MICHIGAN RADIOLOGICAL SOCIETY

RESIDENT & FELLOW SECTION

ABSTRACT BOOK

16TH ANNUAL RESIDENT RESEARCH FORUM

26TH ANNUAL RESIDENT SECTION CONFERNCE

FEBRUARY 24, 2023
MARRIOT AUBURN HILLS PONTIAC

A G E N D A

8:30 AM REGISTRATION

9:00 AM BREAKFAST WITH SPONSORS

9:30 AM INTRODUCTION

9:40 AM AMY PATEL, MD ON RADIOLOGY CAREERS

10:40 AM CHAD WHIPPLE ON FINANCIAL MANAGEMENT

11:40 AM FACULTY PANEL

- David Bloom, MD, FACR, U of M
- Randy Hicks, MD, MBA, Regional Medical Imaging
- Kimberly Garver, MD, U of M
- Michael Kasotakis, MD, Huron Valley Radiology
- Andrew Moririty, MD, Spectrum Health

12:30 PM LUNCH WITH SPONSORS

1:30 PM ABSTRACT PRESENTATIONS

2:00 PM QUIZ BOWL - ASCENION PROVIDENCE/MSUCHM

2:30 PM ANNOUNCEMENT OF 2023 EXECUTIVE BOARD MEMBERS

3:00 PM ADJOURN

KEYNOTE SPEAKER

Amy Patel, MD

MEDICAL DIRECTOR,
BREAST CARE CENTER,
LIBERTY HOSPITAL,
LIBERTY, MO

KEYNOTE SPEAKER

Dr. Amy K. Patel is a Board-Certified Radiologist who specializes in Breast Imaging. She is a Breast Radiologist, Medical Director of The Breast Care Center at Liberty Hospital, and Assistant Professor of Radiology at the University of Missouri-Kansas City School of Medicine.

Dr. Patel is a graduate of the combined BA/MD accelerated program at the University of Missouri-Kansas City. She completed her Diagnostic Radiology Residency at the University of Kansas-Wichita where she served as the first female chief resident in an all male program. She completed her Breast Imaging Fellowship at Mallinckrodt Institute of Radiology Washington University in Saint Louis.

Dr. Patel's professional interests include recruitment of women in radiology, serving as President of the American Association for Women in Radiology Board. Her interests also include mentorship and social media, serving as Associate Editor for Digital Media for the Journal of the American College of Radiology.

Her research interests include breast health equity, digital breast tomosynthesis and artificial intelligence.

She also has an avid interest in radiology political advocacy, serving on the RADPAC Board and is Chair of the ACR Radiology Advocacy Network. She is also a former ACR Rutherford Lavanty Fellow in Government Relations. She is also the first female and youngest radiologist recipient of the ACR Howard Fleishon MD Advocate of the Year Award. She is a staunch advocate for patients receiving access to standard radiological care, particularly in the realm of annual mammography screening beginning at age 40. Consequently, she was involved in helping pass the bill in the state of Missouri ensuring annual screening 2D and 3D mammography coverage beginning at age 40 in average risk women as well as the more recent bill ensuring coverage for above average risk women in accordance to ACR recommendations. As a result of these efforts, she is the 2021 recipient of the Kansas City Medical Society's Patient and Community Advocate Award. She was also named the 2022 Kansas City Chiefs Fan of the Year due to her community impact and love of the team

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16TH ANNUAL RESIDENT RESEARCH FORUM ABSTRACT SUBMISSIONS

ABSTRACT WINNERS

Sondos Al Khatib, MD
Henry Ford Hospital
The Prognostic Significance of the Depth of Cervical Stromal Invasion in Women with FIGO Stage II Uterine Endometrioid Carcinoma

Daniel Chapman, MD
Henry Ford Cancer Institute
The Use of Breast Cup Immobilization in Radiation Therapy and Patient Reported Outcomes on Cosmesis and Pain

Neo Poyiadji MD
Henry Ford Hospital
Diagnostic Imaging Utilization in the Emergency Department: Recent Trends in Volume and wRVUs

Younes Jahangiri, MD
Spectrum Health
Co-registration of Pulmonary Thrombectomy Case Volume with Local COVID-19 Infection Incidence Rates: Analysis of Institutional PERT Registry Data

The Prognostic Significance of the Depth of Cervical Stromal Invasion in Women with FIGO Stage II Uterine Endometrioid Carcinoma

Sondos Al Khatib MD(a), Aseem Bhatnagar MD(a), Noor Elshaikha, Ahmed I Ghanem MD, PhD(a), Charlotte Burmeister MS(b), Ghassan Allo, MD(c), Bassam Alkamachi, MD(c), Alex Paridon MD(d) and Mohamed A Elshaikh, MD(a)*

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Key Words: Endometrial Carcinoma, Stage II, cervical stromal invasion, Adjuvant, Radiation treatment, Hysterectomy, Prognosis.

Abstract

Objective: The prognostic impact of the depth of cervical stromal invasion was not clearly investigated in women with FIGO stage II uterine endometrioid adenocarcinoma (EC).

Methods: Our prospectively maintained database of women with FIGO stage II EC, solely of endometrioid type was quired. Pathologic slides were retrieved and reviewed by gynecologic pathologists to determine cervical stromal thickness and depth of cervical stromal invasion (%CSI) as a percentage of stromal thickness. Kaplan-Meier, log-rank, univariate, and multivariate analyses were used to compare recurrence-free, disease-free, and overall survival at 5 years between women who had <50% versus ⩾50% cervical stromal invasion. Univariate and multivariate analysis assessed other prognostic variables associated with survival endpoints.

Results: The study cohort included 117 patients who had hysterectomy between 1/1990 and 8/2021. 79 (68%) with <50% and 38 (32%) with ⩾50% cervical stromal invasion. After a median follow-up of 131 months, 5-year disease-specific survival was significantly worse for women with ⩾50% cervical stromal invasion (78% vs 91%; p=0.04). However, %CSI was not an independent predictor for any 5-year survival endpoints. Independent predictors of worse 5-year recurrence-free and disease-specific survival included FIGO grade 3 tumors (p=0.02) and the presence of lymphovascular space invasion (p=0.03). Grade 3 tumors was the only independent predictor of worse 5-year overall survival (p=0.02).

Conclusions: Deep cervical stromal invasion was not an independent prognostic factor for survival endpoints in women with stage II uterine endometroid adenocarcinoma after hysterectomy. Our findings may be validated with multi-institutional pooled analysis.

Clinical Outcome in Patients with Early-Stage Small-Cell Lung Cancer Treated with Surgery or Radiation in the Absence of Prophylactic Cranial Irradiation: A Single-Center Retrospective Study

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Abstract

Purpose: As screening chest computed tomography for patients at high-risk for cancer has become more widely accepted, increasing numbers of patients with early-stage small cell lung cancer (SCLC) are being diagnosed. Although surgery is an accepted option for patients with early-stage SCLC, for patients who decline or cannot undergo surgery, stereotactic body radiation treatment (SBRT) is an alternative. While prophylactic cranial irradiation (PCI) improves survival in patients with limited stage SCLC, PCI for early-stage SCLC (T1-T2) has not been explored. Here we define survival and recurrence patterns in patients with early-stage SCLC who were treated with surgery or SBRT in the absence of PCI.

Materials and Methods: A retrospective cross-sectional study of 14 patients diagnosed with early-stage SCLC (Stage T1-T2) between July 2015 and May 2021 at a single tertiary care hospital that were treated with SBRT or surgery with no PCI. Primary outcomes were locoregional cancer recurrence, distant recurrence, recurrence-free survival, and overall survival. Secondary outcome was development of brain metastasis. Analyses included Cox regression, Kaplan-Meier survival, and log-rank tests.

Results: A total of 14 patients (5 women and 9 men) were included in the study: 9 with Stage T1 and 5 with Stage T2 SCLC. Six patients (43%) received SBRT and 8 (57%) had surgical treatment. All patients except one received adjuvant chemotherapy. Median follow-up was 14.3 months (range 2.4-64.4), and median age at diagnosis was 71.5 years (range 54-81). Cox regression and log-rank tests showed no significant differences in any outcomes between the surgery and SBRT groups, and no patients developed brain metastases during the study period.

Conclusions: Patients with early-stage SCLC who forego PCI therapy may not be at higher risk of brain metastasis, and survival and cancer recurrence may not differ between patients who receive surgery or SBRT in the absence of PCI.

Twice as Nice or Double the Trouble: A Single Institution Experience with Sequential Chest Tubes for Persistent Pneumothorax

Authors: **Stefan Brancel**, Claire Sorek, Ivan Rakic, Nick Reeser, P. Joe Massa

Henry Ford Hospital

Purpose:

Chest tube placement is a relatively common procedure and remains standard of care for pneumothorax treatment. Normally a single chest tube is placed which successfully treats the pneumothorax. However, persistent pneumothorax can occur after chest tube placement due to persistent air leak or trapped lung. Current literature suggests surgical or endobronchial interventions for these cases {1}. There is a paucity of literature surrounding the effectiveness of multiple chest tubes for pneumothorax. This study aims to evaluate the safety and efficacy of placing an additional chest tube in the setting of a persistent pneumothorax when one or more chest tubes is already in place.

Materials and methods:

All image guided chest tubes placed for pneumothorax at a quaternary urban hospital in the last 5 years were retrospectively reviewed. Cases were included if there was an existing chest tube prior to additional image-guided chest tube placement and if both tubes remained in place at a 12-48 hour follow-up chest radiograph. Measurement of pneumothorax on pre-procedural imaging and at 12-48 hour follow-up imaging was compared. Respiratory support with supplemental oxygen or intubation was recorded before and 24 hours after the procedure. The study group was 67 % (n=12) male with an age range of 30 - 80 years.

Results:

17 of 131 image guided chest tubes for pneumothorax met criteria for review. Etiologies include post-surgical (12), secondary spontaneous (2), and post-traumatic (3). Pneumothorax size decreased significantly on post-procedural imaging ($P < 0.01$) after sequential chest tube placement. There was a trend towards decreased supplemental oxygen ($p=0.17$). No complications of additional image guided chest tubes were reported.

Conclusion:

Additional image-guided chest tubes for pneumothorax are a safe procedure with no complications being reported in this small study. In patients with diverse etiologies of pneumothorax, imaging findings can be improved with placement of additional chest tubes, but supplemental oxygen requirements did not significantly change.

References:

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The Use of Breast Cup Immobilization in Radiation Therapy and Patient Reported Outcomes on Cosmesis and Pain

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2 Department of Biostatistics and Radiation Oncology, University of Michigan, Ann Arbor, MI

PURPOSE: Breast cosmesis and pain are among the most reported outcomes in patients undergoing breast irradiation. There is variability in the degree of adverse reactions based on different patient specific characteristics. It has been found that women with large body habitus, African American race, and larger breast size tend to have an increased chance of experiencing worse toxicity from treatment. Attempts to improve cosmesis and pain have been highly explored. We explore here whether the use of a breast cup for treatment leads to worse cosmesis and pain when compared to those treated without a breast cup. This is an important topic as it is felt that the use of a breast cup would provide a significant dosimetric advantage (i.e. organ at risk dosing) during treatment. We now explore this treatment option through a retrospective analysis of patient reported outcomes experienced during and after completing post-operative radiation therapy to the breast.

MATERIALS/METHODS: 645 patients undergoing adjuvant breast irradiation were evaluated from 2011 through 2019. 79 patients were treated using a breast cup. Mean heart dose was analyzed and compared between the two treatment groups and was found to be comparable in each arm. Additionally, patient reported outcomes among the entire cohort were collected via survey documentation forms during treatment, at 1 month post treatment, and at 1 year after treatment. These results were collected using the Michigan Radiation Oncology Quality Consortium (MROQC) database as each patient was consented to enroll in MROQC prior to starting treatment. The outcomes of skin changes, lymphedema, and breast pain among the two treatment groups were then compared for statistically significant differences via a logistic regression analysis.

RESULTS: Patients were evaluated at 3 time points; during treatment, 1 month post-treatment and at 1 year after treatment. Of the 79 patients treated with a breast cup, when compared to the no cup patients, grade 2 pruritus and grade 1 alteration in skin texture were not significantly different at any time point ($p > 0.05$). With regards to lymphedema, no statistically significant difference was seen between the two groups of patients outside of the 1 month after treatment survey time point; all p-values greater than 0.05 except for the 1-month mark (p-value 0.03). Lastly, breast pain survey remarks at the pre-specified time points failed to show a significant difference in the symptom between the two analyzed treatment groups ($p> 0.05$).

CONCLUSIONS: From our patient's perspective, the use of a breast cup during radiation therapy did not negatively impact breast cosmesis or pain when compared to patients treated without a cup. Breast cup use was also found to produce similar dosimetric coverage to the heart as non-cup patients, even in left sided breast cancers.

Identification of a Rare Congenital Foregut Duplication Cyst

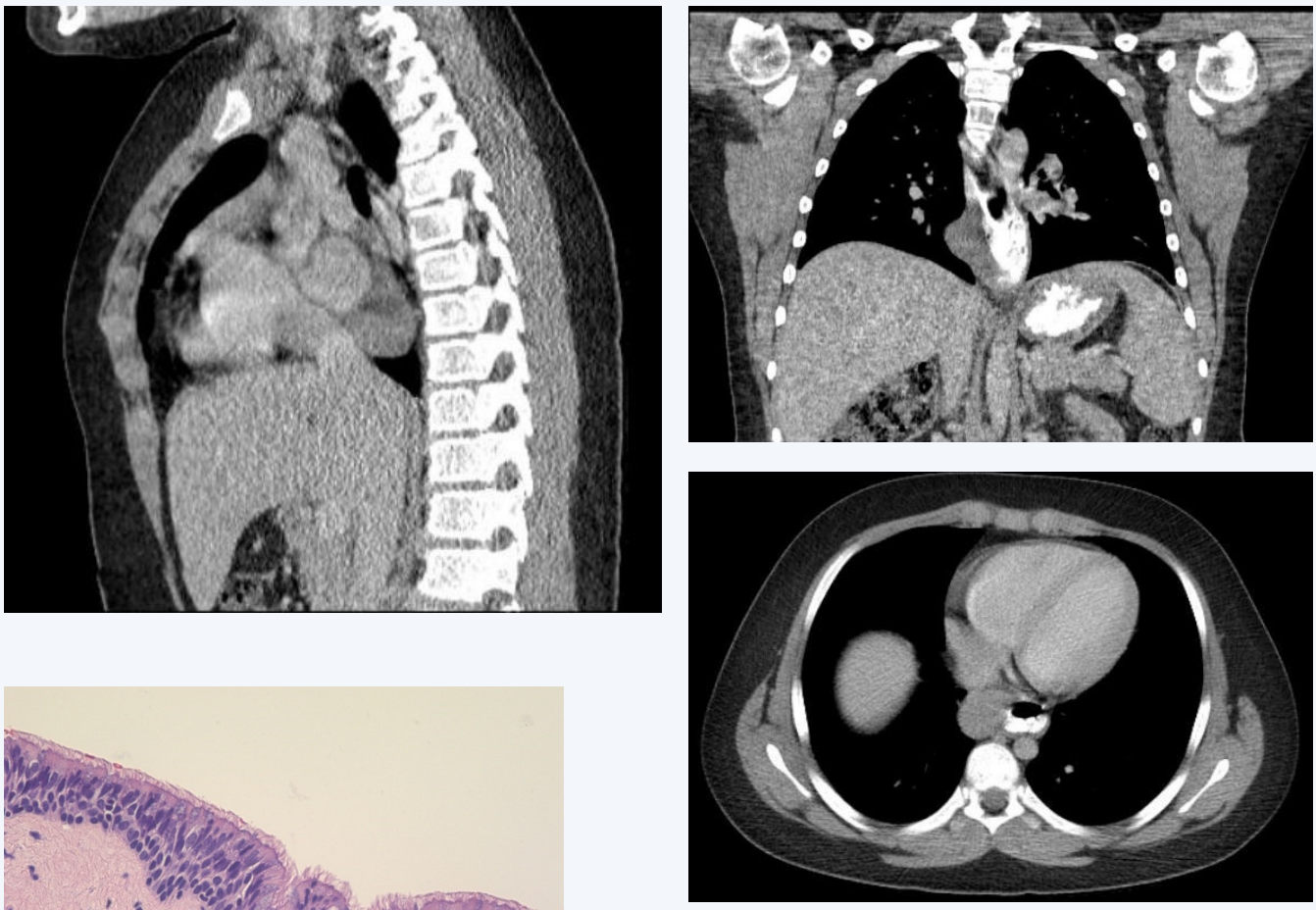
Authors: **Victoria Dekany BSc**, Sydney Wonski D.O., McLaren Oakland / Macomb

Introduction: Congenital foregut duplication cysts are extremely rare, and there are no recent studies that help distinguish bronchogenic versus esophageal origin using CT alone. Our patient has been mainly asymptomatic, and his cyst discovered incidentally although present from birth. Our patient has been mainly asymptomatic, and his cyst discovered incidentally although present from birth. Unusual features of thiscase involve the cyst's center of mass towards the esophagus although bronchogenic in origin. Foregut duplication cysts can be distinguished histologically from their epithelium as resembling airway, esophagus, or small intestine (3). Based on the International Thymic Malignancy Interest Group's (ITMIG) new classification system, duplication cysts tend to fall within the visceral mediastinum but can be anywhere within the mediastinum (4).

Case Report: 13-year-old male with no significant past medical history presented with general chest pain and mild dysphagia. An incidental low-attenuation lesion was found on CT in the posterior mediastinum to the right of the distal esophagus measuring 2.8 x 2.4 x 4.4 cm. Based on post-operative pathology identifying smooth bronchial tissue, location distal to esophagus but above hilum, nonenhancement and low-attenuation on CT, no signs of malignancy or adenopathy, the lesion was identified as a bronchogenic cyst. The gross macroscopic presence of cartilage and fibromuscular connective tissue in the case distinguish the lesion as bronchogenic. Positive clinical features of bronchogenic cysts may present in the early decades of life and include possible mass effect or airway compression from drainage obstruction leading to recurrent respiratory tract infections or significant respiratory distress.

Discussion: Foregut Duplication Cysts: X-ray imaging reveals discrete, round, and sharply defined fluid-filled densities, but is nonspecific. Thin walls and lack of internal enhancement is typical of cysts. Some bronchogenic cysts may appear solid (HU > 20). For nonspecific findings on CT, contrast-enhanced MR depicts a T2 signal like CSF, confirming the cystic nature, and enhancement of the wall (1). MR imaging may demonstrate high signal intensity on T2-weighted images. Hemorrhagic, proteinaceous, or mucoid components lead to variable T1-weighted images and may point to an infection or malignant transformation (4). Esophageal duplication cysts appear identical to bronchogenic cysts on radiology, CT, and MR (1). For children with ectopic gastric mucosa (about half of all esophageal cysts), 99mtechnetium sodium pertechnetate imaging can help diagnose an esophageal duplication cyst (2). Bronchogenic cysts can be identified on imaging in visceral mediastinum (retrocardiac position). They may be symptomatic from mass effect with chronic coughing or recurrent pneumonia and present in the first couple of decades of life (1). X-ray imaging (which is nonspecific) may reveal discrete, round, and sharply defined fluid-filled densities. Here CT imaging reveals a single, well-circumscribed, homogenic, smooth, low-attenuation (HU < 20) cystic lesion with no internal enhancement. Surgical excision revealed a right posterior mediastinal cyst intimate to esophagus inside adventitia and intimate with muscularis propria. Histology confirms the presence of cartilage, smooth muscle, and respiratory epithelium (1). These cysts may have variable epithelial cell layers, containing cartilage and respiratory glands but fibromuscular connective tissue remains the distinguishing feature (3). They are typically at the level of the carina.

Figure 1: Sagittal, Coronal and Axial contrast-enhanced CT images of thorax. Low-attenuation lesion in the posterior mediastinum to the right of the distal esophagus, well circumscribed, homogenous, and hypoattenuating without foal fat. Posterior to the heart an anterior to the spine.



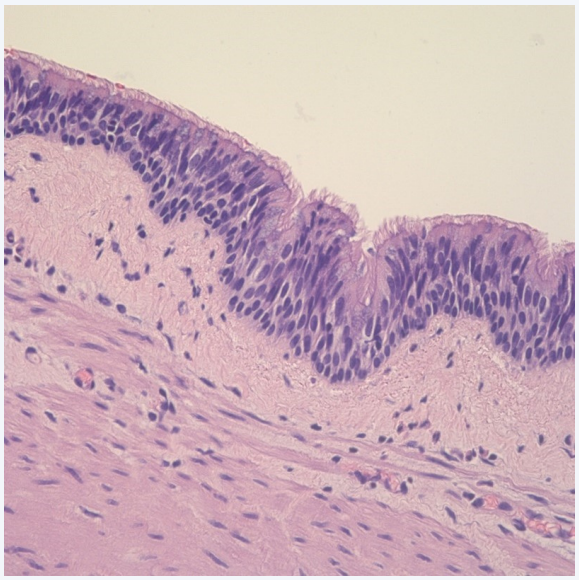


Figure 2: Grosse Pathology revealed the presence of cartilage, smooth muscle, and respirator epithelium and fibromuscular connective tissue.

References:

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2. Bourgouin PP, Madan R Imaging of the Middle and Visceral Mediastinum. Radiol Clin North Am 2021;59 (2):193-204
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Ovarian Herniation of the Canal of Nuck, a Case Report

Krunal Moradiya BSc, **Roham Hadidchi,** Shahram Hadidchi MD

Detroit Medical Center, Department of Radiology

Introduction:

During embryonic development, the female inguinal canal hosts the ilioinguinal nerve, the gubernaculum, and processus vaginalis [1]. The processus vaginalis is an evagination of the parietal peritoneum seen after 12 weeks of gestation [2]. Accompanying the processus vaginalis is the gubernaculum, whose female remnants become the round and ovarian ligaments in adults. Around the 7th month of gestation, the processus vaginalis gradually obliterates in a craniocaudal fashion and closes by the first year of life [1,3] (Figure 1). Failure of the processus vaginalis to obliterate results in a patent opening referred to as the canal of Nuck (coN). Non-obliteration results in two potential outcomes. First, if superior obliteration begins but terminates abruptly, the inferior portion of the coN forms a fluid-filled cavity called a hydrocele. Just as in males, hydroceles in females can remain asymptomatic or sometimes become infected or hemorrhagic [3]. Alternatively, if obliteration does not occur at all, the entire width of the coN remains patent. In females, a patent coN is a predictive anatomic risk factor for hernias [1]. Various organs and/or tissues can protrude through the canal, including omental fat, bowel loops, ovaries, the uterus, fallopian tubes, and the bladder [2,4,5]. In infants, a coN hernia presents as a labial mass or groin swelling. Swellings may be painful and non-reducible [2,3].

Compared to those in males, pediatric inguinal hernias in females are seldom discussed in the literature [4]. Here, we present a case of a female infant who presented with a right ovarian inguinal hernia.

Case Report

The patient was a 4-month-old female who presented with a right labial mass. She had a history of prematurity, patent ductus arteriosus status post-coiling, and severe bronchopulmonary dysplasia. On the physical exam, there was no erythema, overlying skin changes, or tenderness. Physical exam findings were compatible with a non-reducible inguinal hernia and no evidence of strangulation.

Ultrasound of the pelvis and inguinal region was performed. There was an oval shaped, well-defined mass in the right labia with heterogeneous echotexture and multiple scattered hypoechoic foci (Figure 2). Color Doppler images demonstrated normal color flow to the mass (Figure 3). Based on ultrasonography and the physical exam, there was no evidence of a herniated mass or hydrocele in the left inguinal region. Findings were compatible with a herniated ovary in the right coN.

Discussion:

Pediatric inguinal hernias are rare, with a reported incidence of 0.8-4.4% [3]. Most pediatric hernias are indirect and occur at male-to-female ratios of 4:1 to 10:1 [1]. Premature infants are at increased risk of hernias due to non-obliteration of the processus vaginalis, with an incidence of 9-11% in premature infants of any term and 30% in premature infants weighing less than 1000g [1]. Among inguinal hernias in females, the ovary is most commonly involved and is implicated in 15-22% of cases [1,4]. Tension from the round and ovarian ligaments potentially plays a role [4].

Ultrasound is the most cost-effective modality for initial imaging of suspected coN hernias and provides adequate spatial resolution without exposing children to radiation. On ultrasound, ovarian hernias appear as solid masses containing multiple cysts of varying size [5]. Right-sided herniation is more common (56% of coN hernias) due to delayed obliteration of the right processus vaginalis and/or protection of the left deep inguinal ring by the sigmoid colon [1,3]. In our case, herniation of the right ovary was appropriately identified through ultrasound (Figure 2).

Early diagnosis of ovarian inguinal hernia is critical because of the risk of incarceration, in which the herniated ovary becomes non-reducible. Some studies report incarceration occurring in 43% of ovarian inguinal hernias [3]. Incarcerated ovaries can predispose to strangulation and/or torsion, resulting in impaired blood flow and eventual tissue necrosis if the hernia is not reduced. On ultrasonography, a torsed ovary appears enlarged with heterogeneous echogenicity and no blood flow on Doppler evaluation [5]. In our case, Color Doppler revealed appropriate blood flow to the right ovary without evidence of strangulation or torsion (Figure 3).

Canal of Nuck hernias involving the ovary are rare and possibly underreported. Discussion of such hernias is warranted so that radiologists are familiar with their presentation. Prompt recognition can help prevent complications in young patients.

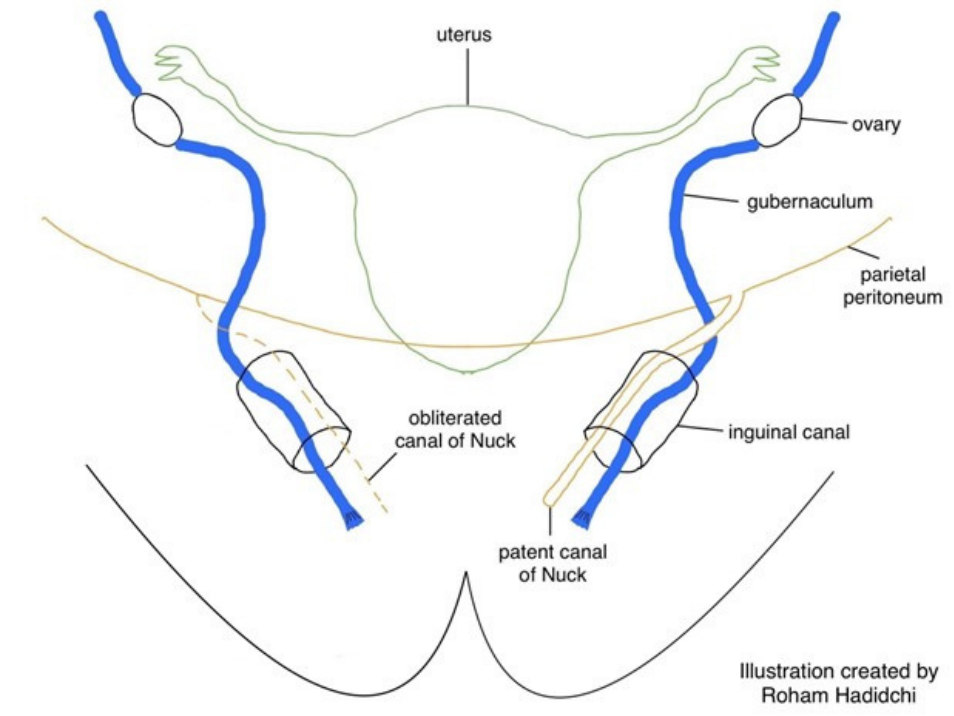

Figure 1: Illustration of the fetal female pelvis and inguinal canal. The gubernaculum and the canal of Nuck originate from the peritoneal space and pass through the inguinal canal toward the labia majora.

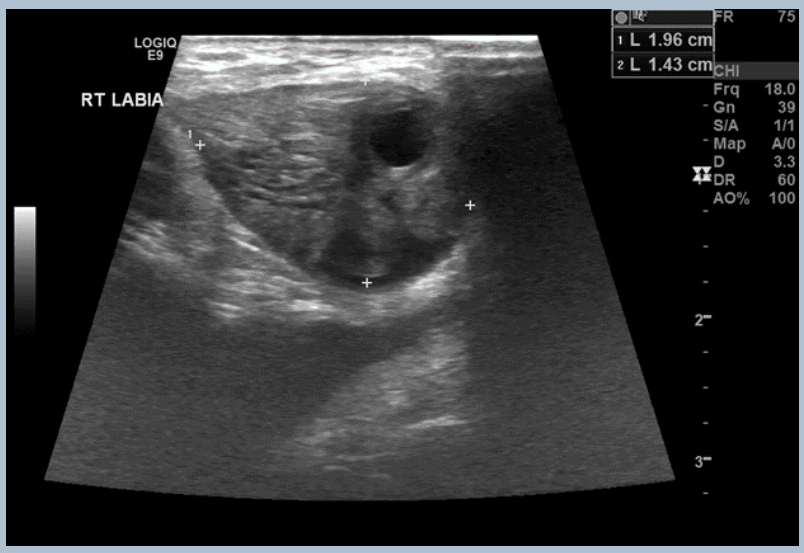

Figure 2. Well-defined mass in the right labia with heterogeneous echotexture and multiple scattered hypoechoic foci compatible with ovarian follicles.

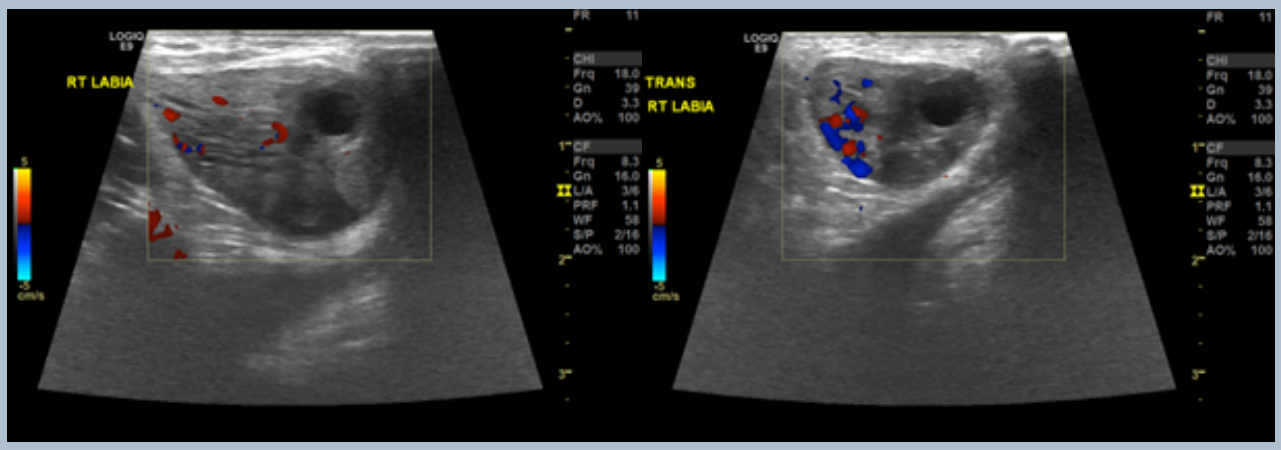

Figure 3. Color Doppler reveals adequate blood flow to the herniated ovary.

References

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Endovascular Treatment of Acute Obstructive Shock Associated with Inferior Vena Cava Filter Thrombosis

Authors: Olivia Everin1, **Younes Jahangiri MD2**, William Slater MD2

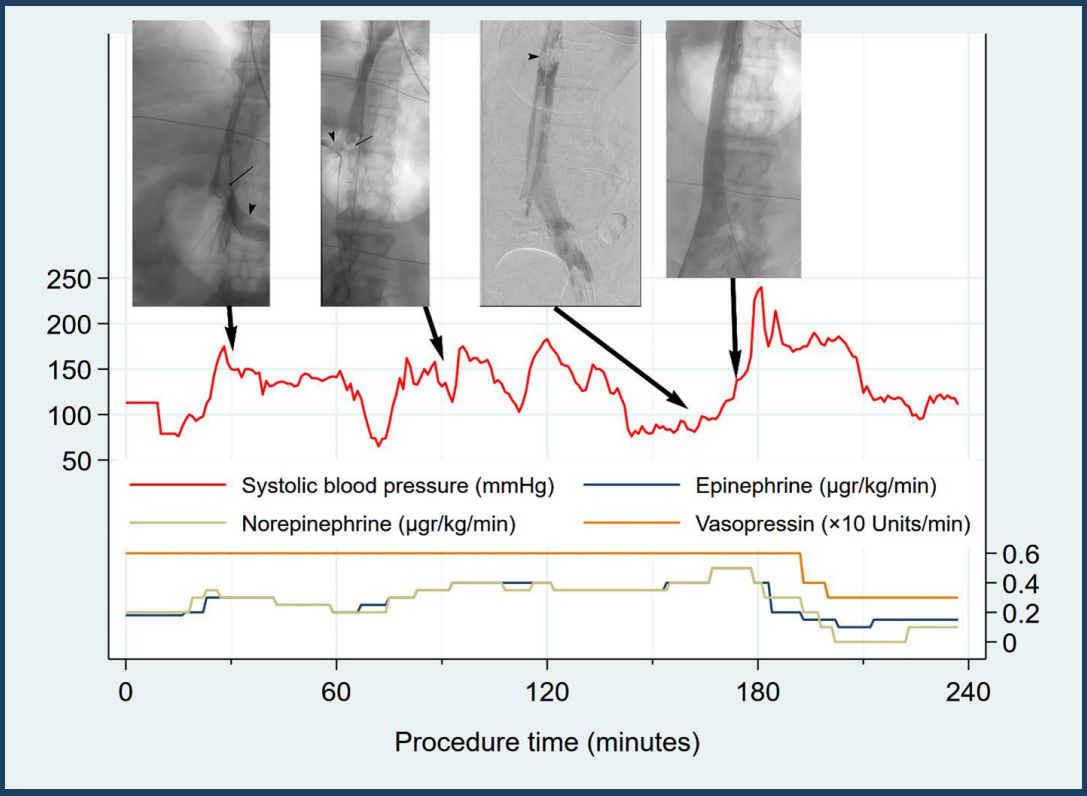
Affiliations:
1. Michigan State University, College of Human Medicine, Grand Rapids, MI
2. Advanced Radiology Services, Corewell Health, Grand Rapids, MI

Abstract:

Background: Inferior vena cava (IVC) thrombosis is a known complication of IVC filter placement. Patients may present with symptoms of acute caval thrombosis or chronic caval occlusion if development is more insidious. Rarely, patients can develop acute obstructive shock. The optimal treatment approach for obstructive shock caused by an acute IVC thrombosis is not well established.

Case: We herein report a case of acute obstructive shock secondary to occlusive IVC thrombosis occurring in a patient with an IVC filter. Successful mechanical thrombectomy resulted in immediate hemodynamic recovery with real time improvement in hemodynamic indices and shock status.

Conclusion: This case highlights the role of emergent mechanical thrombectomy in the management of the potentially lethal complication of acute obstructive shock due to IVC filter thrombosis.



Co-registration of Pulmonary Thrombectomy Case Volume with Local COVID-19 Infection Incidence Rates: Analysis of Institutional PERT Registry Data

Authors: Younes Jahangiri, MD, Nabin Manandhar Shrestha, Catherine Kelty, Renzo Loyaga Rendon, James Morrison, Jarrod Macfarlane

Purpose: Studies have suggested COVID-19 infection to be associated with an increased risk of pulmonary embolism (PE). The purpose of this study is to evaluate correlation between temporal fluctuations in PE thrombectomy case volumes with that of local COVID-19 spread.

Materials and Methods: Public statewide daily COVID-19 positivity and variant data between 3/1/2020 - 8/30/2022 was captured from the State government website. Corresponding daily institutional pulmonary thrombectomy case numbers were queried from the local institutional PE Response Team (PERT) registry data bank. Numerical and categorical variables were compared using the t-test and the Chi2 test, respectively. Time series trends were constructed using the monthly cumulative occurrences of PE thrombectomy at the largest regional health institution and statewide confirmed COVID-19 test positivity numbers. Dynamic Time Warping (DTW) analysis was applied to compare two time series trends. Analyses were done using R and Stata software applications. Number of thrombectomy per 100,000 cases of statewide COVID-19 positive cases per month was calculated using variant data for each published at the end of each month in the state government website.

Results: A total of 2,399,555 COVID-19 statewide confirmed positive cases were recorded in the study period. In the same time period, 318 PE thrombectomy procedures for acute PE performed with a mean age of 61±15 years and 47% females. Among them 52 (16%) were COVID-19 positive by rapid PCR test at presentation. This group of patients were older (61±12 vs 40±21 years; P<0.001), and had lower ratio of female gender (44% vs. 53%; P=0.031). Using dynamic time warping, there was a close correlation between monthly statewide COVID-19 positivity and institutional PE thrombectomy case volumes. An uptick in the number of thrombectomy cases was seen per 100,000 COVID-19 cases per month for the duration that alpha variant was the dominant strain [median (min-max): 2.0(0.9-7.3), 2.8(1.6-5.4), 4.7(1.3-7.4), 2.6(1.1-4.6) and 2.3(0.6-12.9) for epsilon, eta, alpha, delta and omicron variants, respectively].

Conclusion: COVID-19 positivity was seen in 16% of institutional PE thrombectomy cases since start of pandemic. The patients were comprised older population with a higher ratio of male gender preponderance as compared to the total statewide confirmed COVID-19 positive population. There was a direct correlation between fluctuations in statewide COVID-19 positivity and that of institutional PE thrombectomy case volumes signaling direct association between COVID-19 peaks and increased thrombectomy procedure volumes. Especially, dominance of alpha variant among others was associated with higher overall thrombectomy case volumes. This is in agreement with previous studies showing higher mortality and D-dimer deposition in lungs, brain and kidneys with alpha variant.

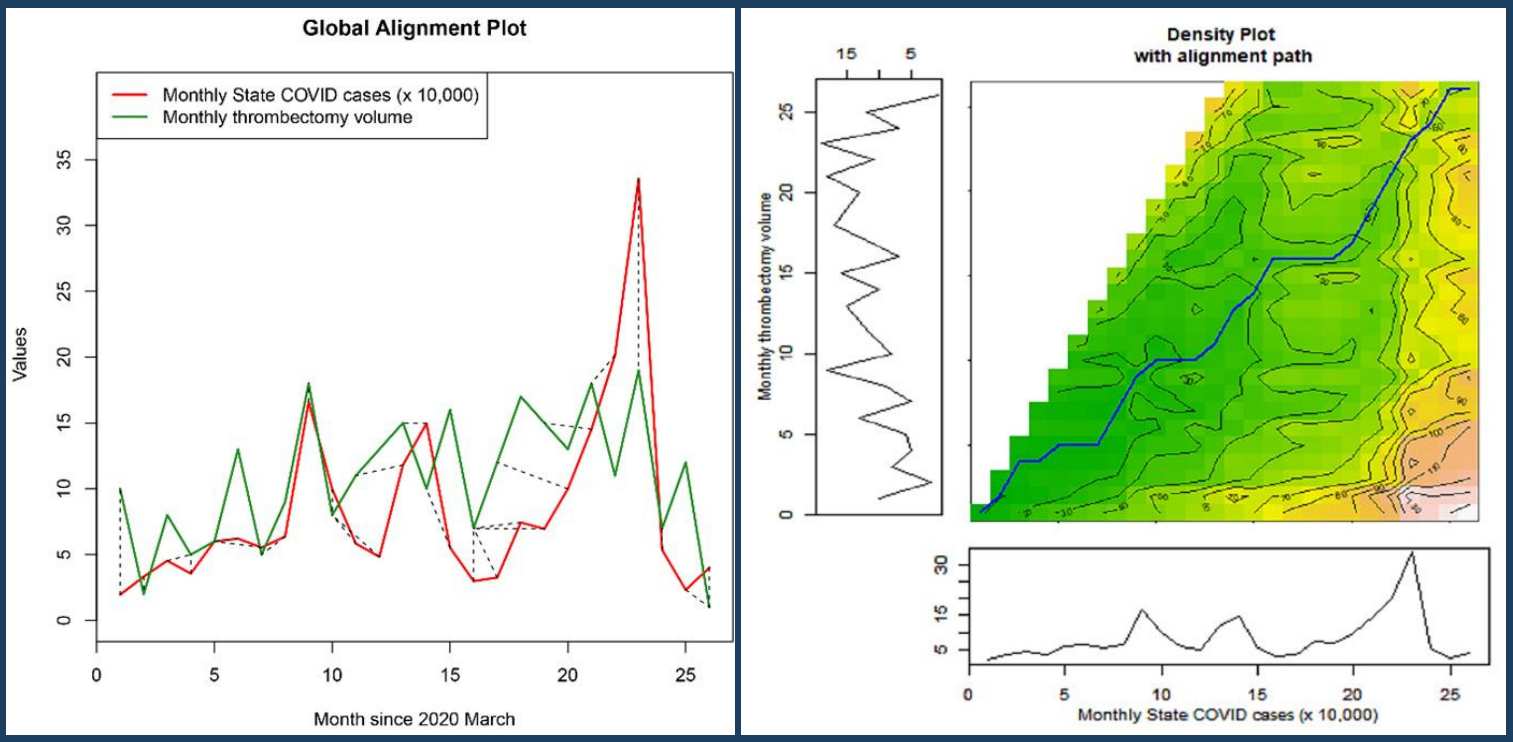


Figure 1) Global alignment plot (A) and density plot with minimal local correlation cost (B) for institutional pulmonary thrombectomy case volume and monthly new statewide COVID-19 cases. Dashed lines (A) show the closest time point with highest correlation between two time series graphs. Almost complete diagonal path of the minimum correlation cost line (blue line in plot B) signals direct correlation between two time series data.

Factors Associated with Overall Survival After Thrombectomy for High and Intermediate-Risk Pulmonary Embolism

Authors: James Morrison, **Younes Jahangiri**, Myles Mowery, Aaron Leach, Ryan Musolf, Micheal Knox

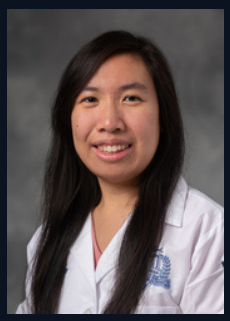
Purpose: To assess survival after embolectomy for high and intermediate-risk pulmonary embolism (PE) and factors associated with higher mortality

Materials and Methods: 257 patients with high and intermediate-risk pulmonary embolism (PE) who underwent mechanical thrombectomy using FlowTriever system between July 2019 and November 2021 were enrolled in this retrospective review. Data were analyzed using Stata MP 17.0 with Kaplan-Meier method and Cox regression survival analysis. Type one error was set at 0.05.

Results: Patients' mean age was 62 (range: 16-97) years, and 51% were male. 20% had previous history of deep venous thrombosis (DVT) or PE, and 81% had concomitant DVT at presentation. Twenty (8%) patients were COVID positive, and 21%, 28%, 24%, 12% and 15% of patients presented with Pulmonary Embolism Severity Index (PESI) class 1-5, respectively. Average pre- and post-thrombectomy pulmonary artery pressure was 50/21 (mean PAP: 32) and 37/16 (mean PAP: 24) mmHg; average decrease in PAP was 13/5 (mean PAP: 8) mmHg ($P<0.0001$ for all comparisons). Mean estimated blood loss was 412 (range: 5 - 1000) ml, and 30% received inferior vena cava (IVC) filter. Immediate complication occurred in 4 (2%) patients including cardiovascular collapse, anaphylaxis and hemoptysis. Among those who presented from ICU (n=48), 15% did not require ICU level of care after procedure. Median post-embolectomy length of hospital stay was 4 (0-42) days. All-cause readmission occurred in 14% in an average of 4 months, with venous thromboembolism (VTE) readmission in a total of 5 (2%) patients in an average of 5 months. Patients were followed for a mean duration of 471 (range: 0 - 1111) days. Post-procedure mortality rate was 14%, all from causes unrelated to the procedure. Total at-risk study duration was 331.4 person-year, with incidence rate of post-procedure all-cause mortality being 0.3 per 1000 person-years. In multivariate analysis, factors (hazard ratio, P value) associated with higher post-procedure mortality were: high or very high PESI class (4.17, 0.002), post-embolectomy mean PAP (1.05, 0.025) and pre-embolectomy ICU stay (6.05, 0.021).

Conclusion: FlowTriever-assisted embolectomy is safe and effective in reducing pulmonary arterial pressure in high and intermediate-risk pulmonary embolism. High or very high PESI class, pre-embolectomy ICU stay and post-embolectomy mean pulmonary arterial pressure are associated with higher post-procedure mortality.

Congenital High Airway Obstruction Sequence (CHAOS): A Case Report



Mia Ma, M.D., Beatrice Knisely, M.D., Brian Craig, M.D., Karyn Ledbetter, M.D.

Introduction:

Congenital high airway obstruction sequence (CHAOS) was coined by Hedrick and colleagues to describe fetuses with upper airway obstruction and ultrasound findings that were incompatible with life. CHAOS is often an isolated finding, but it can also be linked to certain genetic syndromes, such as Fraser syndrome.

Congenital high airway obstruction sequence (CHAOS) was coined by Hedrick and colleagues to describe fetuses with upper airway obstruction and ultrasound findings that were incompatible with life. CHAOS is often an isolated finding, but it can also be linked to certain genetic syndromes, such as Fraser syndrome.

The pathogenesis of CHAOS remains largely unknown. It is believed to be due to atresia or stenosis of the larynx or trachea, which leads to obstruction of the fetal upper airway. The obstruction results in the tracheobronchial tree's inability to reabsorb the fluid secreted by the fetal lung. Subsequently, the accumulated fluid causes increased intratracheal pressure, expands the fetal lungs and may result in oligohydramnios. The overdistended lungs compress the heart, resulting in a dysfunctional and centrally deviated cardiac system. The lack of venous return causes an accumulation of ascitic, pleuritic and pericardial fluid, which directly contributes to nonimmune fetal hydrops and eventual polyhydramnios.

Patient History:

A 35-year-old gravida 10 parity 4 female presents at 18 4/7 weeks gestation for evaluation of a possible twin pregnancy with one viable fetus with an omphalocele. She has a history of 2 spontaneous abortions and 3 elective abortions. She has a past medical history of abnormal Pap smear, chlamydia, and postpartum depression. Her past surgical history includes cervical cerclage and cesarean section. Patient has a family history of autism, Down syndrome, stillbirth, and miscarriage. The only illness during pregnancy was a pimply rash. She denies any vaginal bleeding. She denies recent travel and new sexual partners. She denies drug use, tobacco use, and alcohol use. Ultrasound imaging was obtained for further evaluation.

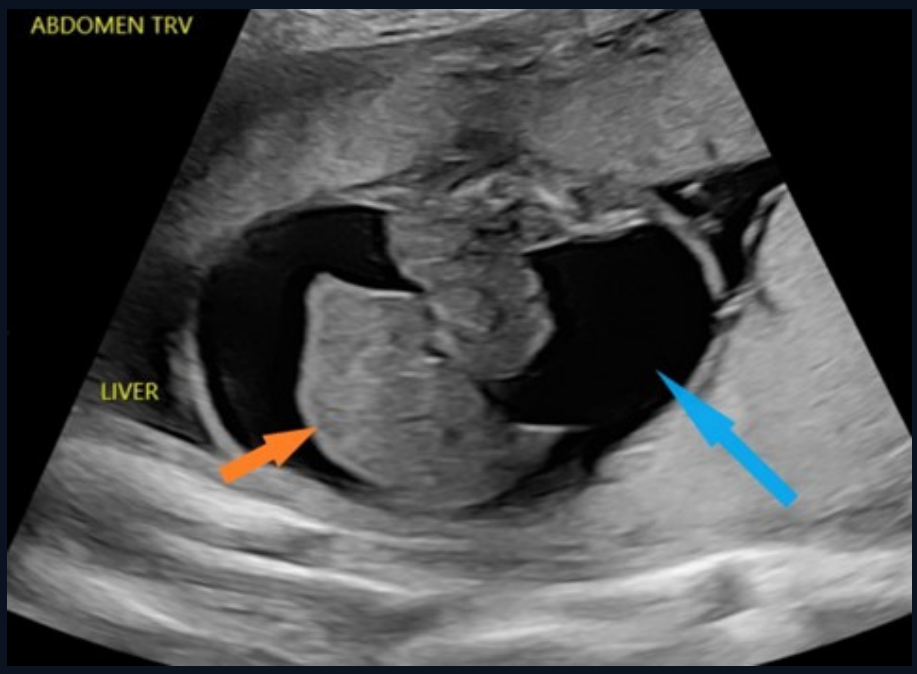


Figure 1: This axial greyscale ultrasound image demonstrates the normal liver (orange arrow) surrounded by large volume ascites (blue arrow).

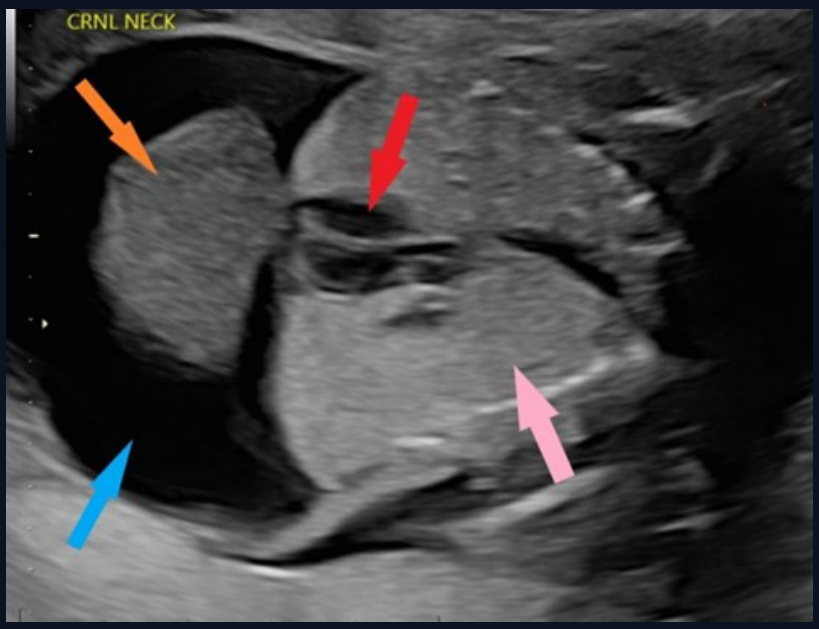


Figure 2: This coronal greyscale ultrasound image demonstrates the normal liver (orange arrow) surrounded by significant ascites (blue arrow). Additionally, the enlarged hyperechoic lungs (pink arrow) are visualized with resultant eversion of the diaphragm. The heart (red arrow) is midline and appears compressed.

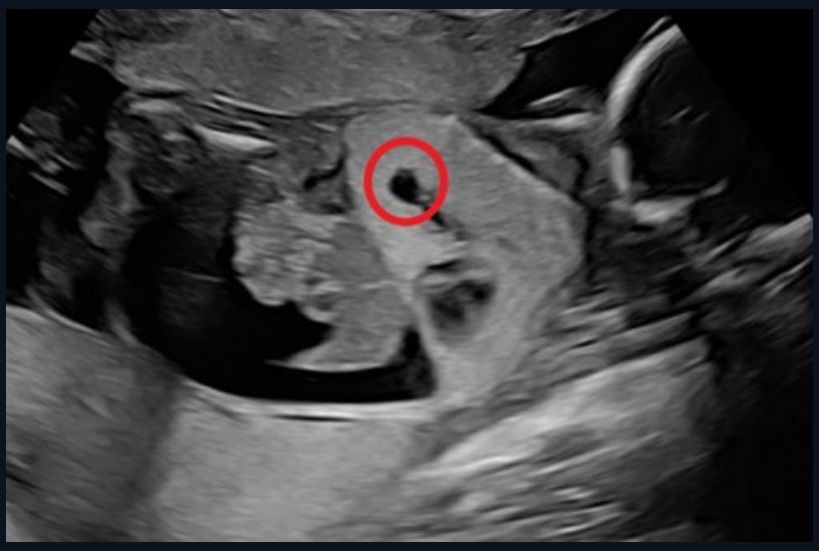


Figure 3: This coronal oblique greyscale ultrasound image demonstrates a fluid filled structure (red circle) opposite of the heart, in the right lung. Presumably, this structure is causing the high airway obstruction, leading to CHAOS syndrome.

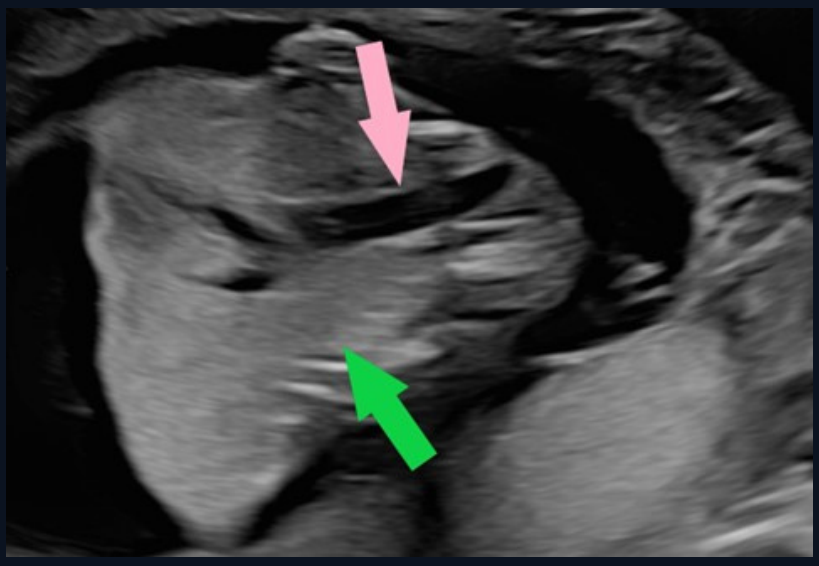


Figure 4: This greyscale ultrasound image in the coronal plane demonstrates an abnormal fluid-filled trachea (pink arrow). The enlarged hyperechoic lungs (green arrow) are again noted.

Discussion:
The classic sonographic findings of congenital high upper airway obstruction (CHAOS) include bilateral symmetric enlarged hyperechoic fetal lungs, flattened or everted hemidiaphragms, and a dilated, fluid-filled trachea. These findings are diagnosed on prenatal ultrasound, and CHAOS may be detected in the fetus as early as 16 weeks of gestation. Displacement of the heart and severe ascites may also be seen on ultrasound. MRI can also be used to diagnose CHAOS. MRI allows for improved visualization of dilated airways with accurate detection of the level and structure of the obstruction. Although CHAOS often results in fetal demise, there is a spectrum of disease severity that may aid in indicating prognosis. The presence of fetal hydrops, ascites and severe oligohydramnios upon early imaging is an ominous sign and often results in unfavorable outcomes.

The true incidence of CHAOS remains unknown. Nevertheless, among fetuses that have been identified to have CHAOS, the morbidity and mortality rate is extraordinarily high. The ex-utero intrapartum treatment (EXIT) is one of the most recognized procedures for treating CHAOS. This technique enables clinicians to maintain placental blood circulation to the fetus while maintaining the airway by tracheostomy or intubation. The EXIT procedure should only be considered in fetuses with obstruction at a level that is compatible with an artificially established airway and in fetuses that do not have additional findings that are associated with poor prognosis, such as hydrops or genetic syndromes.

CHAOS is a rare syndrome that is important to detect early to offer interventions, such as the EXIT procedure or pregnancy termination, in a timely manner. CHAOS presents with a spectrum of clinical severity and may be associated with factors that indicate a poor prognosis, such as early hydrops or ascites. Pregnancies complicated by CHAOS may be associated with genetic disorders, resulting in intellectual disability, recurrent miscarriages and karyotypic aberrations. Therefore, it is important for radiologists to recognize the key radiological findings of CHAOS to accurately guide patient management.

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Evaluation of Appropriate Clinical Utilization of Pediatric Stroke Protocol/MRI Examinations

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Abstract

Background: Pediatric stroke is rare with only 1000 pediatric strokes in the United States per year. Despite its infrequency, pediatric stroke remains a major cause of morbidity and mortality in the pediatric population which is often attributed to delays in diagnosis with cases remaining under or misdiagnosed. This is largely due to the lack of focused neurological signs such as focal motor weakness, facial weakness and aphasia in children. Non-specific symptoms such as seizures, lethargy, generalized hypotonia and headache tend to be more frequently encountered with pediatric stroke. While CT head can be a useful first line imaging option, MRI brain may be required in the pediatric age group to arrive at a definitive diagnosis. It is important, however, to recognize the appropriate symptoms which merit the need for evaluation by pediatric stroke MRI due to the high rate of stroke mimics and to avoid overutilization and inappropriate use of urgent MR imaging.

Objective: To study the impact of having monthly educational reviews regarding the most recent usage of pediatric stroke protocol and their appropriateness in the context of the patient's presenting symptoms.

Materials and Methods: The number of ordered pediatric stroke protocol cases and the number of positive stroke cases and negative stroke cases are logged every month and the data is analyzed to see how many of those cases are true positives. The attendees are then given information regarding each scenario when the protocol was activated, what the final diagnosis was, and whether activating the protocol was beneficial or not in identifying arterial ischemic stroke. Additionally, a 5-question survey utilizing a Likert scale is distributed to conference attendees with questions focused on the impact of monthly educational sessions.

Results: Since the initiation of monthly conference sessions, there has been a decrease in the number of false positive pediatric stroke cases identified by emergent MR. Additionally, when surveying conference attendees, 75% of respondents agreed that monthly educational sessions help to decrease the use of unnecessary stroke protocol/MR examinations and 67% of respondents agreed or strongly agreed that monthly conference sessions have been helpful in their decision making regarding when to order a study. Remaining questions were analyzed separately as additional effectiveness assessment tools for conference sessions.

Conclusion: Since the initiation of this study, there has been an overall decrease in inappropriate usage of urgent pediatric stroke/MR studies with 75% of conference attendee respondents agreeing that monthly educational sessions help to decrease unnecessary stroke protocol/MR examinations. Further research may look into other educational tools and interventions that promote the appropriate ordering and usage of pediatric stroke protocol/emergent MR studies.

Atrial Transseptal Coil Embolization of a Pulmonary Venous Aneurysm In a 38-Year-Old Male With Hemoptysis

Sydney Cooper, DO1, **Myles Mowery, DO**, MBA2, Michael Brunner, MD, FHRS3, Jarrod MacFarlane, DO4

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INTRODUCTION:

Pulmonary venous aneurysm (varix) is a rare venous abnormality defined as local dilation >50% than that of normal vasculature, with normal pulmonary vein diameter ranging from 9 mm to 13 mm [1]. The etiology of pulmonary aneurysm seems to be associated with disruption of pulmonary parenchyma (e.g. trauma, cancer, infection, etc.) or congenital in origin. The overall incidence of these aneurysms is unknown. Historically, treatment of pulmonary vein aneurysms has been based on the presence or absence of hemoptysis. Hemoptysis has been used as a criterion to intervene surgically or endovascularly. The absence of hemoptysis has led others to observe mixed outcomes. Endovascular treatment of pulmonary venous aneurysms is uncommon due to the challenge of accessing the left atrium and the pulmonary venous system. Reported cases have described percutaneous CT-guided [2] and transseptal [3] approaches. In one case report a venous aneurysm was accessed through a patent foramen ovale [4]. We present the case of a pulmonary venous aneurysm in which the left atrium and pulmonary venous system was accessed with a transseptal puncture approach utilizing intracardiac echocardiography (ICE) in collaboration with the cardiac electrophysiology team.

CASE REPORT:

IRB determination was not required by our institution for submission of this case. A 38-year-old male with a history of metastatic synovial sarcoma to the lungs status post chemotherapy treatment who presented to the emergency department with shortness of breath and multiple episodes of hemoptysis. He had presented to an outside facility for recurrent hemoptysis six months prior, where he was found to have hemorrhages of the bilateral upper lobes of his lungs. This was treated with five sessions of radiation therapy. A contrast-enhanced CT angiogram of the chest was performed in our facility at the time of presentation revealing interval enlargement of known metastatic lesions, ground-glass alveolar opacification in the left upper and right lower lobes thought to be hemorrhage, and a new right lower lobe pulmonary venous aneurysm (Figure 1.) Interventional radiology was consulted for a pulmonary artery angiogram, which revealed no abnormalities in the arterial circulation. Delayed images during the angiogram revealed opacification of the pulmonary venous aneurysm previously seen on CT scan, estimated to be 2.7cm without arterial communication. Multidisciplinary discussions took place between interventional radiology, cardiac electrophysiology, radiation oncology, and pulmonology teams. The decision was made to coil embolize the pulmonary venous aneurysm as there was no other identified potential source of hemoptysis. This procedure would be performed in collaboration with the cardiac electrophysiology team, who would grant access to the left atrium via a transseptal approach utilizing intracardiac echocardiography (ICE.)

Cordis introducer sheaths were inserted into the right and left common femoral veins using the modified Seldinger technique and ultrasound guidance. A Biosense Webster ACUSON AcuNav Intracardiac Echocardiography (ICE) 10F catheter was advanced into the right atrium of the heart to visualize the cardiac structures. Transseptal puncture was performed using an Abbott Vascular BRK-1 needle inserted through an Abbott Vascular SL1 sheath. A guidewire was advanced into the left atrium. The SL1 sheath was exchanged for a medium-curve Abbott Vascular Agilis steerable introducer sheath. The sheath was positioned in the right inferior pulmonary vein and a pulmonary venogram was performed to confirm positioning.
A Cook Medical Bentson guidewire and a 6F Argon Plasma Coagulation (APC) catheter were advanced into the right atrium. The catheter and guidewire combination was successfully navigated through the right ventricle into the right pulmonary artery. Right pulmonary venography was performed revealing filling of the right inferior pulmonary vein aneurysm.

Next, a steerable 8 French sheath, and a Cook Medical coaxial 5F Vert and microcatheter system was advanced through the Agilis sheath into the right inferior pulmonary vein. A right pulmonary venogram was performed, confirming the positioning of the catheter tip within the venous aneurysm (Figure 4). A Stryker Excelsior 1.7F microcatheter was then advanced into the aneurysm sac over a guidewire. Numerous Stryker XL and XXL framing coils ranging in size from 12 to 24 mm in diameter were used for embolization of the aneurysm sac (Figure 5). Another pulmonary venogram was performed, confirming successful occlusion of the venous aneurysm and patency of the draining pulmonary vein (Figure 6.)

Following the pulmonary vein aneurysm coiling, the patients' hemoptysis resolved. He was able to discharge in stable condition the following day.

Symptomatic pulmonary vein aneurysm is a rare occurrence. Among those pulmonary vein aneurysms that are symptomatic needing treatment, it is not often repaired endovascularly. One large obstacle to overcome in endovascular repair is accessing the left atrium and pulmonary venous system, which we were able to achieve through a transseptal approach utilizing ICE.

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Diagnostic Imaging Utilization in the Emergency Department: Recent Trends in Volume and wRVUs

Neo Poyiadji MD, Norman Beauchamp, Daniel Myers MD, Brent Griffith MD
Department of Radiology, Henry Ford Hospital, Detroit, MI.

Purpose:
Diagnostic imaging plays a critical role in the management of patients in the emergency department. As emergency departments continue to see a rise in patient visits there has been a historically disproportionate increase in diagnostic imaging volumes according to prior studies. Although imaging can improve treatment and patient outcomes, higher imaging volumes, particularly advanced imaging, leads to increased health care costs, patient radiation exposure and work demands on already taxed radiology departments. This study quantifies and characterizes the recent trends in emergency department imaging volumes and work RVUs at level 1 and level 3 trauma centers.

Materials and Methods:
Total annual diagnostic radiology imaging volumes and work RVUs (wRVU) were obtained from a tertiary level 1 (HFH) and a level 3 trauma (HFWB) center from January 2014 to December 2021. Imaging volumes were analyzed by modality type, exam code and location. Total annual patient emergency department encounters (EDE) were obtained to control for yearly and interhospital variations in ED patient census. Data was analyzed utilizing annual imaging volume or wRVU per EDE and percent change was calculated. The total annual number of Emergency Severity Index (ESI) levels 1-5 were obtained over the study period at each imaging site. The annual weighted average of the ESI level for each imaging site was calculated to control for patient complexity over time. The total number of observation, inpatient, and intensive care admissions from the emergency department were also obtained. The percent of admissions relative to total EDE for that year was obtained to assess for differences over time.

Results:
At the level one trauma center, imaging utilization volumes per EDE increased for CR, CT and MRI (5.5%, 35.5% and 56.3% respectively) and decreased for US (-5.9%) from 2014 to 2021. Imaging utilization volumes per EDE for the level 3 trauma center increased for US, CT and MRI (10.4%, 74.6% and 2.0% respectively), and decreased for CR (-4.4%) over the same 8 year period. Total wRVUs per EDE at the level 1 and level 3 trauma centers increased by 34.9% and 76.6% respectively over the study period. CT accounts for the majority of wRVUs at both sites in 2014 and 2021 (HFH: 62.3%, 71.0%; HFWB: 64.1%, 80.1% respectively). The increase in CT volume accounts for most of the increase in wRVU at both sites by magnitude, and CT wRVU per EDE increased by 53.7% at HFH and increased by 120.5% at HFWB over the study period. CTA head and neck studies demonstrated the greatest percent increase per EDE over the study period with an increase of 536.4% and 1,669.1% at HFH and HFWB respectively.

The average weighted ESI (wESI) declined over the study period at both imaging sites. The wESI for the level 1 center was 2.36 in 2021 and 2.66 in 2014. The wESI for the level 3 center was 2.79 in 2021 and 3.05 in 2014. The annual percent of observation, inpatient, and intensive care unit admissions of total EDE at HFH in 2021 was 6.7%, 17.9% and 3.1% respectively (5.9%, 16.5% and 3.4% in 2014). The annual percent of observation, inpatient, and intensive care unit admissions of total EDE at HFWB in 2021 was 9.6%, 18.6% and 2.2% respectively (8.1%, 18.7% and 4.0% in 2014).

Conclusion:

Emergency department imaging utilization increased over the 8-year study period at both level 1 and level 3 trauma centers with an increase in total work RVU per EDE. There is a disproportionate increased utilization of advanced imaging such as CT and MRI at the level 1 trauma center and increased CT utilization at the level 3 trauma center over time. Increased imaging utilization is independent of ED patient volumes, admission rates and disproportionately greater than the decline in average weighted ESI suggesting that there are extrinsic factors driving the increase in imaging utilization. Emergency department utilization trends suggests that there will be a continued increase in demand for advanced imaging interpretation, including at lower acuity hospitals, thus radiology departments should prepare for this increased work demand.

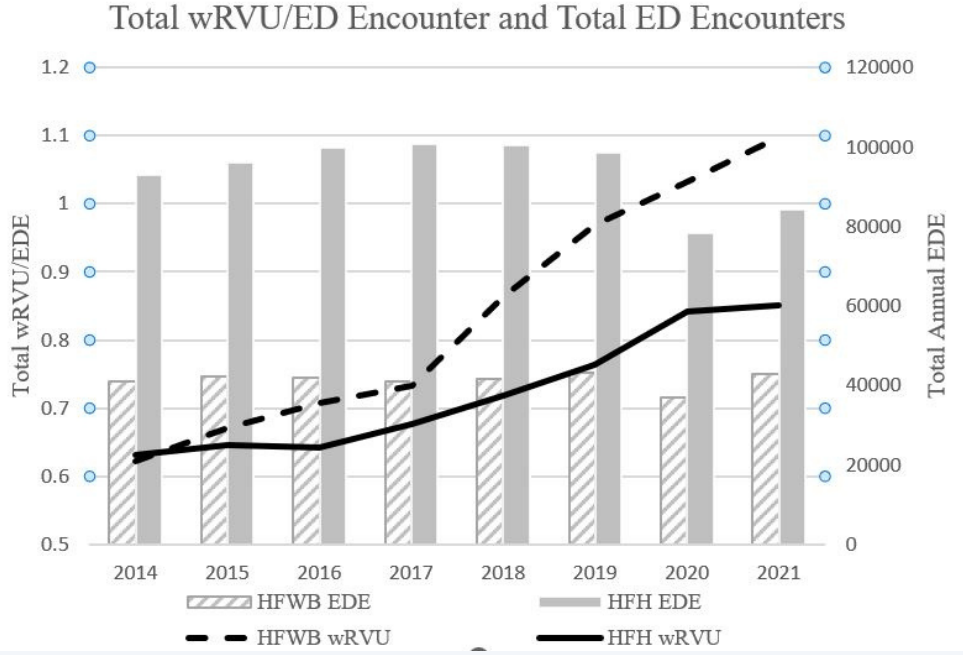

Table 1. Percent Change in wRVU/EDE from 2014-2021		
Modality	**HFWB (%)***	**HFH (%)***
Radiographs	-11.7 (9.8)	2.0 (13.5)
Ultrasound	9.3 (5.9)	-18.5 (8.7)
CT	120.5 (80.1)	53.7 (71.0)
MR	10.2 (4.2)	69.4 (6.8)
Total	76.6	34.9

* Parenthesis denotes percentage of all wRVU performed at that imaging site in 2021.

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Diagnostic Radiology Fellowship Applicant Selection Criteria: A Survey of Program Directors

Authors: **Rajbir S Pannu MD**, Nicholas Mills MD, Alexander Tsibulski MD, George Pappas MD

Residency Program: Trinity Health Oakland Diagnostic Radiology Residency, Pontiac, MI

Introduction:

The study aims to investigate which characteristics are deemed the most and least important by program directors from various diagnostic radiology subspecialty fellowship programs when selecting a fellowship candidate.

Methods:

An online survey of radiology fellowship program directors in the United States was conducted. A total of 6 different radiology subspecialties were surveyed, including Abdominal/Body/Cross-Sectional Imaging, Breast/Women's Imaging, Cardiothoracic Imaging, Musculoskeletal Imaging, Neuroradiology Imaging, and Pediatric Imaging. A total of 22 questions were grouped into four general categories of demographics, personal characteristics, extracurricular activities, and educational accomplishments. A standard 10-point Likert scale was used to rank each applicant's characteristics, with 10 being the most important and 1 being the least important characteristic.

Results:

119 responses were collected from the invitation, corresponding to an overall response rate of 26.2% (119 of 455). A relatively balanced response was collected from different subspecialty program directors. An aggregate analysis of all the subspecialties showed interview performance, letters of recommendation, and residency program attended as the three most important factors considered by the program directors when selecting a candidate for their fellowship program. In contrast, the three least important factors were gender, prior subspecialty training, and minority status. The applicant's visa status, personal statement, and USMLE step 3 performance were the only statistically significant ($p<0.05$) differences between the subspecialties. Women's and body imaging rated the personal statement as more important than musculoskeletal imaging and neuroradiology. Cardiothoracic and musculoskeletal imaging rated the applicant's visa status as more important than neuroradiology. Women's and cardiothoracic imaging rated USMLE Step 3 performance as more important than musculoskeletal imaging.

Conclusion:

Selecting the ideal candidate for a fellowship in radiology can be a difficult task. Our findings outline which applicant characteristics program directors believe are the most and least important when selecting an ideal candidate. For instance, personal characteristics such as interview performance and letters of recommendation are more valued than extracurricular activities such as research experience. Our findings are similar to a study conducted in 2012 which showed interview performance and letters of recommendation as the most important subjective applicant characteristics and residency performance and residency program prestige as the most important objective characteristics (1). Identifying these characteristics provides a better understanding of the fellowship application process and may guide future applicants.

Pediatric Sickle Cell Emergencies from Head to Toe: A Multimodality Imaging Approach
Purpose/Introduction

Anjelica Saulsberry-Abate, MD, James Davis, MD, Anastasia L. Hryhorczuk, MD

Learning Objectives/Aims:

Review the clinical presentation, imaging findings, and management of emergencies in children with sickle cell disease, with attention to the critical role of imaging when differentiating between potential diagnoses and directing appropriate care.

Methods:

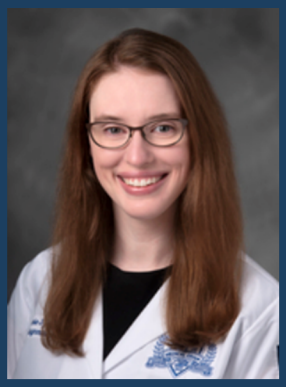
This exhibit will explore the multimodality emergency imaging of children with:

I. Acute vasoocclusive pain crisis
II. Dactylitis
III. Infection/sepsis
IV. Acute chest syndrome
V. Stroke
VI. Splenic sequestration
VII. Gallbladder disease
VIII. Renal nephropathy and infarcts

Conclusion:

We will emphasize the central role of imaging in identifying acute and life-threatening complications in children with sickle cell disease, as well as the value of radiology in uncovering other pathologic processes that should be considered when these children present to the emergency department.

Plasmacytoma of the Cricoid and Thyroid Cartilage: A Rare Location of an Uncommon Tumor



Stephanie Szczesniak, M.D.

Khalid Eteer, M.D.

Vishwas Tiwari, M.D.

Stephanie Szczesniak, M.D., Khalid Eteer, M.D., Vishwas Tiwari, M.D., Horia Marin, M.D., Brent Griffith, M.D., John Corrigan, M.D., Daniel Noujaim, M.D.

Henry Ford Health System

Introduction:

Plasmacytoma is a discrete solitary mass of monoclonal neoplastic plasma cells that may arise from medullary or extramedullary sites. Extramedullary plasmacytoma (EMP) is more commonly found in the head and neck; however, EMP of the larynx is extremely rare. EMP accounts for less than 4% of plasma cell tumors. Head and neck imaging is important in identifying and diagnosing lesions via CT and/or MRI, as well as for image-guided biopsy. Patients can then be treated with a combination of radiation and chemotherapy. Our two cases illustrate this uncommon pathology located in the cricoid and thyroid cartilage, respectively, with Case 2 also demonstrating solitary skeletal involvement of the C2 vertebral body.

Case Presentations:

Case 1: 50-year-old female presents to our facility with enlarging left-sided neck mass. CT neck images (A, B) demonstrate expansile and lytic lesions within the cricoid and left thyroid cartilage with FDG uptake on PET-CT (C). After imaging and endoscopy (E), the patient underwent ultrasound-guided biopsy of the cricoid mass (D). The patient was diagnosed with plasmacytoma with plasma cell dyscrasia that improved with chemotherapy.

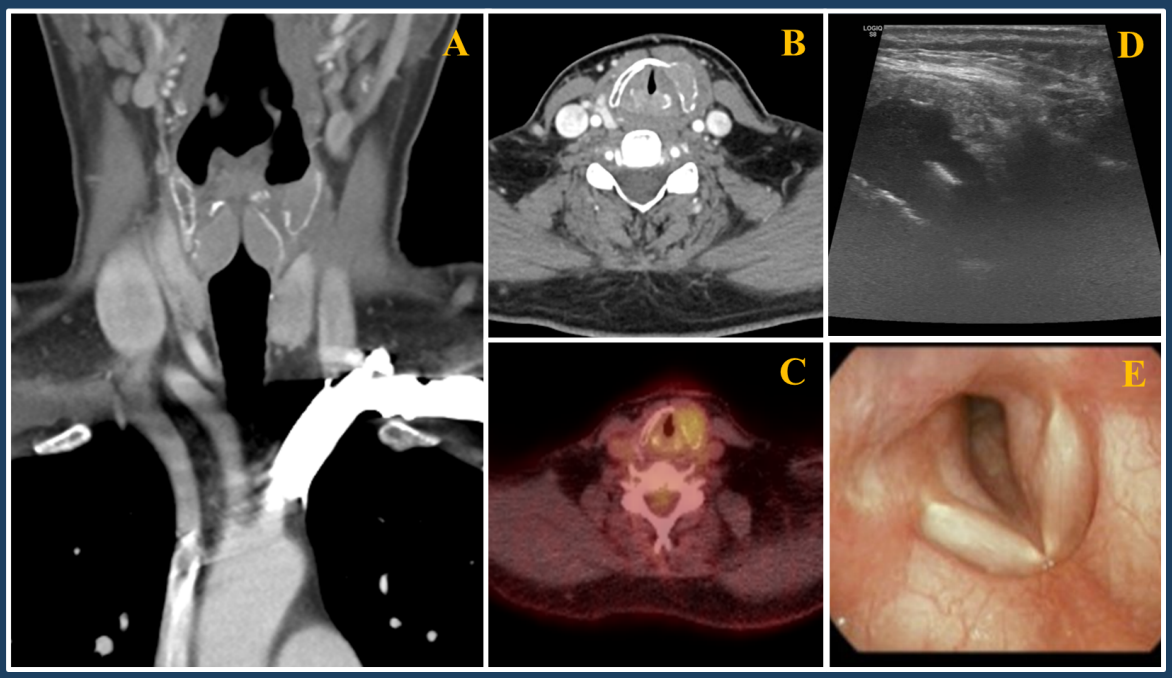
Case 2: 85-year-old male presents to outside facility for a fall with imaging notable for lytic and expansile lesions in the right thyroid cartilage on T1-weighted MRI (A) and CT (B) images, and of the C2 vertebral body on CT images (D). At our facility, uptake is seen on respective PET-CT images (C, E). Then, CT-guided biopsy of the thyroid cartilage lesion and transoral biopsy of the C2 lesion were obtained (F, G), in addition to endoscopy (H). The patient was diagnosed with plasmacytoma without plasma cell dyscrasia.

Conclusion:

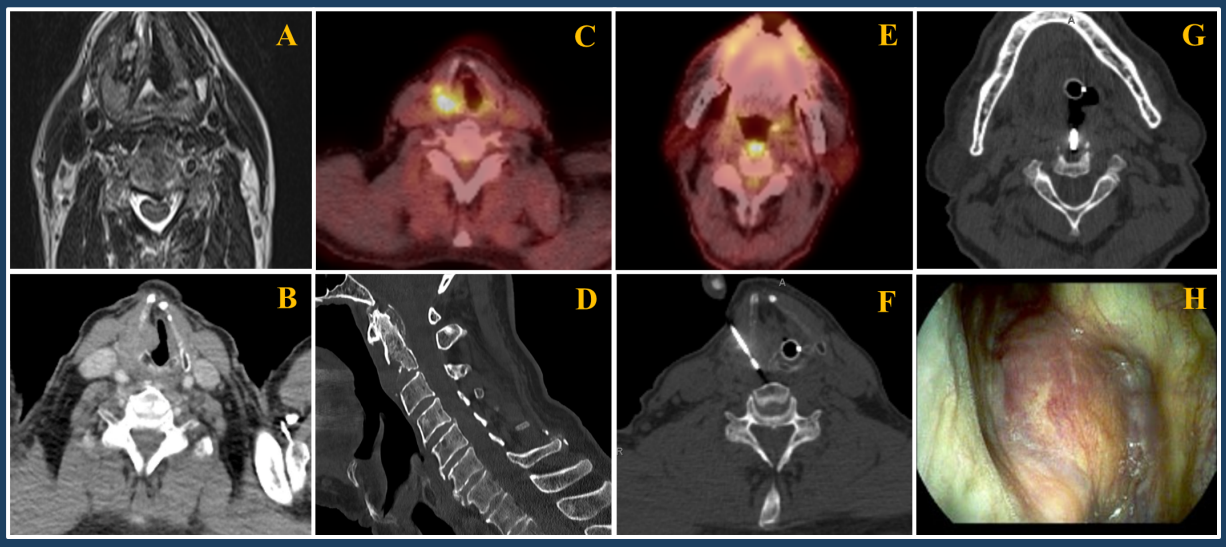
Extramedullary plasmacytoma (EMP) is a rare form of plasmacytoma that is found in the head and neck. While classic imaging characteristics have not been well-defined given the rarity of EMP, it is an important consideration for radiologists when providing differential diagnoses of head and neck lesions.

Case Figures:

Case 1:



Case 2:



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The FIND Program: Improving Follow Up of Incidental Imaging Findings

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Methods:

A retrospective analysis of 2,000 patients with computed tomographic cross-sectional imaging was performed; 1,000 patients prior to implementation of the FIND Program and 1,000 patients one year after establishment of the program. Data collected included the frequency of incidental findings, inclusion of follow-up recommendations in the radiology report, and adherence to suggested follow-up.

Results:

There was a significantly higher rate of follow-up study recommendation for incidental findings in the post-intervention group (67/70, 95.7%) compared to the pre-intervention group (52/69, 75.4%) (p=0.001). Incidental findings noted on studies for emergency department patients more frequently recommended follow-up imaging in the post-intervention group (97.7%, 42/43) compared to 81.8% (27/33) of studies in the pre-intervention group (p=0.04). Patients in the cohort after implementation of the FIND Program had a higher rate of completing follow-up of 50.7% (34/67) in contrast with the pre-intervention group (16/52, 30.8%) (p=0.03). Emergency department patients with incidental findings for which imaging follow-up was recommended had a higher rate of adherence to follow-up recommendations in the post-implementation group (22/40, 55.0%) compared to the pre-implementation group (5/26, 19.2%).

Conclusion:

Implementation of an incidental findings tracking program resulted in improved follow-up of incidental imaging findings. This has the potential to reduce the burden of clinically significant incidental findings possibly resulting in later presentation of advanced disease.

A Lateral Point of View on Bone Mineral Densitometry: A Single Center Retrospective Analysis

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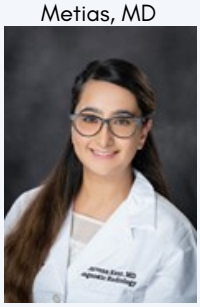

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Introduction:

Osteoporosis is significantly underdiagnosed and undertreated. This may be because traditional frontal lumbar spine protocol for dual-energy x-ray absorptiometry (DEXA) bone density evaluation potentially overestimates bone density due to the presence of superimposed osseous structures and sclerotic degenerative changes. The purpose of this study is to determine if the lateral lumbar spine DEXA is more sensitive than the traditional frontal view in diagnosing osteoporosis.

Methods:

A retrospective analysis of DEXA scans completed between January 2020 and December 2021 at a single institution was performed. All patients who met the criteria for osteoporosis screening were included. The bone mineral density (BMD) and T-scores were compared between the frontal and lateral lumbar spine, as well as the lateral lumbar spine and femoral neck. Statistical analysis was performed using SPSS statistics software version 25.0.

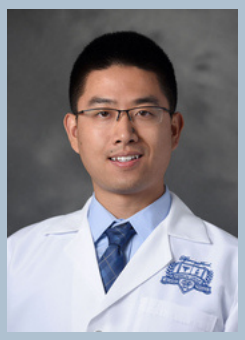
Results:

A total of 2733 patients (mean age, 67.3 years ± 9.2; 2654 (97.1%) female) were included. The T-scores obtained from BMD measurements of the lateral lumbar spine (mean, -1.5 ± 1.7) were significantly lower (paired t-test, $p<0.0005$) than that of frontal views (mean, -0.4 ± 1.7). This resulted in a more frequent diagnosis of osteoporosis, with 30.7% (838/2733) of patients being diagnosed with osteoporosis based on lateral view, compared to 7.4% (202/2733) on frontal view.

Conclusion:

Lateral lumbar spine bone mineral densitometry resulted in significantly lower BMD measurements compared to frontal lumbar spine views, leading to more frequent diagnoses of osteoporosis and osteopenia.

Landscape of Oncology-Specific, FDA-Approved, Artificial Intelligence and Machine Learning-Enabled Medical Devices



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Purpose/Objectives:

Machine learning (ML), a type of artificial intelligence (AI) technology that uses a data-driven approach for pattern recognition, has been shown by numerous research studies to be beneficial for tasks across healthcare. In this study, we aim to characterize the commercial availability of oncology-specific AI/ML applications in the clinic by performing a detailed analysis of such devices that were approved/cleared by the US Food and Drug Administration (FDA).

Materials/Methods:

A list of 343 AI/ML-enabled medical devices that were approved or cleared by the FDA up to June 2021 was published by the agency, and this list was used to construct the initial database for our study. The publicly available FDA approval letters for these devices were independently reviewed by two research assistants, and a device was classified as oncology-specific if its primary intended use is related to assisting the diagnosis or treatment of oncologic pathologies. For oncology-specific devices, additional details on device characteristics, FDA regulatory process, and approved indications were obtained. A basic descriptive statistical analysis was performed on the aggregated data.

Result:

Fifty-two (15.2%) of the 343 AI/ML-enabled medical devices were classified as oncology-specific. The growth of the oncologic-specific devices sharply rose since the mid-2010s, with 49 (94.2%) approved in 2016 or after. Fifty (96.2%) devices were cleared by the 510(k) premarket notification pathway, and, except for one class III device, the remaining 51 devices were considered as class II by the FDA. All but one device was considered Software as a Medical Device (SaMD). Thirty-six (69.2%) devices were intended for diagnostic purposes, of which 24 (66.7%), 9 (14.3%), 1 (6.3%), 1 (6.3%), and 1 (6.3%) was for the detection of breast cancer, lung cancer, prostate cancer, thyroid cancer, and bone cancer, respectively. The 16 devices intended for therapeutic purposes were all related to radiotherapy: 15 are for radiation treatment planning (all included organ auto-segmentation as the main function), and 1 is a linear accelerator equipped with AI/ML algorithms.

Conclusions:

Our results showed a rapid increase of oncology-specific, FDA-approved, AI/ML-enabled medical devices since 2016. Further study is needed to assess the impact made by these devices on the delivery of oncology care.

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