printing were used to produce a manual compression device that facilitates CT-fluoroscopy-guided procedures that might otherwise be difficult or unsafe to perform.

## References

1. Fedorov A, Beichel R, Kalpathy-Cramer J, Finet J, Fillion-Robin J-C, Pujol S, Bauer C, Jennings D, Fennessy F, Sonka M, Buatti J, Aylward SR, Miller JV, Pieper S, Kikinis R. 3D Slicer as an Image Computing Platform for the Quantitative Imaging Network. *Magn Reson Imaging* 2012; 30(9):1323–1341.
2. Dachman AH. A biopsy compression device for use in cross-sectional or fluoroscopic imaging. *AJR Am J Roentgenol* 1998; 171(3):703–705.
3. Sainani NI, Arellano RS, Shyn PB, Gervais DA, Mueller PR, Silverman SG. The challenging image-guided abdominal mass biopsy: established and emerging techniques “if you can see it, you can biopsy it.” *Abdom Imaging* 2013; 38(4):672–696.

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Abstract No. 389

## Utility of prophylactic antibiotics in tunneled peritoneal and pleural drainage catheters

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**Purpose:** Tunneled pleural and peritoneal drainage catheters are most often used as palliative treatment for recurrent pleural effusions and ascites in oncology patients. Guidelines for antibiotic prophylaxis endorsed by the Society of Interventional Radiology do not provide a recommendation on whether antibiotic prophylaxis should be given at the time of placement of these catheters. We performed a retrospective study designed to determine the utility of prophylactic antibiotics in this setting.

**Materials:** A retrospective study was performed examining all tunneled peritoneal and pleural cavity drainage catheters placed at our institution between March 2013 and March 2015. Patient charts were reviewed to determine the indication for the procedure, prior surgical history, history of cirrhosis,

pre-procedural administration of antibiotics and subsequent infections. “Early” catheter site and fluid cavity infections ( $\leq 14$  days after placement) and “late” infections (15-90 days post-procedure) were determined. Statistical significance was determined via chi-square tests.

**Results:** A total of 124 patients had tunneled drainage catheters placed during the study period. Early infections occurred in 5 of the 124 patients. Sixty-two patients (50%) received pre-procedural antibiotics. In this group there were 3 early infections (4.8%). In the group not receiving antibiotics there were 2 early infections (3.2%) ( $p=0.65$ ). Late infections occurred in 9 of the 124 patients. Six of these cases received pre-procedural antibiotics and the remaining 3 had not ( $p=0.31$ ). Ninety-day mortality was not significantly different between the groups receiving and not receiving prophylactic antibiotics (61.2% and 66.1%, respectively). Of the 124 patients, 111 had the drainage catheter placed for palliative treatment of malignant ascites or pleural effusions.

**Conclusions:** No statistically significant difference was observed in early or late infection rates between patients who did versus those who did not receive pre-procedural antibiotics. With known potential adverse effects of antibiotic administration and the lack of efficacy demonstrated in this study, we would recommend against routine prophylactic antibiotic administration.

## References

1. Venkatesan AM, et al. Practice guidelines for adult antibiotic prophylaxis during vascular and interventional radiology procedures. *J Vasc Interv Radiol* 2010; 21(11):1611–1630.
2. Lungren MP, et al. Tunneled Peritoneal Drainage Catheter Placement for Refractory Ascites: Single-center Experience in 188 Patients. *J Vasc Interv Radiol* 2013; 24(9):1303–1308.

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Abstract No. 390

## Outcomes of salvage percutaneous biliary drainage for malignant obstruction after failure of endoscopic stenting

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**Purpose:** To describe the outcomes of patients with malignant biliary obstruction who undergo salvage percutaneous biliary drainage after failure of endoscopic biliary stents.

**Materials:** 47 patients underwent salvage percutaneous biliary drainage for recurrent malignant obstruction after endoscopic stenting at a single institution between 2005-2015. The medical records were reviewed for demographic data, procedural information, laboratory data, 30 day complications and subsequent biliary procedures. Cox regression, t-tests and summary statistics were performed to identify factors that contributed to patient outcome.

**Results:** The study group median age was 61 (range 33-83) and was comprised of 25 men (53%). Underlying malignancies included cholangiocarcinoma (n=13), colorectal (n=11), gallbladder (n=7), pancreatic (n=5), hepatocellular (n=4), and other (n=7). 24 patients had metallic endoscopic stents, 22 patients had plastic endoscopic stents, and one had both. Median time from endoscopic stenting to percutaneous drain placement was 39 days (range 1-824). Bismuth classification of