Intervention

**SE 06 IR-01**

Blue ocean strategy in radiology: clinical efficacy of interventional radiologic procedures for urologic trauma patients  
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Hemodynamically unstable traumatic patients including urologic injuries represent therapeutic challenges for the traumatologist and interventional management is now regarded as essential. We conducted this exhibition to figure out the role of interventional procedure in urologic trauma care.

Urinary tract injuries occur in up to 10% of patients with abdominal trauma, and the kidneys are the most commonly injured urologic system. The kidney is the third most common abdominal organ to be injured in trauma, following the spleen and liver, respectively. The most commonly used classification scheme is the American Association for the Surgery of Trauma (AAST) classification of blunt renal injuries, which grades renal injury according to the size of laceration and its proximity to the renal hilum based on CT findings. They do help delineate most important features of urologic systemic injury that impact patient diagnosis and management including interventional radiologic procedures.

Major renal injuries are usually surgical emergencies. Current trend toward more conservative management of renal trauma, advances in Interventional Radiology in trauma field may increase the use of interventional procedures for renal injured patients.

Urethral injuries can be divided into anterior and posterior urethral injuries depending on the site of injury, and interventional urethral realignment plays an important role in the treatment of urethral injury as well as surgical repair or endoscopic urethral realignment.

Emergent interventional procedure is a safe and effective method for management after traumatic urologic injuries, and this improvement was enough to result in better clinical outcomes in urologic trauma care. Therefore, in this presentation, we provide a review of the literature and discuss the efficacy and clinical value of interventional radiologic procedures on urologic trauma.

**SE 06 IR-02**

Lymphatic flow disorders: evaluation and interventional treatment  
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**TEACHING POINTS:**
- Describe normal and pathologic lymphatic anatomy with contrast-enhanced MR and conventional Lipiodol lymphangiography  
- Review the treatment methods for lymphatic flow disorders  
- Understand anatomic basis of various thoracoabdominal lymphatic flow disorders and discuss various accesses to treat them.

1. Normal and pathologic anatomy and function of the central lymphatics
2. Treatment Methods for Lymphatic Flow Disorders
   1) Medical management
   2) Interventional management
   3) Surgical management
3. Various Accesses to Treat Lymphatic Diseases
   1) Pulmonary lymphatic perfusion syndrome - conventional or retrograde (transvenous) lymphatic access  
   2) Protein losing enteropathy - transhepatic lymphatic access  
   3) Iatrogenic thoracic duct lymphatic injury - conventional, retrograde, or transpleural lymphatic access  
   4) Iatrogenic abdominopelvic lymphatic injury - embolization through punctured LN, closest LN, direct lymphopseudoaneurysm access, or retrograde transperitoneal access into the lymphatic leakage  
   5) Thoracic duct cyst - direct puncture with sclerotherapy

**SE 06 IR-03**

Drug-eluting stent placement in femoropopliteal arterial disease: a single center experience  
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**PURPOSE:** To evaluate the mid-term results of Drug-eluting stent (DES) placement for femoropopliteal lesions at a single tertiary center.

**MATERIALS AND METHODS:** We designed a retro-
spective single center study evaluating the efficacy of DES placement for 25 atherosclerotic femoropopliteal lesions in 23 patients (17 Male, 6 Female; mean age 73.36 years). Patient baseline characteristics assessed include sex, age, and presence of diabetes mellitus and chronic kidney disease. The primary effectiveness endpoint was primary patency assessed by the Kaplan-Meier method. Secondary endpoints were major adverse events including clinically driven target lesion revascularization (TLR), major amputation, mortality, and major complications of the procedure.

RESULTS: 60.8% of our patient population had diabetes mellitus, and 13.0% had chronic kidney disease. Mean lesion length was 19.8 cm, and 80.7% were total occlusion. DES angioplasty was technically successful in all patients. Thrombus migration occurred in one patient, which was successfully treated with thrombolysis. After the procedure, improvement of symptoms was observed in 23 cases (92.0%). The mean follow up period was 329.1 days (range, 30-1252 days). Mean patency was 796.9 days and median patency was 667.0 days. Primary patency at 12 and 24 months were 75.0% and 45.0%, respectively. Freedom from TLR at 12 and 24 months were 86.5% and 74.2%, respectively. Mortality rate was 8.7%, and the major target limb amputation rate was 8.7% at 24 months.

CONCLUSION: Mid-term result of DES placement for femoropopliteal lesions in our study is acceptable but compares unfavorably with the previous study.

SE 06 IR-04
Percutaneous microwave ablation for perivascular hepatocellular carcinoma: single center experience and review the literature
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Image-guided tumor ablation (ITA) is an accepted non-surgical treatment for liver neoplasm, especially for hepatocellular carcinoma (HCC). However, when the lesion is located in the vicinity of hepatic vessels, the blood flow act as heat sinks, drawing away heat from the ablation area and resulting in reduced ablation volume. Microwave ablation (MWA) is a recent development in the field of ITA that uses electromagnetic waves to establish a microwave near-field with direct tissue heating. The potential advantages of MWA include higher intratumoral temperatures, larger ablation volume, and shorter ablation times. These characteristic of MWA reduces susceptibility to heat-sink effect in the ablation of perivascular tumor than other heat-based ablation modalities. In this presentation, we would present our experience of percutaneous MWA for perivascular HCC and review the literature.

SE 06 IR-05
Percutaneous embolization of postoperative refractory bile leak with N-butyl cyanoacrylate
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PURPOSE: To assess the effectiveness and safety of percutaneous embolization with N-butyl cyanoacrylate (NBCA) for postoperative refractory bile leak.

MATERIALS AND METHODS: From January 2013 to December 2017, percutaneous embolization of postoperative refractory bile leak using NBCA was performed in 10 patients (M:F = 6:4; mean age, 61.7 years). Five patients underwent hepatic lobectomy, two patients underwent cholecystectomy, two patients underwent pancreatoduodenectomy, and one patient underwent liver transplantation. All patients had previously failed the traditional non-surgical treatment for postoperative bile leak; percutaneous catheter drainage (PCD) of biloma and percutaneous transhepatic biliary drainage (PTBD). After cholangiography to confirm the site of bile leak, percutaneous embolization with NBCA was performed using microcatheter system through the PTBD route. In patients with combined biliary strictures, biliary balloon dilation was also performed.

RESULTS: Technical success was achieved in all 10 patients. All bile leaks were initially closed immediately. However, one patient showed recurrent small bile leak 6 days later and underwent repeated NBCA embolization with successful result. Three patients showed biliary strictures and underwent biliary balloon dilation. The unintentional spillage of NBCA into the CBD was observed in two patients, which does not cause flow disturbance and ultimately clinically insignificant. There were no other procedure-related complications.

CONCLUSION: In the postoperative bile leak patients who failed treatment with PCD of biloma and PTBD, percutaneous embolization with NBCA is a safe and effective therapeutic method as a minimally invasive treatment alternative to surgery.
SE 06 IR-06
Quality improvement in Interventional Radiology: techniques and results
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PURPOSE: Quality in healthcare has been a subject of intense debate, investigation, and activity for the last decade in the US with the goal of providing safe, efficient, and effective care. Interventional Radiology (IR) departments provide highly sophisticated care for a large number of patients with a variety of different conditions. As such, IR departments should strive to provide the highest quality of care. The purpose of this educational exhibit is to describe fundamental techniques for quality improvement in healthcare and demonstrate successful QI projects in IR.

MATERIALS AND METHODS: Quality improvement methodology based on Plan-Do-Study-Act (PDSA) Cycle was applied in IR department at a tertiary cancer center in the US. After defining a problem, baseline data were collected for planning stage of PDSA cycle. SMART goal setting was used to set a well-defined goal that was specific, measurable, achievable, relevant, and time-bound. Fishbone diagram was constructed to outline potential causes of the problem. After identifying actionable cause(s), flowcharts were created to map out processes and point out areas for intervention. Specific interventions were considered to address the most common cause(s) of the problem identified by a Pareto chart. Processes were modified to reflect new interventions. Following implementation, data were gathered to statistically analyze the impact of quality improvement.

RESULTS: In three consecutive QI projects, the IR Department successfully applied PDSA cycle and the principles of QI to achieve meaningful results, rendering operations more efficient, effective and safe. Inter-procedure time interval (room turn-over time) for the angiography suite was reduced by 24% (p = 0.004), retrieval rate for IVC filters was increased by more than 50% (p = 0.0264), and the incidence of percutaneous nephrostomy (PN) catheter associated urinary tract infection was reduced by 53% within 90 day of PN placement (p = 0.0032).

CONCLUSION: This exhibit demonstrates that PDSA is a powerful and effective methodology for quality improvement in IR department. Every IR department should allocate time, resources, and personnel to meaningful QI projects. The methodology and examples described in this exhibit provide a roadmap for future QI projects.

SE 06 IR-07
Lymphocele embolization using glue for post-nephrectomy lymphatic leakage: preliminary experience in six patients
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PURPOSE: To assess the safety and efficacy of lymphatic embolization using N-butyl cyanoacrylate (glue) in the management of chylous ascites after nephrectomy or equivalent retroperitoneal surgery involving perirenal space.

MATERIALS AND METHODS: From January 2014 to October 2018, a retrospective analysis was performed in 6 patients (mean age, 45.3 y; range, 26-61 y) who underwent lymphatic embolization procedures for chylous ascites that developed after nephrectomy or equivalent retroperitoneal surgery involving perirenal space (4 donor nephrectomy, 1 partial nephrectomy and 1 paraaortic lymphadenectomy). Chylous lymphatic leakages were drained through a catheter placed directly into the lymphopseudoaneurysm at the surgical site. Lymphatic embolization procedures using glue was performed through the drainage catheter route in a separate session: superselective embolization for a damaged lymphatic vessel (n = 1), filling of the lymphocele itself with glue (n = 5).

RESULTS: All patients showed excessive amount of chylous leakages through the drainage catheter (mean 1173 mL, SD 1098 mL) despite full medical treatment including fat restriction diet and use of IV octreotide. After the embolization procedures, the damaged lymphatic vessels themselves were filled with glue in 3 patients, while only the retroperitoneal lymphoceles were filled in the other 3 patients. The amount of daily catheter drainage reduced to less than 10 mL in all 6 patients and drainage catheters were removed thereafter. No procedure-related complications or delayed recurrence of the chylous lymphatic leakages occurred during a mean follow-up period of 107 weeks (range, 37-155 wk).

CONCLUSION: Lymphatic embolization using glue is safe and effective for chylous lymphatic leakages after nephrectomy or equivalent retroperitoneal surgery involving perirenal space.
**SE 06 IR-08**

Endovascular therapy of pulmonary arteriovenous malformations: Korean single center experience
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**PURPOSE:** To assess the safety and effectiveness of embolization for pulmonary arteriovenous malformation (PAVM).

**MATERIALS AND METHODS:** From 2007-2018, 21 consecutive patients (M:F = 3:18; mean age, 47 years; age range, 34-78) underwent embolization of 31 PAVMs. Clinical and radiological findings were evaluated. Technical success, safety and effectiveness were evaluated retrospectively.

**RESULTS:** Patients complained resting chest pain (n = 1), hemoptysis (n = 1), transient ischemic attack (n = 1), and no clinical symptom (n = 18). Two patients had PAVM related with hereditary hemorrhagic telangiectasia (HHT) and 19 patients had sporadic PAVM. Locations of PAVMs were LLL (n = 7), RLL (n = 4), LUL (n = 10), RML (n = 8), and RUL (n = 2). All 31 PAVMs were simple type (one feeding artery; mean diameter, 3.35 mm; range, 1.4-6.3). Technical success was achieved in 29 PAVMs (94%); two cases of technical failure were due to catheterization failure (n = 2). Microcoils and Amplatz vascular plug were used in 28 and one PAVMs, respectively. One of two patients in which technical failure occurred underwent surgical resection and the other patient was followed-up radiographically. No procedure-related major complication was occurred.

**CONCLUSION:** Bronchial artery embolization was safe and effective for the management of non-massive hemoptysis.

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**SE 06 IR-09**

Bronchial artery embolization in the patients with non-massive hemoptysis
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**BACKGROUND:** Bronchial artery embolization has been well known to be effective life-saving procedure for the patients with massive hemoptysis. This study was to evaluate the safety, efficacy, and long-term outcome of bronchial artery embolization for the treatment of non-massive (< 300 mL within 24 hours) hemoptysis.

**MATERIALS AND METHODS:** This was a retrospective study of patients referred for bronchial artery embolization to manage non-massive hemoptysis from March 2005 to September 2014. BAE was performed in 233 patients (M:F = 143:90; mean age, 57 years; age range, 17–92 years) We assessed technical success, clinical success, recurrence, additional treatment, and major complications in all the patients.

**RESULTS:** Technical success was achieved in 224 patients (96.1%). Total of 219 patients (94.0%) was discharged with symptom improvement. During or after admission, hemoptysis recurred in 64 patients (27.5%) with mean recurrence time of 374 days (range, 0–2445 days) after embolization. The patients with recurred hemoptysis underwent repeat embolization (42 patients), surgical treatment (3 patients), or both (5 patients). The remaining 14 patients was treated conservatively. Total of 169 patients were uneventful during follow-up period (mean, 595 days; range, 2–3381 days). All the patients did not show any major complications.

**CONCLUSION:** Bronchial artery embolization was safe and effective for the management of non-massive hemoptysis.

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**SE 06 IR-10**

Outcome of rectal arterial embolization for rectal bleeding in 34 patients: a single-center retrospective study over 20 years
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**PURPOSE:** To report the efficacy of rectal artery embolization (RAE) for the treatment of rectal bleeding and the prognostic factors related to rebleeding.

**MATERIALS AND METHODS:** A total of 34 patients in a single center who underwent RAE for treatment of rectal bleeding between September 1998 and December 2018 were retrospectively reviewed. Procedure details including angiographic findings and embolic materials used, technical success rate, bleeding control rate during hospital stay, major adverse events rate, and prognostic factors associated with rebleeding were evaluated.

**RESULTS:** The technical success rate was 97.1% (33/34). Bleeding control during hospital stay was achieved in 64.7% (22/34) of patients. The most
common bleeding focus was in the superior rectal artery. Rebleeding occurred in 11 patients. Incomplete initial angiography with only inferior mesenteric or internal iliac angiogram was performed in 90.9% (10/11) of patients with rebleeding and 52.2% (12/23) of patients with bleeding control \( (p = 0.053) \). The use of N-butyl-2-cyanoacrylate (NBCA) was related to a significantly lower incidence of rebleeding \( (p = 0.014) \), whereas coagulopathy \( (p = 0.001) \) and more than 10 units of packed red blood cells (PRBC) \( (p = 0.003) \) were related to higher rebleeding rates. One patient had puncture site-related complication and no bowel infarction was noted during the follow-up period.

**CONCLUSION:** RAE was feasible and safe. The use of NBCA, presence of coagulopathy, and history of more than 10 units of PRBC were significant factors related to rebleeding. Bilateral inferior mesenteric artery and internal iliac artery angiography is highly recommended in initial session of RAE to achieve high rate of bleeding control.

**SE 06 IR-12**

Assessment of the probability of post-thrombotic syndrome in patients with lower extremity deep venous thrombosis

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This study was performed to assess the probability of post-thrombotic syndrome (PTS) after treatment of lower extremity deep venous thrombosis (LEDVT). Patients with LEDVT undergoing their first treatments in Nanjing First Hospital from January 2013 to December 2014 were enrolled in this study (156 patients were enrolled in the training cohort, and 135 patients were enrolled in the validation cohort). 51 and 45 patients developed PTS in the two cohorts, respectively. Independent risk factors for PTS were investigated in the training cohort, and these independent risk factors were employed to develop the APTSD scoring system with which to predict the probability of PTS. Four independent risk factors for PTS were identified: iliac vein compression syndrome, residual iliac-femoral vein thrombosis, residual femoral-popliteal vein thrombosis and insufficient anticoagulation. Patients in the training cohort were divided into 2 groups according to the APTSD score of ≤ 7.0 and > 7.0 points regarding the probability of PTS (median PTS-free time, 21.82 vs. 18.84 months; \( p < 0.001 \)). The accuracy of this score system was 81.7% for the training cohort and 82.5% for the validation cohort. Patients with an APTSD score of > 7.0 points may have an increased probability of developing PTS.
Prolonged indwelling sclerotherapy for renal cysts: comparison with conventional method
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PURPOSE: To evaluate the safety and efficiency of prolonged indwelling sclerotherapy for renal cysts by comparing with conventional method.

MATERIALS AND METHODS: 29 cysts (group A) in 27 patients were treated with prolonged indwelling sclerotherapy during the recent 10 years (mean size, 8.42 ± 2.33 cm; mean age, 60.1 ± 11.9 years; M:F = 12:17). 63 cysts (group B) in 58 patients were treated with conventional method during same period (mean size: 7.48 ± 1.98 cm, mean age: 63.6 ± 11.2 years, M:F = 31:32). Under ultrasound guidance, the renal cyst was punctured and 8Fr or 10Fr pigtail catheter were inserted, complete aspiration of the cystic fluid was performed. In group A, we injected 99% ethanol into the cyst and kept it for 2 hours with position changing. In group B, sclerosing agents were injected into the cyst and kept for 12~15 minutes. Repeated procedures were performed until the amount of drainage was less than 10 cc. Follow-up study was taken using US or CT images after the procedure and pre- and post-treatment cyst largest diameter were measured (mean follow up period; group A- 17.57 ± 19.38 months, group B- 21.85 ± 23.18 months). The nonparametric Mann-Whitney U test was used to compare differences in number of procedures, length of hospital stay, complications, and size reduction of the subjects in the two groups.

RESULTS: The mean number of procedures, length of hospital stay were 1.21 ± 0.49, 2.03 ± 1.50 days in group A and 2.81 ± 1.18, 4.30 ± 2.32 days in group B, which showed statistical significance (p value < 0.0001). There was 1 complication (leakage) in group A, but 8 complications (3 intracystal hemorrhage, 3 leakage, 1 pulling catheter, 1 catheter dislocation) in group B. Incidence of complications and size reduction rate of 3.4%, 72.84 ± 19.78% for group A, and 12.7%, 76.40 ± 23.03% for group B were no statistical significance.

CONCLUSION: Prolonged indwelling sclerotherapy is easier and more comfortable way for renal cyst treatment than conventional method.

Safety and efficacy of interventional treatments for hepatocellular carcinoma in HIV patients
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INTRODUCTION: Hepatocellular carcinoma (HCC) is one of the most common malignant tumors. HIV-infected people tend to develop cirrhosis and hepatic decompensation compared to individuals without HIV. Intervventional modalities such as RFA and TACE play a pivotal role in the management of HCC. In addition to this, efficacy and safety of interventional treatments in HIV-HCC patients are not studied well so far. Therefore, it is essential to know these method's safety and efficacy in HIV patients.

PURPOSE: To evaluate the safety and efficacy of interventional treatments for hepatocellular carcinoma in HIV patients.

MATERIALS AND METHODS: The study was approved by IRB of Faculty of Medicine Siriraj Hospital, Mahidol University. We reviewed a database retrospectively, from August 2008 and August 2018. Inclusion criteria were a confirmed diagnosis of both HIV and HCC, available pre and post transarterial chemoembolization (TACE) or radiofrequency ablation (RFA) treatment imaging studies. To compare two groups, we employed age, Child Pugh score, Hepatitis type and tumor size matching method. The overall survival estimates were calculated using Kaplan-Meier plots.

RESULTS: Survival was significantly shorter in HIV-HCC patients than in HCC patients (p = 0.01), with respective median durations of 5.3 years versus 8.7 years. Complications occurred after RFA in HIV-HCC patients are one liver abscess and in HCC groups are two minimal subcapsular hematoma and one liver abscess.
Beretta, Garlassi, Cacopardo et al. noted that 1-year, 2-year, and 5-year survival rates were 81.5% vs. 85.8%, 66.6% vs. 72.2%, and 34% vs. 49.1% for HIV-infected patients versus HIV-uninfected patients. In our study, 1-year, 2-year and 5-year survival rates were 58% vs. 94%, 51% vs. 91% and 46% vs. 79%.

CONCLUSION: This study confirms that TACE and RFA treatments are safe for HIV-HCC patients. However, survival time was significantly shorter in patients with HIV infection compared to non-HIV infected patients with HCC.

SE 06 IR-16
Trans-radial approach for percutaneous intervention of non-maturing hemodialysis fistula: a single center study of 16 cases
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PURPOSE: To evaluate the effectiveness of trans-radial artery approach (TRA) for the treatment of non-maturing arterio-venous fistula (AVF) in hemodialysis patients.

MATERIALS AND METHODS: The retrospective analysis was conducted in this single center study of 16 consecutive TRA endovascular procedures for 16 patients (M:F = 10:6; mean age, 67.1 years; range, 42-89 years) with non-maturing AVFs between January 2008 and April 2019. Eleven cases were radio-cephalic (68.7%), 5 cases were brachio-cephalic (31.2%) AVFs. Patient baseline characteristics, technical and clinical success and complications were evaluated, and functional patency was analyzed by the Kaplan-Meier method.

RESULTS: Radial artery approaches were successful in all patients. The angioplasty through TRA achieved a technical success rate of 100% (16/16) and the clinical success rate of 81.2% (13/16). The overall primary functional median patency time was 12.6 ± 5.2 months and the overall primary functional patency rates at 6 and 12 months were 64.6% and 40.4% respectively. There were no major complications, and no adverse events especially related to radial artery approach, such as hand ischemia.

CONCLUSION: Trans-radial approach for the treatment of non-maturing AVFs seems to be safe and effective in hemodialysis patients. This approach can be a feasible alternative to traditional direct approach in selected cases.

SE 06 IR-17
Transvenacaval extrahepatic portosystemic shunt (TEPS) creation: three cases report
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Transjugular intrahepatic portosystemic shunt (TIPS) creation requires patent intrahepatic portal vein and accessible hepatic vein. Those who have portal vein occlusion or liver graft with piggyback inferior vena cava may need alternative approach to create portosystemic shunt. Transvenacaval extrahepatic portosystemic shunts (TEPS) were attempted in two patients of portal vein occlusion and one recipient of liver transplantation. After successful translumbar transvenacaval portal-vein cannulation, a through-and-through guidewire was placed via trans-splenic vein snaring. After trans-splenic venacaval cannulation with 4-Fr catheter, another guidewire was parallelly placed headed to jugular vein. Stent-grafts were successfully placed over jugulosplenic through-and-through guidewire. TEPS is feasible in patients who are unfit for conventional TIPS.

SE 06 IR-18
Feasibility and effectiveness of hepatic artery guiding technique in transjugular intrahepatic portosystemic shunt procedure
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PURPOSE: To evaluate the feasibility and effectiveness of the hepatic artery guiding technique in transjugular intrahepatic portosystemic shunt (TIPS) procedure.
MATERIALS AND METHODS: From January 2009 to December 2018, 41 patients (M:F = 36:5; mean age, 57.9 years; range, 33-77 years) who underwent TIPS were retrospectively evaluated. Total procedure times, puncture times, and total procedure radiation doses as radiation quantity (mGy) and dose area product ($\mu$Gy m$^2$) from each procedure were compared using the Mann-Whitney U test between those in the simple blind puncture group and those who underwent hepatic artery guiding technique.

RESULTS: Technical success was achieved in all patients. Out of 41 patients, simple blind puncture was performed in 11 patients (26.8%), and hepatic artery guiding technique was performed in 30 patients (73.2%). No complications were observed in either group. The mean puncture time among those who underwent hepatic artery guiding technique (26.67 ± 11.46 min) was significantly shorter than the mean puncture time in the simple blind puncture group (38.50 ± 29.69 min) ($p = 0.045$). There was no statistical significance in total procedure time and radiation dose ($p > 0.05$).

CONCLUSION: Hepatic artery guiding technique could increase the feasibility of portal vein puncture in TIPS without a significant increase in radiation dose.

SE 06 IR-19
Catheter with hard plastic sheath and plastic wings: the novel device for US-guided paracentesis
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PURPOSE: To evaluate efficacy and safety of the new developed catheter and compared with the routinely used catheter for US-guided paracentesis.

MATERIALS AND METHODS: We retrospectively identified 137 patients who underwent the US-guided paracentesis between July 2017 and March 2018. Among them, 82 patients (M:F = 57.25; median age, 62 years) underwent US-guided paracentesis with the new developed catheter. Other 55 patients (M:F = 38.17; median age, 60 years) underwent US-guided paracentesis with routinely used catheter. The peri-procedural factors, safety and efficacy were compared between two groups with T-test, Mann Whitney U test and Fisher’s exact test. And we assessed the efficacy-associated factors using logistic regression analysis.

RESULTS: Regarding the safety, there was no major and minor complication in both groups. Rate of repuncture was significantly decreased in the group using the new developed catheter (6.1%, 95% C.I., 2.3 to 13.8) compared with the group using routinely used catheter (21.8%, 95% C.I., 12.8 to 34.5) ($p = 0.01$). Duration of procedure was significantly decreased in the group using the new developed catheter (median duration, 1 minute) compared with the group using routinely used catheter (median duration, 2 minute) ($p = 0.01$). On univariate analysis, thickness of abdomen ($p = 0.04$) and use of the new developed catheter ($p = 0.01$) were significantly associated with the rate of repuncture. On multivariate analysis, only the use of the new developed catheter is significantly associated with the rate of repuncture.

CONCLUSION: Using this novel catheter with hard plastic sheath and plastic wings, the rate of repuncture and the duration of procedure was decreased without complication for US-guided paracentesis.

SE 06 IR-20
Ultrasound-guided intraoperative radiofrequency ablation with surgical resection for treatment of cholangiocarcinoma: feasibility and long-term survival
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BACKGROUND: Most patients with ICC are not eligible for surgical resection due to advanced stage.

PURPOSE: To evaluate the feasibility, local tumor control, and long-term survival of intraoperative radiofrequency ablation (IORFA) with surgical resection to treat unresectable intrahepatic cholangiocarcinoma (ICC).

MATERIALS AND METHODS: From 2009 to 2016, 20 consecutive patients (12 primary ICC, 8 recurrent ICC) underwent curative IORFA with hepatic resection for surgically unresectable ICC. All patients were not qualified to undergo surgical resection due to multiple lesions causing postoperative hepatic insufficiency and undesirable tumor locations for surgical resection or...
percutaneous RFA. Among the 51 treated tumors (mean 2.6 ± 0.9 tumors/patient), 24 were treated by IORFA and 27 were surgically removed. The technical success and efficacy, overall survival, progression-free survival (PFS), and complications were assessed retrospectively. The overall survival and PFS rates were estimated by the Kaplan-Meier method.

**RESULTS:** The technical success and efficacy of IORFA were both 100%. The overall survival rates at 6 months, 1, 3, and 5 years were 95%, 79%, 27%, and 14%, respectively. The median overall survival time was 22.0 months. The PFS rates at 6 months, 1, 3, and 5 years were 70%, 33%, 13%, and 13%, respectively. The median PFS was 9.0 months. The prognosis was significantly worse for patients with recurrent ICC than for patients with primary ICC. One patient (5%) had major complications due to IORFA such as liver abscess and biliary stricture.

**CONCLUSION:** As a treatment for ICC that is not amenable to surgical resection alone, IORFA with surgical resection can be feasible and provides acceptable local tumor control and overall survival.

**SE 06 IR-22**

**Endovascular management for ruptured hepatic artery (7), GDA (2) and SMA (2) pseudoaneurysm - experience of eleven cases**

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**INTRODUCTION:** Pseudoaneurysms are a serious complication of acute or chronic surgical injury to the hepatic artery, GDA and SMA. Transcatheter embolization has been considered as the treatment of choice.

**PURPOSE:** To assess the efficacy of coil and glue embolization.

**MATERIALS AND METHODS:** 11 cases in eight patients (M:F = 8:1; mean age, 52; range, 28-76) were treated with transcatheter arterial coil embolization with one stent between January 2007 and February 2019. They were analyzed with regard to the clinical presentation, radiological finding, procedure, and outcome. All patients presented with epigastric pain and gastrointestinal bleeding. The aneurysms ranged from 0.4 to 4.4 cm in size. The aneurysms were located in the common hepatic artery (n = 7), GDA (n = 2), and one SMA (n = 2). Embolization was performed with fibered microcoils in all aneurysms (n = 9). Glue (n = 2) was also used.

**RESULTS:** First, Complete occlusions were achieved in nine patients. Mild biliary ischemic injury was noted in one patient. And there was no recurrence of the symptoms and bleeding during follow-up (mean, 13 months; range, 5-24 months). In one patient who was treated with stent insertion with coiling, however, rebleeding occurred at aneurysmal neck portion five days later. In emergency surgery, coiled aneurysmal sac was removed. One month after, another ruptured aneurysm was detected in angiography and we performed coil packing twice. He expired one month later due to septic shock. Another patient had also bleeding in GDA and another pseudoaneurysm. We embolization for 2nd pseudoaneurysm. CONCLUSION: Transcatheter arterial coil embolization for ruptured pseudoaneurysm is effective. Pre and post pseudoaneusym coil embolization are important. Two cases are incomplete embolization, two cases are recurred bleeding. We had 2ndary embolization, one case in GDA, another one left hepatic artery with stent case. We consider stenting as a useful modality for unique supplying artery for liver, which had spastic change, underlying hepatic infarct. In our experience, the stent should be handled more carefully. Further study and long term follow up is necessary.
SE 06 IR-23
Transmediastinal transdiaphragmatic approach for ablation of sonographically invisible high dome liver lesion
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High dome liver lesions are technically difficult lesions for RFA due to the anatomical reasons with the presence of critical structures surrounding the liver such as lungs, diaphragm and heart. The difficulty will be compounded if the lesion is not visible on ultrasound. Usually in these cases, the lesion is approached with creation of artificial ascites or artificial pneumothorax or transpulmonary route. We present a case where high dome liver lesion is approached through the mediastinum and diaphragm and successfully ablated with complication and with no requirement of creation of artificial ascites or pneumothorax as well avoiding the complications related to transpulmonary route. If due care is taken during the procedure, this is a safer approach with no requirement of additional procedures such as artificial ascites or pneumothorax and also avoiding morbidity related to those additional procedures.

SE 06 IR-24
Bronchial artery embolization: a single-center experience and comprehensive literature review
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Bronchial artery embolization (BAE) is known as effective and safe treatment for controlling massive hemoptysis. This poster includes comprehensive literature review of BAE and case information conducted BAE in Gil Medical Center from 2005 to 2018. BAE had conducted from 2005 to 2018 to 674 patients as a new case. The underlying cause of patients conducted BAE had the highest frequency on pulmonary tuberculosis (sequelae and active disease) and bronchiectasis without tuberculosis history. On Embolic material aspect, using PVA rather than gelfoam shows higher clinical success and lower recurrence rate and using both PVA and glue shows a little higher clinical success. The most common underlying case of recurrent bleeding case after conducting BAE is the aspergilloma (with tuberculosis sequelae). Analyzing patients received re-intervention, the number of case conducted 2nd BAE tends to decrease but the frequency of 2nd BAE within 3 months was 5~10% with no big difference.

SE 06 IR-25
Interventional Radiology management in pulmonary pseudoaneurysms
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PURPOSE: To describe Interventional Radiology management in patients with pulmonary pseudoaneurysms presenting with hemoptysis.
MATERIALS AND METHODS: Retrospective analysis of patients presenting with hemoptysis was done over a period of January 2014 to May 2019. Patients with imaging features suggestive of pulmonary pseudoaneurysms were included.
Sample size: 19
The patients were assessed for the following parameters.
Age
Underlying pathology- TB, ABPA, PDA, pneumonia, no underlying cause.
Hemoptysis- Minimal to massive
Lobe involved
Size on CT
Based on these parameters, management was decided.
Route- endovascular vs percutaneous.
Guidance- DSA, CT, USG or Fluoroscopy.
Embolization agent- Glue/coils/thrombin.
Success of the procedure was divided into technical and clinical success.
Technical- Complete vs incomplete embolization.
Clinical- episode of hemoptysis post procedure.
RESULTS:
Age- 4 to 70 years (Mean- 47 years)
Underlying pathology- Tuberculosis most common- 13/19 (68.4%), followed by pneumonia- 3/19(15.7%). One case each had ABPA and PDA with PAH, whereas no obvious underlying pathology was seen in one case.
Hemoptysis- Varied from minimal in two cases to massive (> 500 ml) in three.
Lobe involved- Most common- Left upper lobe and right lower lobe (5/19- 26.3% each).
Size on CT- 3 mm to 30 mm in largest dimension.
Intervention- 10/19 (52.6%) cases were taken up for endovascular intervention, with coils used in six patients and glue in one. Two patients with pseudoaneurysms on CT did not show contrast outpouching on DSA and had no further episodes of hemoptysis.
Remaining 9/19 (47.4%) cases were taken up for primary percutaneous intervention, out of which six were done under CT guidance, two under USG guidance and one under both US and fluoroguidance. NBCA Glue was
used in 7/9 cases and thrombin in 2/9 cases. Primary technical success was achieved in 15/17 cases (88.2%). Patients treated with percutaneous thrombin (two) had incomplete thrombosis which were then taken up for glue embolization. Clinical success was achieved in all except one patient who had episodes of hemoptysis post procedure and subsequently expired.

**CONCLUSION:** Pulmonary pseudoaneurysms are rare but fatal cause for massive hemoptysis. Intervention Radiology management via embolization, whether endovascular or percutaneous, is a safe and minimally invasive treatment measure in these patients with successful outcomes.

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**SE 06 IR-26**

**The utility of CO2 angiography during renal transplant artery stenosis procedures**

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**PURPOSE:** Renal transplant artery stenosis patients often present with renal failure. There could be risk of iodinated contrast-induced nephropathy due to conventional iodinated contrast angiogram. The purpose of this study was to minimize the usage of iodinated contrast angiogram with the utilization of CO2 angiography during renal transplant artery procedures.

**MATERIALS AND METHODS:** From April 2018 to July 2018, 2 patients (mean age, 62.5 ± 6.5), who presented with suspected renal transplant artery stenosis from USG Doppler study. Digital subtraction angiography was performed first with iodinated contrast (“gold standard”). Subsequent angiograms during the angioplasty procedures were using CO2 instead of iodinated contrast. The final angiogram was performed with iodinated contrast (“gold standard”). The diagnostic accuracy of the angiograms with iodinated contrast and CO2 were compared. Blood creatinine levels were monitored after angiography.

**RESULTS:** CO2 angiograms were successfully performed in these two patients. One patient was confirmed to have significant renal transplant artery stenosis in both iodinated contrast and CO2 angiograms, which was successfully treated with angioplasty. One patient had no renal transplant artery stenosis in both iodinated contrast and CO2 angiograms. There were no false-positive nor false-negative results in our initial series. Renal function was not compromised in these two cases.

**CONCLUSION:** Our initial experience confirmed that CO2 angiography was able to identify the renal transplant artery stenosis during renal transplant artery procedures. Therefore, CO2 is a beneficial contrast medium for renal transplant artery stenosis patients where standard iodinated contrast agents may induce iodinated contrast-induced nephropathy. More patients with suspected renal transplant artery stenosis will be planned to enroll into CO2 angiography during renal transplant artery procedures.

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**SE 06 IR-27**

**A 2-dollar construction of a biliary drainage phantom for puncture training in Interventional Radiology**

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Ultrasound guided puncture of the intrahepatic ducts may be particularly challenging for trainees to master percutaneous transhepatic biliary drainage. Commercially available phantoms for simulation and training may be cost prohibitive. We describe the development of a low cost biliary drainage phantom using common household and hospital supplies. This gelatin-based phantom is easy to make, inexpensive and easily renewable. It permits ultrasound-guided puncture, aspiration of bile or blood and wire insertion, simulating dilated biliary system and adjacent portal vein.
SE 06 IR-28

Endoluminal forceps biopsy of the renal pelvic mass through a percutaneous nephrostomy tract: a case report with literature review

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Renal biopsy is an essential invasive technique for establishment of the diagnosis and proper therapy planning. Image-guided percutaneous fine-needle aspiration biopsy is now an established diagnostic procedure in the different renal parenchymal diseases. The advent of the automated biopsy device, or biopsy gun, has further improved adequacy of the specimen for histopathologic analysis. Nevertheless, this method of tissue diagnosis is not fully justified for intra-urotract lesions which are often too small to allow an accurate puncture to obtain appropriate material. Percutaneous nephrostomy (PCN) is the procedure of choice for patients with obstructive uropathy. It can be used as an access to the urotract for biopsy instruments. Herein, the authors report a case of renal pelvic malignancy causing hydronephrosis for which tissue confirm was achieved by means of endoluminal forceps biopsy through the PCN tract. The authors also review the technical aspect and pros and cons of the procedure.

SE 06 IR-29

Embolization treatment of high flow priapism

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BACKGROUND: Priapism is prolonged erection that persists beyond or is unrelated to sexual stimulation. There are two main types of priapism: high flow and low flow. The treatment of priapism will differ depending on the diagnosis of these two different types. In particular, Interventional Radiology plays a key role in treating patients with high-flow priapism. This article will review the diagnosis and treatment of the high-flow priapism.

MATERIALS AND METHODS: We had 45 years old high flow priapism patient due to trauma. Color Doppler ultrasonography (CDU) is an adjunct to the corporal blood aspirate in differentiating low-flow from high-flow priapism. CDU is performed using a high-frequency transducer (7 MHz or higher). With the patient in the frog-leg position and the scrotum elevated, the cavernosal arteries are traced from their origin in the perineum along the ventral aspect of the penile shaft. In low-flow priapism, cavernosal arterial flow typically demonstrates a “high-resistance, low-velocity” waveform and arterial flow is usually absent. In high-flow priapism, CDU demonstrates a “low-resistance, high-velocity” arterial waveform. The sensitivity of CDU in localizing an arteriocavernosal fistula is nearly 100%. On gray-scale ultrasonography, the arteriocavernosal fistula is a hypoechoic area surrounded by echogenic tissue.

RESULTS: We successful penile selection by microcatheter and wire. We embolized by gelfoam particles. Post embolization angiography shows no visualized arteriovenous fistula in penile artery.

CONCLUSION: Priapism can be the result of a variety of etiologies and is often a treatable condition. During the initial evaluation, it is critical to differentiate high-flow and low-flow etiologies because the pathophysiology and treatment are different. Patients with low-flow priapism must be treated emergently because of the high risk of complications. Patients with high-flow priapism may be treated initially with conservative therapy, reserving more aggressive treatments for those patients who do not respond to conservative therapy. Selective transcatheter embolization of the arteriocavernosal fistula with absorbable/nonabsorbable agents has been shown to be effective, with the results of selective embolization superior to surgical ligation with fewer complications.

SE 06 IR-30

Imaging and intervention in peripheral vascular trauma: a comprehensive review for Emergency Radiology trainee

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BACKGROUND: Computed tomography angiography (CTA) is the imaging modality of choice for detecting arterial injuries in blunt and penetrating trauma involving extremities.

PURPOSE:
1. To discuss the CT angiography indications in peripheral vascular trauma.
2. Highlighting the wide spectrum of CTA signs of arterial injury in blunt and penetrating extremity trauma.
3. To discuss the role of IR in the management of peripheral vascular trauma

CONTENT ORGANIZATION: CT angiographic signs of arterial injury include
- Active extravasation of contrast material,
  - Pseudoaneurysm formation,
  - Absence of opacification of an arterial segment (thrombus)
- Arteriovenous fistula formation,
Loss of alignment of proximal and distal arterial segments with intervening nonopacified segment (Transection)
Diffuse spasm management

Ischemic limb: Surgical exploration

Bleeding vessel:
- Large vessel Rent: Stent Grafting
- Small/medium vessel: Embolization

CONCLUSION: CT angiography modality of choice for identifying and defining the extent of vascular injuries. IR plays important role in the bleeding type of vascular injuries.

SE 06 IR-31
Clinical value of blue laser imaging combined with Endoscopic ultrasonography for early gastric cancer and precancerous lesions
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BACKGROUND: Gastric cancer (GC) is the second most frequent cause of cancer associated deaths in the world, and especially in northeast Asia, it has the highest incidence. Compared with advanced cancer, early gastric cancer (EGC) generally carries a much more favorable prognosis. Blue laser imaging (BLI) is a new image-enhanced endoscopy technique that contributes to the diagnosis and endoscopic treatment of early lesions, however, it is often difficult to detect the invasive depth of EGC by BLI. Endoscopic ultrasonography (EUS) is regard as a useful means for predicting the depth of invasion in EGC and helpfully selecting suitable treatments of GC.

MATERIALS AND METHODS: This retrospective, simple-center study was conducted at Affiliated Zhongda Hospital, Medical School of Southeast University. Total 156 patients with suspected EGC were evaluated from September 2017 to January 2019. Of these, 75 patients were examined using single BLI, and BLI combined with EUS was performed for other patients. Definite diagnoses were obtained according to postoperative pathological results of subsequent treatments (using endoscopic resection or gastrectomy). The demarcation line (DL), microvascular pattern (MVP) and microsurface pattern (MSP) of BLI were assessed using the vessel plus surface classification system. A 20MHz thin ultrasound probe was used for invasion depth staging and the EGC lesions were classified into mucosal and non-mucosal (includes submucosal and advanced) subgroups.

RESULTS: Compared with patients using single BLI, the accuracy of diagnosis of EGC was significantly higher (p = 0.049) in other patients using BLI combined with EUS. However, there is no significant difference of the diagnosis rate of EGC between mucosal and non-mucosal sub-groups (p = 0.053). Interestingly, according to the results of clinicopathological staging, the accuracy of diagnosis of mucosa was significantly higher than non-mucosa in invasion depth staging of EUS (p = 0.011).

CONCLUSION: In the present study, we determined that compared with simple BLI, BLI combined with EUS may contribute to enhancing the diagnostic accuracy of EGC, and this combined method is more recommended to the mucosal EGC due to this type of EGC has higher accuracy of diagnosis. In addition, the discovery of invasion depth by BLI combined with EUS can be helpful to indicate the choice of therapeutic method. Multicenter cases and larger sample sizes are needed to confirm the present finds.

SE 06 IR-32
¹²⁵I irradiation stent for hepatocellular carcinoma with portal vein tumor thrombosis: a systematic review
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PURPOSE: To evaluate the value of ¹²⁵I irradiation stent placement for patients with hepatocellular carcinoma (HCC) and portal vein tumor thrombosis (PVTT).

MATERIALS AND METHODS: PubMed, Cochrane Library, EMBASE, MEDLINE for literatures were searched for all studies concerning ¹²⁵I irradiation stent placement in the treatment of HCC with PVTT.

RESULTS: A total of 7 studies with 682 patients were included in the final analysis. According to the Cheng’s classification, the type of PVTT that included in the 7 studies was as follows: II (n = 3), III (n = 7). Among them, 474 (69.5%) patients received treatment with ¹²⁵I irradiation stent placement, while 177 (26.0%) patients were performed with stent implantation without endovascular brachytherapy (EVBT). The median overall survival for patients treated with ¹²⁵I irradiation stent placement, while 177 (26.0%) patients were performed with stent implantation without endovascular brachytherapy (EVBT). The median overall survival for patients treated with ¹²⁵I irradiation stent placement and stent implantation without EVBT was 9.3 and 8.9 months, respectively. The risk factors associated with survival from the included studies were as follows: treatment regimen, stent patency, main portal vein stenosis or occlusion. Six studies with 392 cases reported the complications and side effects. The most common radiation-related adverse event was leukopenia (n = 20), while radiation-induced liver disease and
gastrointestinal ulceration were not reported in the studies. The stent-related adverse events consisted of fever (n = 43), abdominal pain (n = 2), hemorrhage (n = 8), and anorexia (n = 2). No stent or seeds migration was reported in the included studies.

**CONCLUSION:** \(^{125}\text{I}\) irradiation stent can be used as an alternative therapy in HCC patients with PVTT belong to Cheng’s type II or III, prolonging the survival and stent patency, improving disease control rate and tumor response.

### SE 06 IR-33

**Cerebral Lipiodol embolism (CLE): a rare complication of transarterial ethanol ablation (TEA)**

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**INTRODUCTION:** Transarterial ethanol ablation (TEA) plays an essential role in the management of unresectable hepatocellular tumor. Cerebral Lipiodol embolism (CLE) is a rare complication that may occur during chemoembolization with various neurological presentation.

**CASE REPORT:** A 64 years old male patient with known case of underlying HCC who underwent multiple operation for primary tumor resection. Latest computer tomography (CT) shows recurrent HCC with pleural metastasis which was inoperable.

![Fig. 1. (pre-TEA): CECT abdomen in axial and coronal views revealed a large irregular heterogeneously enhancing vascular mass arising from the edge of previous surgical site with large exophytic component. It infiltrated the right hemidiaphragm and right pleura.](image)

Hence, this recurrent hepatocellular tumor was inoperable. He was refer to intervention radiologist for TEA. No preoperative echocardiogram was performed for this patient. During TEA, right inferior phrenic artery was cannulated. Embolization was performed with alcohol:Lipiodol (1:2) mixture, followed by gelfoam slurry embolization till near stasis. Total 45 ml of mixture was given. No evidence of inferior phrenic arterio-pulmonary vein shunting.
Fig. 2. (TEA): Left- Right inferior phrenic artery angiogram. No evidence of inferior phrenic arterio-pulmonary vein shunting. Surgical clips noted. Middle and Right- DynaCT showed dense Lipiodol staining in the posterior right subdiaphragmatic tumor.

12 hours after procedure, his level of consciousness deteriorated which only aroused upon pain stimulation. Non-contrast CT (NCCT) brain was performed and showed diffuse gyriform hyperdensities at cerebral gyri.

CLE was diagnosed owing to a history of TEA. The complication was communicated to the family members. The family members decided for supportive care only and not for active resuscitation if patient further deteriorated. Day 2 post-procedure, patient collapsed and succumbed to death.
**Fig. 3.** NCCT brain showed diffuse gyriform hyperdensities throughout bilateral cerebral, cerebellar hemispheres, bilateral thalami, midbrain and pons.

**CONCLUSION:** Risk of develop CLE following TACE for hepatic tumor may be related to Lipiodol dose and abnormal right to left shunt. Control of Lipiodol dosage and preoperative evaluation for the presence of abnormal left-to-right shunt in essential in this patient.

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**SE 06 IR-34**

Endovascular treatment of giant fusiform hepatic artery aneurysm presenting with jaundice and hemobilia: a case report and literature review

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Hepatic artery aneurysms are rare but a clinically important phenomenon. Their incidence continues to rise slowly and mortality rate from spontaneous rupture is as high as 40%. They can present as a dull ache, obstructive jaundice or rarely as bleeding into gastrointestinal tract. Repair is recommended in those aneurysms greater than 2 cm in diameter. Management options range from reconstruction using prosthetic grafts to excision or embolization. Herein, the authors report a 72-year-old man with giant fusiform aneurysm arising from the common hepatic artery and intrahepatic portion of posterior division of the right hepatic artery causing jaundice and hemobilia. We successfully treated the aneurysm by means of transcatheter embolization of the common hepatic artery with vascular plug and coils. Embolization technique in such a challenging case will be review.

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**SE 06 IR-35**

Transarterial embolization for iatrogenic arterial injuries after percutaneous interventional procedures

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Recently, percutaneous interventional procedures have become a widely applied technique and represent the first-choice approach for diagnosis and treatment of much pathology of solid organs, such as hepatobiliary system and kidney. These techniques are less invasive than open surgery and are associated with high success rates, but vascular complications related to the percutaneous access can occur, such as early and delayed bleedings. Usually, venous bleedings can be controlled by simple maneuvers, such as deployment of larger dilators or of drainage catheters. Nevertheless, these maneuvers are insufficient in several cases of arterial damage and cannot be performed in arteriovenous fistulas or post-traumatic aneurysms. Therefore, selective angiography and embolization become a highly appealing treatment option. In this educations exhibition, we will review the variable imaging features, interventional management for iatrogenic arterial injuries after percutaneous
Intervention procedures, including diagnostic and therapeutic hepato-biliary or renal procedures and many drainage procedures.

**SE 06 IR-36**

**Efficacy of endovascular intervention for gastrointestinal bleeding treatment: a single center experience**

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**BACKGROUND:** Gastrointestinal (GI) bleeding is a serious medical condition. Endoscopic procedures can control most of these cases. However, there are still cases that endoscopy cannot handle due to re-bleeding or challenging bleeding site, especially lower GI bleeding. Endovascular intervention - Transcatheter arterial embolization (TAE) is a minimally invasive procedure that is effective for these difficulties.

**PURPOSE:** To review all GI bleeding embolization cases, to evaluate technical and clinical outcome and complication rate of TAE for these cases.

**MATERIALS AND METHODS:** Case series report. From January 2017 to December 2018, 23 patients with GI bleeding were embolized. Patient characteristics; bleeding site (upper GI, lower GI), procedure related factors: embolic materials, technique success rate; bleeding controlling success rate were assessed.

**RESULTS:** 26 angiography sessions in 23 patients, including 12 upper GI bleeding, 14 lower GI bleeding. The median age is 69 (range, 27 to 90). Twenty cases of active bleedings or vascular dysplasia were detected on arteriogram and embolized. Nineteen of 20 cases were performed with coils, one case with glue. Technical success rate was 95% (19/20) while bleeding controlling success rate was 89.5% (17/19). No patient had major complications (intestinal ischemia or infarction, death...).

**CONCLUSION:** TAE seems to be a safe and effective procedure to control GI bleeding with high success rate and acceptable procedure-related complication rate.

**SE 06 IR-37**

The fainting spell of Nutcracker Syndrome

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Compression of left renal vein between the abnormally narrowed aorto-mesenteric angle describes the Nutcracker syndrome or left renal vein (LRV) entrapment syndrome, which is a known cause of left renal vein distension. We would like to report a rare case of Nutcracker syndrome presented with orthostatic symptom preceding left flank pain. Also included is the uncommon imaging findings of left renal vein aneurysm associated with this syndrome and our experience treating the condition with self-expandable endovascular stent.
SE 06 IR-38
Systemic air embolism posttransthoracic lung biopsy
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Transthoracic lung biopsy is a common diagnostic procedure that is known to be associated with various complications. Most commonly encountered complications are such as pneumothorax and pulmonary hemorrhage. Systemic air embolism however is a known but exceedingly rare occurrence. We report a fatal case of air embolism to the left ventricle of the heart and the aorta, confirmed by a CT Thorax.

SE 06 IR-39
Selective arterial embolization of renal angiomyolipomas
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BACKGROUND: Angiomyolipoma (AML) is a benign renal tumor and the most common benign hamartomatous neoplasm accounting for 0.3% to 3% of all renal masses. They are more accurately characterized as perivascular epithelioid cell neoplasms in pathology.

PURPOSE: To evaluate the efficacy and safety of selective arterial embolization (SAE) in the treatment of renal angiomyolipomas (AMLs).

MATERIALS AND METHODS: A retrospective analysis of 28 patients treated using RAE between 2015 and 2018 was carried out. Tumor size and treatment outcomes were assessed at baseline and after the procedure during follow-up. CT, MRI or ultrasonography was used to evaluate AML shrinkage Statistical analysis: SPSS 25 mainly used. p < 0.05 was considered statistically significant.

RESULTS: 28 patients (F:M = 18:10; median age, 45.7 years;) who underwent SAE either to treat bleeding AML n = 1 or as prophylactic treatment = 15 were included. Technical success rate was 100%. The mean AML size reduction rate was 1.0 ± 0.3 cm after mean follow up was to 6 months from 1 years.

CONCLUSION: SAE is a safe and effective technique to manage renal AMLs as a preventive treatment as well as in emergency setting, with significant reduction in tumor size during follow-up.

SE 06 IR-40
Atypical presentation of dural arteriovenous fistula: acute hydrocephalus
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Dural arteriovenous fistula accounts for at least 15% of arteriovenous malformation of the brain and typically they present with symptoms of venous hypertension. We present a case of 39 years old gentleman who presented with symptoms of increased intracranial pressure such as acute history of worsening headache with associated early vomiting, progressive blurring of vision and unsteady gait. Physical examination revealed bilateral papilledema. Computed tomography and magnetic resonance imaging showed acute hydrocephalus with high signals in the vermis and both the cerebellum. There were also enhancing lesions at the foramen of Luschka and Magendie, obstructing the outlets. Conventional cerebral angiogram subsequently revealed a focus of dural AVF at the right occipital region which recruits supply from posterior branch of right middle meningeal artery, and a smaller cross supply from contralateral middle meningeal. Subsequently, selective angioembolization of right middle meningeal was done with precipitating hydrophobic injectable liquid (PHIL) and this patient regained almost complete neurological function after intervention. This case demonstrates an atypical presentation of dural arteriovenous fistula (dAVF) which came to us with acute hydrocephalus. We postulate that the acute hydrocephalus is possibly caused by obstruction by dilated veins/ congested choroid plexus at the bilateral foramen Luschka and foramen Magendie which may have developed as result from increased venous pressure within the dural sinuses. Early identification and treatment can potentially cure and reverse the damage.
SE 06 IR-41
Efficacy and safety of cutting balloon angioplasty versus high pressure balloon angioplasty for treatment of hemodialysis AV fistula stenoses resistant to conventional balloon angioplasty
Krishna Mohan Gummalla¹, Seung Wook Ryu¹, Arun Thomas¹, Rupak Dutta¹, Kabilan Chokkappan², ¹Tan Tock Seng Hospital, ²Khoo Teck Puat Hospital, Singapore, Korea.
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We compare the efficacy and safety of cutting balloon angioplasty versus high pressure balloon angioplasty in the treatment of dialysis AV fistulas resistant to conventional balloon angioplasty in a retrospective evaluation of dialysis fistuloplasties performed in our department over a 5 year period from November 2013 to October 2018. We would present the results with primary patency rates and complication rates.

### Intervention-Informal Scientific Presentation

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<td>Endovascular treatment of giant fusiform hepatic artery aneurysm presenting with jaundice and hemobilia: a case report and literature review</td>
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<td>Efficacy of endovascular intervention for gastrointestinal bleeding treatment: a single center experience</td>
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