Article published online: 2021-04-26

obtained to provide a target for fluoroscopic access into a retroclavicular collateral from above, facilitating large sheath insertion and endobronchial forceps retrieval of the filter, which required surprisingly little force. Following retrieval, contained extravasation was observed at the previous site of the filter struts. Despite balloon-tamponade and an attempt at flow diversion using a bare-metal stent, the pseudoaneurysm continued to fill. A catheter was advanced through the stent interstices into the pseudoaneurysm, which was treated with balloon-controlled thrombin administration. After 5 min, repeat Intra vascular Ultrasound (IVUS) showed pseudoaneurysm thrombosis. The final venogram revealed no further contrast extravasation and a patent IVC. The patient was discharged on postoperative day 2. At the 5-month postoperative follow-up visit, the patient reported resolution of previous abdominal pain and CT scan re-demonstrated patent IVC. **Conclusion:** Extended dwell times and penetrating IVC filters increase the risk of retrieval complications. While conservative treatment options should be considered first, physicians performing high-risk retrievals should understand and be prepared for rare complications.

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Fibrin Sheath Removal from Port-A-Cath by Exteriorization of the Catheter by Snaring Through a Shortened Vascular Sheath: A Novel Technique

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Objectives: Port-a-caths are commonly placed central venous access devices in children. Fibrin sheath formation is a common complication, leading to port malfunction. Unlike other tunneled central line, port-a-caths cannot easily be exchanged over a wire. Treatment of fibrin sheath formation includes fibrinolytic therapy, fibrin sheath stripping via transfemoral route or replacement. We describe an alternative minimally invasive technique of fibrin sheath removal. **Methods:** This novel technique was performed on four patients with port-a-cath who had failed fibrinolytic therapy and presence of fibrin sheath confirmed on contrast injection. The port was accessed under aseptic precautions. Ultrasound-guided right internal jugular vein access was performed just cranial to previous catheter insertion site, and shortened vascular sheath, which was one and half times larger French size relative to the size of the port catheter, was inserted. Catheter tip was successfully snared under fluoroscopic guidance using a 30 mm Goose Neck snare. Catheter was then exteriorized through the sheath. Catheter was then cleaned with a wet Telfa gauze to clear any fibrin sheath. A 0.018" Nitrex wire was also passed through the catheter to clear intracatheter clot or debris. Catheter was reinserted back through the vascular sheath into right atrium with the help of snare. **Results:** Port-a-cath function was restored in all four patients with satisfactory flushing and aspiration. Contrast venogram was performed to confirm function and no residual fibrin sheath was demonstrated. No complications were encountered. **Conclusion:** Fibrin sheath removal by exteriorization of port catheter by snaring through shortened vascular sheath is an attractive alternative which is minimally invasive and highly effective, compared to traditional stripping or replacement with new port.

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Transarterial Embolization of the Renal Arteries for the Management of Iatrogenic Renal Vascular Injuries: Two Centers Experience in 150+ Patients

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Objectives: Nephrourologic percutaneous interventions namely percutaneous nephrolithotomy (PCNL), percutaneous nephrostomy (PCN), and renal biopsy are common minimally invasive procedures; however, they can be associated with massive life-threatening hemorrhage. Conventional surgical management in the form of partial and total nephrectomy is usually associated with marked comorbidity and massive renal parenchymal loss. This study aims to retrospectively assess the technique and short-term hemostasis of transarterial renal artery embolization in iatrogenic vascular injuries in two centers. **Methods:** A total of 154 patients (90 males and 64 females) with suspected renal vascular trauma (107 post-PCNL, 46 postrenal biopsy, and 1 post-PCN) either presenting with hematuria (120 patients) or increasing perinephric hematoma by ultrasonography (34 patients) were referred to both institutes for the possibility of embolization. Embolization was done with variable-sized vascular coils in 133 patients, hand-cut gel foam pledgets in 13 cases, and NBCA in three patients with marked hemodynamic instability. Five patients had negative angiographic findings, so embolization was not done. **Results:** The bleeding artery could be identified and embolized in 149 patients; in patients with negative angiography, no further intervention was done. A total of 146 patients showed clinical improvement in the form of stoppage of hematuria and stabilized vital data. Rebleeding occurred in three patients (all embolized by gel foam) who were treated by another session of embolization with combined gel foam and NBCA. None of the treated patients needed any further surgical treatment. No major complications occurred. **Conclusion:** In this large-volume series, transarterial renal artery embolization has shown to be an effective option in the management of iatrogenic renal vascular injuries with high hemostasis as well as low complication rates.

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Anaphylaxis Following Angioplasty of the Superficial Femoral Artery with Paclitaxel-Coated Balloon: A Case Report

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Background: Paclitaxel-coated Drug coated balloons have been shown to reduce restenosis rates. Severe hypersensitivity reactions to systemic infusions of paclitaxel are well described. Notwithstanding, hypersensitivity reactions to DCBs are extremely rare when used as angioplasty devices. **Methods:** A 79-year-old woman presented to our institution with rest pain (Rutherford IV) afflicting her right leg on a background of a progressive claudication over the previous 6 months. She was a current smoker with chronic airways disease in the context of 50-pack year history. In addition, her background included dyslipidemia, hypertension, and osteoporosis. There was no history of diabetes. She was receiving lipid-lowering (atorvastatin), antihypertensive (irbesartan, and hydrochlorothiazide), and dual-antiplatelet (aspirin and clopidogrel) medications. She had known allergies to nonsteroidal anti-inflammatory drugs (skin rash), penicillins (skin rash), and sulfonylureas (skin rash). Two months previously, she had undergone successful angioplasty of a stenosed left external iliac artery (EIA) and an occluded left superficial femoral artery with two paclitaxel-coated Ranger DCB (2.0 μg/mm^2; Boston Scientific, Marlborough, MA, USA). There were no procedural complications and she had no symptoms postoperatively. Preoperatively, she had palpable femoral pulses bilaterally with absent popliteal and pedal pulses on the right side and was Buerger's positive on the right with chronic trophic changes and prolonged capillary refill. Arterial duplex ultrasound imaging revealed a near-occlusion of the right SFA with a reduced ankle-brachial pressure index of 0.49. The patient underwent an SFA angioplasty procedure under local anesthetic and sedation. An "up and over approach" was taken with a retrograde puncture of the left common femoral artery (CFA) and placement of a 6F Britetip sheath into the right CFA (Cordis, Johnson and Johnson, Warren, NJ, USA). 7000 units of intravenous heparin was administered in total during the case (weight 70 kg). Digital subtraction angiography (DSA) confirmed a >20 cm SFA occlusion. The lesion was re-canalized for 10 cm before the wire passed into the subintimal plane. No re-entry was possible into the true lumen at the distal target from an antegrade approach. Subsequently, a retrograde puncture was made of the right dorsalis pedis artery with successful passage of a through and through "flossing' wire." The lesion was pre-dilated with a 3 mm × 200 mm conventional Armada balloon followed by a 5 mm × 150 mm conventional Armada balloon (Abbott Vascular, Abbott Park, IL, USA) taken down from above through the 6F sheath. Residual dissection of the mid-SFA was treated with a 5.5 mm × 180 mm Supera bare-metal stent (Abbott Vascular, Abbott Park, IL, USA). Given the residual disease beyond the stent and to improve patency of the site of treatment, a 5 mm × 150 mm Ranger DCB with paclitaxel coating (2.0 μg/mm^2; Boston Scientific, Marlborough, MA, USA) was deployed across the distal SFA and popliteal artery and inflated to nominal pressure in accordance with manufacturer recommendations. On inflation of the DCB, the patient became abruptly and hemodynamically unstable with hypotension (noninvasive blood pressure 60/30 mmHg) and tachycardic (heart rate 150 bpm) with warm peripheries and flushed skin changes. ST-elevation was noted on cardiac telemetry. The DCB was deflated and immediately removed from the patient. She was promptly intubated and ventilated and noted to have bronchospasm with reduced airway compliance. She was given a total of 70 mcg adrenaline together with crystalloid resuscitation. A urinary catheter and right radial arterial line were placed. The left groin sheath was removed with manual compression for closure. The patient was stabilized in theater with attainment of normal vital parameters and resolution of the cardiorespiratory and electrocardiographic abnormalities noted earlier. She was extubated and transferred to the coronary care unit for observation on telemetry and treated empirically with heparin infusion (APTT target 45–90) and regular dual anti-platelet therapy. Transthoracic echocardiography (TTE) and coronary angiography revealed no significant anomalies. Serial troponin (ng/L) results at t = 0, 4, 12, and 24 h postevent were 199, 67, 66, and 59, respectively. Serial tryptase (μg/L) results at t = 0, 4, 12, and 24 h postevent were 37.9, 25.6, 8.5, and 5.2, respectively. The patient made a good clinical recovery with a marked improvement in her symptoms over 24 h. Palpable pedal pulses were noted on bedside examination at the end of the case. Repeat arterial duplex imaging 48 h following the event revealed a patent SFA with ABPI 0.96. At this point, the patient was able to mobilize at her baseline and was discharged on her usual dual anti-platelet therapy. She was referred to a specialist allergy clinic for further investigation with her consent. Intradermal allergy testing at standard concentrations was performed at the clinic for substances used in the case, with positive and negative controls. This was done in accordance with ANZAAG published guidelines. Substances included propofol, fentanyl, chlorhexidine, povidone iodine, ultravist, visipaque, omnipaque, and paclitaxel. Testing with paclitaxel yielded a significantly positive result. All other agents tested negatively. **Results:** The majority of contemporary DCBs use paclitaxel to prevent restenosis of arterial lesions following angioplasty. The Transpax™ proprietary coating of the Ranger™ balloon provides a paclitaxel density of 2 μg/mm^2, a relatively low concentration compared with commercially available DCBs. The excipient is a citrate ester with both hydrophilic and hydrophobic properties and its purpose to support coating integrity and transfer of paclitaxel to the vessel wall during inflation. Anaphylaxis is an acute, potentially life-threatening hypersensitivity reaction resulting from the abrupt release of mast cell and basophil-derived mediators into the circulation. It is a clinical diagnosis supported by elevated levels of serum mast cell tryptase. The reported incidence of hypersensitivity following systemic infusions of paclitaxel is 1%–3%, even when administered with antihistamine and glucocorticoids as premedication. In addition, the concentrations of paclitaxel deployed in DCBs are at least several hundred-fold lower. This case presents the first known incident of anaphylaxis following inflation of a paclitaxel DCB in the peripheral circulation. Our patient exhibited an abrupt onset of cutaneous signs with respiratory compromise and hypotension, together with a significantly elevated serum tryptase and a confirmed diagnosis of paclitaxel allergy. There is insufficient evidence to mount a case for a primary coronary insult. Investigations including TTE and coronary angiogram showed no evidence of significant disease. Instead we believe rate-related ST elevation and elevated troponins occurred in the context of hypotension and tachycardia. Notably, the patient had undergone successful angioplasty of the contralateral EIA and SFA 2 months earlier using two separate Ranger™ DCBs, with no adverse event. The mechanisms responsible for anaphylaxis are complex; however, it is proposed the patient was immunologically sensitized to paclitaxel from this previous exposure. It is implausible to suggest either the DCB excipient or delivery system were involved in the event. The likelihood that two independent agents induced anaphylaxis simultaneously is also exceedingly small. At the time of writing, three DCBs (IN.PACT Admiral DCB, Lutonix DCB, and Stellarex

DCB) have been approved by the FDA following RCTs. Two DCBs (SurVeil DCB and Ranger DCB) are still to be approved following completion of the trials. No drug hypersensitivity reactions have been reported. To our knowledge, there are no other reported cases of anaphylaxis to paclitaxel DCB when used as endovascular treatment for peripheral arterial disease. There is one case in the literature of acute hypersensitivity reaction following femoral-popliteal angioplasty with paclitaxel DCB. The patient developed a painful, erythematous rash of the thigh shortly after removal of the DCB with associated agitation, tachycardia and hypertension. However, the patient did not meet criteria for anaphylaxis. Another paper reported delayed hypersensitivity reaction manifesting as a vasculitic rash of the lower limb following femoral angioplasty of the symptomatic limb with a paclitaxel-coated balloon. **Conclusion:** There is evidence to support the use of DCBs in the treatment of peripheral arterial occlusive disease via improvements in vessel patency. We present a rare case of anaphylaxis following deployment with a paclitaxel DCB. Clinicians using these devices should be aware of such risk.

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Establishing Interventional Radiology in the Developing World: Intra-Arterial Procedures in Tanzania

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Objectives: In the developing country of Tanzania, there are currently no fellowship-trained interventional radiologists to serve the rapidly growing population of almost 60 million people. The inaugural interventional radiology (IR) fellowship in the region was established in 2018 under the auspices of Muhimbili National Hospital (MNH) and Muhimbili University of Health and Allied Sciences. Due to lack of in-country expertise, teaching has been conducted by visiting teams from the United States, training the first generation of Tanzanian IR fellows, nurses, and technologists. While the majority of cases have consisted of nonvascular procedures, this report outlines the first intra-arterial procedures at MNH performed over the past year. **Methods:** All consultations received by the IR service at MNH were logged via Research Electronic Data Capture, a Health Insurance Portability and Accountability Act compliant workflow application. Patient information including sociodemographics, referral source, medical diagnosis, comorbidities, and indications for IR interventions has been collected since October 2018. In addition, procedure type, technical success, complications, and pathology results for relevant interventions were recorded. **Results:** A total of 308 consultations and 231 procedures were performed by the newly established IR service from October 2018 to November 2019. Of these, 28 (12.12%) were intravascular procedures. Of these, seven (25%) were intra-arterial procedures, including one pancreatic pseudoaneurysm embolization, one splenic embolization for thrombocytopenia, and five uterine fibroid embolizations (UFEs). No intra- or peri-procedural complications occurred. The pancreatic pseudoaneurysm demonstrated no flow of contrast in the aneurysm on follow-up imaging. The splenic embolization demonstrated an improvement of thrombocytopenia from 30,000 to 42,000 platelets per microliter at 1 month. Follow-up visits demonstrated improvement in bulk symptoms, pain, and bleeding in UFE patients at 1 month, and at 3 months, a patient who previously needed a monthly transfusion had hemoglobin of 11 g/dl with no further transfusions required. **Conclusion:** Overall, our early experience demonstrates the safety, feasibility, and excellent outcomes of the first intra-arterial procedures performed in Tanzania. **Recommendations:** The establishment and expansion of IR training improve access to critical IR services in developing countries such as Tanzania.

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Pulmonary Arteriovenous Malformation Embolization: Nottingham University Hospitals, UK-Based Tertiary Center Experience

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Objectives: Pulmonary arteriovenous malformations (PAVMs) are structurally abnormal vessels that provide direct capillary-free communication between the pulmonary and the systemic circulations and hence an anatomic right to left shunt. They are commonly caused by hereditary hemorrhagic telangiectasia (HHT). Treating these lesions is of high clinical priority as they can increase the incidence of developing stroke and cerebral abscesses. The main indication to treat these lesions is when the feeding artery measures more than 4 cm. Here, we present our experience in treating 18 patients with endovascular embolization in Nottingham University Hospitals. **Methods:** A retrospective review of all the PAVMs underwent endovascular embolization between October 2014 and November 2019 (5 years) was conducted. We reviewed the number of treatments, clinical success, complications, and the recanalization rates. **Results:** A total of 18 patients with PAVMs treated with endovascular embolization over 5 years. There were 12 males and 6 females with mean age of 56 years. The documented and genetically proven underlying cause was found to be HHT in most cases (15 patients). A total of 25 treatments were performed (4 patients had multiple AVMs treated in separate occasions and two patients had recanalization of previously treated AVMs which were then re-treated). One patient with AVM underwent angiogram which showed multiple small AVMs which were not treated. One patient had difficult embolization with migration of coil into the pulmonary vein and the right ventricle which was then retrieved using a vascular snare with resolution of ectopics and no late complications developed. No major or minor postembolization complications developed; one patient was admitted postembolization with pleuritic pain which was treated conservatively. No patients suffered a stroke or cerebral abscess since treatment. Sixteen treatments had documented successful improvement in their oxygen saturations on respiratory review. Three patients developed recanalization (defined as persistent perfusion through a previously placed coil). Two patients had further treatments and one patient did not have further treatment. **Conclusion:** Endovascular embolization is a minimally invasive treatment for PAVMs with high technical and