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P-1 (301.1)

Outcome of DEB and PTA post stenting in occluded versus stenotic lesions including evaluation of the implanted stent – subgroup analysis of the randomized Freeway Stent Study

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Purpose: Stents are needed in up to 50 % of all peripheral interventions where PTA with plain or drug-eluting balloons alone will not reopen the vessel sufficiently. Nevertheless, the restenosis rate of stents is still a major limitation of peripheral arterial interventions. Drug-eluting balloons (DEB) potentially overcome the problem of in-stent restenosis when used for postdilatation after primary nitinol stenting in the SFA and PI segment.

Material and methods: The Freeway Stent Study is a prospective, randomized, international trial conducted in 13 centers in Germany and Austria. 204 patients were randomized for postdilatation by either DEB (FREEWAY™) or plain balloon (PTA) of primary implanted stents. The choice of commercially available nitinol stents was on the physician's decision. Primary endpoint is clinically driven target lesion revascularization (TLR) at 6 months; secondary endpoints include patency rate, shift in Rutherford classification, ABI and MAE at 6 and 12 months.

Results: The 12 months follow up results highly favor the use of FREEWAY™ DEB over PTA postdilatation. The majority of patients presented at baseline suffer total occluded lesion. The significant higher patency rate for the FREEWAYTM arm in the occluded lesions subgroup underlines the overall outcome.

Conclusions: The Freeway Stent Study shows that the usage of DEB as a restenosis prophylaxis seems to be safe and feasible. The 12 months follow up results give a clear sign in all parameter in favor of DEB. Subgroup analysis of occluded versus stenotic lesions show the beneficial effects of DEB particularly in difficult lesions.

P-2 (301.2)

Efficacy and Safety of the "off-label" use of the Angio-Seal Vascular Closure Device

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Purpose: Closure devices are increasingly used in interventional radiology. In complex situations such as coagulation disorders or repeated arterial punctures they may be particularly helpful, but the use will be "off-label". Goal of this retrospective analysis is to assess safety and efficacy of the "off-label" use of the Angio-Seal closure device.

Material and methods: The use of 6F and 8F Angio-Seal devices in 471 consecutive patients was evaluated. Indications, puncture technique and patient characteristics including coagulation state were recorded. Outcome was monitored using data from the institutional complication management system and patient records. Results were statistically analyzed.

Results: In 94 patients devices were used in one or more off-label indications, including oversize puncture (n=31), thrombolysis for more than 24h (n=44), recurrent arterial punctures within 90 days (n=7), superficial femoral artery puncture (n=7) and coagulation disorders (n=13). The off-label group included significantly more male patients (p=0.008), smokers (p=0.004), diabetics (p=0.026) and patients with previous vascular surgery at the access site (p<0.001). Devices were successfully applied in 466 patients; all technical failures occurred in the "on-label" group. There were 3.6% minor complications and 1.3% major complications, with significantly higher complication rate in the "off-label" group (p=0.012). Outcome was not different when comparing antegrade and retrograde puncture techniques (p=0.527).

Conclusions: The Angio-Seal vascular closure device can be used with high technical success in "off-label" indications. Although complication rates are higher in case of "off-label" use, they are well within the ranges reported in the literature. The requirement of quality improvement guidelines of the Society of Interventional Radiology are met.

P-3 (301.3)

Leaking portal vein

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Clinical History/Pre-treatment imaging: We report an interesting case of a 77-year old patient with benign papillary stenosis who was admitted to our hospital with a misplaced nasobiliary tube penetrating the common hepatic duct into the extrahepatic portal vein. Due to the small caliber of the nasobiliary tube it was initially decided to remove the tube and to endoscopically implant a biliary stentgraft into the common hepatic duct to prevent bile leakage and to bypass the papillary biliary stenosis. Unfortunately, during the ERCP the wire followed the same route and the biliary stentgraft was therefore accidentally put in the same location (from the common hepatic duct into the portal vein) resulting in a significant portobiliary fistula (Fig. 1).

Treatment Options/Results: Because the stent was fully expanded, the defects in the walls of the common hepatic duct and the extrahepatic portal vein measured around 1cm each. Therefore, to prevent major bleeding the implantation of a stentgraft was decided. In a combined approach the biliary stent was extracted endoscopically in the angio suite and subsequently a covered 16mm stentgraft (BeGraft, Bentley, Hechingen, Germany) was placed through a transhepatic approach in the main trunk of the portal vein for sealing (Fig. 2a und b). Consecutively, the transhepatic approach was embolized with several Amplatzer plugs (Abbott, MI, USA) and a percutaneous biliary drainage was placed to bypass the papillary stenosis.

Discussion: Endovascular stent grafting should be the first-line therapy to treat large portobiliary fistulas.

Take-home Points: A choice of suitably sized grafts should be on stock in tertiary referral centers for such cases.

P-4 (301.4)

Perivascular hyaluronan – new cure for venous insufficiency

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Purpose: Injectable hyaluronan gels offer three options to treat venous insufficiency: 1) Percutaneous valvuloplasty (PVP), aiming at the restoration of local valve function; 2) focal venoplasty (FVP), aiming at diameter reduction to reduce reflux, and 3) segmental venoplasty (SVP) to reduce diameters as an adjunct to endoluminal procedures.

Material and methods: PVP was studied in 22 patients (14 f, 8 m, 32 – 54 y., GSM valves, diameter 7.0 – 12.0 mm), using a prototype hyaluronan (XL type, Vivacy). FVP was evaluated in 16 patients (11 f, 5 m, 46 – 69 y.) for reflux reduction in GSV or sidebranch insufficiency (L-type, Vivacy). SVP was investigated in 20 cases (13 f, 7 m, 41 – 72 yrs.) with GSV or SSV insufficiency, adjunctive to Biomatrix sclerofoam (Venartis), using another hyaluronan (S-Type, short durability, Vivacy). For this collective, target segments were split and randomized to hyaluronan vs. NaCl 0,09%.

Results: PVP established orthograde flow in 22/22 cases. With FVP, 13/16 cases were successful (81.3%) in obtaining alternate (n = 10) or orthograde flow (n = 4), correlating well with clinical improvement. With SVP, technical success (> 50% lumen reduction) was obtained in all cases (20/20). In all hyaluronan compressed segments, there were no postinterventional complaints, compared to 18/20 cases (90%) after standard procedures. All hyaluronan applications were without adverse reactions.

Conclusions: PVP is effective and safe to restore valve function. Also FVP for haemodynamic purposes showed feasibility, effectivity and safety, while clear indications need further studies. SVP adjunctive to endovenous ablation significantly improves post-treatment comfort.

P-5 (301.5)

Prevalence of May-Thurner syndrome in patients with iliofemoral deep venous thrombosis at a large medical referral center

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Purpose: We set out to investigate the prevalence of May-Thurner syndrome (MTS) in a cohort of patients diagnosed with iliofemoral deep venous thrombosis at a large medical referral center.

Material and methods: We retrospectively analyzed a cohort of 496 patients who were referred to the emergency unit of a large medical referral center with suspected VTE and were diagnosed with deep venous thrombosis of the iliac veins and/or the thigh on ultrasound. We retrospectively assessed the presence of MTS in the primary ultrasound examination and on additional imaging (available in n=193 patients).

Results: Across all 496 patients with iliofemoral deep vein thrombosis, median age was 70 years. 238 patients (48%) were female. The thrombosis was left-sided in 263 cases (53%), right-sided in 208 cases (42%) and bilateral in 24 cases (5%). In the subgroup of patients with left-sided and bilateral thrombosis, the growth pattern was classified as ascending in 142 patients (50%), descending in 104 patients (36%) and unclear in 41 patients (14%). Additional imaging tests were available in 193 patients: 119 patients (41%) underwent CT, 18 patients (6%) MRI and 30 patients (10%) a phlebography. Within the subgroup of patients with left-sided and bilateral thrombosis MTS was confirmed in 88 patients (31%), imaging findings in 17 patients (6%) were highly suspicious of MTS. In 86 patients (30%) a differentiation was not possible and in 96 patients (33%) MTS was excluded.

Conclusions: Underlying MTS is not uncommon in the selected cohort of patients with DVT at a large referral center and should be excluded by imaging.

P-6 (301.6)

Predictive performance of the mHAP-II score in a western real-life cohort with hepatocellular carcinoma (HCC) following trans-arterial chemoembolization with drug eluting beads (DEB-TACE)

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Purpose: The HAP score is a widely used rating system to evaluate the survival outcome of HCC patients undergoing TACE. Park et al. were able to show a greater prognostic performance of an updated version, the so-called mHAP-II score which contains the number of lesions as a new parameter, in addition to tumor size, alpha-fetoprotein, total bilirubin and serum albumin. However, the initial study was primarily based on a Korean sample and standard cTACE. We evaluated the predictive performance of the mHAP-II score in a western real-life HCC-cohort treated with DEB-TACE.

Material and methods: Until present, 100 HCC-patients undergoing one or more DEB-TACE sessions using 100-300 µm DC Beads® (BTG PLC, London, UK) have been retrospectively analyzed. Mint Lesion® (Mint Medical GmbH, Heidelberg, Gemany) was used to acquire tumor size and number of lesions. Reevaluation of the mHAP-II score was based on Kaplan-Meier method, log-rank tests and Cox-regression models.

Results: The sample had a mean age of 73,8 years and was predominatly male (86%). HCC-etiology was mainly ethanol (40%) and hepatitis C (34%). Average laboratory parameters were: Alpha-fetoprotein: 372,04 µq/l, total bilirubin: 1,66 mg/dl and serum albumin: 3,73 g/dl. Median survival was 26,4 months. BCLC-A (24%), BCLC-B (76%). mHAP-II B (37%), C (47%) and D (13%) all differed significantly from each other with average survival rates of 32,2 months, 24,1 months and 11,6 months respectively. Only alpha-fetoprotein and tumor number contributed significantly in Cox proportional-hazards regression.

Conclusions: mHAP-II score is suited to predict survival outcomes of western HCC-patients in BCLC-stage B undergoing DEB-TACE.

P-7 (301.7)

Selective internal radiation therapy after trans-arterial chemoembolization for patients with hepatocellular carcinoma

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Purpose: To evaluate the efficacy of selective internal radiation therapy (SIRT) in patients with prior trans-arterial chemoembolization (TACE) for non-resectable hepatocellular carcinoma. SIRT is often performed in patients non-eligible to TACE, e.g. due to extensive tumour size or portal-vein thrombosis, or if progression after TACE occurs.

Material and methods: All patients who received SIRT for non-resectable HCC at the Medical University of Vienna from January 2012 to December 2016 were included in this retrospective study. Patients were divided into two groups, regarding their treatments prior to SIRT (group 1: patients with TACE prior to SIRT, group 2: without).

Results: A total of 42 patients were included, with 14 patients in group one and 28 patients in group two. Both groups had similar rates of other therapies prior to SIRT (target-therapy: 4 (28.6%) vs. 9 (32.1%), p=0.813 and surgery: 5 (35.7%) vs. 7 (25.0%), p=0.469). There was no significant difference in the radiation dose distribution (median, group 1: 1.60 GBq, group 2: 1.50 GBq, p=0.661). Median time to progression (TTP) was 4 months [±1.06 SD] for group 1 and 7 months [±2.53 SD] (p=0.12) for group 2. The Kaplan-Meier curve revealed a median overall survival (OS) of 21 months [±2.99 SD] for patients in group 1 and 26 months [±2.30 SD] for patients in group 2 (p=0.94).

Conclusions: Our study shows no significant difference in the TTP and the OS in patients with prior TACE compared to patients without prior TACE.

P-8 (301.8)

Interventional embolization of chylous leaks following esophagectomy

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Clinical History/Pre-treatment imaging: Four patients with chylous leaks following esophagectomy (postoperative day 1 to 16) are presented. In all patients the chylous leak was classified as high-output fistula.

Treatment Options/Results: Ultrasound guided lymphangiography with embolization of the thoracic duct and/or disruption technique of the cisterna chyli were performed to occlude the leakage site. In all four patients, ultrasound guided lymphangiography of the groin with injection of Lipiodol was able to detect and visualize the leakage site in the lower mediastinum. In three patients, the leak could successfully be occluded by Lipiodol embolization, in one patient embolization failed and the disruption technique was successfully performed. No procedure related complications were observed.

Discussion: Iatrogenic injury of the thoracic duct during cardiothoracic surgery is by far the predominant etiology of chylothorax. Chylous leaks after transthoracic esophagectomy are rare events but this postoperative complication is a life-threatening condition in particular for high-output fistula of more than 1000 ml/day and its reported 30-day mortality exceeds 17%.The medical management of high-output leaks is difficult because of the severe fluid loss so that surgical occlusion of the leaking thoracic duct is necessary. However, due to anatomical variations or the concomitant mediastinitis with inflammatory tissue the leakage site cannot always be detected intraoperatively. In this setting, radiologic intervention seems to be a favorable option completing the present treatment strategy.

Take-home Points: In case of a postoperative chylothorax, radiologic intervention is feasible and safe. The procedure is indicated for high-output chylous fistulas after esophagectomy and should be applied early after diagnosis of this postoperative complication.

P-9 (301.9)

Magnetic resonance-guided focused ultrasound treatment (MRgFUS) of a desmoid tumor in the abdominal wall in analgosedation

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Clinical History/Pre-treatment imaging: 30-year-old patient with Gardner-syndrome, initial diagnosed 2005, with desmoidal soft tissue tumors in both groins and in the right abdominal wall with infiltration of the subcutis, the M. rectus abdominis (incl. the left M. rectus abdominis) and long-stretched walling of the right lower costal arch. The desmoid in the abdominal wall was symptomatic with pain and recurrent after a previous resection.

Treatment Options/Results: Another resection was rejected due to short term recurrence. Systemic therapy (Tamoxifen) showed no effect. Radiotherapy was also rejected due to adjacent risk structures (e.g. stomach) and side effects. Thus therapy decision to multistaged MRgFUS as compassionate use was made. The first session made 24% NPV (Non-perfused-Volume) and was well-tolerated by the patient, even though it was done under analgosedation and not under general anesthesia. Already one week after therapy subjective reduction of symptoms was observed.

Discussion: Desmoid tumours are locally infiltrative and may cause pain and dysfunction. Standard therapies, including surgical resection, radiation and systemic therapy, suffer from excessive side effects when considering their limited efficacy for treating desmoid tumors. This case demonstrates that MRgFUS treatment of desmoids is feasible and that this technique may be used to control the growth of symptomatic desmoid tumours, even of the abdomen and under analgosedation. Most of the published treatments have been performed under general anaesthesia.

Take-home Points: MRgFUS can provide safely and effectively durable control of tumour growth and is an alternative to operative resection, radiation therapy, systemic therapy. Although MRgFUS was only performed in analgosedation, it was well tolerated by the patient.

P-10 (301.10)

Mechanical thrombectomy of M2 occlusions with distal access catheters using ADAPT

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Purpose: The direct aspiration first pass technique (ADAPT) using distal access catheters (DAC) has proven to be an effective and safe endovascular treatment strategy of acute ischemic stroke with large vessel occlusions. However, data about direct aspiration using DAC in M2 segment occlusions is limited. We assess the safety and efficacy of DACs in acute M2 occlusions using ADAPT with large bore (5Fr/6Fr) aspiration catheters as the primary method for endovascular recanalization.

Material and methods: In 2017, 24 patients with an acute ischemic stroke due to M2 occlusions underwent mechanical thrombectomy using ADAPT with DACs (SOFIA 5 French/Catalyst 6) as a frontline therapy. Of these 24 patients, 15 had an isolated M2 occlusion. Inclusion criteria were NIHSS score > 5 and mRS score 3-5 at admission.

Results: Median NIHSS score was 14 at admission. Successful revascularization to mTICI 2b-3 with ADAPT alone was achieved in 20 of 24 patients (83.3 %) with mTICI 3 achieved in 15 of 24 (62.5 %) patients. Additional stent retrievers were used in 3 patients and led to an overall successful revascularisation of the M2 thrombectomies of 87.5 % (21/24). Median NIHSS at discharge was 4 and 13 of 24 (54.2 %) patients had a mRS score 0-2 at three months. Symptomatic intracranial hemorrhage did not occur.

Conclusions: The results of our retrospective study suggest that DACs can safely and effectively be used for mechanical thrombectomy of acute M2 occlusions using ADAPT as a frontline therapy. High successful revascularization rates (87.5 %) and good clinical outcome without symptomatic complications can be achieved.

P-11

Painful thoracic wall metastasis from renal cell carcinoma – IR as a very effective complementary treatment tool

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Clinical History/Pre-treatment imaging: 61 year old male Patient with history of Nephrektomy of the left kidney 2001 due to low differentiated chromophobe renal cell carcinoma (RCC) pT3a N0 Mx - G3. Recurring pulmonary metastasis on the left lung undergoing surgical metastasektomy 2006 and Radiofrequency Ablation 2008 and 2012. Finally left sided Pneumonectomy was performed 2014 due to recurring pulm. metastasis. The Patient is in a very good physical and mental state. Starting from 03/2017 he suffers progredient pain caused by newly detected osteoinvasive hypervascularized metastasis of the left caudal and laterocranial thoracic wall occured under palliative Immunotherapy with monoklonal IgG2 Antibody.

Treatment Options/Results: Transfemoral occlusion of the dorsal 9th left intercostal artery in a first interventional procedure using Histoacryl / Lipiodol was done 01/2018. Six weeks later the second embolization of the large tumor burden in the left upper thoracic wall extended to the left axillary space was performed. The target vessels where left lateral thoracic artery, thoracoacromial artery and subscapular artery using Histoacryl / Lipiodol. Additional back door occlusion of left internal mammarian artery and intercostal branches using coils (Azur CX, Terumo, VortX, Boston Scientific) was performed. Follow-up CT scan 06/2018 showed shrinking of all the embolized tumors with hypovascularized and necrotic residual tumor.

Discussion: This case should show the effectiveness of non-hepatic embolization of symptomatic (painful) metastasis as a complimentary treatment option beside palliative Immunotherapy.

Take-home Points: Although it is always an individual clinical decission transarterial embolization especially of painfull metastasis can be a very effective and minimal invasive therapeutic option in palliative setting.

P-12

Radiation dose in coronary angiography and intervention: towards the establishment of dose reference levels in hospitals of the south-west of Colombia

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Purpose: To present the initial results of a retrospective analysis carried out at a large academic medical centre in South America and to propose initial values for patient Reference Levels (DRL's) for fluoroscopically guided procedures in the region.

Material and methods: This analysis of data from radiation doses was conducted under a protocol approved by our Institutional Review Board (IRB). Data were collected for diagnostic coronary angiography (CA) and single-vessel percutaneous intervention (PCI) procedures. Dose area product (DAP), skin surface entrance dose (SED), fluoroscopy time (FT), and patient height and weight were collected for 3 months. The DRL was established from the 75th percentile of the DAP.

Results: 590 patients were included in the CA group where the median FT was 3.5 min (inter-quartile range = 2.3–6.1). Median SED = 581 mGy (374–876). Median DAP = 2,308 uGym2 (1,489–2,965) DRL = 2,965 uGym2. 947 patients were included in the PCI group where median FT was 11.2 min (7.7–17.4). Median SED = 1,501 mGy (928–2,224). Median DAP = 2,736 uGym2 (1,449–3,900) DRL = 3,900 uGym2.

Conclusions: The proposed DRL's should be considered as a first approach to help the optimisation of these procedures. More studies are required to establish "tolerances" from these levels accounting for the complexity of the procedure and patient's size. This survey helped increase the awareness of the members of our hospital on a topic as essential as patient dose values on radiation protection. A regional registry of radiation-dose data for interventional procedures is a necessary next step to refine these reference levels.

P-13

Challenging recanalization of a chronic occlusion of the IVC and iliac veins

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Clinical History/Pre-treatment imaging: A 24 year old male patient, who was hospitalized in 2014 for treatment of acute pyelonephritis, developed acute deep vein thrombosis of the iliac veins (IVs) bilaterally and consecutively the inferior vena cava (IVC). Subsequently he developed a postthrombotic syndrome with varicosis of both thighs and a Caput Medusae at the abdominal wall. He was suffering from swollen legs and mild claudication. Direct transfemoral phlebography and MRI revealed complete occlusion of the infrahepatic segment of the IVC, the main renal veins and both IVs.

Treatment Options/Results: Since treatment with oral anticoagulants alone proved unsuccessful, an attempt of recanalization of the IVC and both IVs was planned. Via US-guided bi-transfemoral and right transjugular approaches gentle recanalization with hydrophilic guide-wires under assistance of goose-neck-snares was performed. After predilatation self-expanding nitinol-stents (Vici Venous Stent; Boston Scientific, Marlborough, MA) with diameters of 16 mm (IVC) and 12 mm (iliac veins) were implanted. Phlebography showed regular in- and outflow of the stents, a tight stenosis in the left common IV remained. Ultrasonography 3 weeks after showed patent and perfused stents. Clinical symptoms improved, varices are considerably reduced.

Discussion: Recanalization of chronic occlusion of the IVC and IVs is a technically challenging procedure. Patients with worsening clinical symptoms can improve significantly. Staged procedures could be considered, the intervention should be offered only by experienced centers.

Take-home Points: Endovascular treatment of long-lasting chronic venous occlusions is technically feasible but demanding. Experience with different devices is necessary.

P-14

Combined transplenic and transhepatic access to treat a high grade stenosis of portal vein

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Clinical History/Pre-treatment imaging: 45 yo male patient; Whipple surgery 2013 after adenocarcinoma of gastroduodenal junction now presenting with upper GI bleeding and hemorrhagic shock CT scan showed variceal bleeding in the area of the choledocho-jejunostomy with hemorrhage in the biliary limb, no arterial bleeding

Treatment Options/Results: A simultaneous ultrasound guided transsplenic and transhepatic access with a rendezvous maneuver in the portal vein to pull through a wire from splen to liver was performed. Because of this, there was enough tension on the wire to straighten the kinked stenosis and to push and place a balloon expandable stent over the stenosis. Initial pressure gradient dropped from 11 to 1 mmHg after stent release. At the end embolisation of liver and splen with sponge during retreat sheeths. No more bleeding occured, patient could leave ic unit the next day.

Discussion: The difficulty in this case was to recognize that the reason for upper GI bleeding was a high grade kniked stenosis of portal vein underrated in CT. Retrospectively varices has developed slowly after whipple surgery 5 years ago and start upper gi bleeding. Double angulation of c-arm was necessary to detect the stenosis. To treat this stenosis a one way access was not enough to get enough push, therefore double acces through splenic vein and portal vein was performed. Over a tensioned wire a balloon or a stent can easily be placed.

Take-home Points: Ultrasounf guided puncture of liver and and splen is safe and efficacy to get a stable access to portal vein system to treat stenosis or occlusion.

P-15

Advanced application of direct thrombin injection for the treatment of haemorrhage (ultrasound-guided percutaneous periarterial thrombin injection for paracentesis-related haemoperitoneum

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Clinical History/Pre-treatment imaging: A 50-year-old male with a complex medical history presented to the Emergency Department with a few day history of worsening gait, weakness, and somnolence. He had a paracentesis without image guidance using a 5 French Huey centesis needle. Two liters of bloody fluid was drained. Overnight, the patient became hypotensive and his hemoglobin dropped to 5.6 gm/dL. CT demonstrated intraperitoneal active extravasation at the site of prior paracentesis.

Treatment Options/Results: The patient was taken to the IR suite where angiography demonstrated irregularity associated with the right 11th and 12th intercostal arteries, near the site of prior paracentesis. A gelatin foam slurry was used to perform a successful embolization. A repeat CT demonstrated persistent arterial extravasation. Ultrasound evaluation demonstrated a persistent arterial bleed. Under ultrasound guidance, thrombin was injected adjacent to the origin of the vascular jet. Afterwards, the vascular jet was no longer visualized.

Discussion: Paracentesis is normally a low-risk procedure, however, a blind-entry approach increases the risk of perforation. Conventional interventions were imprudent due to elevated operative risks and a low likelihood of success. Creating a thrombin wheal around the vessel stopped the hemorrhage under real-time ultrasound visualization.

Take-home Points: The reported case shows the efficacy of ultrasound-guided percutaneous thrombin injection in the setting of arterial hemorrhage following

paracentesis when performed by a well-trained interventional radiologist. While transcatheter embolization and surgery remain the first-line therapies due to their proven efficacy and safety, ultrasound-guided thrombin injection could be considered as an alternative, particularly when traditional therapies fail or are prohibited by comorbidities.

P-16

Safety of successive transradial access for oncologic interventions

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Purpose: To evaluate the safety and feasibility of repeat radial access for transarterial tumor therapy (TACE, Radioembolization).

Material and methods: The data of all patients who underwent transradial oncologic interventions between 06/2016 and 07/2018 was retrospectively reviewed. For the final analysis, all patients who had more than one transradial intervention from the same access site and who had at least one follow-up with duplex ultrasound following the last intervention were selected. The procedure reports, ultrasound reports as well as the clinical data was reviewed for cannulation failure, cross-over to femoral access, radial artery occlusions (RAO) and other complications.

Results: A total of 84 patients underwent 189 transradial procedures. Of 47 patients with ?2 transradial interventions 42 had a complete follow-up. The mean number of interventions per patient was 3 (min. 2, max. 9). Cannulation of the radial artery was successful in 100% of the procedures. Two of 42 patients (4.8%) developed an asymptomatic, incomplete RAO following the last intervention. Both patients received anticoagulation resulting in complete resolution of the occlusion in one patient. There was one cross-over to femoral access. No major access-related complications occured.

Conclusions: Successive transradial access for oncologic interventions is feasible and seems reasonably safe. The rate of asymptomatic RAO is in the same range as reported for non-successive transradial interventions. Transradial access should be considered as a reasonable alternative to femoral access for oncologic interventions.

P-17

Onyx embolization of a huge high flow AVM hand

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Clinical History/Pre-treatment imaging: 51-year-old female patient with a large high flow arteriovenous malformation of the left hand, on the thumb side with persistent pain and marked movement restriction of the thumb. The AVM exists since the age of 3 years. From preschool age up to 20 years of age, some therapeutic trials such as surgical resection or radiation were performed without significant clinical improvement. An angiographic presentation of AVM was performed at the age of 20 and a therapeutic option was not possible. The patient turns to us with an urgent desire for therapy because of heavy chronic pain of the hand. One recognizes a hump-like relatively large tumor of the handball on the thumb side. thumb ist atroph and retracted.

Treatment Options/Results: We performed a 3D Angio-MRI and 3 months later a conventional subtractionangiography of the hand. Both studies show a high flow AVM. The arterial inflow takes place via a mesh of feeder of the radial artery. Very extensive venous drainage from multiple drainage veins. We opted for percutaneous onxy embolization. In two sessions we were able to embolize the AVM completely. The total amount was 42 ml of Onyx 18. Six weeks later, the onyxembolate was removed by hand surgery.

Discussion: Percutaneous onyx embolization is a very suitable radical therapy of high flow AVM. Therapy decision and method is to be made individually.

Take-home Points: Interventional radiology contributes significantly to the treatment of AVM. Surgery or radiotherapy are mostly ineffective in treating such vascular anomalies. Therapy decision and method is to be made individually.

P-18

Infected versus sterile abdominal fluid collections in postoperative CT – a new scoring system based on clinical and imaging findings

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Purpose: To implement and validate a scoring system for discrimination between infected and sterile postoperative abdominal fluid collections in contrast enhanced computer tomography (CT).

Material and methods: Between May - November 2015, patients with postoperative portal-venous abdominal CT within 24 hours before CT-guided aspiration of abdominal fluid collections were included. The following parameters were included and analyzed by two radiologists: Fluid collections for Hounsfield units (HU), entrapped gas and wall enhancement. Under consideration of results of the microbiology a scoring system was developed containing

information of morphology of the fluid collection and C-reactive protein (CRP) obtained 24h before intervention. The scoring system was validated by a second sample of patients included between January 2013 – April 2015 and December 2015 – September 2016.

Results: Fifty patients were included to develop the scoring system. Each of the four parameters was associated with the presence of infected fluid collections. A scoring system based on scores from 0 to 11 (CRP </? 50 mg/l: 0/4 points; HU </? 20: 0/2 points; wall enhancement no/yes: 0/2 points; entrapped gas no/yes: 0/3 points). A cut-off of 5 points showed a 82% positive predictive value (PPV) for the presence of infected fluid and a 79% negative predictive value (NPV). In a second step, validation of our scoring system using 425 patients revealed an excellent PPV of 90% and a NPV of 86%.

Conclusions: The developed scoring system provides excellent discrimination between infected and sterile postoperative abdominal fluid collections in contrast enhanced CT and is easy to use in clinical practice.

P-19

Transarterial chemoembolization of hepatocellular carcinoma (HCC) using radiopaque drug eluting embolics (DEE): how to pursue peri-procedural cross-sectional imaging?

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Purpose: To compare different imaging techniques (CT based volume perfusion (VPCT), Cone Beam CT (CBCT) and dynamic GD-EOB-DTPA enhancedDCE-MRI with golden-angle-radial sparse-parallel (GRASP) MR imaging) in the evaluation of transarterial chemoembolization (TACE) of hepatocellular carcinoma (HCC) using radiopaque drug eluting embolics (DEE).

Material and methods: An MR and CT phantom investigation of radiopaque DEE was performed. In the clinical portion of the study, 13 patients were prospectively enrolled (22 HCCs). All patients received cross-sectional imaging pre- and post-TACE using 100-300µm radiopaque DEE. Qualitative assessment of images using a Likert-scale was performed.

Results: In the phantom study, CT related beam hardening artifacts were markedly visible at a concentration of 12% (v/v) radiopaque DEEwhereas MR analysis demonstrated no significant detectable signal intensity changes. Pre-TACE imaging was found to have no significant difference regarding tumor depiction. Visualization of tumor feeding arteries was significantly improved with VPCT ($p<0.001$) and CBCT ($p=0.002$) compared to MRI. Radiopaque DEE led to a significant decrease in tumor depiction ($p=0.001$) and a significant increase of beam hardening artifacts ($p=0.012$) pre- versus post-TACE using VPCT. A larger number of residual arterial tumor enhancement was detected with MRI (10 HCCs) compared to VPCT (8) and CBCT (6).

Conclusions: Using radiopaque DEE, all imaging modalities provided comparable early treatment assessment. However, in HCCs with dense accumulation of radiopaque DEE treatment assessment using VPCT or CBCT might be impaired due to beam hardening artifacts and contrast medium stasis.Therefore, DCE-MRI might add value in the detection of residual arterial tumor enhancement.

P-20

Norepinephrene provocation during angiographic treatment of patients with lower gastrointestinal bleeding

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Purpose: Bleeding provocations in gastrointestinal bleeding are rare. This is usually done by intervening in the coagulation system with potential risks and side effects. Here we describe for the first time a novel approach to provocation of a bleeding using intravenous arterenol injections, if initially during endoscopic examination or angiogram the source of bleeding could not be detected.

Material and methods: between October 2016 and November 2017 we treated 5 patients (3 male and 2 female, aged between 67 and 94 yaers) with gastrointestinal bleeding. All patients were in hemorrhagic shock with blood pressure values ??between 70/40 and 90/60 mm Hg. Primary angiograms and selective angiograms were negative. We started a provocation of the bleeding by intravenous fractional injection of norepinephrine using invasive blood pressure monitoring.

Results: After intravenous norepinephrine injection and controlled blood pressure elevation to values ??between 155 / 85mmHg and 170 / 90mmHg, extravasation could be detected in 4 patients. In all cases, the target vessels could be super-selectively embolized with microcoils. Recurrent bleeding or late complications did not occur. cumulative dose of arterenol averaged 40 micrograms.

Conclusions: This procedure has the potential to identify a source of gastrointestinal bleeding for successful embolization. The procedure is quickly available and showed no relevant complications in our patients. Therefore, this novel approach could be a viable and useful option for successful hemostasis in selected patients with lower gastrointestinal bleeding and hemorrhagic shock.

P-21

Occupational orthopedic health problems in interventional radiology: an online survey

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Purpose: Several studies report occupational orthopedic problems among interventional cardiologists. To assess the link between orthopedic health problems and the use of personal radiation protection devices in interventional radiology, an online survey was done.

Material and methods: 1427 invitations to an anonymous online survey that comprised 17 questions were sent via e-mail to interventional radiologists in Germany, Austria and Switzerland. The questions are focused on the use of personal radiation protection devices and work-related orthopedic health problems.

Results: There were 155 survey responders (10.9% response rate). All responders use personal radiation protection devices. 89.5% of these confirm that the personal radiation protection garments fit well. 55.8% of the responders declare that their garments were customized to their individual physique. 52.3% suffered more than five episodes of orthopedic problems during their interventional career. In 81.2% of these cases the lumbar spine was involved. Because of orthopedic problems, 17.7% of the responders had to reduce and 2.7% had to stop their interventional practice. 10.9% of all responders use individually tailored light personal radiation protection devices. Out of this group, no one had to reduce or to stop their interventional practice because of orthopedic problems.

Conclusions: This survey indicates a link between the type and use of radiation protection devices and occupational orthopedic health problems.

P-22

Partial spleen embolization using ethylene vinyl alcohol copolymer (Onyx®) in patients with portosplenomesenteric thromboses and portal hypertension

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Purpose: The purpose of this study was to evaluate success and complication rates after partial spleen embolization (PSE) using Ethylene-Vinyl-Alcohol-Copolymer (EVOH) in patients with portal hypertension. EVOH is a permanent liquid embolic agent that results in a distal occlusion of small sub segmental splenic arteries. In consequence, revascularization of the spleen using collateral pathways - like the gastroepiploic arteries - is prevented.

Material and methods: Retrospective review was conducted of patients with portal hypertension who underwent PSE from May 2012 to February 2017. Medical records, laboratory examinations, endoscopy, imaging and procedure details were reviewed.

Results: 11 patients with portal hypertension underwent PSE using Onyx. Causes of portal hypertension included thrombosis of the portal/mesenteric/splenic vein system in 9 and liver cirrhosis with severe thrombocytopenia in 2 patients. All patients developed multiple extensive varices and splenomegaly. One patient presented with TIPS, the others were not eligible for TIPS placement. Mean embolization rate of the spleen was 62.5%. All patients developed a mild post-embolization syndrome. Leucocytes and hemoglobin increased significantly 6 months after PSE. Thrombocyte counts increased significantly in patients with hypersplenism / severe thrombocytopenia. During follow-up varices decreased significantly and no variceal bleeding occurred. 2 patients developed splenic abscesses. Since percutaneous drainage and antibiotics were not successful splenectomy was performed.

Conclusions: PSE with EVOH is an effective method to prevent variceal bleeding and increases hemoglobin, leucocyte and thrombocyte counts in patients with portal hypertension not eligible for TIPS placement.

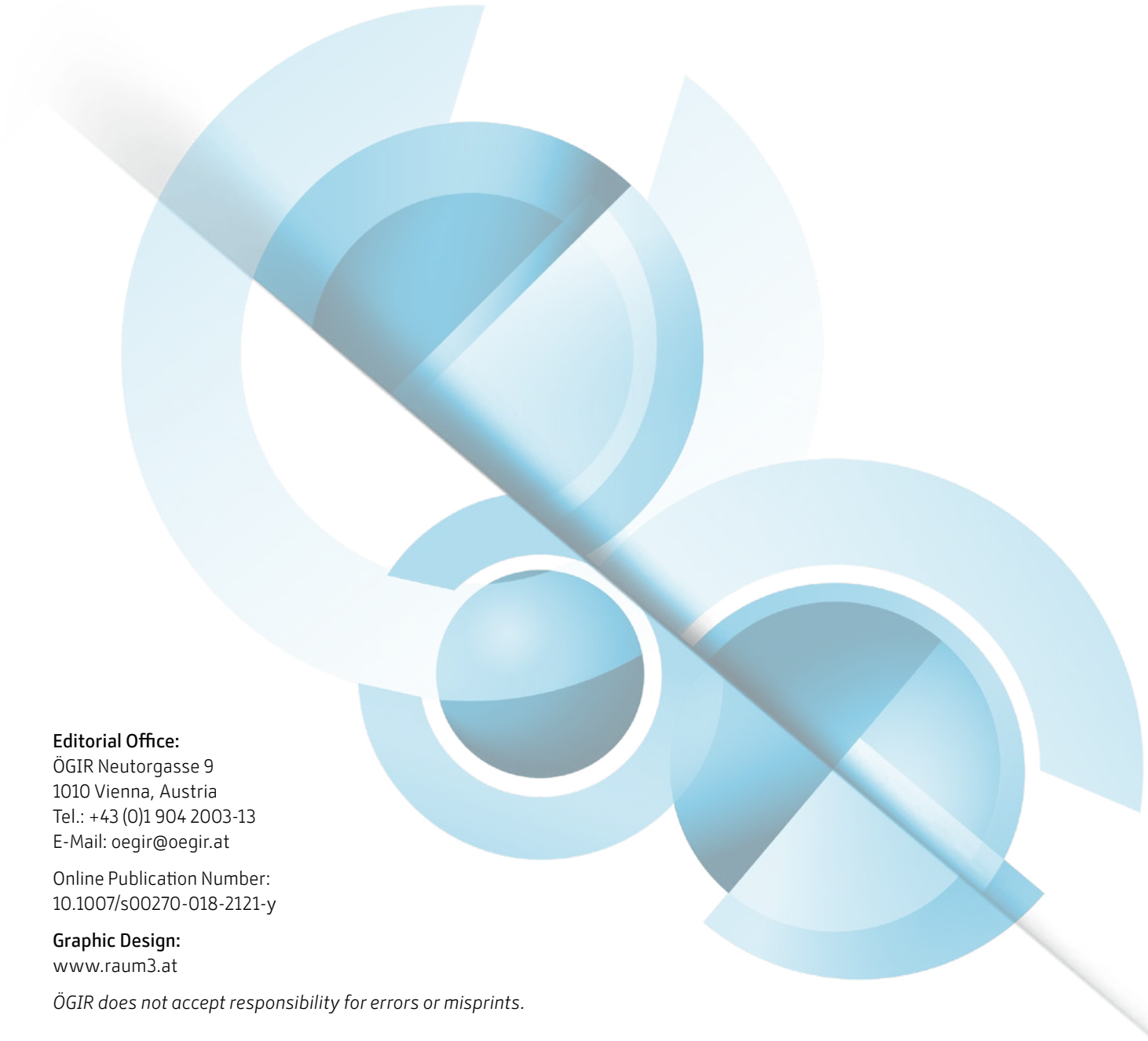
AUTHOR INDEX

All accepted scientific abstracts and case reports will be presented as electronic posters on the **Poster-Terminals** throughout the congress.

In addition, selected posters will be presented orally in the **Poster Top Ten** session:

THURSDAY, JANUARY 10

PS 301 / Poster Top Ten 12:40-13:40



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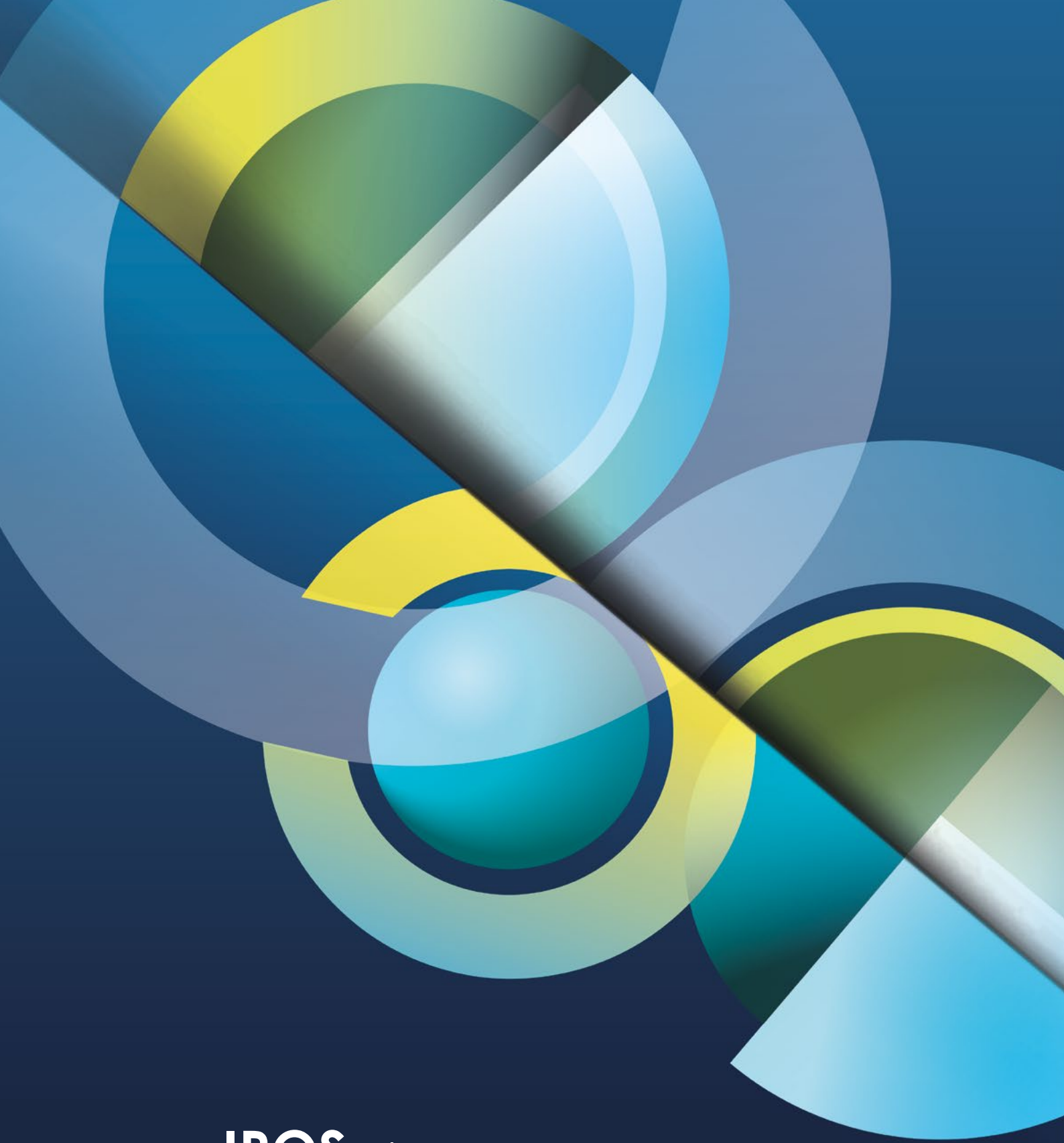

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