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to complications in the setting of pregnancy. This includes gestational age, tube size, amount of hydronephrosis, presence of renal calculi, serum calcium level, fetal complications, time to removal after delivery and requirement of a new tube after initial removal.

**Results:** A one sample t-test with a 95% confidence interval yielded a *P* value of < .0001 for tube exchange time for our sample (*n* = 51) when compared to a theoretical mean of 6 weeks. The average nephrostomy tube exchange time for our sample was 3.43 weeks with a standard deviation of 1.84 weeks. A one sided one sample t-test was also performed for blood calcium level of our sample compared to a theoretical mean of 8.6 mg/dL, which yielded a *P* value of .0075. The lower limit of normal serum calcium level was used due to our sample having lower than normal serum calcium. The average gestational age was 27.1 weeks with a standard deviation of 7.4 weeks. 72% of subjects had moderate hydronephrosis and 80% required an intervention before the 6-week routine nephrostomy tube exchange. There was at least one renal calculus in 68% of subjects.

**Conclusions:** We recommend a 3-week routine exchange time for percutaneous nephrostomy tubes in pregnant patients due to increased complications with longer routine exchange time. Tube encrustation likely plays a significant role in early exchange requirements in this population.

#### Abstract No. 193

### Vascular sequelae of COVID-19: interventional radiology in the management of coronavirus-associated angioopathy

T. Esfandiary<sup>1</sup>, C. Bailey<sup>2</sup>, R. Liddell<sup>2</sup>, H. Singh<sup>2</sup>, G. Lyons<sup>1</sup>; <sup>1</sup>Johns Hopkins School of Medicine; <sup>2</sup>Department of Radiology and Radiological Science, Division of Interventional Radiology

**Purpose:** Corona virus disease 2019 (COVID-19) has been reported to cause thromboembolism, which may be treated with anticoagulation in severe cases. Vascular sequelae of this disease and treatment are poorly understood at this early stage of the pandemic. We report the only case series to date of hemorrhagic complications of COVID-19 treated with angiography.

**Materials and Methods:** An IRB-approved single institution retrospective study was conducted in patients with coronavirus infection through July 30, 2020. Diagnosis of coronavirus was confirmed with RNA RT-PCR; diagnosis of hemorrhage was made on clinical exam, CTA, and/or angiography.

**Results:** 10 patients (median age 61 years; 5/5 M/F ratio) with COVID-19 and unprovoked hemorrhage were identified. 9/10 patients were receiving therapeutic dose anticoagulation at the time of hemorrhage. Sites of bleeding included gastrointestinal tract (4), lung (2), thigh (2), and retroperitoneum (2). Only 5 of the 10 patients had findings of active hemorrhage at the time of angiography. 3/10 patients had multiple concurrent sites of hemorrhage (range: 2-5 sites). 2/10 patients had pseudoaneurysms, including one patient with pulmonary artery pseudoaneurysms associated with lung consolidation. Embolization was performed in 8/10 cases (empirically in 3 cases); IVC filter placement was performed in 1 patient. Technical success was achieved in all cases with no procedural complications. Number of patients with hypotension decreased 24 hours following the procedure (from 7/10 to 1/10). 2/10 patients

died within 7 days of the procedure from COVID-19-related disease.

**Conclusions:** COVID-19 can lead to spontaneous hemorrhage, which may present with atypical angiographic findings such as multiple sites of hemorrhage or abnormal pseudoaneurysm location. Interventional radiologists have a vital role in the management of this condition as embolization is both safe and effective in these patients.

#### Abstract No. 194

### Follow through: increasing inferior vena cava filter retrieval rates at the community level

K. Nasra<sup>1</sup>, A. Tesfay<sup>1</sup>; <sup>1</sup>Ascension Providence/Michigan State University

**Purpose:** To evaluate the efficacy of various interventions at improving IVC filter retrieval rates. Secondary outcomes included whether a medium-sized community practice can achieve rates commensurate with larger academic centers

**Materials and Methods:** Retrospective data review for IVC filter placement and retrieval was performed from July 1, 2014, to June 30, 2018. Three main interventions were made: dedicated patient education and informative resources were provided, interventional radiology (IR) administrative staff and mid-levels established a system to followup with patients three months post-placement and then biannually, and communications were sent addressing appropriate criteria for filter removal to the patient's primary care provider at three months post-placement and then annually. IVC filter and replacement rates were then collected from July 1, 2018, to June 30, 2020.

Exclusion criteria included patients who passed within six months of placement, placement at outside institutions, and non-retrievable filters. Data regarding patient gender, age, indication of filter placement, dwell time of the filter, and reason for retrieval was gathered.

**Results:** Pre-intervention, 530 IVC filters were placed with a retrieval rate of 5.8%. The average dwell time of the IVC filters was 168.5 days with a range from 17–890 days. Post-intervention, 417 IVC filters were placed with a retrieval rate of 12.2%. The average dwell time of the IVC filters 123.4 days with a range from 10-505 days. Of the 51 IVC retrieval patients post-intervention, 23 cited communication from the IR department, 12 cited communication from their primary provider, and 7 cited initial education as reason for follow-up. 9 patients did not volunteer a clear reason.

**Conclusions:** Results were promising with an uptick in IVC filter retrieval (5.8% to 12.2%) and decrease in dwell time (168.5 to 123.4 days). However, this has to be considered against a backdrop of increasing inferior vena filtration rates nationally, partially due to changing healthcare and market trends. The overall rate remains below the reported national average of 30%.

Most patients attributed return for retrieval secondary to communication with the IR department. A non-insignificant proportion also attributed retrieval to the primary care provider or initial patient education. This highlights the necessity of a systems-based approach to maximize health outcomes. In particular, this study stressed the importance of a robust interventional radiology clinical practice that can be directly responsible for patient follow-up and streamlining of IR-related care.