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Scientific Paper Session

3602.1
Treatment of refractory haemorrhage cystitis in children by selective bladder embolization

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Purpose: Haemorrhagic cystitis (HC) causing on-going transfusions and/or symptomatic clot-retention causing urinary obstruction is a rare complication of allogenic-haematopoietic-stem-cell-transplantation (HSCT) and of oxazaphosphorine-alkylating-agents. The efficacy of selective-superior-vesical-artery-embolisation (SSVAE) for refractory-HC in children was assessed.

Materials and methods: Retrospective review of all children (<17 years) undergoing SSVAE for refractory-HC (2009-2019). Statistical analyses performed with T-test; ethics board review not required. 7 children (3M:4F); mean-age 7.2yrs (range: 4.5-16.5yrs) underwent SSVAE. 6 were post-HSCT; 1 was post cyclophosphamide-chemotherapy for desmoplastic-round-cell-tumour-of-retroperitoneum. Bilateral (7) or unilateral (due to arterial spasm) (3) SSVAE was performed via the common-femoral-artery using GelfoamTM(4) or Contour-PVA 355-500 micron particles. All urine-analyses were BK-virus-positive. Prior to embolization patients had standard medical management (hyperhydration, antiviral-treatment, topical-oestrogen, Mesna, and intravesical-prostaglandin) and urological interventions: bladder-washouts (5), ureteric-stents (1), cystoscopy, haematoma-evacuation (2), nephrostomy (1).

Results: 7 primary and 3 repeat-SSVAE were performed. Indications for repeat-embolization were increased blood requirements after temporary improvement (23d & 30d) or previous unilateral embolization due to arterial-spasm (3d). Median-time to SSVAE from HC-onset was 30 days (13-57). Blood-transfusion requirements significantly reduced post-SSVAE (p < 0.05), however platelet-requirements after the 1st week remained unchanged. One minor complication occurred (puncture site bleeding). 4 patients died within 2-8 weeks post-SSVAE: (adenovirus-related hepatic failure (1), pulmonary emboli (1), CMV pneumonitis (1), sepsis/acute kidney injury (1). 3 patients survived with HC resolution within 9-70 days with no urinary symptoms at follow-up.

Conclusion: Refractory HC is associated with a high morbidity rate. SSVAE is rarely considered but is effective at reducing transfusion-requirements in difficult cases.

3602.2
AneuFix, a novel treatment for type 2 endoleak: first results of a multicenter pivotal trial

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General Study Info: A prospective, multicenter, pivotal trial (ClinicalTrials.gov-NCT02487290).

Purpose: AneuFix is a biocompatible polymer that is directly injected into the aneurysm sac in patients with a type-2-endoleak and growing abdominal-aortic-aneurysm. The aim of this study was to assess technical success, safety and clinical benefit.

Methodology: Patients with a type-2-endoleak and aneurysm growth >5mm were included. Patients with a patent inferior mesenteric artery connected to the endoleak were excluded. AneuFix was injected in the endoleak cavity including a short segment of the lumbar arteries through a translumbar approach.

Endpoints: Primary-endpoint was technical success. Main secondary-endpoint was clinical success defined as absence of AAA-growth at 6 months on CTA. CTA follow-up was performed at 1-day, 3, 6 and 12 months. This study reports the first 18 patients.

Expected data/Impact on IR: Fourteen men and four women with a median age of 78 years (IQR, 75-81 years) were treated. The median pre-AneuFix AAA-diameter was 78 mm (IQR, 71–84 mm) and median AAA growth after EVAR was 16.0 mm (IQR, 10.5-19.0 mm). Technical success was 100%. Clinical success was 83%. Three patients showed 5 mm growth with persisting endoleak, probably due to conservative endoleak filling and/or present of a type-1a-endoleak. No serious adverse events related to the procedure or AneuFix material were reported. This procedure may herald a novel interventional treatment for type 2 endoleaks because of a newly used biocompatible polymer.
3602.3
MONARCH Trial: 30 day results of the prospective, multicenter, single-arm, real world study assessing the clinical use of the caterpillar arterial embolization device for arterial embolization in the peripheral vasculature

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To assess the safety and performance of the CATERPILLAR Arterial Embolization Device for peripheral artery embolization.

The prospective, multicenter, single-arm, real world MONARCH study enrolled and treated 50 patients at 10 centers in the United States. Primary endpoints were freedom from device-related serious adverse events (SAEs) through 30 days and technical success, defined as successful occlusion of the target embolization site(s) (TES) as confirmed during the index procedure via angiographic assessment. Secondary endpoints were time to vessel occlusion, freedom from clinically relevant recanalization site through 30 days, acute and non-acute migration, and from device and/or procedure-related adverse events (AEs) through 30 days. Additionally, accuracy of device delivery, ease of device trackability/deliverability, ease of detachment, and acceptability of device visibility were evaluated.

Freedom from device-related SAEs through 30 days was 100.0% and technical success was achieved in 98.2% of the TESs treated. The majority (58.2%) of the TESs treated were found to be occluded within 3 minutes, while 80.0% occurred within 5 minutes and 89.1% within 10 minutes of device deployment. There was no clinically relevant recanalization, acute or non-acute migration. The freedom from device and/or procedure-related AEs through 30 days was 84.0%. Accuracy of device delivery and ease of device trackability/deliverability were both measured at 98.4%. Ease of detachment was measured at 100.0% while acceptability of visibility under fluoroscopy was 93.7%.

The 30 day MONARCH study results demonstrated no device-related SAEs and 98.2% technical success of treated TESs using the Caterpillar Arterial Embolization Devices for arterial embolization in the peripheral vasculature.

3602.4
Long-term outcome of prostatic artery embolization for patients with benign prostatic hyperplasia: single-centre retrospective study in 1072 patients over a 10-year period

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Purpose: To assess the long-term outcomes of prostatic artery embolization (PAE) for patients with lower urinary tract symptoms (LUTS) and benign prostatic hyperplasia (BPH).

Materials and methods: Single centre retrospective study from March 2009 – March 2019 including 1072 patients who received PAE and had available follow-up. Patients were evaluated yearly at 1-10 years post PAE using the International Prostate Symptom Score (IPSS) and quality of life (QoL), prostate volume (PV) measured with transrectal ultrasound, prostate-specific antigen (PSA), peak urinary flow rate (Qmax) and post residual (PVR) volume. The need for prostatic medication, re-intervention rates, repeat PAE and prostatectomy rates were assessed with Kaplan-Meier survival analysis.

Results: Mean follow-up time was 4.39 ± 2.37 years. At last follow-up visit, mean IPSS and QoL improvements were -10.14±8.34 (p<.0001) and -1.87±1.48 (p<.0001) points, mean PV reduction was -6.82±41.11 cm3 (p=0.7779), mean PSA reduction was -1.12±4.60 ng/mL (p=0.9713), mean Qmax increase was 2.72±6.38 mL/s (p=0.0005), mean PVR reduction was -8.35±135.75 mL (p=0.6786) and mean IIEF-5 reduction was -8.35±135.75 mL (p=0.6786) and mean IIEF-5 improvement was 0.18±7.40 points (p=0.4546). There were 335 patients (31.3%) needing prostatic medication after PAE. Re-intervention rates were 3.4% at 1 year, 21.1% at 5 years and 58.1% at 10 years. Repeat-PAE rates were 2.3% at 1 year, 9.5% at 5 years and 23.1% at 10 years. Prostatectomy rates were 1.1% at 1 year, 11.6% at 5 years and 35.0% at 10 years.

Conclusion: PAE induces durable long-term LUTS relief, with re-intervention rates of 20% in the first 5 years and 30%-60% > 5 years post-PAE.
3602.5
Giant versus non-giant uterine fibroid embolization: how does it compare?

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**Purpose:** Uterine fibroid embolization (UFE) is a well-established and effective minimally invasive treatment for symptomatic uterine fibroids. Evidence supporting UFE for the sub-group of giant fibroids remains sparse with variable results, leading some to advise against it. We aim to assess the clinical effectiveness, imaging response and re-intervention rate for giant fibroid UFE compared to non-giant fibroids.

**Materials and methods:** Single centre retrospective study comparing 50 consecutive giant UFE patients with 50 consecutive non-giant cases over a 3-year period. Giant fibroids were defined as fibroids >/= 10 cm or a uterine volume greater than 700 cc. Pelvic MRI with contrast was performed pre UFE and 3 months post-procedure. Fibroid infarction was defined as: complete (>90% lack of enhancement), partial (50-90%) or no response (<50%). Reduction in dominant fibroid or uterine volume was also recorded. Electronic records were examined for a minimum 1-year follow-up (range 12 – 69 months) for clinical response, major complications and re-interventions. Chi-Square test used for statistical analysis.

**Results:** Improvements in symptoms were observed in 46/50 giant and 43/50 non-giant UFE patients. Mean reduction in volume post UFE was 38% in giant and 31% in non-giant fibroids. Complete fibroid infarction was observed in 45/50 giant (90%) and 48/50 non-giant cases (96%). Re-intervention occurred in 5/50 (10%) giant versus 6/50 (12%) non-giant UFE patients. This difference was not statistically significant (p = 0.75)

**Conclusion:** Giant uterine fibroid embolization is effective and safe with similar outcomes to non-giant UFE, offering an alternative uterine sparing treatment option to conventional surgery.

3602.6
Abstract not to be published.

3602.7
High tolerability and feasibility of irinotecan-eluting chemoembolization for CRLM: prospective real-life data from 152 patients across Europe

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**Background:** Transarterial chemoembolization (TACE) using irinotecan-eluting beads for unresectable colorectal cancer liver metastases (CRLM) requires evidence-based protocols to ensure its feasibility, safety and effectiveness. Using real-life data from the CIrse REgistry for LifePearl microspheres (CIREL), a prospective, observational study, the planned number of sessions, safety profile, feasibility and rate of complete administrations were assessed in 152 patients from 11 countries across Europe.

**Methods:** Eligible patients were ≥18 years with liver-only or -dominant disease treated with irinotecan-eluting TACE after an MDT board decision. Prospective data was collected for baseline, planned and performed number of sessions, technical details of each session and safety according to CTCAE 4.03.

**Results:** 121 patients (79%) completed all planned sessions (1 or 2 uni-lobar; 3 or 4 bi-lobar). 13 patients aborted the treatment cycle due to bad health condition or tumour progression and 9 patients refused further treatments/could not be further contacted. 99% of sessions were considered technically successful due to complete delivery of the dose (60%), complete stasis (17%) or both (21%). Lack of technical success was indicated due to failure to inject the complete dose because of artery anatomy (4 sessions) or patient condition (1 session). 8% of patients experienced at least 1 peri-interventional adverse event of grade 3-4. Larger liver-involvement (p=0.001), bi-lobar disease (p=0.01) and larger beads (200μm vs 100μm; p<0.001) were associated with AEs.

**Conclusions:** Irinotecan-TACE in CIREL was well-tolerated with a high proportion of completed treatment cycles and successfully performed sessions.
Arterial

**P-1**
Do renal artery aneurysms require long term CTA follow up: a single-centre retrospective review of 172 patients from 2006-2021

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**Purpose:** Retrospective review of patients diagnosed with renal artery aneurysm (RAA) on CT, assessed growth rate over time and requirement for long term imaging follow up.

**Materials and methods:** PACS system was searched for patients diagnosed with RAA on CT. A database, recorded details including age, gender, size, initial and follow up imaging, and intervention. Aneurysms were measured and assessed over time for change.

**Results:** We identified 172 patients with RAA, of which 100 patients had 22642 CT scans. There were 111 RAA for review, as some patients had bilateral aneurysms (39 males, 61 females, age range 34-89, mean age 62.9). Initial size measurement ranged from 0.4 cm to 6 cm (mean 1.4 cm). Mean follow-up was 1,054 days (2.89 years). Mean change in size of RAA was 0.54 mm, (range -1.8 to 1.8 cm, SD 2.89). Average growth rate per year was 0.154 mm. 83 RAA (74.8%) did not change over the duration of follow up, and 12 had grown 0.5-2 mm (within range of measurement error). Therefore, 85.6% remained stable over approximately 3 years.

**Conclusion:** RAA remain relatively stable in size over time. Large aneurysms, those with connective tissue disease, and women of child-bearing age will continue to require follow up and/or treatment. Our preliminary results indicate that smaller aneurysms (<2 cms), require limited follow-up. Yearly CTA to 3 years may be enough to confirm stability, reducing follow-up imaging, cost, and radiation dose. A larger study could verify results, look at risk factors such as hypertension, fibromuscular dysplasia, calcification and arterial diseases.

**P-2**
Associate factors of negative transcatheter angiography in lower gastrointestinal hemorrhage patients with active contrast extravasation from CTA: a single center 5 years’ experience

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**Purpose:** Lower gastrointestinal bleeding is one of the most common medical emergency. The condition accounts for 40-150/100,000 annually, with 4-10% mortality rate for. Numbers of patients underwent transcatheter angiography result in negative findings. Although there is recognition of slight superior sensitivity of CTA over transcatheter angiography, other factors still suspected to be associated. The objective of this study is to explore possible factors of negative transcatheter angiography in LGIB patients. To lower the negative angiography, avoid possible angiographic related complications and to provide information for team and patients.

**Methodology:** Technical and clinical information of patients with gastrointestinal hemorrhage treated at Ramathibodi hospital during December 2014 to December 2019 were retrospectively collected. Factors were analyzed using generalized linear model, Pearson’s correlation and Mann-Whitney test.

**Result:** There are 42.9% of active contrast extravasation during transcatheter angiography. The associated factors of negative transcatheter angiography are shock index at admission (p<0.01), CT to angiography time (p<0.01), heart rate at admission (p<0.01).

**Conclusion:** In our study, 57.1% of cases show negative findings on transcatheter angiography even active extravasation was found on CTA. In the excluded cases without prior CTA and underwent transcatheter angiography, we found 66% of them show negative on angiography, none of them had rebleeding event. These probably imply the usefulness of preprocedural CTA. We found the factors associate with negative angiographic findings. This information probably useful to inform the patient and help the team making decision before go on transcatheter angiography.
P-3
Transarterial embolization of spontaneous soft tissue hematomas in COVID-19 patients on anticoagulation: single center experience

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Purpose: To retrospectively evaluate the technical and clinical success rate and long term results of embolization in anticoagulated COVID-19 patients with spontaneous soft tissue hematomas (SSTH).

Materials and methods: This is a single-center, retrospective observational study performed in our country’s largest COVID-19 hospital from 04.2020 to 04.2021. We analyzed nine patients’ records with SARS-COV-2 infection and active bleeding, treated with transarterial embolization (TAE). Six female and three male (age range 49-78) were included. Patients underwent therapy with low-molecular-weight heparin, had drop of hemoglobin, were hemodynamically unstable and had SSTH with positive CT scan. Rectus sheath hematomas were observed in six (66.6%), retroperitoneal hemorrhages in two (22.2%) and thoracic wall hematoma in one patient (11.1%). Target bleeding arteries were: inferior/superficial epigastric, deep iliac circumflex, internal mammary, lateral thoracic, thoracodorsal and lumbar/iliumlumbar accordingly. Different embolics were used like pushable and detachable coils, N-butyl 2-cyanoacrylate and PVA particles.

Results: Technical and procedural success was achieved in 100% of cases. Most common site of bleeding was rectus abdominis muscle. Clinical success rate was 88.8%. Eight from nine patients completely recovered after embolization and from COVID-19 infection. One patient died three weeks after successful TAE, while still hospitalized in COVID-19 department due to multiorgan failure.

Conclusion: Since the pandemic, we witness increased number of SSTH associated with heparin treatment. To-date, no clear criteria exists in the management of SSTH in anticoagulated COVID-19 patients. Concluding from this small series, in hemodynamically unstable COVID-19 patients with active bleeding, immediate TAE can be life-saving, in addition to medical therapy.

P-4
Evaluation of the safety and navigability of embolization by microspheres through the SeQure microcatheter in patient with hemoptysis: preliminary results

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Purpose: Assess the security of non-target arteries embolization, the navigability, and the use of different coils of the micro-catheter SeQure® (Guerbet) in the management of hemoptysis.

Materials and methods: We reviewed patients who had had bronchial artery embolization with the use of SeQure microcatheter (Guerbet). We evaluated the absence of embolization of non-target arteries of the intercostal arteries of the right broncho-intercostal trunk (RBICT) (Embolization >10% or <10% of the non-target arteries). We classified the navigability within systemic arteries using this scale as artery dissection or spasm, sub-optimal (<80% of awaited catheterization) or optimal catheterization of the target artery. We noted the type of coils used and their brand.

Results: During two months, Dec2019 and Jan2020, 21 patients were treated for hemoptysis, in ten procedures (4 cancers, 2 aspergillosis, 1 bronchiectasis, 1 tuberculosis sequelae, 1 eosinophilic disease, 1 valvular heart disease) SeQure was used. They were, 8 men, mean age of 70.2 yrs (range 33 to 93 years, median:70 yrs). Hyperselective catheterization was performed in 20 arteries. The navigability was assessed as optimal, suboptimal, spasm, and failure of catheterization respectively in 12, 5, 2, and 1 situation. Eleven RBICT were evaluated, absence of non-target arteries embolization was observed in 9 RBICT, in one patient had a failure of catheterization (even with other micro-catheters) and in one patient presence of embolization of non-target artery.

Conclusion: The use of SeQure as a microcatheter in patient with hemoptysis is accurate with a good navigability and respect of the non-target arteries.

P-5
Endovascular hemostasis for abdominal bleeding with the use of n-butyl-2-cyanoacrylate

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Purpose. To show an effectiveness of endovascular hemostasis with the use of cyanoacrylate in patients with abdominal bleeding, which can provide complete embolization due to high degree of adhesion to the vascular wall and which have a possibility to control a bleeding in patients with hypocoagulation due to fast polymerization.

Materials and methods: During last 7 years we had 163 patients with abdominal bleeding, 125 were male, 38- female, mean age 55 years. 47 patients had bleeding due to trauma, 116- had other causes. The average amount of hemoglobin was 95.9 and RBC- 2.9.

60 patients had embolization after abdominal operations, 108 patients had emergency embolization without previous treatment. In 8 cases we used NBCA with peripheral coils, in 2 cases- microspheres, in 158 cases we used only NBCA.

Steps of operation:
1 - searching for direct and indirect signs of bleeding with the use of DSA angiography;
2 - selective catheterization of bleeding arteries with microcatheter;
3 - embolization of affected segment.
4 - control angiography.

Results: Effectiveness of embolization was 100%-bleeding was controlled in all cases. 5 episodes of recurrent bleeding-3 due to destructive pancreatitis, 2- due to Non-Hodgkin lymphoma. 22 patients died because of progressive multiple organ dysfunction. 141 patients were discharged from the hospital without any signs of bleeding.

Conclusion: According to our study embolization for abdominal bleeding with the use of NBCA is an effective procedure, which can be used in almost all cases of bleeding.
P-6

Safety and efficacy of Lipiodol® Ultra Fluid in association with surgical glues during vascular embolization

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Purpose: To evaluate the safety and efficacy of Lipiodol (ethiodized oil) associated with surgical glues in vascular embolization.

Materials and methods: Patients with vascular lesions/anomalies, eligible for vascular embolization with Lipiodol associated with surgical glues (mixture), were included. A first embolization procedure was performed, and if needed, a second was scheduled within one month. Adverse events (AEs) occurring during, and up to one month after the procedure were recorded. Consistency between target and actual obliteration rate was evaluated.

Results: Overall, 124 adults underwent a first procedure, and 12 underwent a second procedure. No AEs were reported during the procedures, and 42 AEs in 23 patients (18.5%) were reported after the procedure. Two mild AEs in one patient (0.8%) were related to the mixture (blister and skin necrosis), and 26 AEs in 16 patients (12.9%) were related to the procedure (mostly mild [57.7%] or moderate [38.5%]). The most frequent AE related to the procedure was post embolization syndrome (4.8%). Non-fatal serious AEs related to the procedure were reported in two patients (hydrocephalus and cerebellar infarction in one patient, peripheral ischaemia in another patient). The actual obliteration score was ≥ target score in 119/135 lesions (88.1%) for the first procedure, and 11/13 lesions (84.6%) for the second procedure.

Conclusion: Lipiodol had good safety profile when associated with surgical glues for vascular embolization, with no AEs during the procedure, and two mild AEs related to the mixture after the procedure. Lipiodol associated with surgical glues in vascular embolization achieved a satisfactory obliteration rate.

P-7

Image-guided embolotherapy of arteriovenous malformations of the face

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Purpose: To evaluate the safety and outcome of image-guided embolotherapy of extracranial arteriovenous malformations (AVMs) primarily affecting the face.

Materials and methods: A multicenter cohort of 28 patients presenting with AVMs primarily affecting the face was retrospectively investigated. Fifty image-guided embolotherapies were performed, mostly using ethylene-vinyl alcohol copolymer (EVOH)-based embolic agents. Clinical and imaging findings were assessed to evaluate response during follow-up (symptom-free, partial relief of symptoms, no improvement, and progression despite embolization), lesion devascularization (total, 100%; substantial, 76-99%; partial, 51-75%; failure, <50%; and progress), and complication rates (classified according to the SIR guidelines). Sub-analyses regarding clinical outcome (n=24) were performed comparing patients with (n=12) or without (n=12) subsequent surgical resection after embolotherapy.

Results: The median number of embolotherapy sessions was 2.0 (range, 1-4). Clinical outcome after a mean follow-up of 12.4 months (±13.3; n=24) revealed a therapy response in 21/24 patients (87.5%). Imaging showed total devascularization in 14/24 patients (58.3%) including the 12 patients with subsequent surgery and 2 additional patients with embolotherapy only. Substantial devascularization (76-99%) was assessed in 7/24 patients (29.2%), partial devascularization (51-75%) in 3/24 patients (12.5%). Complications occurred during/after 12/50 procedures (24.0%) including 8.0% major complications. Patients with subsequent surgical resections presented more frequently symptom-free at the last follow-up compared to the group having undergone embolotherapy only (p=0.006).

Conclusion: Image-guided embolotherapy is safe and effective for treating extracranial AVMs of the face. Subsequent surgical resections after embolization may substantially improve patient’s clinical outcome emphasizing the need for multimodal therapeutic concepts.

P-8

Advantages of percutaneous glu – Lipiodol combination for management of peripheral high flow arterio-venous malformations

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Purpose: To evaluate efficacy of percutaneous embolization with glue – lipiodol combination for management of peripheral high flow arterio-venous malformations (HFAVM)

Materials and methods: 21 patients of high flow vascular malformations diagnosed on dynamic MRI & USG were treated at our department. These cases were involving face, fingers, cheek, back, chest wall. All cases were evaluated on DSA for evaluation of the arterial feeder and draining vein. Based on these parameters the high flow AVM was embolised using various concentration of lipiodol – glu combination. In addition manual compression, BP cuff compression & balloon in the arterial feeder was used to control the flow across the AVM during embolization for optimal result.

Results: 6 cases the draining vein manual compression was required during embolization. In one case BP cuff was inflated to occlude the flow. In one case balloon inflation was done in the feeding artery during embolization. Rest of the 13 cases were embolized with percutaneous controlled injection of glue- lipiodol. All the cases underwent successful complete excision of the AVM post embolization. There was no
recurrence of the AVM. One complication of arterial thrombus formation was noted and was managed successfully with on table thrombo-aspiration.

**Conclusion:** Percutaneous glu embolization is a safer and effective technique for management of peripheral high flow vascular malformations. No non-targeted embolization or parent vessel occlusion was noted in our group. One arterial thrombus formation was noted and was managed successfully with on table thrombo-aspiration.

**P-9**

*Use of Penumbra coil devices in endovascular embolization of splenic artery aneurysms: a single center retrospective study*

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**Purpose:** To evaluate the safety and efficacy of splenic artery aneurysms (SAA) embolization procedures by using Penumbra coil devices.

**Materials and methods:** Between January 2018 and December 2021, 15 consecutive patients with a mean age of 60.6 ± 7.1 years [range, 55–73 years] underwent endovascular embolization using Penumbra coil devices (Ruby coil) for the treatment of splenic aneurysms. Ruby Coil is a versatile coil with a three-dimensional shape which has a 0.20"caliber compatible for a very low profile delivery system (Lantern Delivery Microcatheter, 0.25” inner diameter). Procedures were performed slowly under continuous fluoroscopic guidance to avoid non-target embolization.

**Results:** The average diameter of SAA was 2.1 ± 1.2 cm [range, 1.0 – 3.8 cm]. Each SAA was embolized by deploying an average of 4.2 detachable Penumbra coils. A 100% technical success rate was achieved. Post-treatment angiographic results predicted complete aneurysm exclusion in 10/15 (67%) procedures. No re-intervention procedure was performed in all patients. No major treatment-related adverse events were observed, and no expansion or rupture of SAs occurred in the average follow-up period of 11 months. Post-treatment CT angiography follow-up performed at three months showed signs of splenic ischemia in 7/15 procedures (47%); however no expansion or rupture of SAs occurred in all patients. No major treatment-related adverse events were observed. CT angiography follow-up performed at three months showed signs of splenic ischemia in 7/15 procedures (47%); however no expansion or rupture of SAs occurred in all patients. No major treatment-related adverse events were observed. CT angiography follow-up performed at three months showed signs of splenic ischemia in 7/15 procedures (47%); however no expansion or rupture of SAs occurred in all patients.

**Conclusion:** Penumbra coil devices can be considered a safe and effective embolic tool for the endovascular embolization of SAs.

**P-10**

*Pulmonary AVM and their management*

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**Learning objectives:** Our literature review outlines the investigation and management of pulmonary arteriovenous malformations(PAVMs).

**Background:** PAVMs may result in arterial hypoxaemia from right-to-left shunts, and thromboembolic phenomena caused by paradoxical embolism. Rupture can lead to haemoptysis and death, particularly in pregnancy when hormonal changes may induce a rapid enlargement of PAVMs. Characteristic CT appearances of PAVM are of a homogenous, well-circumscribed, non-calcified nodule or a serpiginous mass.

**Procedure details:** Diagnostic pulmonary angiography is performed to identify all treatable PAVMs. Choice of embolic agent (coils or vascular plugs) depends on vascular anatomy and vessel size. Careful dense packing and cross-sectional obliteration of the feeder is mandatory. There is a lack of clinical trials comparing agents noted in our literature review, which echoes the Cochrane review in 2018. For coil embolisation, the inner catheter is advanced as close to the venous sac as possible, beyond any branch supplying normal lung. In a large feeding artery with a risk of coil migration, the anchor technique, scaffold technique or balloon occlusion technique can be applied to secure coil stability. Microcoils are an option for small size, tortuosity or complex anatomy of the target vessel. Plugs may also act as an anchor to prevent coil migration in a large high-flow vessel. The duration of procedure depends on number and complexity of PAVMs and patient tolerance.

**Conclusion:** There is association between PAVMs and hereditary haemorrhagic telangiectasia(HHT), and so PAVMs should lead to family screening of HHT. Embolization of all patients with treatable PAVM is recommended (2a evidence).

**P-11**

*N-Butyl cyanoacrylate embolisation of an extremely rare variant of sequestration complex – a high flow left to left shunt between systemic artery and pulmonary vein*

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We present a case of 19 years young female who presented to the emergency with complaints of exertional dyspnea with 1-2 episodes of hemoptysis per day (amounting to a total of ~ 70 cc/day). The patient had no history of past trauma, infection, or surgery. The diagnostic imaging evaluation revealed three aberrant vessels arising from descending thoracic aorta, entering the right lung forming high flow fistulous communication with superior and inferior right pulmonary veins. The pulmonary arterial supply and tracheobronchial tree were normal. The patient was managed by transcatheter embolization using balloon occlusion to reduce inflow to the aberrant vessels and simultaneously injecting N-butyl cyanoacrylate (NBCA- Glue) for embolization. Post-procedure check angiogram revealed complete occlusion of the aberrant vessel. Systemic artery to pulmonary vein fistula is one of the least common congenital anomalies which was first described by pyre et al, as type I of sequestration complex. It is a rare anomaly with aberrant systemic vessels to the lung with no parenchymal or bronchial abnormalities and the presence of normal pulmonary arterial supply. The patients from the adult age group are mostly asymptomatic, the next most common complaint is exertional dyspnea which can be associated with...
hemoptysis. Amplatzer Vascular plug and Coil have been used in embolization of the same etiology by various authors. To our knowledge, this is the first case of the systemic artery to pulmonary vein fistula managed by the use of N-butyl cyanoacrylate (NBCA – Glue) as embolizing material.

P-12
Internal thoracic artery pseudoaneurysm embolization with glue: case report

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Clinical history/Pre-treatment imaging: We report the case of a young adult female patient presenting with dyspnea and ventilatory-dependent chest pain six days after cesarean delivery. The angiotomography revealed a left internal thoracic artery (ITA) pseudoaneurysm with active bleeding and haemothorax.

Treatment options/Results: Embolization of the ITA pseudoaneurysm was indicated. In the ultrasound evaluation, it wasn’t identified for a percutaneous approach. The pseudoaneurysm was catheterized, but, due to technical difficulties, it was not possible to perform distal catheterization. We opted for embolization with glue (Histoacryl/Lipiodol 1:4). Angiographic control showed persistence of the pseudoaneurysm through collaterals to the backdoor and access through the front door was no longer possible. A percutaneous puncture of the pseudoaneurysm was made guided by fluoroscopy to the previous embolic material injected, using a 22G Chiba. Then, with an 0.014" microwire and 2.4F microcatheter we embolized the remainder of the pseudoaneurysmal sac also with glue. Final control demonstrated no residual opacification of the pseudoaneurysm and the patient evolved without further hematic thoracic drainage.

Discussion: ITA pseudoaneurysm is a rare vascular complication, has potentially fatal consequences. The decision to use glue was an attempt to embolize the pseudoaneurysm given that it was not possible to perform distal catheterization to use coils, for example; however, in our case it was not effective and we needed to look for an alternative approach. In our experience, the use of glue is effective.

Take-home points:
– Glue can be effective for pseudoaneurysm treatment.
– Combined approach is an alternative to pseudoaneurysm treatment.

P-13
Progressive multistage embolisation of postprocedural refractory bleeding

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Clinical history/pre-treatment imaging: A 70-year-old male patient presented with massive hematomas in gluteal and femoral region and a six-year lasting history of prostatic, urethral, right colonic and right pulmonary carcinoma, with myeloproliferative disease that recently ended with lymphatic leukemia. Surgical evacuation of haematoma was performed. There were no postprocedural complications and the patient was discharged from the hospital. Three days after discharge the patient was readmitted due to swelling in the postoperative region. Ultrasound diagnostics presented recurrent haematoma.

Treatment options/Results: Due to the development of compartment syndrome, fasciotomies with evacuation of massive hematomas were performed. Despite normal coagulation parameters, adequate conservative and surgical therapy the bleeding persisted. The patient was presented at the multidisciplinary board and the endovascular treatment was indicated. Digital subtraction angiography showed bleeding from peripheral branches of internal iliac and deep femoral artery. After the target embolisation of the bleeding vessels, the bleeding recurred after few days. Despite several successful reinterventions, the clinical success was the same as after the first intervention. Because the patient’s clinical condition deteriorated, we decided for more aggressive, non-target gradual embolisation of the internal iliac artery and profunda femoris artery.

Discussion: After relative clinical success the rebleeding period after each reintervention was prolonged. In the last procedure we ended up with almost complete embolisation of the deep femoral artery with complete haemostasis and no rebleeding with gradual healing of incisions.

Take home points: Multidisciplinary approach in complex cases is mandatory. Multistage gradual embolisation can be a successful treatment method in refractory bleeding.

P-14
Combined approach in the treatment of a distal splenic pseudo-aneurysm with iatrogenic sac rupture

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Clinical-history: 68 year old male admitted with, fatigue, tachycardia and HB drop. Triple-phase CT demonstrates a previous haemorrhage with a splenic pseudo-aneurysm. Ultrasound confirmed the splenic pseudo-aneurysm but flow was not easy assessed. Endovascular approach was favoured as a reliable method in assessing satisfactory end result.

Results: The splenic artery was cannulated, however given the vessel tortuosity and the location of the pseudo-aneurysm, decision was made to perform a direct pseudo-aneurysm puncture (Image 1). Contrast injection into the sac demonstrate a pseudo-aneurysm with small feeding vessels. This was injected with 0.5ml Gluebran (3/1 ratio with Lipiodol). There was still sac filling. Further 0.5ml Gluebran was injected. This unfortunately caused the sac to rupture. Angiographic runs demonstrate flow into the sac but no clear feeding vessel. Therefore coil embolization was not favoured. Sonographic assessment confirmed the pseudo-aneurysm was still present. Direct Spinal needle puncture. Sac was injected with 1.5ml of thrombin. Final angiogram demonstrate no flow into sac (Image 2).


**Discussion:** The method of treatment for pseudoaneurysms depends on factors such as size, location, availability of materials, expertise and cost. In slow bleeding pseudoaneurysms with no sonographic Doppler flow, a combined approach can be utilized to provide best outcomes, this is especially useful in the treatment of difficult to reach pseudo-aneurysms. **Take-home points:** When employing percutaneous approach it is important to accurately measure the endovascular space as over injection of liquid embolics can lead to rupture of the pseudo-aneurysm. Thrombin can always be used in the treatment of residual pseudoaneurysm sac.

**P-15**

**Combined transarterial N-butyl cyanoacrylate and coil embolization of a giant common hepatic artery aneurysm**

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**Clinical history/pre-treatment imaging:** A 38-year-old gentleman had epigastric pain for a week. The abdominal CT angiography revealed a 3.5x3.4x4.0cm(APxRLxCC) saccular wide-neck aneurysm with intramural hematoma, originated from proximal celiac axis to common hepatic artery(CHA), and supplied the left gastric artery(LGA).

**Treatment options/results:** To embolize the aneurysm, we planned to embolize the LGA and CHA(back doors), as well as the aneurysm itself and the proximal celiac artery(front door). First, the LGA was embolized with multiple 0.018" coils. Then, a 5Fr. C1 catheter and a microcatheter were advanced into the aneurysm and distal CHA, respectively. Multiple 0.035" pushable and detachable coils were delivered into the aneurysm. When the flow within the aneurysm became sluggish, we closed the back door at CHA by delivering 0.018" detachable coils. Finally, N-butyl cyanoacrylate(NBCA) was injected at the proximal celiac artery to close the front door. The following angiogram showed exclusion of the aneurysm with collaterals from SMA reconstituting the proper hepatic artery.

**Discussion:** By using the double-catheters technique, we embolized the aneurysm while preserving distal CHA access for further back-door embolization. The detachable coils prompted precise embolization of the back door – a short and angulated distal CHA. Coil embolization of major branches followed by NBCA embolization proximally successfully obliterates the aneurysm and prevents non-target migration of the NBCA.

**Take-home points:**
1. The double-catheters technique preserves back-door access during aneurysm embolization.
2. Detachable coils could facilitate precise embolization.
3. Combining coil and NBCA embolization is an effective treatment for visceral artery aneurysms.

**P-16**

**Hepatic artery mycotic pseudoaneurysm treatment with glue in setting of arterio-biliary fistula**

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44 year-old male with history of Staphylococcus aureus bacteremia complicated by septic emboli and endocarditis requiring mitral valve replacement, presented with right flank pain. Imaging demonstrated a 2.2 cm pseudoaneurysm within the porta hepatis. Glue embolization was performed during catheter directed angiography. Post embolization computerized tomography (CT) triple phase scan demonstrated a small amount of residual enhancement. Percutaneous embolization of the residual pseudoaneurysm was then attempted. Intraprocedural multi-phase cone-beam CT demonstrated an arterio-biliary fistula. Glue was used to embolize the residual pseudoaneurysm, with small amount of glue within the common bile duct (CBD). A cholecystostomy tube was placed for gallbladder decompression and potential further treatment. No residual enhancement of the pseudoaneurysm and embolic material within the CBD was seen on post-procedural CT. One week later, imaging demonstrated migration of glue from the CBD. Six weeks later the CBD and cystic ducts were patent on cholangiogram. Tube was removed after passing a capping trial.

In our case, the patient had treatment of endocarditis with six weeks of antibiotics before presenting with right flank pain, elevated total bilirubin of 4.6 mg/dL, and a stable hemoglobin. In retrospect, the arterio-biliary fistula and perhaps some small amount of hemobilia may have reflected this. When treating mycotic pseudoaneurysms, it is important to note inflammation is more likely to cause fistulas, which needs to be considered when determining appropriate treatment method. Visceral pseudoaneurysms are at high risk of rupture and require urgent treatment. Potential for arterial fistulas should be considered when determining treatment method.

**P-17**

**Endovascular treatment of pseudoaneurysm of external iliac artery: intra arterial thrombin injection and coils placement**

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**Clinical history/pre-treatment imaging:** A 53 year old intravenous drug abuser, HIV+, with active covid-19 pneumonia and history of severe cirrhosis, presented with a swollen left groin, low hemoglobin level and abnormal coagulation profile. His digital substraction angiography (DSA) depicted left external iliac artery lacerated with a 7cm, in its maximum intraluminal diameter, pseudoaneurysm (PSA) in its end. Left common femoral artery was patent supplied by collateral vessels.
**Treatment options/results:** Treatment of PSAs with minimally invasive methods rather than surgery is well established. In this case, due to the dimensions of the PSA, the non continuity of the vessel and the abnormal coagulation parameters an endovascular approach with a combination of a liquid embolic material and coils was decided. Therefore 1000 IU (1ml) of thrombin was injected via a catheter inserted into the dome of the PSA and the artery proximal to it was emboised with coils. There was complete technical and clinical success and no complications, including thromboembolism, were observed.

**Discussion:** Although catheter directed endovascular use of thrombin is not FDA approved, it can be applied in cases of PSAs demanding a liquid embolic material. Thrombin is readily available, inexpensive and does not cause adherence of the catheter to the vessel. Acute non target thrombosis is a considerable complication, but with meticulously slow rate of injection and use of little quantities, it can be eliminated.

**Take-home points:** This case report adds an example of a successful and safe treatment of a large PSA using intra-arterially injected thrombin and coils.

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**P-18**

**Trans-arterial radioembolization as a salvage treatment for advanced NET liver metastasis with portal invasion**

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**Clinical history:** We report the case of a 75-year-old woman, who was diagnosed with a rectal neuroendocrine tumor (NET). Despite resection, irresectable liver metastases developed for which she received a somatostatin analogue and bland embolization’s.

**Treatment options:** After two years her liver metastasis progressed with tumoral invasion of the portal bifurcation. Due to this thrombus, treatment options were limited. The patient was not eligible for peptide receptor radionuclide therapy (PRRT), as (68)Ga-DOTATE PET/CT showed low accumulation in the portal tumoral invasion, while FDG PET/CT showed a high metabolism. She started with chemotherapy, but stopped after the first cycle due to toxicity. Although the effect on the fast growing tumoral thrombus was uncertain, we decided to treat her with Y90 trans-arterial radioembolization (TARE). After a successful mapping angiogram and adequate targeting of the portal invasion, she was treated with a planned tumoral dose of 120 Gy without any toxicity. The 3-month follow up CT-scan, showed a partial response of the liver metastasis with a significant shrinkage of the tumoral invasion of the portal vein. This successful treatment was repeated one year later and currently she is still alive, 2.5 years after treatment.

**Discussion:** For patients with unresectable NET liver metastasis, liver-directed therapies can provide locoregional control and improve hormonal symptoms. The current case shows that TARE can also be a safe, effective and repeatable salvage treatment option for patients with portal invasion.

**Take home points:** TARE can be an effective treatment for patients with advanced NET liver metastasis with portal invasion.

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**P-19**

**Endovascular management of uterine AV malformation arising from non-uterine artery branches in a patient with history of previous bilateral uterine artery ligation**

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**Clinical history/Pre-treatment imaging:** A 39-year-old female presented with copious vaginal bleeding secondary to incomplete abortion and attempted medical termination of pregnancy. Her previous gestation was complicated by scar ectopic pregnancy managed by bilateral uterine artery ligation to counter post-abortion bleeding. Transvaginal color Doppler demonstrated hypoechoic tortuous cystic spaces in the myometrium with arterial flow pattern and retained products of conception. The arteriovenous malformation (AVM) nidus was seen bulging into the endometrial cavity and the diagnosis was confirmed by Computed Tomography (Image 1).

**Treatment options/Results:** Considering the patient’s desire to preserve fertility, she underwent uterine artery embolisation (UAE). This proved difficult due to previous bilateral uterine artery ligation and the presence of small collateral feeders to the uterus from non-uterine arteries (Figs. 2A, 2B). Bilateral embolisation of feeders with glue lipiodol mixture and polyvinyl alcohol particles via transfemoral route was performed. Post-intervention angiography (Fig. 2C) showed successful embolisation with marked clinical improvement.

**Discussion:** Acquired uterine AVM is a rare condition that can succeed a history of uterine trauma. AVMs may lack intact fibrinolytic pathways leading to ongoing clots after UAE, stasis, and eventual regression. Understanding the collateral pathways and unique anatomy of pelvic vasculature is important in managing such patients endovascularly. This increases the technical success rate and reduces recurrence risk.

**Take-home points:** Patient history is of utmost importance in determining treatment for uterine AVMs. UAE is a minimally-invasive life and organ-saving procedure, which can be done even in unstable patients presenting with torrential bleeding secondary to uterine AVMs.
P-20
A case of endovascular embolization of a bleeding arteriovenous malformation (AVM) of a branch of the right gastroepiploic artery

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Clinical history: A 60 year old man entered the emergency department complaining of right quadrants abdominal pain and showing a reduction in hemoglobin values from 14.6 to 12.9 mg/dl during a six-hour observation while in intensive care unit. CTA scan highlighted an arteriovenous malformation of a branch of the right gastroepiploic artery located between the duodenum and the liver (24x41x28 mm), which caused peritoneal hematic effusion. During the hospitalization, MRI and endoscopy excluded the duodenal origin of the lesion.

Treatment: The AVM was later managed by embolization aiming at the occlusion of the arteries feeding the nidus, the shrinkage of the AVM and to avoid further bleeding. Squidperi 12 BALT SAS © was the chosen embolic agent for the procedure, which was conducted under conscious sedation through percutaneous left omeral access and catheterization of the branch of the right gastroepiploic artery feeding the nidus (Figure 1). After the first super-selective arterial embolization, a small portion of the AVM situated under the VI hepatic segment continued to show arterial inflow from a branch of the right colic artery, requiring catheterization and a second super-selective embolization.

At the final DSA and CT scan performed on the third post-operative day, more than 90% of the nidus was excluded without peritoneal effusion (Figure 2).

Discussion: This presentation reports a unique case of embolization of an AVM of a right gastroepiploic artery branch.

Take-home points: Bleeding splanchnic AVMs should be treated. Embolization can prevent enlargement and life-threatening peritoneal bleeding, thus restoring the patients’ quality of life.

P-21
Bronchial artery embolization in Hereditary-Hemorrhagic-Telangiectasia (HHT) syndrome patient with massive hemoptysis

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Clinical history: We present a 68-year-old woman with Hereditary-Hemorrhagic-Telangiectasia (HHT) syndrome consisting of severe pulmonary (uncountable arteriovenous malformations (AVM) treated multiple times), hepatic and digestive disease, currently in treatment with biological therapy. During an admission for gastrointestinal bleeding she presented massive hemoptysis with severe desaturation and hemodynamically instability needing intubation and vasodepressor drugs. CTA showed multiple treated (some recanalised/repermeabilised) and untreated bilateral AVMs. A giant one at the left lobe, with multiple recanalised pulmonary arterial feeders, also showed probable vasularization from a hypertrophied left bronchial artery.

Treatment/Results: A 5Fr right arterial femoral access was performed and the left bronchial artery was microcatheterized. Selective angiography showed multiple systemic-pulmonary fistulae towards the bed of pulmonary AVMs at the left lobe. Ultrasoundmicrocatheterization of each systemic supply was not feasible, so embolisation with EVOH was decided expecting distal progression of the embolic agent without migration to the venous circulation. Results were satisfactory, so an 8Fr right venous femoral sheath was placed and ultrasoundselective microwaterization with embolization of the recanalised arteries was completed.

Discussion: Systemic arterial vascularization of AVMs has been described, but its management is controversial. It is not systematically performed, but in this particular case, since the patient presented with massive hemoptysis (a rare HHT manifestation), we decided to perform an embolisation.

Take-home points: Systemic arterial vascularization must be discarded in HHT patients with hemoptysis CTA can be useful to decide treatment options Embolization can be challenging because of the complexity of the AVMs.

P-22
Embolisation of a superior gluteal artery pseudoaneurysm secondary to colon cancer: a case report

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Clinical history/Pre-treatment imaging: A 71 year old male was diagnosed with a colon cancer. After the diagnosis had a colon perforation with an abscess formation as a tumor complication requiring hospital admission. During the patients hospital stay he debut with massive rectal bleeding with hemodinamic instability. The patient was referred for an endoscopic study, without a diagnoses because the massive bleeding was obscuring the bowel. The patient was referred to our Interventional Unit, we recommended a CT, revealing a sacular imaging depending on the right superior gluteal artery branch of internal iliac artery, suggesting a pseudoaneurysm secondary to tumor erosion.

Treatment options/Results: The patient was brought to the laboratory, where an angiography was performed through the right femoral access and the pseudoaneurysm in the right superior gluteal artery was confirmed. We proceeded to pseudoaneurysm embolisation applying an hybrid sandwich technique using coils distal and proximal to the pseudoaneurysm and filling the sac with glue (Glubran®) with lipiodol (1:1 Dilution), finishing the procedure satisfactory without complications.

Discussion: Lower gastrointestinal bleeding can be some times a life threatening situation. Usually the first step for diagnosis and treatment is endoscopy, but sometimes when the patient debut with a massive bleeding the CT has more diagnostic accuracy, as in our case, showing other causes of bleeding apart of the usuals.
Take-home points:
- We recommend CT for lower gastrointestinal bleeding in special situations as in massive hemorrhage and colon cancer.
- The hybrid sandwich embolisation technique is feasible, safe and effective for pseudoaneurysm treatment.

P-23
Post transhepatic renal biopsy bleeding embolization

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Male, 58 y.o., with an incidental 1.7 cm lesion on the upper pole of the right kidney. Coagulation profile was normal. Patient was not receiving antithrombotic therapy. CT-guided percutaneous, transhepatic right kidney biopsy, was performed. Perinephric hematoma was observed. CT-angiography obtained depicted arterial extravasation, without identification of the extravasating artery. Although hemodynamically stable, the patient was immediately transferred to the angio suite. Under aseptic techniques, ultrasound guidance and local anaesthesia, the right CFA was punctured and a 6-Fr vascular sheath was inserted. Using a Simmons-2 catheter, multiple selective right renal, hepatic, superior mesenteric and lumbar arterial angiographies were performed, with no identifiable extravasation. Patient was immediately transferred for a new CT-angiography, due to BP drop, persistent flank pain and tachycardia, indicating the possibility of ongoing bleeding. CT-scan demonstrated massive arterial extravasation (with no identifiable extravasating artery). Patient was transported once again to the angio suite. The patient turned clinically unstable (BPsys 60), so the anaesthesiology team was called for immediate support. Right transfemoral access was obtained and a midline catheterization of the aberrant vessels and embolization was performed using histoacryl glue and lipiodol mixture (1:4). Final angiography demonstrated cessation of contrast extravasation (with no identifiable extravasating artery). Patient was transported once again to the angio suite. The patient turned clinically unstable (BPsys 50), so the anaesthesiology team was called for immediate support. Right transfemoral access was obtained and a midline catheterization of the aberrant vessels and embolization was performed using histoacryl glue and lipiodol mixture (1:4). Final angiography demonstrated cessation of contrast extravasation. Patient’s vital signs returned to normal. Technically successful embolization following iatrogenic penetrating trauma during renal biopsy was performed. Immediate response to such an acute situation is critical and lifesaving. Take-home point is the persistency to detect an active bleeding by all means.

P-24
Superior gluteal artery as a gate to embolize the internal iliac artery pseudoaneurysm or endoleak

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65-year-old female with medical history of hypertension and diverticulosis and Hartmann’s procedure for vascular-enteric fistula underwent the reversal which was complicated by an extensive lysis of adhesions and injury to the left internal iliac artery requiring iliolumbar bypass which was complicated by graft infection and developed hematoma with subsequent hemorrhagic shock that was found to be secondary to bleeding from a right common femoral vein, which resulted in ligation of bypass. She developed rectal bleeding and mycotic pseudoaneurysm of the left internal iliac artery. The pseudoaneurysm was initially embolized with CT guided direct needle stick and onyx. However, the pseudoaneurysm enlarged on the follow up CTA of pelvic. Then, the patient was placed in prone position and the left superior gluteal artery was accessed under color doppler ultrasound using a 21 G 15 cm, needle. Contrast injection confirmed the left SGA position of the needle. A 0.018-inch Nitrix wire was advanced into the left SGA. Subsequently, the needle was exchanged for a 5 Fr 15 cm transitional sheath. The dilator and microwire was traded for 2.8 Fr progreat microcatheter. Then, the pseudoaneurysm was embolized with penumbra coils followed by onyx 18 embolization of the feeding vessels, iliolumbar artery and superior and inferior gluteal arteries. Follow up CTA of pelvic showed complete embolization of the left internal iliac pseudoaneurysm.

P-25
Transarterial embolization of rare gastric fundus Dieulafoy lesion with three different embolic agents

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A 40-year-old male hospitalized with COVID-19 pneumonia developed hemorrhagic shock after a 7-day history of melena and a drop of hemoglobin levels from 11g/dl to 3.5g/dl. Endoscopy and colonoscopy failed to show an active bleeding site. Contrast computed tomography was performed, which revealed several dilated and tortuous arteries in the fundus of the ventricle, one of which was a direct branch from the descending aorta. These findings were consistent with Dieulafoy Lesion (DL). Surgical ligation achieved initial haemostasis, but five days after laparotomy the patient developed haemorrhagic shock and recurrent bleeding from DL was suspected. The case was referred to our interventional radiology unit for transarterial embolization (TAE). Angiography showed the anomalous and hypertrophied esophageal artery arising from the descending thoracic aorta giving branches to the gastric fundus. It also revealed hypertrophied right and left middle adrenal arteries with upward course and direct branching pattern supplying the stomach fundus. We proceeded with superselective catheterization of the aberrant vessels and embolization with three different embolic agents. Pushable and detachable coils, PVA particles and microvascular plugs were used for embolization. Shortly after the procedure the patient became haemodynamically stable and had a full recovery. The diversity of embolic agents puts TAE at the top for managing tricky bleeding sites, such as DL. This seals the efficacy of interventional radiology in the treatment of DL in haemodynamically unstable patients.
P-26
Endovascular treatment of a type 2 endoleak (T2E) of internal iliac artery aneurysm (IIAA)

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A 73-year-old male, treated for IIAA with endovascular exclusion by embolization of the gluteal artery and covered stent implantation along the right iliac axis, showed a CT angiography with a T2E fed from the iliolumbar artery (ILA) with a growth of IIAA measuring 7 cm.

A good option in T2E treatment of IIAA is a percutaneous access to the sac from a trans-lumbar approach; a percutaneous access to the gluteal artery from a posterior approach is also described.

In this case the iliac bone didn’t allow direct access to the endoleak nidus and the superior gluteal artery had previously been embolized. Therefore using a 4Fr sheath in the left femoral artery, we catheterized the fifth right lumbar artery with a Simmons catheter identifying the T2E and the feeding artery. Through the ILA we reached the aneurysmal sac with a 2.4Fr microcatheter (Progreat, Terumo) and we performed the embolization of the nidus and the afferent artery with coils and a liquid agent (Phil, MicroVention).

T2Es of IIAA are a challenge because of its complicated anatomy. The deep localization and the presence of multiple feeders make each case different. The anastomosis of ILA with retrograde flow in lumbar arteries represents a cause of T2E in the AAAs. However, through a reverse direction of flow, this was the cause of T2E of the IIAA.

T2E treatment of the IIAA is a challenge, but the careful evaluation of CT angiography and the knowledge of different techniques and materials allow you to choose the best strategy.

P-27
A first case of multidisciplinary arteriovenous malformation (AVM) at Muhimbili National Hospital (MNH), Tanzania

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A 10 month girl who presented with a slowly growing forehead mass since birth. No bleeding reported. Family and growth history was unrevealing. Hemangioma was diagnosed and was kept on propranolol without clinical improvement. On examination revealed a forehead large mass (7 cm) which was non tender, spongy, non-Ulcerative and pulsatile (Figure 1 (a)).

The neurologic examination was unremarkable. Imaging revealed multiple arterial feeders with intraluminal AV shunting, suggestive of an AVM. She underwent resection of the mass 2 months post embolization (Figure 2 (d)) and mass was compatible with hemangioma on histopathology (Figure 2 (e)).

The planned for embolization followed by surgical resection. Embolization was performed via a 0.008 microcatheter system with detachable tip using EVOH (Squid 18) at an interval of 2 minutes for a period of 45 minutes in plug-and-push technique and complete occlusion of the nidus was achieved. Embolization was stopped before EVOH entering the draining ophthalmalic vein. Both left and right internal and external carotid artery runs were done and no further feeding arteries were identified (Figure 2 (a) and (b)).

AVM’s as representatives for high-flow lesions are high-risk lesions, especially in the facial region. The combined treatment of embolization and surgical resection (if defect then reconstruction) have turned out to be appropriate for AVM’s. Despite the introduction of antiangiogenetic drugs, medical treatment has not been established for AVM’s up to now.

Not all vascular malformations are hemangiomas and all differential diagnosis and management options should be sought out for and requires a multidisciplinary approach for treatment.

P-28
Successful embolisation of a large ruptured central pulmonary artery pseudoaneurysm on top of squamous cell lung cancer

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Clinical History: A 61-year-old female patient was referred to our tertiary centre with severe haemoptysis. There was a one-month history of progressive haemoptysis, weight loss, and night sweats. The underlying diagnosis was unclear.

Imaging: CT angiography revealed a large right pulmonary pseudoaneurysm (PAP) arising from the superior aspect of the proximal lower lobe apical segmental artery (5.3x4x3.6 cm) with short wide neck, Figure 1.

Treatment options/results: After ICU stabilisation, an endovascular embolisation was performed under local anaesthesia. The pseudoaneurysm was packed with 25 long coils, two vascular plugs, and a 5ml of Human Thrombin. The patient’s haemoptysis settled. However, there was a sudden deterioration after 12 hours with a large pulmonary haemorrhage and respiratory failure. After decision taken with thoracic surgeons and ITU team, the parent segmental artery branch was embolised with four vascular plugs, Figure 2.

Definite cessation of bleeding was achieved. The patient was extubated after 5 days. Endobronchial ultrasound biopsy revealed underlying squamous cell carcinoma.

Discussion: Primary and metastatic lung cancers are rare causes of PAP. Most of the few reported PAP cases due to lung cancer showed small-sized pseudoaneurysms. PAP is more common in peripheral pulmonary arteries.

Take-home points: Availability of different IR tools leads to success with urgent challenging procedures (long sheath, different embolics). Centrally located PAP increases the embolisation difficulty by minimising the endovascular treatment options and making the access unstable. PAP exclusion by embolising the parent artery has challenges of wide calibre, tapering nature, lack of luminal stenosis, and distensibility of the pulmonary artery.
P-29
Successful embolization of ruptured pancreaticoduodenal arcade pseudoaneurysm in the setting of simultaneous coeliac trunk occlusion recanalization and angioplasty

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Clinical history: We present a clinical case of 81 years old male patient brought to emergency department with a history of acute onset of abdominal pain. Abdominal ultrasound revealed liquid in the abdominal cavity. Computed tomography angiography (CTA) showed large intraabdominal hematoma with multiple visceral artery collateral blood vessel arcades with multiple aneurysms at the level of hematoma and coeliac trunk arteries. Coeliac trunk occlusion prevented superselective embolization of pathological pancreaticoduodenal anastomoses prior to coeliac trunk recanalization. Using brachial approach coeliac trunk was recanalized. Balloon angioplasty was performed, following 5x20mm balloon expandable stent implantation. Consequently pathological vessels were embolized with microcoils. Patient received hemotransfusions and was discharged from hospital on 7th day. Control CTA after 5 month revealed no recanalization or new collateral development, coeliac trunk showed preserved in-stent lumen.

Discussion: Compensatory anastomotic flow through pancreaticoduodenal arcade is common in cases of coeliac trunk occlusion and endovascular embolization of these vessels may lead to ischemic complications. Coeliac trunk staged recanalization with maintained antegrade flow following anastomotic vessel aneurysm occlusion may be solution for urgent hemostasis.

Take-home points: Chronic coeliac trunk occlusion often leads to collateral vessel development. Pathological collateral development carries high risk of acute infraabdominal bleeding. Endovascular collateral embolization could lead to pancreatic necrosis in case of underlying coeliac trunk occlusion.

Pre-treatment Imaging:
1) Duplex Ultrasound Arterial And Venous System of Right Upper Extremity showed Arterial-Venous Malformation at Right Lower end of Humerus with AVF ? Pseudo-Aneurysm below Elbow joint.
2) Cinefluoroscopy and DSA Angio shoots in Cathlab (Contrast Angiography) revealed High Flow Vascular Malformation between Right Radial artery with Venous drainage into Brachial Vein.

 Dense Network of Hypertrophied Muscular branches of Rt. Distal Brachial & Proximal Radial artery shunting through Primitive Vascular Nitidus into Tortuous, Dilated Brachial Vein.

IR Treatment Approach:
1. Trans-Femoral Catheter guided AVM & Aneurysmal Sac Embolisation with NBCA Glue (Histoacryl) mixed with Inj. Lipiodol.
2. Direct puncture Glue Embolisation at the AVM Nidus.

Results: After Super-selective Catheterisation with 4 Fr Head Hunter (H-1) of Rt. Brachial artery “Intra-Nidal Glue Embolisation” successfully done for High Flow AVM. Simultaneously Glue Embolotherapy performed for Aneurysmal Sac. Post Embolisation Check Angio shoots showed complete occlusion of AVM & Aneurysm.

Discussion: Post traumatic Upper extremity High flow AVM & Aneurysm growing in size, extending into Inteamuscular compartment. If Not treated by Endo-Vascular approach then can lead to High Cardiac output failure or AVM Rupture may have caused profuse bleeding.

Take Home Message: Glue Embolisation is Safe & Successful in High Flow AVM & Aneurysm.

P-31
Different techniques for management of traumatic arterial injury – a case report

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Clinical History: We report the case of a 66 years-old patient, hospitalized with COVID, who after a femoral artery puncture developed an increase in the volume of the right thigh with a decrease in hemoglobin with the necessity for transfusion support. Angio-CT revealed an arterio-venous fistula (AVF) as well as a voluminous hematoma with active hemorrhage.

Results: The angiography revealed bleeding pseudoaneurysms on the medial femoral circumflex artery and in a branch of the deep femoral artery that were excluded with coils and particles of polyvinyl acetate (PVA), and an AVF between the proximal superficial femoral vein and artery excluded with a covered stent (Atrium Advanta V12). Angio-CT one day after embolization depicted resolution of the active bleeding and exclusion of the AVF.

Discussion: Indications for treatment in peripheral arterial injuries include contrast extravasation, false aneurysm, AVF, tears in the lining, and distal ischemia. Treatment options include stent graft for transection, false aneurysm, AVF and arterial occlusion, and embolization for focal bleeding. Permanent (coils, plugs, PVA, glue) or temporary (Gelfoam, thrombin) materials are appropriate in different situations. Covered stents can be used in major vessel injuries where preservation of flow is desirable.
**In our case, PVA and coils were used to exclude bleeding pseudoaneurysms and a covered stent was used to treat the AVF.**

**Take-home Points:**
- Treatment of injuries to peripheral arteries should be decided on a case-by-case basis according to local expertise.
- Stent grafting and embolization may be definitive treatments and spare the patient further operative intervention.

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**P-32**

**Killing the Hydra: a case of acquired chest wall AVM**

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**Clinical history/Pre-treatment imaging:** 61yo female with history of breast cancer treated with chemoradiation complicated by radiation recall, chest-wall necrosis, and DIEP reconstruction was referred for an 8x6x2cm acquired arteriovenous malformation (AVM) found on CTA done for hemoptysis. Feeding vessels included the left subscapular, lateral thoracic, superior thoracic, internal mammary, and 2nd-8th intercostal arteries.

**Treatment options/Results:** Pulmonary and aortic angiography confirmed findings on CTA and showed the venous outflow of the AVM into the left pulmonary artery. Intra-arterial coil embolization and ethanol/lipiodol injection was performed in three sessions, which successfully eliminated flow to the AVM. Treatment was complicated by chest wall pain which was treated successfully with T2-T7 intercostal nerve ablation and oral amitriptyline. A superficial ulcer of the left breast flap healed spontaneously. The patient described improved exercise tolerance, cessation of hemoptysis, and absence of chest-wall pressure after treatment.

**Discussion:** Radiation recall is a rare etiology of chest wall necrosis after chemotherapy. This case required chest wall reconstruction with a DIEP flap, complicated by a complex acquired chest-wall AVM. Treatment was achieved in 3 sessions, with placement of over 120 coils into all involved arteries. The nidus of the AVM could not be reached and was treated with ethanol injections after confirming the absence of shunting to the left atrium.

**Take-home points:** Radiation recall can cause extensive injury requiring surgical reconstruction rarely complicated by acquired AVMs. These can require several embolization sessions. Successful identification of all feeding vessels and the venous outflow of the AVM is mandatory for successful treatment.
**Preclinical studies of a novel liquid embolization agent with transient contrast**

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**Purpose**: The GPX Embolic Device is a novel liquid embolic currently in clinical trials. The standard GPX material utilizes tantalum, providing permanent radiopacity. However, in certain applications (particularly oncology), visibility of the treated region following embolization is desirable. To meet this need, GPX was reformulated to include non-covalently bound organic contrast agents (GPX-Clear) that are free to diffuse out from the material over time. The resulting formulations were evaluated for duration of radiopacity and effectiveness in benchtop and swine models.  

**Materials and Methods**: The diffusion of contrast from solidified material was evaluated by micro-CT in gelatin tissue phantoms. GPX-Clear was injected into the phantom and allowed to solidify. Images were taken at 1- and 24-hours post-injection with radiopacity measured in Hounsfield Units (HU). In vivo performance testing was performed at various sites within the renal and hepatic arterial vasculature of domestic swine. Angiography before and after embolization was used to evaluate occlusion. Fluoroscope images were used to determine in vivo visibility.  

**Results**: A total of 15 swine embolizations were performed with GPX-Clear, with 15/15 judged completely occluded by angiography. Upon deployment, all samples were visible under fluoroscopy, but imaging performed 1-day post-embolization showed no signs of radiopacity in the treatment regions. Additional follow-up angiograms were performed on non-acute animals at 7 days (n=3) and 36 days (n=2), and all sites were fully occluded.  

**Conclusion**: GPX-Clear displayed transient contrast over a period of hours (<1 day) and complete occlusions that were stable at follow-up through 36 days.

**Safety-efficacy of percutaneous injection of chitosan or chitosan embolizing and sclerosing gels in a TIE2-associated VM Xenograft mouse model**

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**Purpose**: To compare the effects of embolization with chitosan hydrogel (CH) with or without sclerosant (sodium tetradecyl sulfate, STS) versus STS-foam, placebo (saline), and an untreated control group in a murine model for venous malformation (VM).  

**Methods**: 64 subcutaneous VMs generated by injecting HUVEC_TIE2-L914F cells + matrigel in mice (Day, D0) were randomly assigned at D10 to one of five treatment groups (untreated, n= 8; saline, n=9; 3%STS-foam, n=15; CH, n=15; 1%STS-CH, n=17). Solutions were injected through a direct puncture. Chitosan thermogels were prepared by mixing chitosan-Visipaque320 with a gelling agent; for 1%STS-CH, 3%STS (Sotradecol) was diluted into the gelling agent. Tessari technique was used to make 3%STS-foam. VMs were culled at D30 and analyzed for Ulex europaeus I (UEA1) expression and vessel size measurement.  

**Results**: All lesions were successfully punctured and injected. Skin ulceration occurred on 26 plugs with secondary loss of three 3%STS-foam and one 1%STS-CH plug. Both chitosan formulations effectively controlled lesion growth compared to untreated or 3%STS-foam groups at D30 (p<0.05). Vessel sizes were smaller with both CH formulations compared to untreated and saline groups (p<0.05). Additionally, there was a trend towards smaller vessels with 1%STS-CH vs. the CH compared to 3%STS-foam (p<0.05 and p=0.0592, respectively).  

**Conclusions**: CH formulations can be safely injected into this VM model. The ability of CH to control lesion growth suggests a promising therapeutic effect, performing better than the gold standard (STS-foam) on several variables. A long-term follow-up study is needed to evaluate if 1%STS-CH prevents recurrence better than CH alone.
Gynaecological

P-36
Clinical findings and management of rare vascular anomalies in the gynaecological and urogenital tract

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Learning objectives: Overview on clinical symptoms and imaging features of rare gynaecological and urogenital vascular malformations for efficient management and appropriate therapeutic decision making.

Background: In less than 3% of patients with vascular malformations, an involvement of the gynaecological or urogenital tract is present. The rarity of disease and heterogeneity in clinical presentation may delay diagnosis, deteriorate patient’s condition and induce a therapeutic challenge.

Clinical findings: Between 2014 and 2021, 25 out of 537 patients, admitted to our vascular anomaly centre, were diagnosed with urogenital or gynaecological vascular malformations. Radiological evaluation was followed by therapeutic decision making. 10 female (40%) and 15 male (60%) patients, aged 6 to 77 years, were included. Diagnoses, confirmed by ultrasound and MRI, included: 10 (40%) venous malformations (VMs), 5 (20%) lymphatic malformations (LMs) and 10 (40%) arteriovenous malformations (AVMs). The leading clinical symptom was pain. The mean pain severity for VMs was higher than in AVMs with 5.7/10 vs. 4.5/10. Further major symptoms included physical impairment, local swelling and skin discoloration. Bleeding complications were rare. In 13 (52%) patients minimal invasive therapy was indicated: 10 (77%) sclerotherapies and 3 (23%) embolizations. Transcatheter embolization of AVMs required only one session for complete devascularization. Patients with VMs required multiple sclerotherapy session for adequate symptomatic remission.

Conclusion: To create a higher awareness for urogenital and gynaecological vascular malformations, sensibilization for this rare condition is crucial. Therapy decision should be symptom-orientated and rarely requires emergency intervention, even in fast-flow vascular malformations.

P-37
Uterine artery embolisation: redefining management of uterine fibroids in Africa, a Kenyan experience

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Keywords: Uterine fibroids, Uterine Artery Embolization, Menorrhagia

Background: Uterine fibroids are a significant issue in Kenya. It constitutes 25% of the total disease profile in the Gynaecology outpatient at our institution. Uterine fibroid embolization is a relatively novel technique in our region, due to limited personnel and uptake by patients and doctors. We present our limited experience over the a period of four Years.

Methods: 30 uterine artery embolization procedures were performed between 2017 to 2020. Patients age varied from 32-45 years. The primary indication was menorrhagia, mostly associated with fibroids. Pre-procedure MRI was done to confirm. The Procedures were performed via the left radial artery. Bernstein 1 or Ultimate 1 4F Catheters were used and embolization with embolospheres 700-900 and 5-700 sizes (Merit Medical) were used. One patient each had PVA particles and gel Form used for embolization (Merit medical).

Results: Successful embolization was achieved in all cases. There was no incidence of redo Procedures. Post procedure ultrasounds and symptoms were evaluated to assess the Success of the procedure. Pain was the most common complication post procedure.

Conclusion: Embolization is a more cost effective, less invasive option, with acceptable results. Being a day care procedure, the patient’s acceptability is better, and the results are gratifying in comparison to open surgery. This is an ideal treatment choice for Menorrhagia in a low income setting.
Kidney

P-38
Pre-operative embolization prior to renal allograft nephrectomy to reduce morbidity: technical considerations

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Purpose: Morbidity associated with Allograft Nephrectomy (AN) alone remains high related to intraoperative hemorrhage. This study determines if location or material used for preoperative angiographic kidney embolization (PAKE) affected perioperative outcomes from AN.

Materials and methods: Adult kidney transplant patients (n=54) undergoing PAKE prior to AN were reviewed retrospectively at a single renal transplant institution over 19 years. The primary outcome was the impact of PAKE technique upon surgical operative time and surgical blood loss. Technique was defined by location of embolization (main, lobar, or arcuate) in the renal artery and choice of embolic (Gelfoam, coils, or plugs).

Results: The technical success rate was 100%, defined as angiographic flow cessation to the renal parenchyma. Mean surgical operative time was 141 ± 41 min, and mean surgical blood loss was 220 ± 169 cc. Embolization location had no influence upon mean surgical blood loss (p = 0.43) or mean surgical operative time (p = 0.54). Similarly, embolization material had no statistically significant influence on surgical blood loss (p = 0.93) or surgical operative time (p = 0.71). The mean radiation dosage was 848 ± 1275 mGy, and mean fluoroscopy time was 14.5 ± 11.95 min. Male gender was associated with a statistically significant increase in radiation dosage 1416 ± 1882 mGy (p < 0.05).

Conclusions: For patients planned to undergo AN of previously transplanted kidneys, PAKE is associated with improved perioperative outcomes and reduced morbidity. We have demonstrated that differences in embolization location or material did not impact safety and efficacy.

P-39
Selective intra-arterial (SIA) embolization of renal angiomyolipoma (AML) – a 15-year single-center experience

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Purpose: Angiomyolipoma is the most common benign renal tumor. Although no intervention is needed in smaller lesions <4 cms, serial follow-up, interventional, or surgical treatment may be required to prevent or treat bleeding or rupture in larger tumors. We intend to share our 15-year experience with SIA renal AML embolization.

Materials and methods: An IRB-waived retrospective chart review of 39 patients (31 females [79%], 8 males [21%]) who underwent 51 sessions of SIA embolization between December 2006 and August 2021 was conducted. 8 patients underwent multiple sessions. The clinical presentation, serial imaging findings, SIA embolization methodology and response were recorded and evaluated.

Results: The age range was 18-74 years (mean 46 years). The laterality of the lesions was almost equally distributed (26 right, 25 left). The mean follow-up was 3 years. In 7 patients, SIA embolization was performed as a pre-surgical step. For the remaining patients, the goal was to prevent bleeding. The mean tumor size before embolization was 9.3 centimeters (range: 4.2 -18.0 cm) and the mean size after embolization was 7.4 cm (range: 0.6-16.6 cm). The mean change in size was a decrease of 1.7 cm. The most frequently used material was Particles – PVA (35 procedures) and Embozene (2) followed by alcohol only (8), alcohol with lipiodol (6), and Onyx 18 (1), with a combination of materials used in several procedures.

Conclusions: SIA is an effective non-surgical method for managing renal AMLs. Rupture was not reported in any patient post-embolization, with almost all lesions remaining stable in size.
P-40
Standardized technique and indications of pre-operative renal tumor (RT) embolization, rational and results of 16-year monocentric experience

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Learning objectives: Learning about main indications of the intervention in various settings, gaining practical knowledge about the standardized intervention technique and peri-procedural management details, understanding the rational based on the latest literature.

Background: RT embolization is a safe and effective intervention in different treatment scenarios, especially prior to surgical resection, thermal ablation or palliative treatment. However, the heterogeneity in indications and techniques of the pre-operative embolization requires experience- and literature-based standardization.

Procedural details: The main indications of RT embolization prior to surgical resection include reduced intra- and post-operative bleeding, less tumor involvement of adjacent organs and reduction of tumor thrombi, resulting shorter operation time and safer resection. There are controversial cut-offs about when exactly choose to perform pre-operative embolization and what is the ideal interval between the two procedures. Also, the proper choice of embolic agents, devices, and embolization technique is discussed (PMID:20603414). In our 16-year monocentric analysis, pre-operative embolization was performed in >150 patients with renal tumors (2003-2018). Different embolic agents (e.g. glue, iodized oil, microspheres and coils) and embolization techniques (e.g. flow-controlled using Embozene Microspheres or balloon-controlled using Histoacryl/Lipiodolor or Ethibloc) were evaluated and a standardized strategy was established.

Conclusions: With the right materials and technique choice and standardized management strategy, RT embolization is a safe and effective procedure prior to resection. The rational is to lower the surgical complications and make it easier, faster, and safer with optimized outcomes. The combination of embolic agents is individualized and the interval between embolization and resection is typically 0-3 days.

P-41
Obstructive uropathy after angiomyolipoma embolization with N-butyl Cyanoacrylate

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Clinical History: a 52-year-old woman was admitted to the emergency room with 8-hour right flank pain and tachycardia and anemia. Arterial phase CT scan revealed right renal angiomyolipoma with signs of active bleeding. Renal angiography revealed bleeding of the anterior division of the renal artery and it was successfully embolized with N-butyl Cyanoacrylate /lipiodol. Five months after embolization she presented to the emergency department with right renal colic pain. Ultrasound showed right kidney hydronephrosis due to the presence of multiple lithiases. Multiphase CT scan revealed multiple high-attenuation fragments inside the right renal excretory system, not present in the previous CT scan, compatible with the migration of the embolisation material into the urinary tract as the cause of the episode of obstructive uropathy.

Treatment Options: other embolization agents like coils or PVA particles could have been used.

Discussion: In our case, the extensive necrosis of the renal angiomyolipoma facilitated the passage of necrotic tissue and embolization material into the urinary tract, conditioning obstructive uropathy.

Take-home points: Delayed complications of embolic agents should be considered once the bleeding has subsided. The embolic agent should be chosen based on both immediate and late complications.

P-42
Embolisation of progressive giant renal angiomyolipoma

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42-year old female patient with history of LAM and bilateral multiple renal angiomyolipomas. The largest, predominantly exophytic lesion in the cranial part of the left kidney has been presenting a continuous growth over the last 5 years with a current tumor volume of 580 cm³. In a multidisciplinary discussion a partial resection of the kidney was ruled out due to size and location of the tumor. Immunsuppressive therapy with everolimus was also ruled out due to lack of response (42%) in patients with sporadic lymphangioleimyomatosis and notewable therapy related sideeffects.

It was decided to perform a selective embolisation of the giant angiomyolipoma on the left kidney to prohibit further growth and potential hemorrhage.
A CT angiography scan prior to embolisation was obtained which showed a singular left renal artery and feeder arteries originating from the cranial and middle segmental arteries. No aberrant feeders were detected. The initial angiogram illustrated multiple small pseudoaneurysms on the feeder arteries. We positioned an anti reflux microcatheter (SeQure® 2,7F) near the origin of the tumor feeders originating from the cranial and middle segmental arteries and performed superselective embolisations with 400/800μm microspheres (HydroPearl®) followed by detachable coils 3/80-; 3/40-;2/20mm (AzurCX®). Postinterventional angiography showed regular perfusion of the renal parenchyma without any perfusion defects and complete devascularisation of the tumor. A follow up has yet to be performed and will be presented at the convention. This case demonstrates that minimal invasive embolisation is a feasible method to treat angiomyolipomas with high risk of hemorrhage.

P-43
Emergency embolization of perirenal bleeding caused by a large angiomyolipoma
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A 46-year old woman, suffering from sudden flank pain in the upper left abdomen presented at the emergency unit. Haemoglobin 8.0 g/dL (normal value: 12-15.4) was significantly low and an abdominal CT showed a large angiomyolipoma (AML) 13 cm in diameter in the upper third of the left kidney, surrounded by an extensive perirenal hematoma (Figure 1). The patient was hemodynamically stabilized, put on general anaesthesia and transferred to the angiography unit for embolisation. Access to the left renal artery was obtained via a 5F-Sidewinder catheter. An extensive hypervascular mass with a dense early arterial network, and tortuous vessels including micro- and macro-aneurysms were seen (Figure 2). Arteriovenous shunting was absent. First superselective embolisation was performed using particles 500 μm in diameter until the flow diminished significantly. Thereafter deployable microcoils (diameter 5-6 mm, length 10-20 cm) were released within the aneurysmatic vessels near the renal hilum. The Postembolisation angiogram showed no opacification of the mass and maintenance of blood supply to the normal renal parenchyma. Additional angiography showed no evidence of further collateral vessel supply. Ultrasonography confirmed the lack of vascular signal within the embolized mass of the AML. After embolisation, blood pressure and haemoglobin rose and was discharged 11 days later. However, the patient required pain medication and antibiotics due to slightly elevated leucocytes and recurrent episodes of fever. The management of AMLs depends on their size and clinical presentation. Asymptomatic AML ≥ 4cm require CT or US every 6 months, symptomatic AML should undergo angiography with subsequent embolisation.

P-44
Wunderlich syndrome
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Clinical history/ pre-treatment imaging: A 30-year-old male presented to the ER with sudden onset of progressively worsening right flank pain and hematuria which had initiated seven hours earlier. Before coming to the hospital he took an aspirin. Upon arrival his hematocrit was 37.6% and his hemoglobin 11.5mg/dl. He was hemodynamically stable with normal coagulation parameters. The CT revealed a large right renal subcapsular and retroperitoneal hematoma and; due to the presence of fat; set the diagnosis of ruptured renal angiomyolipoma (AML). Three hours later he was still hemodynamically stable but his hematocrit and hemoglobin had dropped to 34.6% and 11.1mg/dl. He had no knowledge of the presence of the AML and no other medical history. Treatment options/results: The patient was referred to the Interventional Radiology department for embolization. He was still stable but his hematocrit was 29%. The right renal artery was catheterized and several branches of the tumor were embolized with microspheres (700-900μm), microcoils and a small amount of lipiodol. The embolization was successful and the patient was discharged eight days later. Discussion: Wunderlich syndrome is a rare condition in which spontaneous non-traumatic renal hemorrhage occurs into the subcapsular and perirenal spaces. Conservative management is indicated if the hemorrhage is self-limiting and the patient is responsive to fluid resuscitation. Angiographic selective embolization is indicated for hemodynamically stable patients. In hemodynamically unstable patients, emergent; partial or total; nephrectomy is often required. Take-home points: Wunderlich syndrome is potentially life threatening and requires high degree of clinical suspicion and appropriate intervention.
P-45
Use of interventional neuroradiology devices (Solitaire AB and Cascade Net) in the treatment of complex renal aneurysms through stent-assisted coil embolisation

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Clinical history: 54-year-old patient with pain in right side for one year. CT angiography shows an aneurysm in the right renal artery. A general physical examination reveals untreated high blood pressure (156/103 mmHg) and creatinine 1.3 mg/dl (previously 0.8 md/dl). Preventive treatment started with Adiro 100 and check-ups every 3 months via a CT angiography. After a review by a multidisciplinary team it is finally decided to carry out an embolisation.

Treatment options: The risk of rupture of true renal artery aneurysms is low but when they are bigger than 2 – 2.5 cm it increases significantly, making treatment essential. The endovascular treatment of wide neck aneurysms or aneurysms located in the bifurcations of the renal artery is a challenge for conventional endovascular techniques (simple coil embolisation) due to the risk of coil migration. The use of stents/grafts is another valid but less popular option due to the increased risk of areas of ischaemia in this renal location (bifurcations). Routinely-used techniques in interventional neuroradiology such as flow diverters or those assisted with an occlusion balloon or stent have proven to be suitable alternatives for complex aneurysms in the visceral arteries

Discussion: The need to use alternatives to conventional techniques in order to avoid predictable complications as coil migration is mandatory. Interventional neuroradiology devices such as the Cascade Net stent (Perflow Medical and Grupo Logsa) and Solitaire AB stent retriever (Medtronic) are valid and safe options. We describe the technique of such devices.

P-46
Embolization of the iatrogenic damage to the right renal artery after complex stenting of lower extremity arteries

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Clinical history: Patient L., 68 years old, was admitted 03.06.2014 in our hospital with a diagnosis of chronic right leg ischemia stage III by Fontain classification. There is occlusion of the right CIA from the ostium and occlusion of the stent in the right external iliac artery. We performed retrograde recanalization, angioplasty and stenting of the right CIA and EIA. After 30 minutes, the patient noted the pain in his stomach, also there is pressure drop to 80/40 mmHg. According ultrasound of the abdominal cavity, we find retroperitoneal paranephral hematoma in the right side. We suspected perforation of the right renal artery, probably due to unintentional moving of hydrophilic guidewire from brachial artery access.

Treatment options: The patient is urgently taken to cathlab again, angiography confirmed extravasation of blood in the region of upper pole branch of a right renal artery (Fig.1). Then we performed selective catheterization of this branch with microcatheter and embolization with 1 neurocoil. There is no extravasation in the control angiography (Fig.2). The next day the patient has lumbotomy, revision and drainage of the retroperitoneal space. After 12 days the patient was discharged in a good condition. Renal function is not impaired.

Discussion: Iatrogenic damage of the renal artery it is very rare condition. But doctors should be prepared for these complications and be able to do various embolization techniques.

Take-home points: It is necessary to work very carefully with hydrophilic wires and always delivered them under X-ray control.
Liver

**P-47**
Post-radioembolization non-contrast cone-beam CT as an early predictor of 90Y-resin microspheres distribution for the interventional radiologist: validation of the technique and comparison with nuclear medicine imaging

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**Purpose:** to validate the role of non-contrast cone-beam CT (NC-CBCT) performed after trans-arterial radioembolization (TARE) of metastatic liver tumors with yttrium-90 (90Y) resin microspheres, as an early predictor of 90Y distribution for the Interventional Radiologist.

**Material and methods:** from November 2019 to January 2022, 22 patients (11M, 11F; median age, 66.5 years; range 47-77 years) with metastatic liver tumors underwent TARE procedures and NC-CBCT was performed after microspheres administration to assess intra-tumoral distribution prior to SPECT/CT imaging. Technical aspects of NC-CBCT acquisition were analyzed. Enhanced liver territories on NC-CBCT images were compared with intra-tumoral radioactivity detected on SPECT/CT images.

**Results:** treated tumors included metastases from: colorectal adenocarcinoma (11/22; 50%), neuroendocrine tumours (3/22 cases; 13.6%), ampullary cancer (1/22; 4.6%), breast cancer (1/22; 4.6%), melanoma (2/22; 9%), ovarian cancer (1/22 cases; 4.6%), pancreatic adenocarcinoma (2/22 cases; 9%) and prostatic adenocarcinoma (1/22; 4.6%). Lobar treatment was performed in 16 cases, segmental treatment in 2 cases and whole-liver treatment in 4 cases. Average delivered dose was 1.8 GBq (range 0.8-2.7). Post-TARE NC-CBCTs were acquired immediately after microspheres injection, with C-arm rotation time of 5-8 seconds. Mean radiation dose of NC-CBCT acquisitions measured as DAP was 13.1 Gy·cm². In 19 of 22 cases (86.4%), NC-CBCT showed enhancement of liver lesions in treated territories and in those cases microspheres distribution on NC-CBCT images matched 90Y intra-tumoral deposition on bremsstrahlung SPECT/CT images.

**Conclusion:** post-radioembolization non-contrast cone-beam CT in a useful tool for the Interventional Radiologist to predict intra-tumoral distribution of 90Y-resin microspheres prior to SPECT/CT imaging.

**P-48**
TACE in colorectal liver metastases – the influence of right-sided or left-sided primary tumour location

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**Purpose:** The study investigated the oncologic outcome following transarterial chemoembolization (TACE) with irinotecan loaded spheres in patients with liver metastases of adenocarcinomas of right-, respectively left-sided colorectal origin (RSCC, LSCC).

**Materials and methods:** 21 Patients (pts) with unresectable mono- or bilobar colorectal liver metastases (CRLM), liver-only or liver-dominant metastatic spread, with less than 25% of the liver parenchyma involved and progression after second line systemic chemotherapy underwent lobar irinotecan TACE. Tolerability, safety and oncologic outcome were assessed in terms of intervention-associated side effects, local tumour control (LTC), progression free survival (PFS), and overall survival (mOS), respectively.

**Results:** 16 pts with LSCC and 5 pts with RSCC with a mean volumetric metastatic burden in the liver of 5.27 ± 6.26%, (median 2.89%, range 0.23 – 24.1%) received in total 49 TACE, in average 2.33 interventions per patient. Treatment-related epigastric pain occurred in 4.08% on the day of intervention and could be controlled with non-steroidal anti-inflammatory drugs. LTC (CR, PR or SD) in the liver was achieved in 20/21 (95.2%), 19/21 (90.4%) and 16/21 (76.2%) patients at 1, 3 and 6 months, respectively. PFS was 5.5 months in LSCC, and 3.75 months in RSCC. mOS was 33 months after the first TACE in LSCC, and 17 mo in RSCC, respectively.

**Conclusion:** TACE with irinotecan loaded spheres is a safe and well tolerated procedure in the treatment of CRLM. The promising results in terms of mOS especially in tumours of left-sided origin deserve further investigation in larger prospective trials.
P-49
Occurrence of vascular lake phenomenon as a predictor of improved tumor response in HCC patients that underwent drug-eluting bead transarterial chemoembolization

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Purpose: The present study aimed to assess the prevalence of vascular lake (VL), its associated factors and correlation with prognosis in hepatocellular carcinoma (HCC) patients treated with drug-eluting bead transarterial chemoembolization (DEB-TACE).

Material and methods: The clinical data of a total of 198 patients diagnosed as primary hepatocellular carcinoma who were treated with D-TACE by using microspheres as embolization material during the period from March 2018 to December 2020 were retrospectively analyzed. According to whether there is a “vascular lake” phenomenon during the operation, it is divided into A, B two groups. The treatment outcomes of the two groups were evaluated according to the modified efficacy evaluation criteria for solid tumors (mRECIST) and the liver function indexes and adverse events before and after DEB-TACE were compared between the two groups.

Results: The incidence of “vascular lake” phenomenon in patients was 15.6% (31/198), and the incidence of “vascular lake” phenomenon in total lesions was 11.6% (33/288). The occurrence of “vascular lake” phenomenon was significantly related to tumor diameter ≥ 3 cm, presence of tumor pseudocapsule and smaller bead size (P<0.05). Statistically significant differences in prognostic evaluation results by mRECIST and overall survival rate existed between group A and group B (P<0.05). The liver function indexes before and after DEB-TACE, the incidences of adverse events were of no difference between two groups.

Conclusion: VL occurs in 15.6% of HCC patients treated with DEB-TACE, and it is correlated with larger tumor size, pseudocapsule, smaller bead size, more favorable treatment response and better survival.

P-50
Comparison on efficacy and safety of drug-eluting beads transarterial chemoembolization and conventional transarterial chemoembolization in the treatment of advanced hepatocellular carcinoma

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Purpose: This study aimed to compare efficacy and safety of drug-eluting bead (DEB) transarterial chemoembolization (TACE) and conventional TACE (cTACE) in advanced HCC patients.

Material and methods: We enrolled 180 patients treated between 1, 2019 to 6, 2020; 102 and 78 underwent C-TACE and D-TACE, respectively, with 85 and 17 of the former group and 53 and 25 of the latter group classified as Child-Pugh A and B, respectively. Treatment response, PFS and adverse events were assessed during the follow-up.

Results: The PFS rates in the C-TACE and D-TACE groups were 8.3 and 6.0 months, respectively (p = 0.05). The response and disease control rates were 41.23% and 49.35% in C-TACE patients and 63.87% and 70.97% in D-TACE patients (p = 0.03). The liver function damage in the D-TACE group is much lower than that in the C-TACE group (P = 0.05). In contrast, the incidences of biliary injury and arterio-portal shunts were higher in D-TACE group (p < 0.05); the incident rates of arterio-portal shunt formation were 9.7% and 47.8% in patients undergoing C-TACE and D-TACE, respectively. Multivariate analysis identified that size of nodules > 5 cm, portal vein invasion might be correlated with worse survival, Child-Pugh A was significantly associated with arterio-portal shunt formation after D-TACE on multivariate analysis.

Conclusion: A combination therapy comprising Lenvatinib, TACE, and Tislelizumab is an effective downstaging strategy for advanced HCC and is associated with few adverse events.
P-52
Possible use of digital variance angiography in liver transarterial chemoembolization: a retrospective observational study

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Purpose: Digital variance angiography (DVA), a recently developed image processing technology provided higher contrast-to-noise ratio (CNR) and better image quality (IQ) in lower limb interventions compared to digital subtraction angiography (DSA). Our aim was to investigate whether this quality reserve can be observed also in liver transarterial chemoembolization (TACE).

Materials and methods: We have retrospectively compared the CNR and IQ parameters of DSA and DVA images from 25 patients (mean±SD age: 67.5 ± 11.2 years) underwent liver TACE intervention at our institution. CNR was calculated using 728 regions-of-interest on 50 images. IQ of the same image set was evaluated by 5 experts using a 4-grade Likert scale. The diagnostic value was evaluated by the possibility to identify lesions and feeding arteries.

Results: DVA provided significantly higher CNR than DSA (the mean CNRDVA/CNRDSA was 1.33). DVA images received significantly higher Likert score than DSA images (mean±SEM 3.34±0.08 vs. 2.89±0.11, Wilcoxon signed-rank p<0.001). DSA could not detect lesion and feeding artery in 30% and 36% of cases, and allowed clear detection only in 20% and 14%, respectively. In contrast, DVA failed only in 8% and 18% and clearly revealed lesions and feeding arteries in 30% and 26%, respectively.

Conclusion: DVA provides higher quality images and better diagnostic insight than DSA, therefore it might be a useful tool in liver TACE interventions. The observed quality reserve might be used for dose management (reduction of applied radiation dose and/or contrast media), but the validation of these claims requires further clinical investigations.

P-53
Time to degradation and long-term disappearance of image-able drug eluting microspheres following embolization up to 5 years later

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Purpose: To characterize the changes in appearance on CT of image-able microspheres in the months and years following liver tumor embolization.

Materials and methods: 17 patients were assessed with 117 CT scans following 31 embolization sessions with radiopaque microspheres. The CT features were assessed subjectively and using image processing metrics to assess the distribution and degree of radiopacity from the initial follow-up CT to most recent CT. CTs showing measurable signs of opacity degradation or changed location were recorded. The follow up interval was recorded when sphere degradation was initially noticeable on review by IR radiologist.

Results: 17 patients and 117 CTs (mean 6.9 CTs/patient) revealed 31 embolization sessions (mean 1.8 sessions/patient, range 1-4 sessions) over a 5 year follow-up period. Imageable microsphere degradation over time was noted, all the way to regional total disappearance between the initial and follow up CTs. Serial and gradual degradation of imageability is demonstrated on CT in multiple patients with up to 5 years of serial CTs.

Conclusion: Patterns of long-term opacity in humans is poorly described (stability, degradation or change). Pre-clinical swine survival studies had demonstrated 90 day stability in CT appearance of iodinated imageable microspheres, without substantive visible degradation. The rate of imageable microsphere degradation is variable among a pilot population of patients. CT appearance of imageable iodinated microsphere beads showed some acute stability and some long-term degradation in the months and years following embolization. This included total disappearance of beads and columns in some cases.
P-54
Liver pseudoaneurysm treated by transarterial thrombin injection

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A 78 yo male patient was referred for percutaneous biliary drainage due to obstructive jaundice secondary to an unresectable hepatocellular carcinoma in segment IV. Five days after bilateral biliary drainage the patient started with progressive anemia and hypotension together with hemobilia. The CT reported a 4mm pseudoaneurysm (PA) close to both biliary drainage.

The angiography confirmed a PA with direct origin of the right hepatic artery (RHA) [image 1]. Sacrifice of the hepatic artery was considered but was finally ruled out to avoid ischemic complications since the right portal vein was partially invaded by the tumor. Placement of a covered stent was also considered but the small caliber and tortuosity of the RHA forced to discard it. The intrascaular use of coils in PA has a risk of rupture during packing and is not usually of choice in our center. Other liquid embolic agents were also ruled out due to risk of reflux and non-target embolization.

The PA sac was supraselectively catheterized and 0.3 mL (300 IU) of recombinant human thrombin was injected. Both post-injection angiography and Cone Beam CT [image 2] revealed complete exclusion of the PA while preserving the patency of the RHA. The patient remained hemodynamically stable and hemobilia resolved within 24h.

Although percutaneous thrombin injection has been widely described there are few cases reported demonstrating the efficacy of transarterial thrombin embolization in visceral PA. Herein we take advatagae of this case report and breifly review short series using transarterial thrombin embolization published so far.

P-55
Use of bleomycin in the embolization of giant hepatic hemangiomas, a case

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Clinical History/Pre-treatment Imaging: A 45-year-old woman with a history of breast cancer in 2010 and 2018, under follow-up by Oncology. She has two giant hepatic hemangiomas, the largest in the left hepatic lobe measuring 25 cm, which have doubled in size in the last two years. The patient presented diffuse abdominal pain and significant mass effect. She was referred to the General Surgery service and, given the size and symptoms presented by the patient, embolization with bleomycin and lipiodol was chosen as the first therapeutic option.

Treatment Options/Results: Through right femoral access, selective arteriography of the celiac trunk was performed, observing vascularization of the giant hemangioma dependent on the left hepatic artery. Embolization was performed with a solution of 45IU of bleomycin and 15cc of lipiodol under fluoroscopic guidance. This procedure was repeated a second time 5 months later. After the second procedure, the patient presented abdominal pain and laboratory tests with slight changes in the liver profile, managed on an outpatient basis. In the one-year follow-up, the lesions have significantly decreased in size, and the symptoms have disappeared.

Discussion: Hemangiomas greater than 5 cm can be symptomatic and require treatment. Surgical intervention is considered the gold standard of treatment. Transarterial embolization with bleomycin/lipiodol is a minimally invasive technique that has shown to be safe and effective in decreasing lesion size and resolution of symptoms in large hepatic hemangiomas.

Take-home Points: Embolization with bleomycin/lipiodol is a safe alternative to consider in the treatment of giant hepatic hemangiomas.

P-56
Significant response to Drug-Eluting BeadsTransarterial Chemoembolization+ lenvatinib + PD-1 antibody treatment in unresectable hepatocellular carcinoma with major portal vein tumor thrombus: a case report

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Clinical history/Pre-treatment imaging: A 58-year-old male patient was admitted on June. 10, 2019, due to an increase of α-fetoprotein (AFP) level and hepatitis B history. AFP level was 25698 ng/mL. Besides, enhanced liver CT showed HCC with PVTT. The patient had PS score 0 and Child-Pugh stage A.

Treatment options/Results: The patient received 3 cycles of on-demand D-TACE, Lenvatinib (8 mg, PO QD) and Tislelizumab (200 mg, every 3 weeks) treatment. Five months following the treatment, complete response occurred with regression of HCC and PVTT. AFP decreased to normal range (3.2 ng/mL).

In recent follow-up, he remained in remission without clinical or imaging evidence of disease recurrence. The current OS is 44 months.

Discussion: HCC with PVTT is regarded as an advanced disease stage with poor prognosis. Lenvatinib is recommended as the only standard treatment for these patients; however, the effects of treatment with Lenvatinib alone on OS have not been satisfactory. It has been demonstrated in clinical studies that D-TACE had better tolerability and fewer complications compared with cTACE. Studies had shown that Lenvatinib in combination with Tislelizumab could show strong anti-hepatocellular carcinoma activity and good clinical efficacy, enriching the selective treatment of hcc. The combination of D-TACE plus Tislelizumab and Lenvatinib might exert synergistic effect on killing HCC cells, thus it showed good therapeutic effect in advanced Hcc patients.

Take-home points: Considering the limited treatment options and poor survival associated with HCC with PVTT, the present case findings present significant impact for selecting treatment modalities.
Lymphatics

P-57
Single step rightsided portal and hepatic vein embolisation (PVE & HVE)

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An 59 year old male with hepatic metastases of a colorectal carcinoma was transferred from a external hospital to our interventional radiology for a combined right portal (PVE) and right hepatic vein (HVE) embolisation in a combined intervention as a single step procedure.

The intervention was performed in an angiosuite under intubation. The PVE of all right portal branches was performed over a percutaneous approach using an 1:5 mixture of cyanoacrylate/Lipiodol-mixture (using a microcatheter in a pull back technique). Parallel over a rightsided transjugular approach 2 Amplatzer plugs Type II were placed in the right hepatic vein. The postinterventional path of the patient was without any angio-associated complications and the patient was operated as planned (pre- and postinterventional volumetry of the FLR were performed by MDCT).

P-58
Chylothorax investigation & embolisation

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Learning Objectives: This literature review describes the diagnosis, localisation and interventional radiology management of Chylothorax. It depicts thoracic duct anatomic variations and their significance. It reviews thoracic duct embolisation procedures and their success rates.

Background: Chylothorax confers serious morbidity and mortality to patients, with the aetiology dominated by iatrogenic causes. Complications of the leak may lead to profound nutritional deficiency, immunosuppression, loss of fat-soluble drugs, organ failure, rapid decompensation and death.

Procedure Details: Contrast-enhanced multidetector computed tomography, magnetic resonance ductography and lymphangiography (LG) aid the interventional radiologist in detecting the location of lymphatic leakage in not only chylothorax but also chylos ascites and lymphatic fistulae. Anatomical variants may occur in up to 14% of individuals. Intranodal LG is preferred over pedal as it is significantly shorter. Lipiodol is postulated to cause an inflammatory and granulomatous reaction during extravasation, as an ethiodized oil. This may confer a therapeutic effect in decreasing or terminating flow.

After micro-catheterisation of the thoracic duct is achieved, digital subtraction LG may be used to guide the embolisation of agents past the site of injury. Micro-coils are deployed proximally along the entire course of the thoracic duct, both proximal and distal to the leak. Alternatively, a mixture of ethiodized oil and N-butyl cyanoacrylate glue with tantalum powder is used to complete the embolisation of the distal thoracic duct and to seal the cisterna chyli.

High embolisation success rates have been reported. Complications may be avoided with appropriate planning.

Conclusion: This technique is demanding and requires specific expertise.
P-60
Percutaneous image-guided therapies of chylous leakages: alternatives to thoracic duct embolization

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Learning objectives:
- To describe the lymphatic anatomy and its clinical implications and the technics for leakages diagnosis.
- To summarize our experience with available image-guided therapies including indications, technical aspects and complications.

Background: The tears of the lymphatic circulation and lymphorrhea are infrequent, usually presented as surgical complication and with low outputs. In some cases, when output is high (>500-1000 ml/day), the leakages cause chylothorax or chylous ascites with severe nutritional loss requiring a surgical or interventional management. In the diagnosis is paramount an anatomic assess of the lymphatic circulation and leakage location with radiologic proofs, usually a lymphography through inguinal nodes. At the present, other imaging modalities as dynamic contrast-enhanced MR, SPECT/CT or scintigraphy are available.

Clinical findings/procedure details: In cases of high output, the first-line treatment are interventional therapies including selective embolization of thoracic duct or disruption of cisterna chyli. However, due to the variability of the anatomy and difficulty to access to it in some cases, there are non-selective alternatives as embolization of the theoretical leakage point or the adjacent tissues of normal anatomy. As we pretend to show based on our experience, selective and non-selective therapies are enough to decrease the lymphatic flow and to solve the leakage.

Conclusion: The lymphatic leakage is an unusual entity but associated with poor prognosis when exists high output. An accurate imaging of anatomy for diagnosis and the knowledge of the different interventional therapies to treat them are mandatory due to its variability at presentation.
Musculoskeletal

P-61
Successful management of chylothorax in FDG PET/CT negative Hodgkin lymphoma

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Clinical history/pretreatment imaging: A 21-year-old female patient of Hodgkin’s lymphoma of classical type underwent chemotherapy. Follow up PET/CT demonstrated left supraclavicular inodital mass with necrosis with no avid uptake; however, there was increased right pleural and pericardial effusion. Fluid analysis showed chylothorax and chylopericardium secondary to nodal mass. CEMR lymphangiogram showed lymph nodal mass obliterated the terminal part of the thoracic duct with pooling of contrast in mediastinum on left side suggest chylo-lymphatic reflux. Delayed images revealed progressive opacification of the right pleural and pericardial effusion.

Treatment options/results: To localize thoracic duct abnormality, the patient underwent intranodal lipiodol lymphangiography. Under ultrasound guidance, lipiodol (8ml) was injected into bilateral inguinal lymph nodes. Fluroscopy confirmed near-complete occlusion of the terminal part of the thoracic duct. Left subclavian vein was punctured under fluroscopy to access the thoracic duct. Due to terminal obstruction of the thoracic duct, cannulation was unsuccessful. Persistence of lipiodol in mediastinal and retroperitoneal lymph nodes was observed in the follow-up CT after an hour. The right pleural effusion drain output reduced subsequently. Lymphangiography with lipiodol thus proved to be both therapeutic and diagnostic for this case.

Discussion: Identification of the site of thoracic duct involvement helps in better management of chelothorax patients. MR lymphangiography has better sensitivity for identifying the lymphatic leak. Gadolinium is injected into the inguinal nodes slowly for contrast sequences. Lymphangiography by intranodal lipiodol injection may have diagnostic and therapeutic potential.

Take-home points: Lymphangiography by intranodal lipiodol injection can sometime be both diagnostic and therapeutic option.

P-62
Pre-operative embolization of hypervascular long bone metastases

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Learning objectives:
· Discuss the rationale and indications for embolization of long bone metastases.
· Describe the technique of tumour embolization and the desired endpoint.
· Demonstrate the angiographic appearances of hypervascular long bone metastases and what constitutes a successful embolization.

Background: Skeletal metastases can cause significant pain and loss of function in patients suffering from malignant disease. Surgery to fix acute or impending pathological fractures is complicated by the risk of significant blood loss from hypervascular tumours. Examples of hypervascular metastases include renal cell carcinoma (RCC), hepatocellular carcinoma (HCC) and melanoma. This risk can be mitigated by devascularisation of the lesion, which can be achieved using minimally invasive endovascular techniques.

Clinical findings/procedure details: 5 pre-operative embolization procedures performed in a single centre will be described. All lesions were RCC metastases. 3 lesions were in the proximal femur (2 acute fractures, 1 impending fracture) and 2 were acutely fractured humeral lesions. Access was gained via the common femoral artery and selective angiogram of the bone tumour performed. Feeding vessels superselectively embolised using particles +/- coils. Desired endpoint is to achieve at least 75% reduction in tumoral staining. Surgical fixation of the lesion is best performed within 24 hours due to rapid neovascularisation of these tumours.

Conclusion: The risk of significant blood loss from surgical fixation of hypervascular long bone metastases can be mitigated by endovascular embolization techniques. The interventional radiologist plays an important role in facilitating effective treatment and ultimately alleviating pain and loss of function in these patients.
P-63
Transarterial embolization in musculoskeletal tumors

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Learning Objectives: To review transarterial embolization in different types of musculoskeletal tumors.

Background: Musculoskeletal tumors include bone and soft tissue tumors and may be primary or metastatic. Treatment of musculoskeletal tumors is often complicated and includes many different approaches. Transarterial embolization (TAE) is one of these approaches. Embolization of tumors has been widely used successfully for many years in interventional radiology. Many embolizing agents and different techniques can be used. However, the aim of all of them is the devascularization of the tumor.

Clinical Findings/Procedure Details: TAE can be performed on musculoskeletal tumors ranging from primary bone tumors to metastases and soft tissue tumors. The primary goal in TAE is to devascularize the tumor, avoiding non-target embolization. With the effect of TAE applied preoperatively, blood loss during surgery can be considerably reduced. Therefore, safer, easier, and complete resection is achieved thanks to the smaller tumor volume and lower perioperative bleeding. In addition, TAE allows reducing the size of inoperable metastases prior to other treatments such as radiotherapy. It can also be used as a palliative method for pain. Although different types of embolizing agents such as polyvinyl alcohol particles, microspheres, liquid agents, and coils are used in TAE, the most crucial factor in embolizing agent selection is the operator’s experience.

Conclusion: TAE should be included in the treatment algorithm of musculoskeletal tumors. It should be kept in mind that it is beneficial, especially in large tumors with a high risk of bleeding during surgery.

P-64
Traumatic proximal humerus fracture complicated by axillary artery pseudoaneurysm

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Clinical history/Pre-treatment imaging: An 88 year old male was conservatively treated for traumatic left proximal humerus fracture. At one month, he presented with malaise and increased left shoulder pain. Significant bruising was seen at the left shoulder. Left upper limb distal pulses were intact. CT examination found a haematoma associated with an axillary artery pseudoaneurysm, 6x5cm in size. There was contrast opacification of the axillary artery distal the the pseudoaneurysm. After discussion with our vascular and orthopaedic surgeons, decision was made for endovascular approach to treatment.

Treatment options/Results: The pseudoaneurysm was excluded by placement of two covered stents, accessed via the right femoral artery. The left axillary artery was accessed via VTK catheter, 6Fr Neuron MAX® 088 guiding sheath. Then, 4Fr CXI® catheter and guiding sheath navigation across the pseudoaneurysm neck. Two BeGraft stents were deployed with balloon assistance, covering the pseudoaneurysm neck, the second for better anchoring and expansion. The procedure was covered with intra-venous heparin. The patient was started on dual antiplatelets. No post procedural bleeding or ischaemic limb complications encountered.

Discussion: Upper extremity vascular injury endovascular treatment requires consideration of non-expendable arteries. Therefore use of stent grafts have been used for treatment, in this case. Mobility at the shoulder joint conceivably may affect long term outcomes. Consider fracture reduction first especially if distal pulses are absent.

Take-home points:
- Use of stent grafts should be considered in cases of non-expendable arteries, such as axillary artery injuries.
- Consider discussion with vascular and orthopaedic surgeons prior to treatment.
Neuro

P-65
The current role of interventional radiology embolisation techniques in the treatment of patients with head and neck pathology

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Learning Objectives: Demonstrate the techniques available to Interventional Radiologists in the treatment of elective and emergency head and neck pathologies.

Background: Developments in medical devices made in recent decades, including microcatheters, covered stents and novel embolic agents, have allowed safer and more effective minimally invasive image-guided procedures in the head and neck than traditional surgical approaches.

Procedure Details:
Carotid Blowout Syndrome – Defined as rupture of the extracranial carotid arteries or their major branches. The traditional surgical approach of vessel ligation can result in serious neurological deficits. Pseudoaneurysm can be treated with placement of a covered stent across the site of vessel injury. Bleeding from the external carotid artery or its branches can be treated with superselective cannulation and embolization.

Palliative Tumour-Embolisation – Acute, large volume haemorrhage due to vessel erosion occurs relatively frequently in patients with advanced, ulcerated tumours in the non-curative setting. Transarterial embolisation with particles can achieve capillary level vessel occlusion, reducing risk of rebleeding compared to surgical ligation.

Arteriovenous malformations – Rare, high flow vascular malformations are amenable to multiple interventional options. Occasionally lesions require more than one treatment with more than one device. The patient experience is enhanced by regular follow up with Interventional Radiology to review treatment response and plan further interventions.

Conclusions: Interventional Radiology can make valuable contributions to patient management in many aspects of otolaryngological practice both in elective and emergency settings. Collaboration with Surgical colleagues and raising awareness of minimally invasive options can broaden management pathways and offer better patient outcomes.

P-66
Neuroform Atlas stent-assisted coiling of ruptured intracranial aneurysms

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To evaluate efficacy, safety of stent-assisted coiling (SAC) of ruptured intracranial aneurysms (RIA) with use of antiplatelets agents and antiGP2b3a inhibitors.

Coil embolization of acutely ruptured aneurysm gives reasonable protection against acute rebleeding. Historically, use of stents in acute care has been avoided mainly because of adjunctive risk related to antiplatelets medications. On other hand, in selected difficult cases, non-assisted coiling or balloon-assisted coiling may be too challenging or fail. However, many studies have not shown significant additional risks in use of antiplatelet agents.

15 consecutive patients (male/female 10/5), aged 59.1 years (36–86) underwent SAC for RIA without antiplatelet premedication. m-Fischer scale: 1 in 7 cases; 2 in 1 case; 3 in 3 cases; 4 in 4 cases. In patients with acute hydrocephalus, external ventricular shunt was placed before treatment. Intravenous ASA (300-500 mg) was administered to all patients before stent deployment except in one case of reported adverse effects. Heparin was given in bolus in all patients (5000UI + 1000UI/h). Intravenous glycoprotein 2b/3a inhibitors (antiGP2b3a) were used as bail-out therapy for stent thrombosis in 1 case and in last 10 cases was used as standard protocol therapy. 1 rescue-SAC therapy for coil dislocation in portal vessel. Stent thrombosis occurred in 2 patients; distal microembolism occurred in 1 patients. Thrombosis resolution occurred in all cases without clinical complication. Double antiplatelet therapy were administered after procedure except in 1 case. no hemorrhagic complications occurred.

In our limited experience SAC with its associated therapy has great efficacy and isn’t associated with bleeding complications.

P-67
Air embolism

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Clinical history/Pre-treatment imaging: A 73 year-old man presented with a history of TIAs. Imaging showed occlusion of the left internal carotid artery with a 90% heavily calcified stenosis of the right internal carotid artery and initially considered unsuitable for stenting. The right vertebral artery was occluded with severe stenoses within both external carotid and subclavian arteries. The patient was considered unsuitable for surgery with concern of clamping carotid flow.
**P-68**

**Embolisation of vertebral artery arteriovenous fistula: from planning to execution**

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**Clinical history/Pre-treatment imaging:** A 68-year-old lady presented with an abnormal opacity projected over the right medial lung apex on CXR. There was no history of prior trauma. A pulsatile mass was noted at the right lower neck with palpable pulsation. CT revealed a vascular lesion involving the right lower neck, involving the right vertebral artery (VA) and right paravertebral venous plexus. Diagnostic digital subtraction angiography (DSA) confirmed the initial CT findings. Four vessel DSA found retrograde perfusion through upper cervical right vertebral artery, into the fistula with no other abnormal supply or connection. The proximal right VA appeared tortuous.

**Treatment Results:** Embolisation was performed on this vascular lesion with a MVP microvascular plug system at the right vertebral artery followed by eighteen Concerto Helix detachable coils of varying sizes. Control DSA showed successful occlusion of the fistula. Difficulty was encountered during deployment of coils due to high flow nature of the lesion, which necessitated proximal balloon deployment for partial flow control.

**Discussion:** This case highlights use of DSA to delineate vascular supply, to detect changes in the cerebrovascular system associated with arteriovenous fistulas. In this case, tortuosity of the proximal right vertebral artery and high flow nature of the lesion were potential issues.

**Take-home points:**
- DSA helps in treatment decisions and avoiding complications.
- Route of catheter access and flow nature of arteriovenous fistula should be considered prior to treatment.
- Catheter instability and displaced embolization materials, may be avoided with careful equipment selection.

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**P-69**

**Pre-operative embolisation of an aberrant pharyngeal arterial branch arising from the internal carotid artery and supplying a large juvenile nasopharyngeal angiofibroma**

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**Clinical History:** A 16-year-old male presented with a 6-month history of severe epistaxis and hemifacial swelling. MRI demonstrated a large tumour consistent with Juvenile Nasopharyngeal Angiofibroma (JNA). The bulk of the tumour was supplied by the right internal maxillary artery which was selectively embolised. Interrogation of the internal carotid artery (ICA) showed a tumour blush arising from a small branch of the proximal cervical ICA.

**Treatment:** The ICA branch was selectively cannulated using a 2.0Fr microcatheter (Progreat, Terumo Corporation) and a 0.014” wire (Fathom, Boston Scientific). Digital subtraction angiography confirmed a large tumour blush and no evidence of communication with intracranial or ophthalmic arteries. Embolisation performed with two detachable 4mm x 80mm microcoils (Concerto, Medtronic) and a 5.3 x 12mm microvascular plug (MVP, Medtronic) with resultant vessel stasis. Patient underwent surgical resection, was discharged day 1 postoperatively and has been well in the following 6 months.

**Discussion:** Preoperative embolisation of JNA is a well-established treatment that reduces intraoperative blood loss and improves surgical outcomes. While the bulk of arterial supply to the tumour is derived from the external carotid system, some degree of contribution from the ICA is common. ICA branch embolisation in this setting has previously been avoided due to concerns over ischaemic neurological complications, possibly contributing to the increased intraoperative blood loss observed in patients with tumours with ICA supply.

**Take Home:** In cases where superselective cannulation of ICA branches demonstrates no intracranial supply, embolisation can significantly reduce intraoperative blood loss, postoperative complications and hospital stay.
P-70
Blunt splenic trauma in a level 1 trauma centre: the expanding role of splenic artery embolization over 10 years

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Purpose: There is an increasing role for splenic artery embolization (SAE) in the management of high grade traumatic splenic injuries. A review of SAE rates and outcomes at a level 1 trauma centre in patients presenting with blunt splenic trauma was carried out and compared to a previous review within the last decade to demonstrate changes in practice.

Methods: A retrospective review of patients with splenic injuries secondary to blunt trauma between January 2018 and December 2021 was performed. The revised 2018 AAST grading score was used to grade injuries. This was compared to a previous review from February 2012 to May 2015.

Results: 212 patients with splenic injury secondary to blunt trauma were identified from January 2018 to December 2021. Of these patients, 131 had a high-grade injury (AAST 3-5) with 96 of these patients being managed non-operatively. Of these patients, 55 underwent SAE (57%). This is a marked increase when compared to the previous review where SAE was performed in 13 out of a total of 45 patients with high grade splenic injury (29%). During this time period SAE procedures had a 96.4% technical success rate (n=53/55) and a 94.3% clinical success rate (n=50/53) with only 3 patients requiring surgical splenectomy despite embolization.

Conclusion: The rate of patients with high grade splenic injury managed with SAE has approximately doubled over the last decade from 28% to 57% at our level 1 trauma centre. It is safe and efficacious with no evidence of increased complications or delayed splenic rupture.

P-71
Embolization of the parenchymal tract after percutaneous portal vein catheterization: comparison of different techniques in two referral centers

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Purpose: To compare the outcomes, in terms of safety and efficacy, of different techniques of embolization of the parenchymal tract after percutaneous catheterization of the portal vein.

Methods: We retrospectively analyzed interventional procedures with percutaneous transhepatic/transplenic access to the portal vein (excluding portal vein embolization) from 2010 to 2021, in two tertiary hospitals. The following data were evaluated: access site, the technique of embolization, technical success in terms of immediate thrombosis of the tract, safety, and clinical efficacy in terms of the absence of hemorrhagic and thrombotic complications.

Results: 164 patients (81 females; median age 36 years) underwent 230 (range 1-7) percutaneous transhepatic or transplenic portal vein catheterization procedures. The main indications were pancreatic islet transplantation, portal anastomotic stenosis after liver transplantation, and portal vein thrombosis recanalization. As embolic materials gelfoam was used in 106 cases, metallic micro-coils in 54, and cyanoacrylic glue+lipiodol in 45; in 22 cases no embolization was performed. Technical success was 98.7% (100% gelfoam; 98.1% coils; 97.8% glue; 95.5% without embolization; p=0.45). Eighteen post-procedural bleedings (8/106 gelfoam; 7/53 coils; 1/45 glue; 2/22 without embolization) occurred, but the difference among groups was not statistically significant (p=0.34). We detected 12 intrahepatic portal branch thromboses not strictly related to an embolization technique (1/106 gelfoam, 4/53 coils, 3/45 glue, 4/22 without embolization; p=0.01).

Conclusions: Embolization of the parenchymal tract after percutaneous portal catheterization is technically safe and effective. The use of cyanoacrylic glue in higher caliber accesses showed better control of hemostasis, although without statistical significance compared to other materials.
P-72
Percutaneous intravascular retrieval of inadvertently embolized fragment of peripherally inserted central catheter from the pulmonary arteries

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Purpose of the study: The embolization of foreign body such as catheter fragment has increased risk symptomatology or thrombosis. Sometimes the venous catheters ad guidewire may get lodge in the pulmonary artery, making them more difficult to retrieve. We retrospectively analyzed safety and feasibility of percutaneous retrieval of inadvertently embolized fragment of peripherally inserted central catheter from the pulmonary arteries.

Materials and methods: We retrospectively analyzed the departmental data of intravascular foreign body retrieval between 2015 to 2021. We found total of 11 patients of intravascular PICC line fragment retrieval. We could find total of 5 patients, where foreign body was lodged in PA.

Results: The patient age varied from 10 years to 67 years (mean 46 years). Male to female ratio was 4:1. All the patients were hemodynamically stable. Chest radiograph and CT were performed in all the patients. We could successfully retrieve all the PICC line in pulmonary artery by loop snare. Pre and post procedure PA pressure and PA saturation was taken in all the patients. No intra-procedure and post-procedure complications were seen in all these patients.

Conclusion: Percutaneous retrieval of embolized fragment of peripherally inserted central catheter lodged in PA is not easy, but it is safe and viable option with experienced interventional radiologist instead of complicated morbid surgery for their removal.

P-73
Embolization therapy for pancreas-related bleeding with the use of n-butyl-2-cyanoacrylate

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Purpose.
To determine an ideal embolic agent to control an arterial bleeding in patients with pancreatitis, which can allow:
1) Embolize small and tortuous vessels;
2) Provide complete embolization due to high degree of adhesion to the vessel wall;
3) Have a possibility to control a bleeding in patients with hypocoagulation due to fast polymerization;

Materials and methods: During last 6 years we had 27 patients with pancreas-related bleeding, 19 were male, 8- female, mean age 51 years. The average amount of hemoglobin was 85.7 and RBC- 3.148. 16 patients had embolization after traditional operations on pancreas, 11 patients had emergency embolization without previous treatment. In 4 cases we used NBCA with peripheral coils, in 23 cases we used only NBCA.

Steps of operation;
1 – searching for direct and indirect signs of bleeding with the use of DSA angiography;
2 – superselective catheterization of bleeding arteries with microcatheter;
3 – embolization of affected segment with NBCA.
4 – control angiography.

Results: Efficiency of embolization was 100%- bleeding was controlled in all cases. One episode of bleeding in 10 month after the first embolization with the source in another anatomical region. 3 patients died because of progressive multiple organ dysfunction. 24 patients were discharged from the hospital without any signs of bleeding.

Conclusion: According to our study embolization for pancreas-related bleeding with the use of NBCA is effective and safe procedure, which can be used in cases of inefficiency of other methods of hemostasis.

P-74
Discrepancies in the recommended initial management guidelines of lower gastrointestinal bleeding

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Purpose: Acute lower gastrointestinal bleeding (LGB) poses potential management challenges to clinicians as there are multiple diagnostic and therapeutic strategies. We systematically reviewed recent guidelines across societies regarding the initial management of LGB.

Materials and methods: PubMed, Scopus, Embase and Web of Science databases were searched systematically as per Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to identify the most recently updated clinical guidelines by societies. Four articles from the American College of Radiology (ACR), American College of Gastroenterology (ACG), European Society of Gastrointestinal Endoscopy (ESGE), and British Society of Gastroenterology (BSG) met inclusion criteria.

Results: All four societies recommended clinical risk stratification, principally based on if the patient is hemodynamically stable (HDS) or unstable (HDUS). For HDS patients, colonoscopy was recommended as the first-line management for all societies, though ACR also included CT angiography (CTA) and red blood cell (RBC) scintigraphy as first-line options. For HDUS patients, all except ACR included a recommendation to exclude an upper gastrointestinal source. First-line management for HDUS patients was CTA and/or transcatheter embolization for all societies, although ACG also recommended colonoscopy if the patient could tolerate bowel preparation. Most significant areas of discrepant management recommendations involved rebleeding after colonoscopy (with ACR and ESGE recommending transcatheter embolization, ACG recommending repeat colonoscopy, and BSG recommending additional diagnostic imaging or capsule endoscopy). All societies agreed that surgery should be considered only after alternative options were exhausted.

Conclusion: Management recommendations for LGB vary depending on society, particularly in regards to the role of radiology.
P-75

Advances in knowledge on management of overt gastrointestinal bleeding

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2Stuttgart Clinics, Stuttgart, Germany, 3Heidelberg University and reliable use of image fusion.

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Learning objectives: In this educational exhibit, we will review:
1) Initial management recommendations by major clinical guidelines for overt gastrointestinal bleeding
2) Increasing role of CT angiography and transcatheter embolization
3) Protocol and interpretation of CT angiography
4) Management of rebleeding and postoperative complications

Background: Overt gastrointestinal bleeding is a common complaint to the emergency department with variable clinical presentations, ranging from trivial to life-threatening. Initial management depends on clinical presentation and subspecialty clinical guideline. Although transcatheter embolization and CT angiography were traditionally considered second-line management strategies after colonoscopy, both are increasingly used first-line, even for hemodynamically stable patients. CT angiography is noninvasive and can quickly localize bleeding, while transcatheter angiography can be performed in patients expeditiously without bowel preparation.

Clinical findings/procedure details: We will review management recommendations, the role of radiology (in particular, CT angiography and transcatheter embolization), optimal CT protocol, and management of postoperative bleeding and complications. Additional emphasis will be placed on emerging research in CT for transcatheter embolization planning, including dual-energy CT and mathematical modeling / quantitative imaging to predict intra-procedural findings.

Conclusion: Management of overt gastrointestinal has changed in the past decade, with a greater emphasize on radiology. This educational exhibit will review important changes for the interventional radiologist.

P-76

Image fusion & embolization – a new standard of care?!

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Learning objectives: The learning objectives of this work are to familiarize with the current concepts of image fusion for embolization procedures through a colorful series of clinical cases. The reader will get an impression of the opportunities, challenges and limitations.

Background: Radiology and Interventional Radiology virtually seem to be predestined for the implementation of AugmentedReality. One of its essential requirements is the safe and reliable use of image fusion.

Clinical findings/procedure details: The clinical case series includes a range of embolization procedures such as prostatic artery and uterine fibroid embolization, lymphatic embolization, and liver and kidney embolization as elective or emergency treatment. Image fusion is performed using bookmarks created with either preinterventional MRI or CT data or intraprocedural DynaCT data, or a combination thereof. The options for image fusion with respect to live projection onto the angiography monitor are diverse and can be tailored to the individual preferences of the Interventional Radiologist. The results suggest that radiation exposure, complication rates, and costs can be reduced, and trainee learning curves and patient satisfaction can be increased.

Conclusion: There are several concepts of image fusion for a number of embolization procedures that can be safely and reliably used. It is anticipated that current limitations, such as workflow issues (e.g., complex post-processing of big image data), intelligent perception (e.g., dynamic-adaptive bookmarks), and human/angiography-unit interaction (e.g., voice control), will be controlled in the near future. In our view, image fusion defines a new standard of care for embolization procedures.

P-77

Vascular risks in Pole Dancing

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Clinical history/imaging: A 27-year-old woman, was seen in 2016, for a mass at the internal right thigh that appeared in 2011, after a brutal attempt at a catch using the thighs during pole dancing. Complaints consisted of a hematoma (20*20cm), followed by a persistent bulk and a feeling of heaviness.

Clinical exam revealed a pulse and thrill. MRI showed the presence of an AVF in the gracilis muscle, with an afferent artery originating from the deep femoral artery.

Results: We chose an endovascular approach using a retrograde contralateral access. The origin of the AVF was coming from the deep femoral artery. We clogged it using 4 coils 6mm*7mm and 1 of 7mm*7mm. After 10 days, the lesion’s size decreased. After 1 month, we found that the fistula was still fed via superficial femoral artery (SFA).

Later, we occluded 3 feeding vessels from the SFA, using a Cantata catheter and coils : 5mm*7cm, 4mm*7cm, 3mm*5mm. CT-scan at follow-up indicated weak perfusion by public branches inaccessible endovascularly. The mass became soft and non-pulsatile. Long follow-up remains reassuring.

Discussion: Literature about traumatic AVF consists mostly of case reports and very few studies. The location of traumatic fistula seems to depend on the mechanism of trauma and has been described all over the body.

Take-home points: There are no guidelines for the management of traumatic AVF, but angiography is one of the mainstays to determine the best possible treatment. If not treated correctly, complications are serious.
P-78
Mycotic pulmonary artery pseudoaneurysm: novel endovascular treatment of a life threatening condition
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A previously well 46-year-old female admitted to hospital with fevers, cough and chest pain. The patient was diagnosed with necrotising pneumonia and treated with antibiotics. Three days later the patient developed massive haemoptysis leading to cardiac arrest requiring cardiopulmonary resuscitation, dual lung intubation and intensive care unit admission.
A CT pulmonary angiogram revealed a 17mm pulmonary artery pseudoaneurysm (PAP) arising from the right posterior basal segmental artery. A 7 mm Micro Vascular Plug was inserted at the neck of the aneurysm slowing flow in the segmental pulmonary artery, however there was a small volume of residual flow into the PAP. A microcatheter was then advanced along the side of the plug into the PAP. Further embolisation was then performed using Histoacryl glue diluted 4:1 with Lipiodol. Subsequent DSA demonstrated complete occlusion of the PAP and right medial basal segmental artery. The patient was discharged seventeen days later and continues to work four months post procedure.

It is estimated that almost 50% of PAP are missed on initial reporting of chest CT scans. If untreated PAPs have a mortality rate of about 62%. This case adds to the body of literature demonstrating safety and efficacy of endovascular treatment while outlining a specific technique hereto undescribed.
1. Pulmonary artery pseudoaneurysms are often missed and fatal if untreated.
2. Endovascular treatment of PAPs is safe and efficacious.
3. A combination of a microvascular plug and a liquid embolic can be used to treat PAPs.

P-79
Emergent embolization of an iatrogenic pulmonary artery pseudoaneurysm through a Swan Ganz catheter
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Clinical History/Pre-treatment imaging: A 64-year-old female with non ischemic cardiomyopathy and chronic systolic heart failure developed massive hemoptysis following Swan Ganz (SG) catheter repositioning. The patient was supratherapeutic on Coumadin with an INR of 3.2. A CT pulmonary angiogram showed a 1.4cm right middle lobe pulmonary artery pseudoaneurysm distal to the retracted SG with surrounding pulmonary hemorrhage.
Treatment/Results: A pulmonary angiogram (Image 1) performed by injecting contrast through the SG confirmed the CT findings. A microcatheter was introduced through the existing SG catheter and the pseudo aneurysm was successfully coiled (Image 2). Following embolization, hemoptysis resolved and the patient subsequently underwent a successful cardiac transplant.

Discussion: Microcatheter embolization through an SG catheter is a feasible option for treating acute hemoptysis from an iatrogenic pulmonary artery injury. This technique can be performed without anesthesia and avoids the need for an additional venous access and time required to catheterize the bleeding pulmonary artery branch. This is especially useful in a coagulopathic patient as in our case.

Take home points: Swan Ganz (SG) related hemoptysis is a rare but serious complication best managed by endovascular means. Co-axial embolization through the existing SG is a viable treatment option that has not previously been reported.

P-80
Cystic artery embolisation during macroaggregated albumin injection
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Clinical history: A 65-year-old hepatitis B carrier presented with hepatocellular carcinoma in both liver lobes. Multidisciplinary consensus was reached for trial of Yttrium-90 (Y-90) to the right liver tumors and transarterial chemoembolisation to the left. Patient underwent a contrast CT liver, and then a hepatic angiogram for macroaggregated albumin (MAA) injection.

Results: Hepatic angiogram showed a common origin of the cystic artery and the right hepatic artery. This would mean inadvertent administration of MAA, and then later Y-90, to the gallbladder, causing radiation-induced cholecystitis. To avoid this complication, the medial and lateral segmental branches of the cystic artery are super-selectively cannulated with embolisation by 2mm MicroNester coils. Post-embolisation angiogram confirmed nil gallbladder staining. The patient subsequently underwent an MAA breakthrough scan, which showed only minimal gallbladder uptake post-coiling.

Discussion: About 30 patients are referred for MAA assessment in our tertiary centre each year. In most cases, the cystic artery can be bypassed for right hepatic MAA injection. A shared origin of the right hepatic and cystic arteries is uncommon. Our centre prefers to trap the cystic artery prior to MAA injection. This allows for precise assessment of expected Y-90 uptake. It also avoids complications of delaying Y-90 injection in case of difficult cystic artery embolisation, if it were performed during the episode of Y-90 therapy. No complications have resulted from cystic artery trapping.

Take-home points: Cystic artery embolisation performed prior to MAA injection gives an accurate picture of Y-90 uptake, and avoids delayed Y-90 injection in case of complicated embolisation.
**P-81**

**Endovascular repair of a mesenteric arteriovenous malformation causing venous ischaemic colitis**

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**Clinical History/Pre-treatment imaging:** A 58-year-old diabetic patient presented with a six-month history of intermittent left and lower abdominal pain, tenesmus, urgency and watery diarrhoea. Extensive left hemiculonic varices were visualised on colonoscopy and confirmed on CT, however the underlying arteriovenous malformation (AVM) was not appreciated at the time and symptoms were attributed to presumed previous inferior mesenteric vein (IMV) thrombosis and therefore treated conservatively.

The patient represented 14 months later with acute worsening of symptoms. Repeat CT demonstrated progressive left-sided colitis, and possible underlying AVM was suggested with vascular shunting resulting in venous congestion with ischaemic colitis.

Digital Subtraction Angiography (DSA) demonstrated a large nidus with a leash of abnormal vessels between the inferior mesenteric artery (IMA) to the IMV, consistent with a large AVM. Given clinical deterioration with suspected ischaemic colon, preoperative AVM embolisation with subsequent left hemicolecotomy was planned.

**Treatment Options:** An approximate 60% reduction of flow across the nidus was achieved with Onyx and left hemicolecotomy with Hartmann’s procedure was uneventful. Follow-up CT and colonoscopy nine months later demonstrated normal remnant colon with no evidence of residual AVM. The patient is otherwise well, and a stoma reversal is being planned.

**Discussion/Take-home points:** Mesenteric AVMs are a rare but important cause of portal venous hypertension because of the high morbidity and mortality carried by the associated risk of venous ischaemic colitis. Prompt radiological diagnosis is necessary to facilitate early referral for DSA and consideration of embolisation, which may avoid development of venous ischaemia and surgical resection.

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**P-82**

**Application of the spaghetti effect to deliver onyx inside a giant bronchial aneurysm**

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**Clinical History:** A bronchial artery aneurysm of 36x30 mm was discovered in an asymptomatic 69-y-o woman. Clinical History/Pre-treatment imaging: A bronchial artery aneurysm of 36x30 mm was discovered in an asymptomatic 69-y-o woman. Treatment with transcatheter embolisation was decided after a multidisciplinary consideration. Aneurysm irrigation came from high flow hypertrophied and redundant bronchial arteries (fig 1).

**Treatment Options:** The initial plan was to navigate with a microcatheter into the aneurysm sack and coil the aneurysm. This was impossible given the redundancy and tortuosity of the bronchial arteries. We thought about glue injection but it seemed dangerous. Proximal coil occlusion of the feeding arteries seemed that it was an incomplete treatment and it also closed future access into the aneurysm.

Finally a 0.017” microcatheter was advance as close as possible to the aneurysm through the bronchial arteries but without reaching the aneurysm sack. Onyx was injected with force so that it would advance and the flow would push it into the lumen of the aneurysm.

15 months later the patient is doing well, the aneurysm is occluded and the sack now measures 14 mm.

**Discussion:** When onyx is injected into an artery with high flow, due to the cohesiveness of this embolic, a polymer thread is formed that moves with the flow. This is known as the “spaghetti effect.” We used this effect to create a tangle (fig 2) that grew inside the aneurysm until it completely occluded it.

**Take-home points:** The spaghetti effect is a property of EVOH that may occur due to a wrong indication of but that could be useful in some particular cases.

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**P-83**

**Presurgical embolization of nasopharyngeal angiofibroma**

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**Clinical history:** 14-year-old male with epistaxis and dysosmia. Optical examination revealed a violaceous-looking mass on the floor of the fossa from the body of the right inferior turbinate and reaching the cavum. In CT and MR study:solid mass in the floor of the fossa from the body of the right inferior turbinate and reaching the cavum. In CT and MR study:solid mass in the right nostril with extension to the cavum and with contrast enhancement that doesn’t produce bone involvement in relation to juvenile nasopharyngeal angiofibroma.

**Treatment options:** Presurgical embolization (two days before). Through right femoral access with a long 6Fx90cm introducer and a 4Fx125cm multiPurpose preformed catheter, right external carotid artery is catheterized. Selective arteriography reveals a highly developed maxillary branch on which a marked staining of pathological appearance depends, in relation to the lesion.

With a catheter and a long hydrophilic guidewire, as well as a microcatheter, the lesion was reached with subsequent embolization with 3mmx6 and 12cm, and 4mmx15cm Interlock-type coils, with good results in subsequent control.

**Discussion:** Juvenile nasoangiofibroma is a highly vascularized benign tumor, typically found in adolescent males, with aggressive and locally invasive behavior that causes clinical manifestations. It originates from the sphenopalatine foramen at the posterolateral margin of the nasal cavity and extends in all directions (including the infratemporal fossa). They are vascular malformations that derive from the remains of the artery of the first branchial arch.

**Take-home points:** Pre-surgical embolization with coils is considered a minimally invasive technique that allows studying the vascular map of this malformation, and the possible anastomoses, as well as providing a treatment that reduces morbidity and mortality during surgery, manifested mainly by bleeding.
**Paediatric**

**P-84**
Management of acute intra-abdominal haemorrhage in ruptured hepatoblastoma with transarterial embolization using calibrated gelfoam particles

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**Purpose:** The treatment outcome of transarterial embolization using calibrated gelfoam particle in the management of acute intra-abdominal haemorrhage in ruptured hepatoblastoma is evaluated.

**Materials and methods:** Three patients with ruptured hepatoblastoma complicated with acute intra-abdominal haemorrhage were identified retrospectively from 2019 to 2022 in a territory-wide tertiary paediatric oncology centre. The offending arteries were catheterized using microcatheters and embolized using calibrated gelfoam particles (500-700um or 710-1000um) until stasis. Primary outcomes were technical success and procedure-related complications. Secondary outcomes included rebleeding rate, patient’s 30-day survival rate and overall survival duration.

**Results:** Mean age of the cohort was 6 years (range, 3-7 years). All patients belonged to high risk group (Patient A, PRETEXT III V+ R+ M+; patient B, PRETEXT IV V+ P+ R+ C+ M+; patient C, PRETEXT II R+). Pre-procedural CT showed active contrast extravasation in the tumour in all cases, with two cases demonstrating haemoperitoneum. Mean pre-embolization haemoglobin level was 6.6g/dL (range, 5.7 – 7.6g/dL). Technical success rate was 100% with cessation of flow to the offending arteries. No post-procedural complication was detected. The 30-day survival rate was 100% with no rebleeding. Patient A and B received further courses of chemotherapy but died due to disease progression, at 463 days and 97 days post-embolization, respectively. Patient C received four courses of chemotherapy followed by right hepatectomy and remained free of disease at the last follow up.

**Conclusion:** Transarterial embolization using calibrated gelfoam particle can provide a safe and effective means to manage acute intra-abdominal haemorrhage in ruptured hepatoblastoma.

**P-85**
Emboliisation of a giant hepatic arteriovenous malformation in an newborn using squid

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**Clinical history/Pre-treatment imaging:** Antenatal evaluation revealed a cardiomegaly with congestion of the right heart. A male infant was born at 37 week’s gestation with a birthweight of 3080 g after an emergency cesarean section due to suspected hypoxia. Severe respiratory failure and impaired microcirculation was observed right after. Cardiac ultrasound showed a significant pulmonary hypertension, type II atrial septal defect with patent ductus arteriosus. Additionally, dilated hepatic veins, increased blood flow in the hepatic arteries and portal vein. CTA confirmed a large bilobar intrahepatic AVM.

**Treatment options/Results:** Staged transarterial (from peripheral to central feeder’s) embolisation with Squid was chosen. During 1st, 7th and 13th day’s of life a total exclusion of the AVM was achieved by a three step embolisation of different compartments via the internal mammary, inferior phrenic, inferior epigastric and the right hepatic feeders. After stabilizing the condition, during 16th day the patient was extubated and three weeks later discharged with antihypertensive treatment. 3 months later liver ultrasound was repeated – no residual nidus revealed.

**Discussion:** Congenital hepatic AVM’s are rare lesions associated with significant morbidity and mortality, mostly from high output cardiac failure. There remains no standardized treatment and our more aggressive tactics were driven by severe hemodynamic parameters. Moreover, only the complete nidus occlusion had a significant role to the positive changes.

**Take-home points:** Multidisciplinary approach is the key to the efficient diagnosis and treatment. Embolisation should be carefully planned due to the high amount of overlapping radiopaque material.
P-86
Embolicion of intraosseous capillary haemangioma of the mandible
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Clinical history/pre-treatment imaging: An 11 year old child presented with a three-month history of pain and swelling to the right jaw associated with bleeding and gradual increase in size. Following dental review, imaging demonstrated an expansile lesion in the premolar region of the right hemi-mandible.

Treatment options/results: An incisional biopsy was performed as part of the work up. The patient experienced significant intraoperative bleeding requiring packing during biopsy and was urgently transferred to Interventional Radiology for embolisation. A blush was demonstrated arising from branches of the facial artery which were successfully embolised using 2x 5.3mm microvascular plugs and a 4mm detachable coil. Following successful acute haemorrhage control, the results from the recent biopsy confirmed an intraosseous capillary haemangioma. Surgical excision and reconstruction of the mandible was planned following the confirmed histological diagnosis. Following close discussions between IR, plastic surgery and maxillofacial surgeons, the patient underwent further embolisation of the lingual and inferior alveolar arteries in order to fully devascularise the troublesome lesion prior to surgery.

Discussion: This case highlights the value of embolization in both acute haemorrhage control but also in pre-operative prophylactic haemorrhage control. The two approaches nicely demonstrate isolated embolisation of a bleeding vessel vs multi-vessel embolisation to devascularise a lesion.

Take-home points: Embolisation is a useful pre-operative strategy in managing vascular tumours pre- surgical resection. Increasing awareness of IR Embolisation treatments to other specialties can be achieved by building a culture of discussion around cases and by increasing IR visibility and attendance at clinical decision meetings.

P-87
Embolisation treatments in congenital, post surgical recurrence of pelvic cavity (vulval & anal) malformations in young female patient
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Clinical History: 17 year young female since birth suffering from Extra-Truncular Vulval & Ano-rectal Venous Malformations. This Slow flow VM lesion had recurred & flared up after gross failure of Foam Sclerotherapy with Inj. Setrol (STD)-3%, Post Surgical Excision (Ligation & Stripping), Thermal Ablation with 980 nm Diode Laser. Patient had difficulty in Micturation and defecation; during which malformations increases in size. No bleeding through Vulval varices during Menses.

Pre-Treatment Imaging: MRI of Pelvis (1.5 T, Pre & Post Contrast) revealed Large Venous Malformation involving Left side of Vulva (Labia majora) extending Posteriorly through Lt. Ischio-Anal space into the Pelvis & Parametrium. Involvement of Left lateral wall of Urethra & Vagina markedly seen along Mesorectal fascia. No abnormal Arterial feeders on MRA.

Treatment Options: Closed Space, Direct puncture DSA Venography And Embolisation with Inj. NBCA Glue (Endocryl), Inj. Ethanol (95% Alcohol) mixed with Inj. Lipiodol and Follow up Foam Sclerotherapy with 3% Inj. Polidocanol (Asklerol) at 1, 3, 6, 12 months Intervals.

Results: Good Obliteration of Dilated Venous spaces in malformed veins of Vaginal, Vesicles, Rectal region after directly punctured Glue (3 vials) + Lipiodol (10 ml); 15 ml Ethanol & 6-8 cc Inj. Polidocanol well noted in 12 months period.

Discussion & Take Home Message: Post Embolisation Day-1 Patient had episode of Hypokalemia, Supra-Ventricular Tachycardia, Blurring of Vision & Slurred Speech, Pain, Swelling, tenderness over Vulval region. Managed well in Cardiac ICU with good recovery. Follow up MRI Scan Pelvis showed Fibrosed Perineal & Mesorectal fascial malformed Veins. No recurrence.
**Prostate**

**P-88**

Impact of prostatic artery embolization in patients with enlarged true middle lobes

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**Background:** Prostate arterial embolisation (PAE) as a therapy for benign prostatic hyperplasia (BPH) is able to improve prostatic volume (PVol), intravesical prostatic protrusion (IPP) and the prostatic urethral angle (PUA). True middle lobes (TML) are associated with bladder outlet obstruction (BOO), as well as lower urinary tract symptoms (LUTS). This study investigated the effect of PAE on the reduction of TML.

**Material and methods:** A retrospective analysis included 47 men with TML, treated with PAE between April 2015 and September 2021. The volume of TML, IPP and PUA was measured on MRI before and 2 months after PAE. Successful devascularisation of the TML was assessed 48 hours after treatment by contrast-enhanced MRI (ceMRI).

**Results:** The TML was successfully technically embolised in 72%. After two months PVol was reduced by 25.8±13.3% (from 72.1±39.8 cm³ to 52.5±27.9 cm³; p<.000). After a technically successful PAE of the TML, the TML-Vol decreased by 32.1±21.5% (from 10.6±16.1cc to 7.2±13.1cc; p<.000), and the IPP was reduced by 29.3±15.5% (from 16.3±7.4mm to 11.9±6.6mm; p<.000). In contrast, after technically incomplete devascularisation of the TML, the TML-Vol was reduced by only 7.2±17.7% (from 8.4±9.3cc to 7.5±8.9cc; p=.089), and the IPP was reduced by only 10.9±8.8% (from 16.4±7.3mm to 14.6±6.7mm; p=.003). The PUA after successful and after incomplete embolisation of the TML was comparable at 11.6±7.6° and 12.2±9.4°, respectively (in both cases p<.001).

**Conclusions:** PAE is able to reduce TML volume, further to reduce IPP even when caused by TML.

**P-89**

Mid-term results of the prospective LUMI-PAE study: propensity-matched analysis of 1-year follow-up data

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**Purpose:** DC Bead LUMI (Marlborough, Massachusetts, USA) is a non-resorbable spherical embolic agent which is radiopaque and therefore holds several advantages over traditional particles. We aimed to evaluate its safety and clinical effectiveness for Prostatic artery embolization (PAE) through a prospective study and propensity matching with the UK-ROPE database (UK- Registry of Prostate Embolisation).

**Materials and Methods:** 27 consecutive patients were enrolled in this prospective study (age 69.4, prostate volume 127.3 cc) and had PAE with DC Bead LUMI between July 2018-August 2020. Primary outcomes were device safety and symptom improvement, measured with International Prostate Symptom Score (IPSS) at 12 months. A logistic regression/nearest neighbour propensity-matched analysis (matched for age, baseline IPSS, baseline prostate volume, and baseline flow rate (Qmax)) were used to compare the prospective DC Bead LUMI cohort against a matched control group from the UK-ROPE database.

**Results:** After withdrawals and exclusions, 11/27 patients had completed 12 months follow-up. 11/121 propensity-matched pairs were identified from the UK-ROPE database. There were no major adverse events. Baseline IPSS for the LUMI group was 25.3/35 +/- 4.5 and 24+/ - 4.9 for the matched group (p=0.52). At 12-months post-procedure, the follow-up IPSS score was 13.5 +/- 9.1 (LUMI) vs. 11.5 +/- 5.9 for the matched group (p=0.6). IPSS reduction post embolization was not significantly different (11.7 +/- 7.9 vs 12.5 +/- 7.5, p=0.83).

**Conclusion:** DC Bead LUMI is a safe and effective embolic agent for PAE and achieves a comparable overall symptom score reduction to established agents used in the UK-ROPE database.
P-90
Prostatic artery embolization in men with severe hemophilia A: a case report of two patients

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Clinical history: This is the first case report describing the hemostasis plans in two patients with severe hemophilia A (HA) who underwent prostatic artery embolization (PAE). Patient 1 (60 years old) had a prostate volume (PV) of 131 cm³ and maximum flow (Qmax) of 11.6 ml/s, while Patient 2 (53 years old) had 44 cm³ prostate and Qmax of 17.4 ml/s. Both patients had severe LUTS not responding to medical therapy.

Treatment options/Results: Extended half-life recombinant factor VIII (EHL rFVIII) and tranexamic acid (TA) were administered intermittently for 7 days following PAE, as seen in Table 1. Initial dose was timed at 30 minutes before procedure start to provide maximal coverage at the time of greatest bleeding risk and highest need for procoagulant therapeutic effect during the embolization process. PAE was performed using right femoral access and PErFecTED technique. No bleeding complications occurred. At 6 months’ follow-up, both patients were satisfied with the result.

Discussion: No guidelines for factor replacement in endovascular procedures in patients with severe HA exist. In our experience, intermittent factor administration provides satisfactory factor levels while helping to minimize the overall cost. To account for the possibility of transient hematuria following PAE, TA was added as an antifibrinolytic agent with good effect. Further studies are needed to investigate the optimal perioperative regimens.

Take home points:
• PAE could be the preferred procedure in men with HA and LUTS
• Intermittent factor replacement with addition of TA seems to provide good hemostasis in the perioperative period

P-91
PVE: Alcohol or NCBA?

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Background: Portal vein embolization (PVE) is a technique used to prevent liver insufficiency after hepatectomy in oncologic Patients.

Aim of the study: Share our experience comparing outcomes obtained using alcohol or NCBA in patients before hepatectomy, considering effectiveness FLR volume (%), post procedure hospitalization, major post procedure complications and success of hepatectomy.

Material and Methods: We enrolled 32 Patients diagnosed with perihilar Colangiocarcinoma (67,9 +/- 9,8 yo) who underwent PVE before Hepatectomy (July 2008-December 2021). 13/32 Patients treated with NCBA and 19/32 with alcohol.

Results: There wasn’t a statistically significant difference between the use of alcohol or NCBA in term of post procedure hospitalization, onset of major complications and success of hepatectomy. The post procedure hospitalization days were 8 in NCBA and 7,5 in alcohol (p=0,872). Major complications were present in 9,3% in NCBA and 12,5% in alcohol (p=0,406). The percentage of success of hepatectomy was 69% in NCBA and 79% in alcohol (p=0,896). The % FLR was bigger in patients treated with alcohol (9,3% vs 6,4%) with a p value statistically significant (p=0,011).

Conclusions: PVE with ethyl alcohol is safe and more effective than NCBA in inducing the growth of FLR because it generates huge inflammatory response in periportal spaces causing fibrosis thus prevent undesirable hepatic revascularization.
P-92
A high-flow micro-balloon catheter for balloon-occluded retrograde transvenous obliteration of gastric varices without gastro-renal shunt: initial clinical experience

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Purpose: A high-flow micro-balloon (MB) catheter has a larger inner lumen and the balloon diameter than conventional MB catheters. The purpose was to describe the initial experience using a high-flow MB in balloon-occluded retrograde transvenous obliteration (B-RTO) procedures for gastric varices (GVs) without gastro-renal shunt (GRS) considered as difficult to be treated by regular balloon or conventional MB catheters.

Material and Methods: Five patients (M:F=2:3, median age 67 yrs.) with enlarging GVs without GRS underwent B-RTO. GVs drained into the gastro-caval shunt (n=1) and gastro-pericardiac shunt (n=4) and gastro-renal shunt (n=1). A 1.9 Fr microcatheter was further advanced close to the target varices through a high-flow MB, when needed (i.e., tri-axial system). A 5% ethanolamine olate iopamidol (EOI) was filled in the varices under balloon occlusion. Clinical success was defined by complete thrombosis of the GVs. The diameter of occluded vessels, the volume of 5% EOI, the use of tri-axial system, additional embolic agents and adverse events were also evaluated in each case.

Results: Clinical success was achieved in all patients without major adverse events. The mean diameter of occluded vessels was 9.02 mm (range, 4.6-11.1 mm). The total amount of 5% EOI ranged from 9 to 40 mL (mean, 15.8 mL). In three patients, tri-axial system was applied. In four patients, the efferent vein was embolized with detachable coils.

Conclusion: A high-flow MB was useful for challenging B-RTO of GVs without GRS whose efferent veins were too tortuous and dilated to treat using either regular balloon or conventional MB catheters.

P-93
Combined role of laser ablation, inj. ethanol embolisation and foam sclerotherapy in the treatment of congenital venous malformations in K-T syndrome cases

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Purpose: To evaluate Combined role of Endovenous Laser Ablation, Inj.Ethanol (95% Alcohol) mixed with Inj. Lipiodol or Embotраст (Contrast agent) and Foam Sclerotherapy as a result oriented therapeutic option for the Symptomatic patient’s having Painful,Tense(Thrombotic), Bleeding or infiltrating skeletal muscle vascular Lesions in KTS Patients.

Material & Methods: Laser Ablation & Embolisation with Absolute Alcohol & Sclerosants is done in Single lower limb of 30 young Patients (Age Group 4-35 yrs)operated in between 2012-2022. All patients selected by prior Duplex Venous USG study, 3T MRI Scan and Closed space, direct puncture Contrast Venography. These Imaging modalities confirmed Hypoplasia, Aplasia & Patency of Deep Veins. Arteriography is Unimpressive unless A-V Fistula is there. Compression Garments for localised painful,distended Varices,Analgesics & Anti-inflammatory (NSAID) medicines given for local venous thrombosis. All Patients were followed at 1,3,6,12 months & 2 yrs interval.

Results: Successful Thermal Ablation observed in Great or Short Saphenous & it’s accessory Veins with 980nm Hemoglobin Specific & 1470nm Water Specific Diode Laser with Bare tip (603 micron) And Single or 2 Ring Radial fibers. Successful Embolisation & Fibrosis of Abnormal,Dilated, Intricate Cutaneous & Intramuscular localised Venous channels seen in 6 months span. No complications like Acute Venous insufficiency, Intractable leg swelling or mortality documented.

Conclusion: Inj.Ethanol Embolisation for malformed Veins infiltrating Skeletal muscle,Endovenous Laser to ablate Incompetent GSV & SSV, Foam Sclerotherapy by using 3% Polidocanol / STD for Cavernous Venous Lesions is a feasible,efficient & Safe Treatment of Choice in these Patients with Congenital Varicosities of KTS Cases.

P-94
Multiple feeders during BRTO

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Learning objectives: Share our successful experience of complex BRTO procedures and discuss this in professional society.

Background:
- In 2021 we performed 16 procedures in portal hypertension due to liver cirrhosis with 100% successful result.
- Among them 7 patients had 2-4 varicose veins feeders.
- 3 urgent cases.

Procedure details:
- CT-angio to detect feeders, drainage vein(s) and exclude main portal vein/PV-branches thrombosis.
- Transfemoral access – gastrorenal shunt (GRS) catheterization with AL-2 max uprising – changing to amplatz ultra stiff – insertion of Coda balloon.
- Retrograde balloon-occluded venography
- In cases with multiple feeders we had unstable interposal of contrast.
- US-guidance, puncture right (preferably) or left PV branch with Neff puncture set and leave the introducer from the set there (4F).
- Angio from all the feeders pre- and post- balloon occlusion in GRS and choose vessels for staged occlusion with aetoxisclerol 3% (we found it the most safety) and coils after.
- If inter-feeder communication exists, blockage with the balloon in one of the feeder and inject sclerosant from the wire channel during inflation is needed.
P-96
Difficult BRTO procedure
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Clinical history:
• 59 y.o. liver cirrhosis patient due to alcoholic liver disease.
• Hospitalization in another city with upper gastrointestinal bleeding: coffee ground vomitus and hemodynamic instability (ABP 80/50).
• Varicose etiology after UGIE – 3rd grade of gastric VCs and 2nd grade EG junction, severe portal hypertensive gastropathy (PHG).
• CT-angio – 4 afferent vessels and gastrorenal shunt as dominant drainage vein.

Treatment:
• First line medical therapy started.
• 4 doses of blood + 6 doses of blood plasma.
• Situation seems to be stable after 5 days, patient was discharged with recommendation to come to our clinic.
• Two days after there was a recurrence of bleeding.
• Urgent BRTO + coil embolization have been performed by our operating team away in their clinic.
• Staged embolization of SGV, two PGVs and LGV plus antegrade aetoxisclerol injection.
• BRTO with 3% aetoxisclerol.
• Transhepatic chanel embolization with gelatin sponge.

Discussion:
• Independently of CT anatomy first access should be performed through gastrorenal shunt.
• In any case of unstable interposal of contrast media in GVs or in distal parts of afferent veins (or their absence on BR-angiography), operator should perform second access (trans-TIPS or transhepatic) to verify hemodynamics in portosystemic collaterals.
• That results in stable location of sclerosant, thus intense the impact on GVs.

Take-home points:
• Initially – preoperative CT imaging to determine afferents of gastric varices.
• Direct splenoportography in multiple afferent cases is obligatory to understand hemodynamics in GVs before and after balloon occlusion.
• The importance of gastroprotective therapy after BRTO.

P-95
Intramuscular venous malformations of the lower limb—indications and outcomes of ethanol, diode laser & sclerotherapy
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Learning Objectives:
• Understand Common clinical presentations and features of Venous Malformations.
• Understanding Importance of Imaging of VM in treatment planning & management.
• Understanding Common Techniques, Common Liquid Embolics, Diode Laser, Sclerosants use.
• Understanding Potential Complications of VM And their management.

Background: Intramuscular Low Flow Venous Malformations are mostly developmental abnormalities due to inborn errors of Vasculogenesis. The majority are present at birth but their Clinical Presentation and timing is during developmental age group (15-30 yrs).

Accurate and timely diagnosis is Crucial. The management depends upon clinical symptoms, features, extent, Size, associated pain, swelling, tenderness etc.
The main aim of Intramuscular LFVM in Lower Limb is to relieve Pain, Swelling, Blood Stasis triggering Thrombosis or Bleeding, reducing the Size And almost total cure with Latest Embolisation IR Techniques & Embolics.

Imaging Findings correlating Clinical Symptoms:
On Duplex Scanner (Doppler) showed that These LFVM found in Gastronemius and Soleus group of Calf muscles and does not have direct communication with Deep Venous System neither with any Popliteal-tibial Arteries.

Lower limb Ascending Contrast Venography revealed Dilated, Intricate, Dense network of malformed Veins and mostly localised Venous channels (Hemangioma).

Procedure Details: Closed space, Direct puncture (18G Needle) of LFVM with Inj. Ethanol mixed with Inj. Lipiodol or Embostat (2:1 Proportion). Inj. Polidocanol or STD (3%) injected in Foam form into LFVM present in Subcutaneous plain.

Laser Ablation (1470 nm Diode, Bare tip fibre) for localised VM in deep muscular compartment.

Conclusion: Liquid Embolics, Sclerosant And Laser Ablation for LFVM in Intramuscular compartment is the most suitable, efficacious & useful IR treatment with Excellent outcomes.
P-97

Embolization of a spontaneous splenorenal shunt for the treatment of refractory hepatic encephalopathy in a non-cirrhotic patient

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Clinical history/Pre-treatment imaging: A 79 year old male without history of cirrhosis presented with encephalopathy and hyperammonemia with serum ammonia level of 114 μmol/L. Lactulose enemas and Rifaximin were initiated without significant clinical or laboratory improvement. A contrast enhanced CT of the abdomen pelvis demonstrated a large distal splenorenal shunt, measuring 10mm in diameter and no cirrhosis. Interventional radiology was consulted for possible shunt embolization.

Treatment Options/Results: A transhepatic approach was pursued to confirm the hepatofugal flow in the portal circulation, which was confirmed on the portogram, with the distal splenorenal shunt decompressing the splanchnic circulation. Portosystemic pressure gradient was 2 mm Hg before embolization. The shunt was embolized with coils with significant preferential flow towards the liver. Complete stasis within the shunt was not pursued to allow for physiologic change in hemodynamics and to prevent mesenteric venous thrombosis secondary to stasis within the portal system. Post procedure ammonia levels decreased to 50 μmol/L with complete resolution of patient’s encephalopathy by day two.

Discussion: Spontaneous portosystemic shunts occur frequently in the setting of cirrhosis as opposed to non-cirrhotics, where it is rare. Endovascular embolization of an extrahepatic portosystemic shunt should be considered as a treatment option for refractory hepatic encephalopathy, particularly with non-cirrhotic patients.

Take-home Points: Spontaneous portosystemic shunt should be included in the differential for encephalopathy secondary to isolated hyperammonemia without chronic liver disease. For patients who fail medical management, shunt embolization may be an effective treatment option for improving ammonia levels and encephalopathy.
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