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Tip Location  | All Patients * (n = 2830) | Catheter Migration Complications ** (n = 19)
---|---|---
Vertebral Body Units Below Carina
-0.5 | 4 (0.1%) | 0 (0%)
0 | 25 (0.9%) | 0 (0%)
0.5 | 44 (1.6%) | 6 (31.6%)
1 | 376 (13.5%) | 7 (36.8%)
1.5 | 501 (17.7%) | 1 (5.3%)
2 | 1129 (39.9%) | 5 (26.3%)
2.5 | 429 (15.2%) | 0 (0%)
3 | 285 (10.1%) | 0 (0%)
3.5 | 32 (1.1%) | 0 (0%)
4 | 5 (0.2%) | 0 (0%)

Anatomic Locations
1 | 0 (0%) | 0 (0%)
2 | 0 (0%) | 0 (0%)
3 | 139 (4.9%) | 9 (47.4%)
4 | 1002 (35.4%) | 7 (36.8%)
5 | 1427 (50.4%) | 2 (10.5%)
6 | 262 (9.3%) | 1 (5.3%)

*Missing n = 10 imaging studies from port placement.
**Missing n = 1 imaging study from port placement.

up period of 1,091,498 catheter-days (median = 285 catheter-days). The incidences of this mechanical complication according to anatomic location or vertebral unit distance from carina are summarized in Table. Univariate analysis revealed that catheter tip at locations 1-3 compared to at locations 4-6 (P < .0001), and catheter tip being cephalad to the location one vertebral body unit below the carina compared to being caudal to that location (P < .0001) were significantly associated with catheter migration resulting in port malfunction.

Conclusions: The tip of port catheter should be placed at or below the cavoatrial junction, or below more than one vertebral body unit from carina at the time of port placement to decrease the chance of catheter migration resulting in port malfunction.

Abstract No. 204

Evaluation of complications associated with tunneled dialysis catheters in pediatric patients
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Purpose: Tunneled dialysis catheters are placed in pediatric patients requiring hemodialysis for a variety of congenital or acquired renal diseases. However, they can be associated with infection, thrombosis, vein stenosis, and these complications have been associated with higher mortality rates. The goal of this study is to evaluate complication rates and outcomes in pediatric patients receiving temporary dialysis catheter placement.

Materials and Methods: Retrospective chart review was undertaken after local institutional review board approval on patient ages one month through 22 years who underwent image-guided tunneled dialysis catheter placement between January 1, 2008, and August 1, 2019, at a tertiary academic pediatric hospital. Subjects were randomly selected from this time period, and clinical, procedural, immediate and long-term complications, and outcome variables were collected and evaluated for the duration of each line placement.

Results: A random sample of 76 patients (59.2% male) were evaluated. The majority of placements were for hemodialysis (n = 72, 94.7%), with the remainder placed for pheresis (n = 4, 5.3%). 80.3% (n = 57) lines were placed on the right side. There was a 100% placement success rate for all patients. 5 (10.9%) of the line placements had complications with the first 48-hours, all of which were placed for dialysis. 3 (4.2%) of these complications were due to bleeding, 1 (1.3%) was due to infection, and 1 (1.3%) was due to intraluminal thrombus formation. The average time to complication was 0.6 days (SD 0.55 ). 19 (41.3%) of dialysis line placements developed late complications ( >48hrs). 6 (8.3%) were due to infection, 6 (8.3%) were due to early tube dislodgement, 3 (4.2%) due to clot formation, 3 (4.2%) due to fibrin formation, and 1 (1.3%) due to catheter malfunction. Nearly half (n = 9, 47.4%) of the late complications were rated A or B utilizing the Society of Interventional Radiology complications scale, meaning patients required either no therapy or nominal treatment with no consequences and overnight hospital stay.

Conclusions: Late complications after 48-hours in tunneled dialysis catheters are more frequent than earlier. Early complications are primarily due to bleeding, while late complications tend to be more variable, but appear to be more often due to infection or tube dislodgement. Complications may result in line removal, antibiotic therapy, or hospitalization.

Abstract No. 205

COVID-19 and redefining essential procedures: a comparison of interventional radiology and procedural specialties in large health system
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Purpose: COVID-19 has had a large impact on health care systems during the initial surge phase. Early state mandated guidelines limited non-essential medical care to help curb transmission, preserve medical resources, and ease the burden on health care systems. Our study evaluates the impact on interventional radiology (IR) and surgical procedural volumes following a state mandate to halt non-essential care in March 2020.

Materials and Methods: Total IR volume and procedural volume for other surgical specialties, including vascular surgery, urology, general surgery, gynecology, and GI surgery were compiled for March 2020 and April 2020 for a large health care system based in the Midwest. Procedural volumes were compared to monthly baseline volumes calculated as an average of 6 months
(January 2019 through April 2019 as well as January and February 2020). Percent change in volume for each specialty was calculated.

**Results:** A total of 919 and 708 procedures were performed by IR during March and April 2020, respectively. The aforementioned specialties performed a total of 2,467 and 1,041 procedures in March and April 2020. IR demonstrated a 3.5% decrease in volume during March and 25.7% decrease in volume during April 2020. Vascular surgery, general surgery, urology, gynecology and GI surgery demonstrated 11.2%, 20.2%, 25.4%, 30.6%, 38% decrease in March and 25.7%, 47.4%, 63.3%, 68.0%, 72.9% and 78.7% reduction in volume in April 2020, respectively.

**Conclusions:** Procedural volumes during the initial phase of the COVID-19 health crisis were decreased compared to baseline values. Analysis following a state mandated halt on all non-essential care yielded large resultant reductions in volumes for multiple specialties. IR volumes were relatively less impacted, suggesting a larger proportion of essential procedures during this time frame.

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**Abstract No. 260**

**Comparing the safety and efficacy of ultrasound-guided random percutaneous liver biopsy: right versus left hepatic lobe approaches**

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**Purpose:** Compare the safety and efficacy of right versus left hepatic lobe approaches for ultrasound-guided random percutaneous liver biopsy.

**Materials and Methods:** We retrospectively reviewed 643 random percutaneous liver biopsies performed at our institution over a 10-year period (2009-2019), with direct comparison of right hepatic lobe (RHL) versus left hepatic lobe (LHL) approaches. We observed patient’s age, gender, inpatient/outpatient, needle type, needle gauge, biopsy indication, underlying coagulopathy, anticoagulant medication status, and laboratory studies (INR, platelets, PT). Technical success was determined by histologic diagnosis provided in the medical chart. Complications were observed and further classified (A-F) as suggested by the Society of Interventional Radiology (2015).

**Results:** Of 643 biopsies, 539 (84%) were RHL and 104 (16%) were LHL. Furthermore, 561 (87%) were of adults, with 473 (84%) RHL and 88 (16%) LHL. Eighty-two (13%) were pediatric (age < 18 years) patients, with 66 (80%) RHL and 16 (20%) LHL. Baseline characteristic differences of patients undergoing RHL versus LHL approaches were not statistically significant across all ages (all P values >0.22). Comparing RHL and LHL approaches, there was no statistically significant difference in technical success as determined by sample adequacy in adults (559/560; 99.8%) or children (82/82; 100%), (P = 0.660). Amongst the pediatric cohort, complications were observed in 1/65 (1.5%) RHL and 2/14 (12.5%) LHL, (P = 0.036). One patient (age 5 months) in the LHL cohort died (Complication Class F) secondary to procedure-related hemorrhage. The second pediatric LHL complication patient required pain medication and extended hospital observation (Complication Class B). Amongst adults, complications were observed in 6/467 (1.3%) RHL and 0/88 (0%) LHL, (P = 0.288).

**Conclusions:** In adults, there was no statistically significant difference in complication or technical success rate with regards to RHL versus LHL approaches. Therefore, depending on the operator’s preference and patient’s anatomy, right or left hepatic lobe approach may be performed. In pediatric patients, particularly in infants, the right hepatic lobe approach should be considered first. The LHL approach may be more technically challenging in pediatric patients due to smaller target and close proximity to vital structures.

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**Abstract No. 207**

**Damage-associated molecular patterns released by irreversible electroporation-treated cancer cells skew macrophages to M2 phenotype**

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**Purpose:** To investigate DAMPs released from tumor cells after IRE and their impact on macrophage polarization

**Materials and Methods:** Mouse bladder cancer cell line (MB49) was treated with IRE (2000 V/cm, 64 pulses, 70 microsecond duration) in a 4mm gap cuvette. DAMPs released into the supernatant by IRE were quantified by measurement of ATP with Cell Titer-Glo assay, and HSP70 and HMGB1 by western blotting. Mouse macrophage cell line (RAW 264.7) was incubated with supernatant from IRE treated cancer cells. Macrophage phenotype was assessed by surface markers for CD11b (pan macrophage), CD80 (M1 macrophage), and CD206 (M2 macrophage) evaluated at 4hours, 24hours and 48 hours. Macrophage survival, proliferation, and motility were assessed using trypan blue staining, CCK-8 and Transwell migration assay, respectively. Macrophage treated with IL-4 and lipopolysaccharide were used as positive controls of M1 and M2 phenotypes, respectively.

**Results:** Mean MB49 cell viability after IRE was up to 1.2% in CCK-8 and 1.4% with cell counting. ATP in the supernatant was significantly higher in IRE group (5.9μM) compared with the untreated control group (1.9μM, P < 0.0001). Relative dosimetry of Western blotting showed that HSP70 and HMGB1 in the supernatant was significantly higher than the untreated control group (13-fold for HSP70; P < 0.05 and 1.8-fold for HMGB1; P < 0.05, respectively). There was no significant difference in macrophage survival and proliferation compared with the untreated control group. Transwell migration assay showed significant migration per field compared with no treatment group (38.0 vs 11.6 cells/field; P < 0.05). After adding supernatant, M2 phenotype skewing is observed over time. There was significantly more M2 macrophages at 24 hours time point compared with no treatment group (49.3 vs 23.4%; P < 0.01).

**Conclusions:** DAMPs released by tumor cells after IRE results in M2 phenotype skewing in macrophages.