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PLATFORM and POSTER PRESENTATIONS

Autopsy

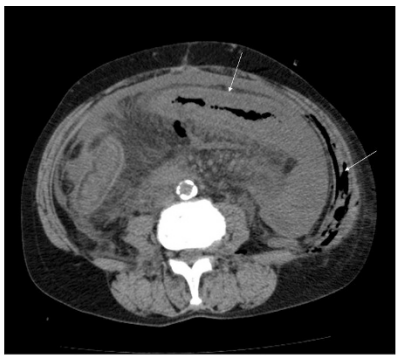
1 Clostridium Septicum Causing Fatal Sepsis in a Patient with Ovarian Cancer: A Case Report

Boulos Beshai, Stephen P Montgomery, Nancy Drotar, Teriza Shehatou. Hartford Hospital, Hartford, CT; Crouse Hospital, Syracuse, NY.

Background: Spontaneous "non-traumatic" gas gangrene is rare, potentially catastrophic, and is almost exclusively caused by Clostridium septicum. This infection is associated with gastrointestinal and hematologic malignancies. We report an autopsy case of ovarian cancer complicated by undiagnosed C. septicum infection following chemotherapy treatment.

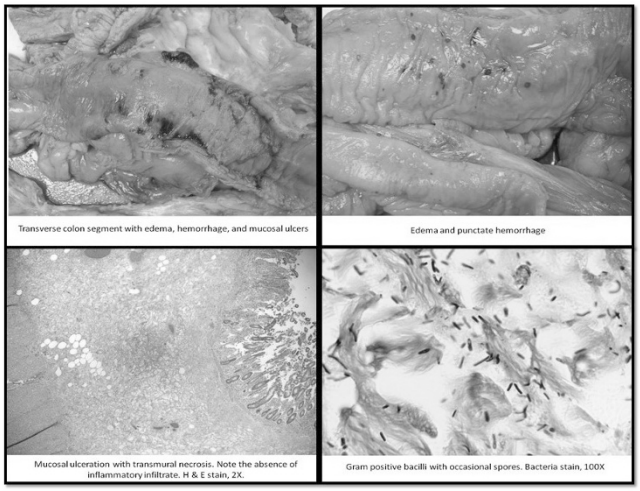
Design: 52 year old female presented with severe abdominal pain, vomiting, and diarrhea. She was diagnosed with stage IIIC serous ovarian carcinoma 3 months earlier and the symptoms started after the second round of chemotherapy. On examination, the patient had generalized tenderness, fever and tachycardia. Labs showed neutropenia, thrombocytopenia, and lactic acidosis. Stool analysis was negative for Clostridium difficile. Blood culture was sent, abdominal CT scan was requested, and she was started on empiric antibiotics (Metronidazole, Piperacillin, Tazobactam, and Vancomycin). Surgical intervention was not indicated at that time based on lack of evidence for obstruction or perforation. The patient shortly developed guarded abdomen, disseminated intravascular coagulopathy, septic shock, and expired 12 hours post presentation.

Results: CT scan of abdomen report came post mortem



Thickened bowel wall and subcutaneous emphysema

Blood culture results revealed C. septicum. Autopsy gross, microscopic findings, and gram stain are shown



Conclusions: C. septicum is a normal gut flora, however, it causes septicemia in immunodeficient patients. It is possible that malignancy itself or its treatment impairs the immune function of the gastrointestinal mucosa and allows access to circulation via mucosal ulceration. This is a rare condition but fatal if not treated early. Recognition is based on clinical presentation, predisposing immunosuppression, lab results and imaging studies findings. Broad-spectrum antibiotics combined with timely surgical intervention can give better outcome.

2 Histologic and Molecular Findings of Heartland Virus (HRTV) at Autopsy: A Case Series Review

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Background: HRTV is a Phlebovirus transmitted by the Lone Star tick and was first identified in Missouri (MO) in 2009. Non-fatal cases have been reported in MO and Tennessee (TN), affecting older Caucasian men living in rural areas. Patients (pt) with HRTV have fever, leukopenia, and thrombocytopenia. No treatment is available and care is supportive. The histologic findings associated with HRTV infection are not well described.

Design: Autopsy reports from 2009-2016 were reviewed for HRTV. One case was identified from 2014. A literature search for fatal cases of HRTV was also performed. A case from 2013 in TN was identified. The histologic findings and history were reviewed to identify similarities in the cases. The cases had material sent to the Centers for Disease Control for polymerase chain reaction (PCR) and immunohistochemical (IHC) analysis for HRTV.

Results: The pts were older Caucasian men (60 and 80) who lived in rural areas. They had co-morbid conditions including chronic obstructive pulmonary disease. The 60-year-old (P1) was immunosuppressed for treatment of rheumatoid arthritis and had type 2 diabetes mellitus. The second pt (P2) had a history of alcohol abuse. Both presented with weakness, fever, and altered mental status; transaminitis and thrombocytopenia was present in both. P2 was leukopenic. Both had thrombocytopenia and leukopenia requiring critical care before developing multiorgan failure and expiring.

Autopsy findings in both pts showed splenic white pulp depletion. The spleen of P1 and mediastinal lymph nodes (LN) in P2 had features of hemophagocytic histiocytosis (HLH). The IHC in P2 was positive in the spleen and LNs and negative in the bone marrow. IHC was positive in a pre-mortem bone marrow biopsy of P1, but was negative in the autopsy samples. PCR was positive in serum, LNs, and spleen in both pts. P1 had involvement by angioinvasive *Candida* which was not seen in P2.

Conclusions: Many similarities were found among the cases. Both men were older and had comorbid conditions. HLH and white pulp depletion were seen in both cases. One difference was the negative IHC in P1's spleen and in the bone marrow of P2. However P1 and P2 had HRTV detected by PCR in the spleen and LNs. Given the involvement of the spleen, LNs, and bone marrow in P1 this supports the theory that HRTV involves the hematopoietic system. This is further illustrated by the presence of HLH in both pts. Overall, HRTV has a limited course in most pts. However in pts with comorbid conditions who develop hemophagocytosis HRTV should be included in the differential diagnosis.

3 Role of Hospital Autopsy in Peri-Procedural Deaths: A 5 Year Retrospective Study

Baidarbhi Chakraborty, Xiaofeng Zhao, Xu Zeng, Nahum Duker, Abir Mukherjee. Temple University Hospital, Philadelphia, PA.

Background: Peri-procedural mortality can be due to iatrogenic therapeutic complication, due to the disease process itself or due to unrelated comorbidity. A therapeutic complication is not necessarily an error but can be a known complication of a particular procedure. The continuing relevance of hospital autopsy in peri-procedural mortality in the modern era has not been adequately studied.

Design: A five-year retrospective study (2011-2015) was performed looking at all adult autopsies performed in a university hospital setting on patients who had died within 30 days of an interventional procedure. Procedures included open or laparoscopic surgery, endoscopy, organ biopsy as well as vascular catheter and tube placement. Retrospective analysis of the medical records, laboratory and autopsy findings were undertaken to determine if the death was likely due to iatrogenic therapeutic intervention,due to the underlying disease process or to an unrelated cause.

Results: A total of 359 adult autopsies were performed over a period of 5 years of which 56 (15.5%) were related to peri-procedural deaths. In six cases (10.7%) there were major discrepancies between clinical and final autopsy diagnosis. A definite

morphological diagnosis could not be established in 5 cases (8.9%). Iatrogenic therapeutic complications were implicated in 30 cases (53.5%). In 8 cases (14.2%) the cause of death was related to the underlying disease and in 13 cases (23.2%) related to co-morbidites. Perioperative exsanguination (10 cases) was the most common therapeutic complication, followed by infection/sepsis (8 cases), perioperative myocardial infarction (6 cases), pulmonary thromboembolism (3 cases), pericardial tamponade (1 case), pneumothorax (1 case) and cerebral infarction (1 case).

Conclusions: Hospital autopsy continues to play an important role in classifying peri-procedural deaths. It is important to determine the incidence and nature of fatal iatrogenic complications, in order to improve the quality of medical care. Autopsy findings also bring a sense of closure to the family of the deceased.

4 Fatal Aortic Dissection: An 8-Year Retrospective Review of Forensic Autopsy Cases at the West Tennessee Regional Forensic Center: 2009 -2016

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Background: Acute aortic dissection (AAD) is the most common life-threatening disorder of the aorta and a recognized cause of sudden death. The incidence is approximately 3 per 100,000 individuals per year. The mortality rate is near 1% per hour during the initial 24 hours of presentation, therefore early diagnosis/treatment are crucial for survival. Due to highly variable and generally non-specific symptoms, AAD can be difficult to recognize leading to the possibility of delayed or missed diagnosis/treatment.

Design: The purpose of this study was to present a retrospective review of autopsy cases performed at the West Tennessee Regional Forensic Center (WTRFC) during an 8-year period where the cause of death was listed as aortic dissection. The WTRFC database was searched for all deaths attributed to aortic dissection from 2009-2016. The cases in which an autopsy was performed were reviewed and analyzed. Microscopic sections, when available, were also reviewed.

Results: There were 27 cases in which an autopsy was performed and the cause of death was AAD during this 8 year period. The yearly distribution of the 27 deaths ranged from 2 deaths in 2010 and 2016 to 5 deaths in 2013. The majority of deaths were men (85%) and black (59%). The average age was 50 years (age range 29 to 65 yo). In 70% of cases there was a history of and/or autopsy findings indicative of hypertension, including one decedent that was in the early postpartum period. Cocaine toxicity was determined to play a role in 11% of cases. 25 of the cases were Stanford type A dissections and 2 were Stanford type B. The majority of decedents (13 cases) had no known complaints prior to death. The other 14 had variable complaints of chest pain (6), abdominal pain (2), nausea/vomiting (1), respiratory distress (1), arm pain (1), chest cold (1), low back pain (1), and low back and leg pain (1). Importantly, 5 presented to a Healthcare Facility in the days prior to death for various symptoms, were released, and died shortly after discharge. 1 presented to a Hospital and died 15 hours after admission without a proper diagnosis being made.

Conclusions: This study provides an initial look at fatal aortic dissection cases at the WTRFC. The results may assist Healthcare Facilities in recognizing the epidemiologic characteristics and presenting symptomatology of people at risk for aortic dissections in order to aid in immediate and correct diagnosis and potentially lifesaving treatment.

5 Value of Hospital Autopsy in Solid Organ Transplantation Deaths: A 5 Year Retrospective Study

Rachana Choksi, Xu Zeng, Nahum Duker, Abir Mukherjee. Temple University Hospital, Philadelphia, PA.

Background: Solid organ transplantations are now increasingly common and deaths following solid organ transplantations are frequently subjected to root cause analysis for improving quality of medical care. There are very few studies in literature which have evaluated the value of hospital autopsy in this context. This study was conducted with an aim to determine the value of autopsies performed in a hospital setting in patients with solid organ transplants.

Design: A five year retrospective study (2011-2015) of all adult autopsies performed in a university hospital following post solid organ transplantation deaths. Review of their medical records, laboratory and autopsy findings were undertaken to determine the concordance between the clinical and autopsy cause of death.

Results: 359 adult autopsies were performed over a period of 5 years of which 32 (8.9%) had a history of solid organ transplantation (lung 10, liver 7, heart 6, kidney 6, heart and kidney 2, lung and kidney 1). The interval from solid organ transplantation to death showed a wide variation (range 1 day – 33 years; average 5.6 years). In 3/32 cases, autopsies revealed findings that were not recognized in premortem evaluations. Previously undiagnosed high-grade right pleural cavity sarcoma was detected in one status- post renal transplantation case. In two cases, minor discrepancies (myocarditis and pulmonary hypertension), which could have contributed to mortality, were also detected. In three cases (3/32) no definite morphological cause of death could be established. The clinical and autopsy diagnosis were concordant in the remaining cases. In one heart transplant case, pretransplant donor angiography was shown to have significantly underestimated coronary atherosclerosis. Infection was the most common cause of death (14/32), followed by rejection and allograft vasculopathy (4/32), perioperative complications (4/32), malignancy (2/32), primary graft failure (1/32) and unrelated causes (4/32).

Conclusions: Hospital autopsy can reveal discrepancies in a significant subset (3/32) of post solid organ transplantation deaths. Even in concordant cases, autopsy can generate findings valuable for root cause analysis.

6 Lethal Fetal and Neonatal Alloimmune Thrombocytopenia - A Case Report and Review of the Literature

Ding Dai, Qi Cai, Christy Isler, Karen Kelly. Brody School of Medicine at East Carolina University, Greenville, NC.

Background: Fetal and neonatal alloimmune thrombocytopenia (FNAIT) is a rare disease process seen in primipara pregnancies causing intrauterine fetal death. The disease is poorly recognized outside the obstetrics community. We present a case of intrauterine fetal death caused by FNAIT.

The alloantibody against human platelet antigen (HPA) can cause rare, immune-hematological disorders including fetal/neonatal alloimmune thrombocytopenia (FNAIT) and post-transfusion purpura (PTP) characterized by severe thrombocytopenia. FNAIT occurs in pregnant women exposed to non-native paternally-inherited fetal platelet antigens. The maternal alloantibodies formed against these antigens cross the placenta causing destruction of fetal platelets. The majority of FNAIT is caused by anti-HPA1a. We report a case of FNAIT caused by anti-HPA5b leading to intracerebral hemorrhage and intrauterine fetal death.

Design: A 22-year-old, African-American female G1P0 at 25 1/7 weeks gestation presented with decreased fetal movement. Her pregnancy was complicated with significant first-trimester vaginal bleeding without transfusion therapy. The ultrasound confirming the fetal demise showed a large, echogenic brain mass consistent with intracranial hemorrhage. The major autopsy findings were intracerebral hemorrhage with subarachnoid extension and delivery-associated bilateral subgaleal hemorrhage. Microscopy showed intracranial parenchymal hemorrhage, subarachnoid hemorrhage and moderate diffuse, acute hypoxic-ischemic injury. Placental examination was grossly and microscopically normal.

Results: Immunological profiles showed maternal specific antibodies to HPA5b. Human platelet antigen genotyping by PCR and fluorescent hydrolysis probes (BloodCenter of Wisconsin) showed a maternal pattern of HPA 5a/5a and paternal pattern of HPA5a/5b. The fetus carried the genotype of HPA5a/5b with paternal-inherited 5b causing maternal alloantibody production against fetal HPA5b.

Conclusions: The alloantibodies cross the placental barrier into the fetal circulation resulting in destruction of fetal HPA5b-positive platelets. The autopsy found intracranial hemorrhage as the cause of intrauterine fetal death. Currently there is no screening program or prophylactic treatment for FNAIT which, unlike Rh incompatibility, can occur in the first pregnancy. The correct diagnosis is crucial for the optimal management of subsequent pregnancies and prevention of fetal death.

7 The Spectrum of Autopsy Findings of 119 Aborted Fetuses with Skeletal Disorders

Magdalena Dubova, Sarka Hadravska, Jiri Ferda, Ondrej Daum, Michal Michal. Biopticka Laborator s.r.o., Plzen, Czech Republic; Faculty Hospital Plzen, Medical Faculty, Charles University in Prague, Plzen, Czech Republic.

Background: 961 autopsies of aborted fetuses of gestational age ranging from 10 to 23 weeks were performed in our department during the last 5 years. The aim of this study was to evaluate frequency and spectrum of skeletal disorders in this series of autopsies.

Design: Traditional autopsy and histopathological examination were conducted in all 961 cases. Moreover, virtual autopsy using X-ray, computed tomography (CT) or magnetic resonance imaging (MRI) was performed in cases of severe skeletal malformations or developmental disorders.

Results: In 508 cases the pregnancy was terminated due to genetic reasons. Skeletal disorders were the sixth most common reason of an induced abortion (table 1). In addition to 39 cases prenatally diagnosed with severe skeletal disorders, fetal autopsy revealed 80 additional cases of (especially milder) skeletal anomalies (table 2). The mean gestational age at the time of pregnancy termination was 16.7 weeks, the mean maternal age was 32 years (range 18-46). Skeletal disorders were associated with another developmental anomalies in 39 (33.1%) of the 119 cases, most often with gastrointestinal anomalies. Fetal autopsy confirmed all prenatally diagnosed skeletal disorders except one case suspicious of osteogenesis imperfecta. This diagnosis was excluded using X-ray, histopathological and molecular genetic investigation.

Chromosomal aberrations	124 (24.5%)
Central nervous system anomalies	84 (16.5%)
Urogenital anomalies	82 (16.1%)
Gastrointestinal anomalies	70 (13.7%)
Congenital heart diseases	52 (10.2%)
Skeletal anomalies	39 (7.7%)
Congenital anomalies of respiratory system	30 (6.0%)
Another developmental disorders	27 (5.3%)

Skeletal dysplasias	5
Dysostoses affectins extremities	109
Thoracic anomalies	1
Amniotic band syndrome	4

Conclusions: Skeletal disorders are relatively frequent and are often associated with more severe developmental disorders. In the vast majority of cases prenatal diagnoses are in concordance with the autopsy diagnoses, however, carefully performed postmortem examination may reveal additional, especially mild forms of skeletal anomalies. The combination of conventional autopsy with modern imaging techniques enhances diagnostic quality and completeness of the autopsy report.

8 A Structured Autopsy Mortality Review Provides Important Information for Clinical Practice Improvement

Caroline Early, Karen Kelly, Bill Oliver, Mary Gilliland, Peter Kragel. Brody School of Medicine, Greenville, NC.

Background: The Institute of Medicine Report on improving diagnosis in healthcare promotes deployment of approaches to "identify, learn from, and reduce diagnostic errors and near misses in clinical practice." We developed a standardized mortality review form to address the Institute of Medicine recommendations.

Design: Based on the medical record and preliminary autopsy findings, three board-certified forensic pathologists answered the following questions: Was this an expected mortality? Was this an unexpected mortality? Was mortality not expected at admission but expected at time of death? Was death associated with an adverse event or drug reaction? Was the diagnostic work up adequate? Were abnormal lab, X-ray, other test results and physical findings addressed adequately? Was death within 48 hours of admission or a surgical or invasive procedure? Was death associated with a failure to diagnose or with quality issues? If a quality issue was identified, was it related to: patient evaluation and data acquisition, clinical decision making, performing a treatment or procedure, documentation, communication and coordination, policy compliance, supervision or professionalism? Categories were also analyzed by organ system responsible for primary cause of death. Chi-Square was used to determine statistical significance.

Results: Of 48 autopsies analyzed, 18 deaths were within 48 hours of admission and 6 were within 48 hours of a surgical or invasive procedure. Death was associated with an adverse event or drug reaction in 3, and with failure to diagnose in 6 instances. In 6 deaths the diagnostic work up was considered inadequate, and in 7 abnormal lab, X-ray, or other tests or physical findings were not addressed. Quality issues were identified in 7 deaths; 4 of these were attributed to a system or process issue, 2 to both a system or process issue and a physician issue, and 1 was attributed to neither. Statistical analysis showed significantly more quality issues associated with unexpected deaths, death associated with an adverse event or drug reaction, death with an inadequate diagnostic workup, death where abnormal findings were not addressed, death associated with diagnostic failure, and death within 48 hours of a procedure. Death within 48 hours of admission was found to be more often associated with cardiac disease processes (p=0.018).

Conclusions: Autopsy structured mortality review identifies subsets of patients where quality issues and unexpected death is more likely to occur.

9 The Pathology of Eclampsia, an Autopsy Series

Jonathan Hecht, Jaume Ordi, S A Karumanchi, Zsuzsanna K Zsengeller, Elizabeth Pernicone, Seymour Rosen. Beth Israel Deaconess Medical Center, Boston, MA; Hospital Clinic, Institut d'Investigac¸ions Biomediques August Pi i Sunyer (IDIBAPS), Universitat de Barcelona, Barcelona, Spain.

Background: Preeclampsia and eclampsia are a major cause of maternal morbidity and mortality worldwide. There is a high incidence of maternal death in sub-Saharan Africa, often with no or incomplete autopsies. From 2002 to 2006, in association with ISGlobal (Barcelona Institute for Global Health) and the Maputo Central Hospital, autopsies were conducted on maternal deaths in Mozambique. From these autopsies, tissue blocks from 19 women in whom eclampsia was the crucial determinant of death were retrieved. We now describe the main lesions in the liver, brain and kidney.

Design: 162 blocks were analyzed. H&E preparations were reviewed to identify relevant lesions and those blocks were stained with luxol fast blue (brain) and Masson trichrome (liver), endothelial, histiocyte and platelet markers (CD31, CD34, CD68, CD 42B), and for evidence of free radical generation (nitrotyrosine, malondialdehyde).

Results: The lesions in the brain were characterized by perivascular "edema" (68.4%) , hemorrhage (36.8%); and hemosiderin (31.6%); small vessel thrombosis (10.5%) ; parenchymal necrosis (15.8%). The alterations in the liver were those of a periportal/ portal necrosis and sinusoidal fibrin (72.2%), associated with hepatic arterial medial necrosis (44.4%). The kidney changes, as expected, were those of glomerular endotheliosis associated focally with thrombi, arteriolar necrosis and crescent formation. Endothelial, histiocytic and platelet markers highlighted reactive changes as well as capillary injury and loss in the otherwise intact brain parenchyma. Stains for free radical formation were positive in areas of tissue injury, but given the clinical scenario, such is not surprising. However, intact glial/neuronal elements were focally positive as well.

Conclusions: We present an analysis of lesions of eclampsia using modern staining techniques, reaffirm the distinctive periportal liver lesion, note the more chronic CNS alterations (hemosiderin; capillary dropout) and show the presence of free radical injury.

10 Iatrogenic Hydrophilic Polymer Emboli Following Endovascular Procedures: A Potentially Fatal Complication

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Background: Hydrophilic polymer embolization (HPE) has recently been described as a complication of the polymer coating used on many investigative and interventional endovascular devices. Several recent case reports and small case series have described embolization of this distinct foreign material to a variety of tissues with consequences that ranged from being asymptomatic to fatal; e.g. from stroke. HPE material is described as lightly basophilic, amorphous and/or lamellated non-polarizable intravascular foreign substance. Awareness of this complication led to this retrospective clinicopathologic autopsy analysis with pre-mortem diagnostic imaging correlation.

Design: Review of the Vancouver Coastal and Providence Health Laboratory databases from 2010-2016 identified individuals who had undergone endovascular procedures using polymer-coated endovascular devices within 3 months of death. Diagnostic imaging studies were reviewed by two Radiologists. Autopsy slides were blindly reviewed by Pathologists and a Neuropathologist.

Results: Of 53 autopsy cases (average 48 slides/case); 14 (26%) showed evidence of HPE. Involved organs included heart (36%), kidneys (36%), lungs (21%), brain, spleen, colon, pancreas and soft tissues. Pre-mortem endovascular procedures included cardiac and cerebral angiography, vascular stent or valve placement, endovascular embolization and myocardial biopsy. The average time from final endovascular procedure to death was 16 days (range <1 to 37). The HPE had been originally identified in only 21% of autopsy reports. HPE were directly implicated in the cause of death in several cases, and compounded the effects of other comorbidities such as renal failure.

Conclusions: As an autopsy samples only a small portion of the decendent's tissue, HPE is likely under-recognized and occurs more frequently than our observations. This intravascular foreign material, when identified, appears occlusive and may contribute to infarction. We advocate greater awareness of this important and occasionally fatal complication of endovascular procedures.

11 Unusual Presentations of Pulmonary Amyloidosis at Autopsy

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Background: Amyloidosis of the respiratory tract can be a challenging diagnosis during life and at postmortem examination. We present our recent experience with pulmonary amyloidosis at autopsy and describe unique aspects of pathology with protein characterization by mass spectrometry.

Design: Case 1: Pulmonary arterial amylodosis (AL) phenotype, with granulomatous inflammation mimicking ANCA-mediated disease: A 75-year-old man was diagnosed as granulomatous vasculitis and amyloid deposition on open lung biopsy one year prior to death. He was treated with steroids for granulomatous vasculitis. ANCA had been negative. He expired secondary to sepsis one year later and autopsy revealed systemic amyloidosis involving the heart, lung vasculature, liver, kidney and spleen. No granulomatous inflammation was present at autopsy. No definitive plasma cell myeloma was identified at postmortem. Liquid chromatography tandem mass spectrometry analysis of the amyloid deposits revealed AL amyloidosis. The prior lung biopsy was noted to have pulmonary amyloid angiopathy with granulomatous inflammation and mass spectrometry revealed AL amyloid deposition in the vasculature.

Case 2: Diffuse interstitial pulmonary amyloidosis (ATTR) phenotype, without associated cardiac amyloidosis: A 94-year-old woman expired following abdominal surgery and was found incidentally to have extensive interstitial amyloid deposition in her lungs. There was no evidence of any amyloid deposition in other organs. Liquid chromatography tandem mass spectrometry studies revealed ATTR (transthyretin protein) deposition. Additional sectioning of the cardiovascular system following the report again revealed no evidence of amyloid deposition.

Results: Pulmonary amyloidosis may have varied presentations at autopsy and may be incidental or relate to cause of death. Liquid chromatography tandem mass spectrometry studies work well on postmortem tissue to specifically characterize the protein. Our cases demonstrate an unusual inflammatory reaction to amyloid angiopathy, namely granulomatous amyloid angiopathy, which is seen more commonly in cerebral amyloid angiopathy, but may affect pulmonary vasculature. Diffuse alveolar septal amyloidosis, a very uncommon pattern of pulmonary amyloidosis, most often associated with AL amyloidosis, may, as demonstrated in our case, relate to ATTR amyloidosis.

Conclusions: 1) Unique pulmonary amyloidosis presentations may include granulomatous AL amyloid angiopathy and interstitial ATTR amyloidosis

2) Utility of liquid chromatography tandem mass spectrometry on postmortem material is demonstrated

12 Rapid Autopsy and Collaboration: Opening Investigative Pathways for Research Teams

Jody E Hooper, Jowaly Schneider. Johns Hopkins University, Baltimore, MD.

Background: Cancer cells in metastatic sites often share clonal origins from a primary tumor, but these sites can be quite heterogeneous in terms of subclonal somatic alterations and phenotypic features. Rapid autopsies provide a completely unique opportunity to sample large amounts of tumor from multiple simultaneous sites after disease resistance and metastatic spread have occurred.

Design: A centralized Rapid Autopsy Program (RAP) has performed 31 cases in two years investigating carcinomas of the prostate, kidney, ovary, pancreas, head and neck, brain, and various soft tissue and neurologic malignancies. Each patient signs an IRB approved consent which includes permission for genetics research. A timeline is created containing dates for all lesions and response or non-response to treatment. Each patients also had recent imaging results recorded prior to autopsy. An average of 12 unique lesions per case was sampled in addition to normal tissue controls, with corresponding fresh, frozen and formalin fixed tissues taken.

Results: Two pathways of research illustrate the process and effect of active collaboration of the RAP and various research teams. Five cases of melanoma were performed with postmortem intervals ranging from 3 to 7 hours with one outlying case performed at 15 hours. Between 11 and 20 unique melanoma metastases were sampled with 5 to 9 normal tissues and primary pathology specimens were obtained. Viable cell lines were established in 3 cases. The majority of postmortem specimens had excellent histologic quality and viability assessments enabled mRNA expression and whole exome sequencing to be pursued on the most promising lesions. Six cases of sarcoma were performed with postmortem intervals ranging from 3 to 7 hours. Between 6 and 23 unique metastases were sampled with 3 to 5 normal tissues. Nine primary tumor cultures were produced and 4 were tested on a 60-drug chemical screen. DNA and RNA deep sequencing and xenografting are underway. Collaborative conferences with both research teams provided input for research design and technique of future cases.

Conclusions: The ability of rapid autopsy to elucidate differential expression of genes in metastases with different spatial relationships and responses to treatment is crucial to the pursuit of personalized medicine as a treatment modality. Pathologists are essential to opening this significant first step in investigative pathways for multiple research teams and the rapid autopsy is unique in its ability to support these efforts.

13 A 20-Year Review of Hospital Autopsies in a Nigerian Tertiary Hospital

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Background: The hospital autopsy often serves as an audit of clinical practice. It also provides useful epidemiological data about the causes of mortality in the society, though requests for autopsy might not be made for conditions where the cause and course of disease is well understood. The changing trends of disease incidence and outcomes can also be captured by autopsy studies and it serves to realign public health initiatives in the prevention and treatment of common illnesses. The aim of this study was to assess the patterns of mortality that were confirmed by autopsy in our institution over a 20-year period.

Design: Data which included the age, sex and cause of death were retrieved from the departmental archives from January 1996 to December 2015. The causes of death were classified into categories which included but were not limited to infectious, cardiovascular-related deaths, trauma, malignancy, pregnancy-related, perinatal etc. These were analyzed and represented in tables, charts and graphs.

Results: The number of deaths that met the inclusion criteria were 3115. Of these, the majority (31.9%) were seen in the 20-40year age group. Most paediatric deaths (0-20years) occurred in the perinatal period (39.7.8%). Outside the neonatal age group, infections were the commonest cause of death in children (53.8%). The commonest causes of death in adults were related to diseases of the cardiovascular system (25.5%), though trauma was the commonest cause of death in males aged 20-40yrs, and pregnancy-related deaths were the commonest causes of death in females of that same age group. Death due to malignancies and cardiovascular-related deaths were each seen most commonly in the 40-60yrs age bracket. Death associated with congential abnormalities occured predominantly in infants. Over the years, there was a steady increase in the rate of deaths arising from cardiovascular diseases, which eventually replaced trauma as the commonest cause of adult deaths seen at autopsy.

Conclusions: The increased prevalence of cardiovascular disease-related deaths shows the adoption of western lifestyle by inhabitants of Lagos.

14 Fatal Disseminated Strongyloidiasis Secondary to Corticosteroid Use: A Report of Two Cases

Kailee Imperatore, Nicole Herring, Yumna Omarzai, Cristina Vincentelli, Vathany Sriganeshan. Mount Sinai Medical Center, Miami Beach, FL.

Background: *Strongyloides stercoralis* is an intestinal nematode endemic to tropical and subtropical locations, such as most of Latin America, and in the United States, the Appalachian mountain region. Clinical manifestations vary greatly and are non-specific; as a result, cases in regions that do not regularly screen for strongyloides go underdiagnosed. Current research estimates a prevalence of 370 million cases worldwide. Chronically infected patients that become immunosuppressed, particularly from exposure to corticosteroids, are at risk for developing a hyperinfection syndrome or disseminated strongyloidiasis, which carries a mortality rate of up to 87%.

Design: We present two cases of fatal disseminated strongyloidiasis. The first case is that of a 66 year old man, originally from Nicaragua, with ulcerative colitis receiving corticosteroids due to relapsing diarrhea that developed fatal disseminated strongyloidiasis. The hospital course was complicated by gram-negative bacteremia, multifocal cytomegalovirus infection, *Clostridium difficile* colitis, severe gastrointestinal bleeding, disseminated intravascular coagulopathy, deep venous thromboses, multiple pulmonary emboli, fungemia, bacterial meningitis, multifocal pneumonia with aspergillosis and toxic megacolon terminating in death. The second case is that of an 87 year old man, originally from Cuba, with chronic obstructive pulmonary disease and pulmonary fibrosis on corticosteroids for worsening shortness of breath that developed fatal disseminated strongyloidiasis. The hospital course was complicated by respiratory failure, anemia and thrombocytopenia, atrial fibrillation with heart failure, acute renal failure, lactic acidosis, alveolar hemorrhage and *Mycoplasma pneumoniae* pneumonia.

Results: At autopsy, strongyloides was seen in the heart, lungs, ileostomy, esophagus, pancreas, adrenal glands and brain in the first case and in the lungs, large intestine and paraesophageal, paratracheal and hilar lymph nodes in the second case.

Conclusions: Both patients were originally from Latin American countries where strongyloides is endemic. Because chronic infections are typically asymptomatic, both were likely unaware they were infected. Furthermore, use of corticosteroids often suppresses the expected eosinophilic response to infection, which is often the only clinical evidence that prompts clinicians to search for strongyloides. These cases highlight the importance of screening patients from endemic areas prior to initiation of immunosuppressive therapy.

15 Autopsy Findings Following Liver Transplantation: A Retrospective Review of 27 Cases at a Single Institution

Ryan D Jones, Guang-Yu Yang. Northwestern University, Chicago, IL.

Background: Liver transplantation is a major procedure with significant morbidity and mortality, and is performed for patients with end-stage liver disease, acute liver failure, and hepatic malignancies. It is sometimes curative, but relapse of the underlying disease is a common occurrence, and outcomes can be further complicated by rejection of the donor liver or side-effects from the immunosuppressive therapies. Historically the most common underlying diseases leading to liver transplant were viral and alcoholic hepatitis resulting in cirrhosis and possibly hepatocellular carcinoma, however due to advances in hepatitis treatments, and the concurrent rise in metabolic syndrome, nonalcoholic fatty liver disease-related cirrhosis is becoming a major predisposing factor. Understanding the outcomes of liver transplantation is crucial to developing methods to decrease adverse events in the future.

Design: A retrospective review of autopsy records from Northwestern Memorial Hospital (NMH) from 2003-2016 was performed revealing 27 patients who had received a liver transplant. Underlying illnesses leading to transplant, autopsy findings, and survival data was assessed for each patient.

Results: In our NMH cohort of 27 patients, the main underlying diseases leading to transplant were hepatotropic viral infections (13), ethanol-related (4), mixed ethanol and viral hepatitis (2), nonalcoholic steatohepatitis (2), and others (5, including hemochromatosis, amyloidosis, autoimmune hepatitis, and cryptogenic cirrhosis). 12 patients had short-term survival (0-1 month), 4 had medium-term survival (1-12 months), and 11 had long-term survival (>12 months) status post-transplant. The autopsy-confirmed early causes of death included intraoperative complications (4), and postoperative complications (8, including sepsis, cardiac arrest, respiratory failure, hemorrhage, and graft failure or rejection). Mid- to late causes of death include recurrence/progression of underlying illness (7), graft failure/rejection (1), and other causes(7).

Conclusions: These data suggest that the major cause of death related to liver transplantation comes from perioperative complications and recurrence of the patient's underlying disease. With the ongoing shift in underlying processes from viral infections to alcoholic or non-alcoholic steatohepatitis, the risk of recurrence will likely fall. However, the major risks of transplantation remain, especially related to perioperative complications.

16 Follicular Dendritic Cell Sarcoma – Lessons from an Aggressive Example at Autopsy

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Background: While follicular dendritic cell sarcomas (FDCSs) have been reviewed in larger series, no example has been reported at autopsy. FDCS remains a rare and challenging neoplasm arising in lymph nodes and extranodal sites requiring clinicopathologic and immunophenotypic correlation to establish a definitive diagnosis; published literature lacks description of a well-characterized case causing rapid progression.

Design: We review the clinical course and pathologic findings of a recent terminal case of FDCS, including cytology, surgical specimens, and autopsy findings, with correlative immunohistochemistry and molecular testing. We examined these antemortem findings in relation to our findings at autopsy to demonstrate the extent of disease which ultimately led to the patient's death.

Results: The patient (37y, F) initially presented with progressive dyspnea and a 9.0cm heterogeneously enhancing, multilobulated mediastinal mass. Initial biopsies of multiple mediastinal sites and right femur metastasis showed an inflammatory spindle cell lesion with storiform and fascicular growth raising a differential including FDCS, inflammatory myofibroblastic tumor, and IgG4-related sclerosing disease. Diagnostic features were not sampled until a third biopsy of the mass growing down the right main stem bronchus where CD21/CD23/CD35/clusterin/podoplanin+ immunophenotype was seen, with lack of ALK or ROS1 rearrangement, and no increased IgG4 demonstrated. As the patient progressed despite chemotherapy, high throughput sequencing was also performed on the tumor sample. No *BRAF* mutation was present, but two deleterious *NF2* mutations (P493fs and R338H) were identified. No stigmata of neurofibromatosis were apparent; no germline testing was performed. At autopsy, the patient's entire peritoneum was enveloped by the tumor, encasing viscera above and below the diaphragm; mass effect on the cardiovascular system was deemed the immediate cause of death.

Conclusions: FDCS has not been previously associated with mutation of *NF2* (or *NF1,* or with either syndrome), a finding deserving of investigation in larger cohorts of this enigmatic sarcoma. Our observations also corroborate prior findings regarding challenges with FDCS presenting as a mediastinal primary, an infrequent site that may portend diagnostic challenges, limited treatment/resection options, and aggressive course.

17 Autopsy Findings in Leigh-Like Syndrome Associated with a Novel EARS2 Mutation

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Background: Leigh or Leigh-like syndrome (LS), the most common mitochondrial disorder in infancy, is characterized by symmetrical vasculonecrotic lesions of basal ganglia, brain stem, and cerebellum. Glutamyl-tRNA synthetase 2 (EARS2) is essential for mitochondrial protein synthesis. Mutations in the EARS2 gene result in decreased ATP production. To date, 23 cases of EARS2 mutations have been reported, with a phenotypic spectrum ranging from mild neurologic abnormalities to multisystem fatal disease, and one case being clinically consistent with LS. Pathologic descriptions of these cases are limited, however. Our case is the first report of a complete autopsy, including neuropathologic examination and ultrastructural analysis of affected tissues, in a patient with EARS2 mutation.

Design: An autopsy was performed on a 42-day-old term boy with congenital refractory lactic acidosis, hypotonia, and failure to thrive, who died after an extended stay in the neonatal intensive care unit. Magnetic resonance imaging had shown subtle diffusion restriction in the cerebral peduncles, and spectroscopy revealed lactate peaks in all regions of the brain. Genetic testing was performed on peripheral blood.

Results: At autopsy, the child had thin extremities, a fatty liver, and a distended bladder without obstruction. Histologically, the liver showed extensive microvesicular steatosis, and thigh muscle displayed scattered multivacuolated myofibers. Ultrastructurally, skeletal muscle showed prominent sarcoplasmic lipid accumulation in the abnormal fibers, with a slight increase in mitochondria, and occasional mitochondria with tubular cristae. The heart, lungs, kidneys and gastrointestinal tract were normal

by light microscopy. The brain demonstrated bilateral basal ganglia necrosis with microcalcification, surrounded by capillary proliferation, gliosis, and vacuolization of neuropil—findings consistent with LS. Pontosubicular necrosis was also present. Karyotype and chromosomal microarray study were normal. An exome sequencing revealed compound heterozygous mutations in the EARS2 gene, consisting of a known c.322C>T (p.R108W) and a novel c.154G>C (p.G52R) mutation. Both mutations affect the catalytic domain of the enzyme, and are predicted to be probably damaging by PolyPhen-2, with scores of 0.995 and 1.000, respectively.

Conclusions: We describe a case of LS due to EARS2 mutation with complete pathologic characterization. Given the known mild neurologic phenotype of homozygous c.322C>T (p.R108W) mutation, the aggressive clinical course in this child is suggested to be due to the novel EARS2 mutation c.154G>C (p.G52R).

18 Foreign Body in Sigmoid Colon, What Else Can Go Wrong?

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Background: Gallstone ileus is a rare (1-4%) complication of gallstone disease more common in patients over 65 (causing 25% of bowel obstructions). Gallstone ileus causing large bowel obstruction is rare (5%). Autopsy findings of colonic perforation at a gallstone impacted at diverticular narrowing has not been reported previously.

Design: This case report describes a 95-year-old African American female who presented with a 6-day history of abdominal pain without fever, nausea, vomiting, or diarrhea. She had formed stools until presentation when she had loose stool. CT of the abdomen and pelvis with oral contrast showed "a 3.4 x 3.5 cm curvilinear structure with high-density wall within the lumen of the distal sigmoid colon, suspect foreign body. There is moderate bowel wall thickening proximal to this level compatible with colitis. There are scattered colonic diverticula. Pneumobilia without significant bile duct dilatation. The gall bladder was not clearly delineated." Aggressive bowel cleanse was initiated in an unsuccessful attempt to pass the foreign body, suspected gallstone. The patient had increased pain after an enema. By the 3rd hospital day she was hypotensive and septic with increasing abdominal pain. Surgical intervention or colonoscopy was no longer considered possible. The family agreed to comfort care.

Results: An unrestricted autopsy revealed bowel contents in the peritoneal cavity. A necrotic, thick-walled gallbladder had a cylindrical black and yellow stone measuring 3.6 x 3.1 x 3.0 cm in the lumen and a fistula to the adjacent transverse colon. A similar cylindrical stone measuring 4.5 x 2.9 x 2.9 cm was found impacted in an area of fibrotic narrowing of the sigmoid colon with multiple diverticula at the sigmoid perforation.

Conclusions: The autopsy confirmed CT findings that detected the gallstone in the colon, colitis, and diverticular disease. Most, 90%, gallstones are passed spontaneously once they pass the ileocecal valve, so this patient was managed conservatively. Identifying the "foreign body" as a gallstone in an area of diverticular disease with risk of stricture could have lead to a prompt surgical consultation instead of aggressive bowel cleanse. Timely identification of colonic gallstone ileus has led to better outcomes in frail elders with bowel obstruction in other reports in the literature.

19 Significance of Pulmonary Calcifications (Corpora Amylacea and Osseous Metaplasia); a 10-Year Retrospective Autopsy Study

Lauren Mecca, David J Pisapia, Steven Salvatore. New York Presbyterian Hospital - Weill Cornell Medicine, New York, NY.

Background: Incidental pulmonary calcifications are commonly detected at autopsy in the form of corpora amylacea (CA) and osseous metaplasia (OM). Previously described in 1957, CA were found in 3.8% of adult autopsies. No correlation was found between their presence and disease. Some have speculated that CA and OM result from lung injury, however there is limited data to support these assertions. We provide an updated characterization.

Design: Consecutive adult (age >17) autopsy lung slides from 2005-2015 were reviewed from our institution: 842 cases. A retrospective clinicopathologic correlation was performed.

Results: 9.4% of cases had CA whereas 11.6% of cases had OM. CA were found in equal proportions in men and women, while men were more likely to have OM: M 12.9% vs. F 8.2% (p = 0.042).

Associations with age are represented below:

	All cases	CA	OM
Mean age (yrs)	66.2	77.1 (p = 0.0001)	73.7 (p = 0.0001)

Age (yrs)	# Autopsies	# CA	# OM
18-40	49	0	4 (8.2%)
41-60	242	6 (2.5%)	11 (4.6%)
61-80	391	36 (9.2%)	40 (10.2%)
81-100	160	37 (23.1%)	43 (26.9%)

CA were more multifocal than OM; 65% of CA cases involved >2 lobes versus 7% of OM cases (p = 0.0001). 76% of OM cases involved a single lobe, versus 38% of CA cases (p = 0.0001). No association with a particular lobe was found in CA cases. However, OM was present more often in the right lung (66%).

No association was found with CA and interstitial lung disease, lung cancer, or acute lung injury. However, patients with OM were more likely to have pneumonia (p = 0.026, OR = 1.7) and more likely to have lung cancer (p = 0.011, OR = 3.2).

Conclusions: While previously hypothesized to result from injury, the development of CA and OM represent separate pathophysiologic processes, as most notably evidenced by their different patterns of distribution in the lung. The prevalence of CA in our population was roughly 3 times that previously found, which is expected given the older age of our population. The correlation between CA and age supports the assertion that these result from a senile process rather than an injurious one. The association of OM with age was not as clear. OM, however, was associated with pneumonia and lung cancer, perhaps suggesting an injurious etiology. Based on our findings, the presence of CA in a lung biopsy should be recognized as a senile process and of no cause for concern. OM, however, may be a marker of remote and/or continued lung injury.

20 Autopsy Review of Lymphoma Patients Including Clinically Unsuspected Cases: 20 Year Retrospective Study

Aysha Mubeen, Ahmad Alkhasawneh. UF Health Jacksonville, Jacksonville, FL.

Background: Lymphoproliferative disorders cause significant morbidity and mortality, either related to the disease itself or complications of therapy. Some cases of lymphoma may have vague clinical presentation especially in the absence of lymphadenopathy, and clinical work up may not be conclusive. We aim to study autopsy cases of lymphoma patients with an emphasis on clinically unsuspected cases.

Design: Autopsy records from the last twenty years at our institution were searched for "lymphoma", and the following parameters were recorded: age, gender, clinical presentation, labs and imaging, immunosuppression status (IS), lymphoma type and grade: B, Classical Hodgkin or T (BCL, CHL, TCL), low or high (LG or HG), involved organs, hepatosplenomegaly (HSM), enlarged lymph node (LN) and bone marrow involvement (BM).

Results: 15 cases of lymphoma were identified, and four cases were diagnosed at the time of autopsy. Most of the BCL were nodal disease, while TCL had widespread extranodal disease. The results are summarized below.

Cases with Known Lymphoma			
Lymphoma(no.)	Involved Organs-no.	Cause of Death- no.	Autopsy Findings-no.
CHL (1)	LN, liver, spleen	Pneumonia/IS	Pneumonia, HSM
LG-BCL (3)	LN-3Liver and spleen-2BM-1	Pneumonia/IS-3	Pneumonia -3disseminated fungus- 1
HG-BCL (5)	LN-3Small bowel-1Testis-1	Pneumonia/IS-3Pulmonary embolism-1Heart failure- 1	Pneumonia-3Pulmonaryembolsim-1Dilated cardiomyopathy-1
TCL (2)	Skin, spleen, BM-2	Multi-organ failure/ lymphoma-2	Lymphoma in skin, spleen, BM-2

Cases with no Known Lymphoma			
Age / gender	Onset/Clinical Presentation	Lab and Imaging	Autopsy Findings/Diagnosis
44/M			HG-BCL in small bowel and LNPneumonia
87/F	anemia, 2 days GI bleeding/gastric ulcer	Anemia	HG-BCL of stomach
62/M		Lactic acidosis, anemia, thrombocytopenia	TCL in lung, kidneys, spleen, skin, LN
70/F		Lactic acidosis, anemia, thrombocytopenia	TCL in heart, lungs, kidney, liver, spleen, LN

Conclusions: Most deaths in BCL autopsies are due to infection/ therapy-induced immunosuppression, while TCL deaths are due to organ infiltration by lymphoma. Postmortem examination may reveal clinically unsuspected lymphoma, especially in rapidly deteriorating patients with vague presentation such as skin rash, bowel obstruction/bleeding or pacemaker malfunction.

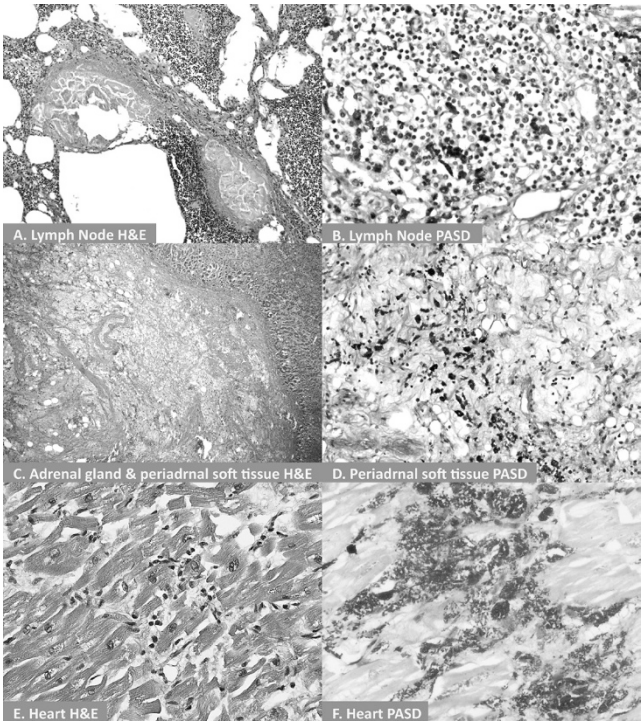
21 "Longstanding Illness with No Definite Diagnosis: A Fatal Case of Undiagnosed Whipple's Disease"

Aqsa Nasir, Lisa Lyons, Shannon M Mackey-Bojack, Brian Hartz, Joseph J Goswitz. University of Minnesota, Minneapolis, MN; Abbott Northwestern Hospital, Minneapolis, MN; Jesse E Edwards Registry of Cardiovascular Disease, United Hospital, Minneapolis, MN.

Background: Whipple's disease is a rare multi-system infection caused by Tropheryma whipplei with an incidence of approximately one per million patients.

Design: We report a fatal case of a 66-year-old male whose symptoms mimicked immune-mediated joint disease. About one year before his death, he presented with generalized weakness, arthralgia, significant unintentional weight loss, and anasarca. He was treated with prednisone for presumed polymyalgia rheumatica. Methotrexate was later started with only a minor relief of the symptoms. Upper endoscopy was not performed. At the time of his final admission, he was pancytopenic and was transferred to the intensive care unit due to worsening of his condition. Blood and bone marrow cultures grew methicillin-sensitive Staphylococcus aureus. Anti-nuclear antibodies were negative. Hepatitis C virus antibody, HIV antigen/antibody, Blastomyces, and Coccidioides antibodies were negative. Histoplasma urine antigen was also negative. His condition continued to deteriorate and he died on the 9th day after admission.

Results: At autopsy, there was cardiomegaly and marked thoracic and abdominal lymphadenopathy. Histologic examination revealed widespread multi-organ involvement by Whipple's disease; including heart (figure1-A & B), lymph nodes (figure1-C & D), peri-adrenal soft tissue (figure1-E & F), seminiferous tubules, serosal surfaces of the abdominal cavity, the bone marrow, and mucosa of the small bowel. The diagnosis was confirmed by PCR on formalin fixed paraffin embedded autopsy tissue.



Conclusions: This case highlights the importance of including Whipple's disease in the differential diagnosis for patients experiencing chronic symptoms of immune mediated arthralgia particularly in the setting of unexplained weight loss.

22 Metastatic Atypical Teratoid Rhabdoid Tumor (ATRT) in an Adolescent

Kwadwo Oduro, Ricard Masia, Maria Cobos Sillero, David Ebb, Eugene Mark, E Tessa Hedley-Whyte. Massachusetts General Hospital, Boston, MA; University of California Los Angeles, Los Angeles, CA.

Background: The central nervous system (CNS) is a common site of metastasis for many malignancies but metastatic spread of primary CNS malignancies outside of the CNS, is uncommon (<1% of pediatric tumors in 1 study). About a quarter of these cases were iatrogenic, associated with ventriculoperitoneal (VP) shunts. ATRT is a rare aggressive primary CNS malignancy, almost exclusively occurring in children less than 5 years old and rarely in older children and young adults. We found 2 cases of biopsied non-shunt related metastatic ATRT, to lung and axillary lymph node respectively, in the literature but no autopsy studies.

Design: We report a 21-year-old woman who succumbed 28 months after initial diagnosis of a left frontal lobe ATRT. She had a local recurrence 20 months after diagnosis and a humeral and surrounding soft tissue metastasis 2 months later. Staging at the time of diagnosis showed no disease outside of the brain. She never had a VP shunt. Histology and immunohistochemistry (IHC) of tumors at autopsy were compared to the patient's diagnostic biopsies.

Results: At autopsy, no residual tumor was found at the primary site, which only showed changes consistent with prior resection and radiation therapy. Metastatic ATRT in multiple vertebrae, left proximal arm, left anterior chest wall and liver were found. The liver metastases were embedded within 2 macroscopic nodules of focal nodular hyperplasia (FNH). No ATRT was detected in a third FNH. In all sites, the tumor was composed of sheets of primitive small round blue cells admixed with rhabdoid cells lacking INI1 by IHC, similar to the primary tumor. No kidney tumor and no heart abnormalities were found.

Conclusions: We report a case with an unusual cluster of rare findings: 1) A 21-year-old woman presenting at an unusual age for an ATRT; 2) A primary CNS malignancy with extra-cranial multifocal metastases in the absence of a VP shunt; and 3) Liver metastases limited to FNH nodules.

23 Pathology Department Chair Attitudes Regarding Emphasis on Autopsy in Pathology Training

David S Priemer, Matthew Kuhar, John N Eble, George D Lundberg. Indiana University School of Medicine, Indianapolis, IN; Stanford University, Stanford, CA.

Background: Decline in autopsies has led to debate over the degree to which autopsy should be emphasized in pathology resident training.

Design: A multi-format survey assessing attitudes on the emphasis of autopsy in pathology residency was created via an online service and sent electronically to pathology department chairs(PDCs) at academic institutions using a PDC electronic mail list. Responses were anonymous.

Results: 30 PDCs responded(response rate: 21%). 70%(21) reported an institutional autopsy rate of less than 200 cases annually, with 33%(10) reporting less than 100. 50%(15) reported that their residents have no difficulty meeting the requirement of 50 autopsies within dedicated rotations, and the remaining reported that at least some residents need to perform more autopsies outside of dedicated rotations. 67%(20) reported that residents spend between 3-5 months on autopsy rotations, 17%(5) reported less than 3 months, 7%(2) reported more than 5 months, and 10%(3) reported that autopsies are part of integrated service rotations.

93%(28) of PDCs agreed that autopsy is valuable for pathology education, however 33%(10) and 27%(8) felt that autopsy rotations are less important than other rotations in anatomic and clinical pathology, respectively. 13%(4) agreed that requiring 50 autopsies in residency is excessive, 60%(18) disagreed, and 26%(8) were neutral. 63%(19) were satisfied with the time their residents spend on autopsy, 20%(6) believed it should be decreased, 13%(4) believed it should be increased, and 3%(1) believed that autopsy services should be optional. 76%(23) agreed that their residents feel confident in independently performing autopsies by completing residency.

Conclusions: A few PDCs believe time and requirements for resident autopsy training should be reduced. In addition, one third and one quarter of PDCs believe autopsy rotations are less important than other rotations in anatomic and clinical pathology, respectively. While not to be ignored, these views are of the minority, and most PDCs are satisfied with current emphasis on autopsy in residency training. However it is concerning that at least some residents in half of institutions are unable to reach 50 cases within dedicated rotations and one quarter of PDCs do not agree their residents end up confident in performing autopsies independently. With continued decline in autopsies, these numbers may increase. We may therefore be at a critical point where efforts toward increasing autopsy rates must be made if lowering the proficiency standard by necessity is to be avoided.

24 Death within 30 Days of Fine Needle Aspiration: Post-Mortem Confirmation of FNA Diagnoses and the Contribution of FNA to Patient Mortality

David S Priemer, Dean A Hawley, Harvey M Cramer. Indiana University, Indianapolis, IN.

Background: Fine needle aspiration(FNA) diagnoses are usually confirmed via concurrent or subsequent surgical pathology, or indirectly by evaluation of clinical outcomes. However, such confirmation may not occur in patients who die soon after FNA, and autopsy may be a useful quality assessment tool in these cases. Also, there is surprisingly little data assessing for a relationship between FNAs and patient mortality.

Design: A search of our electronic database was performed from 1992 to 2016 to identify patients who were autopsied after dying within 30 days of an FNA. Concordance was determined between findings of FNAs, autopsies, and any surgical pathology materials obtained during the time periods from the FNA to death. Finally, likelihoods that FNAs contributed to patient deaths were subjectively determined after reviewing clinical history in each case. Contribution of an FNA to death was categorized as either unlikely (FNA did not appear to contribute to death), possible (FNA may have indirectly contributed to death), or probable (death occurred as a direct or near-direct result of FNA).

Results: 58 patients met search criteria. Average patient age was 58 years(median: 58). Male-to-female ratio was approximately 1:1. There was an average of 12 days between FNA and death. 36(62%) of patients had malignancies, while 22(38%) had benign disease. Surgical pathology material was obtained concurrently or following FNA in 21 cases(36%), either as a biopsy(13 cases) or resection(8 cases). Concordance between FNA diagnoses and surgical pathology findings(when applicable) as well as autopsy findings is tabulated, in addition to a summation of cases regarding the contribution of FNA procedures to deaths.

FNA diagnosis concordance	Malignancy	Benign disease	Overall
Concordance with concurrent or subsequent surgical pathology before death	83%(10/12 cases)	67%(6/9 cases)	76%(16/21 cases)
Concordance with autopsy findings at FNA site	67%(22/33 cases)	82%(14/17 cases)	72%(36/50 cases)
FNA contribution to death			
FNA probably contributed to death	3%(1/36 cases)	9%(2/22 cases)	5%(3/58 cases)
FNA possibly contributed to death	0%(0/36 cases)	9%(2/22 cases)	3%(2/58 cases)
FNA was unlikely to have contributed to death	97%(35/36 cases)	82%(18/22 cases)	91%(53/58 cases)

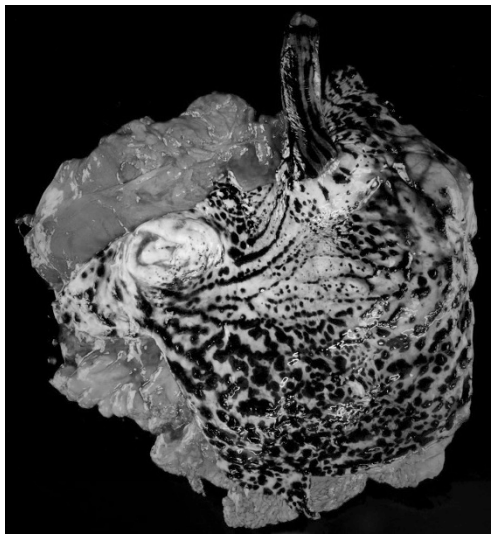
Conclusions: Autopsy can be used to validate FNA diagnoses and, like surgical pathology, confirms that FNA diagnoses are accurate in most cases. However, in a small number of patients, even a minimally invasive diagnostic procedure such as FNA can precipitate death.

25 Acute Esophageal Necrosis (AEN): A Large Autopsy Study with Emphasis on Its Association with Diabetic Ketoacidosis (DKA)

Benjamin D Ramos, Brittany B Coffman, Emily Wolak, Hannah A Kastenbaum, Lori A Proe, Joshua A Hanson. University of New Mexico, Albuquerque, NM.

Background: Acute esophageal necrosis (AEN), less accurately referred to as black esophagus, is a rare endoscopic and autopsy finding that signifies esophageal ischemia and compromised mucosal barrier function. Gross findings are that of circumferential hemorrhage, ulceration, or black coloration of the distal, and to a lesser extent mid and proximal, esophageal mucosa ending abruptly at the gastroesophageal junction. Microscopically, the mucosa is necrotic and often speckled with black to brown hematin pigment. Autopsy data on AEN are scant, and an association with diabetic ketoacidosis (DKA) has hitherto not been investigated. This study aims to determine the incidence of AEN, better characterize its clinicopathologic features, and raise awareness among pathologists.

Design: Autopsy records were retrospectively reviewed from 2000 to 2016 to specifically identify the following cause of death (COD) terms: "esophagitis," "esophageal necrosis," and "diabetic ketoacidosis." Data regarding decedent demographics, comorbidities, toxicology, postmortem vitreous screen, and histology, were collected and analyzed using descriptive statistics and comparative analysis.
Results: Of 29,401 autopsies conducted over the 16-year period, 29 cases of AEN (0.1%) were identified. During the same time period, 170 cases listing DKA as a COD or a contributing factor were autopsied, of which 18 (11%) exhibited AEN. The average age of the decedents was 48 years and 83% were males. The most common COD was DKA (52%), second was upper gastrointestinal hemorrhage (28%), and third was sepsis (7%). Decedents with DKA and AEN were more likely to also display gross gastric lesions (Wischnevsky's lesions) (66.7%) compared to decedents who died of non-DKA related causes (18.2%) (p= 0.02).



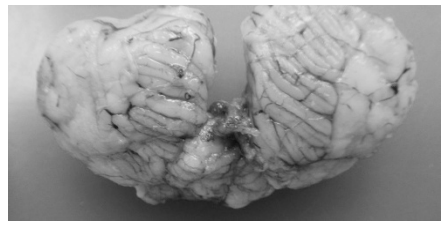
The histology was consistently that of purulent mucosal and submucosal necrosis, with only five cases demonstrating extension of inflammation into the muscularis propria.
Conclusions: This is the largest autopsy study of AEN to date and highlights the importance of its recognition and knowledge of its disease associations. Based on our findings, the possibility of DKA as an underlying cause of death should be investigated when AEN is identified at autopsy.

26 A Window on the Autopsy. Nine Years of USCAP Abstracts

Cecilia Ridaura-Sanz, Ruy Lopez-Ridaura, Eduardo Lopez-Corella. National Institute of Pediatrics, Mexico City, Mexico; National Institute of Public Health, Cuernavaca, Mexico.
Background: The decline of the autopsy in recent decades has been attributed to diverse factors; economic, social, medical and diminishing manpower. A review of the abstracts presented along nine years under "autopsy" in the USCAP meetings can serve as a reference on the current status of this procedure, its objectives and applications.
Design: All 229 abstracts under the "autopsy" heading in the USCAP meetings from 2005 to 2013 as published in Modern Pathology were reviewed. They proceed from 18 countries, 70% from the US and Canada. They were classified according to the type of study, the organ or system studied, disease category and usefulness of the procedure.
Results: Type of study: Almost 60% of studies were descriptive, either case series or case reports. 17% involved a specific question, comparative analysis, correlation of variables or case and control studies. **Topography.** Cardiovascular pathology was the most frequent field of study (27%) and obesity was stressed as a contributing factor to mortality. **Diseases.** Infectious diseases, particularly viral infections were prominently represented (17%). In neoplastic diseases (13%), diagnostic methods, underdiagnosis and results of therapy were evaluated. **Usefulness.** The autopsy resulted in an increased knowledge of the disease and its response to treatment. In 17 cases a new entity was characterized. Some special categories deserve mention; 19 contributions examined transplant pathology, 32 perinatal pathology, forensic pathology in 27 and sudden death in 25, 10 of them from forensic pathology and mostly of cardiovascular disease. In 40 contributions the object of study was the autopsy itself; techniques, new modalities, management and evaluation. An admittedly secondary but important point is the potential of the autopsy as a source of tissue for a wide span of investigations. In addition to the recognized value of archival tissue, modalities such the rapid autopsy (2 contributions), performed 1-4 hours after death has enabled molecular and genetic studies which require fresh tissue and tissue culture lines.
Conclusions: The autopsy has evolved along with other fields of medical activity. It has welcomed new techniques and explored untrodden territories. The autopsy is a source of useful information that merits a more widespread awareness beyond the medical profession. An interest in its potential on the part of society and government agencies would go a long way toward its revitalization.

27 The First Zika-Related Infant Mortality in the United States: An Autopsy Case Report

David Saulino, Elizabeth Gaston, Brianne Younke, Jeffrey A Conyers, Micheal Covinsky, Nina Tatevian, Meenakshi Bhattacharjee. University of Texas, Houston, TX.
Background: International concern for the ZIka virus has risen considerably as of late. This concern is in large part due to Zika's association with significant birth defects, most notably of the central nervous system.
Design: We are presenting an autopsy case of a Zika-associated mortality of a newborn girl delivered by a 20 year old mother at 36 weeks. The mother had lived in El Salvador during her second trimester of pregnancy. An ultrasound performed a few months before delivery revealed hypoplasia of the cerebellar vermis and enlargement of the fourth ventricle (Dandy Walker malformation). Formalin fixed, paraffin embedded tissue sent to the CDC from the umbilical cord and brain tested positive for Zika virus via RT-PCR.
Results: Autopsy revealed several striking external abnormalities, most notably of the head and limbs. The musculature was diffusely underdeveloped with fat replacement. The fronto-occipital head circumference was 25.5 cm (below the 3rd percentile). Internal examination was significant for microcephaly (175 gram brain weight) with a several other developmental abnormalities including: Dandy-Walker malformation, fronto-temporal agyria/pachygyria, and smooth lateral cerebellar hemispheres.



Microscopically, the malformed cerebral cortex also demonstrated subarachnoid glio-neuronal heterotopia. The cerebellum showed polymicrogyria and focal heterotopia in the white matter. Dystrophic calcifications were present in the left thalamus, midbrain, and cerebral periventricular parenchyma. Some additional microscopic findings include diffuse astrocytosis of the cerebral white matter, and ventriculomegaly with focal loss of the ventricular ependymal lining.
Conclusions: This case is significant, not only as the first Zika-related infant mortality in the United States, but for the constellation of autopsy findings that may help shed light on the intrauterine disease process. Many of our gross and microscopic findings correlate well with previous Zika autopsy reports. Unique findings in our case include fronto-temporal agyria/pachygyria and cerebellar polymicrogyria. We postulate that the Zika virus may interfere with early neural migration pathways, which may explain the central nervous system abnormalities associated with intrauterine infection.

28 The Value of Autopsy in Solid Organ and Stem Cell Transplant Patients

Jeremy Shelton, Margaret Compton, Robert Hoffman. Vanderbilt University Medical Center, Nashville, TN.
Background: Hematopoietic stem cell transplants (HSCT) and solid organ transplants are lifesaving procedures, but also have significant associated morbidity and mortality. To assess for possible undiagnosed complications of transplant, we performed a retrospective review of autopsy cases in transplant patients.
Design: A six-year retrospective search of the Vanderbilt University Medical Center autopsy database was performed to identify HCST or solid organ transplant recipients. The autopsy report, lab results, and medical records were reviewed.
Results: 71 transplant recipients were identified, of which 24% were HSCT recipients and 76% were solid organ recipients. Survival after transplant ranged from intraoperative death to 26 years. Signs of rejection were present in 39% of solid organ recipients. Graft vs. host disease (GVHD) was present in 53% of HSCT patients. Infectious complications were present in 61% of solid organ transplant patients and 82% of HSCT patients.
Major unexpected diagnoses (defined as findings that would have altered clinical management) were identified in 29% of HSCT recipients and 31% of solid organ recipients. Types of unexpected diagnoses included undiagnosed infection, malignancy, GVHD, graft rejection, underlying chronic disease (aortic aneurysm, coronary atherosclerosis), illicit IV drug abuse, and iatrogenic ventricular perforation.
Conclusions: There were a significant number of major unexpected diagnoses in both HSCT and solid organ transplant recipients. Our findings underscore the importance of autopsy in this patient population.

29 Transformation of Cerebellar Pilocytic Astrocytoma in a Pregnant Woman with Neurofibromatosis Type I

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Background: Neurofibromatosis type I (NF1) confers an increased risk of central nervous tumors, particularly pilocytic astrocytomas. These tumors are relatively benign, and in association with NF1 are especially unlikely to progress to high-grade lesions.
Design: We report the autopsy neuropathology findings of a 32-year-old woman with clinical diagnosis of NF1, who was approximately 24 weeks pregnant at death. She had a posterior cranial fossa tumor stable since diagnosis at age 10. She presented with intractable headache and became obtunded five days before death. Imaging revealed intracranial hemorrhage and enlargement of her mass, and emergent evacuation revealed a fragment of tumor with morphology most consistent with atypical pleomorphic xanthoastrocytoma. Having suffered diffuse hypoxic brain injury, she died and a restricted autopsy was performed.

Results: Gross examination of the brain revealed a solid and hemorrhagic tumor in the pontomedullary junction. Microscopically, the tumor revealed areas of the preexisting pilocytic astrocytoma with focal transformation into a malignant lesion. Reassessment of the tumor in context of the interface with the benign lesion and the presence of classical features not seen on biopsy revealed a WHO Grade IV astrocytoma.

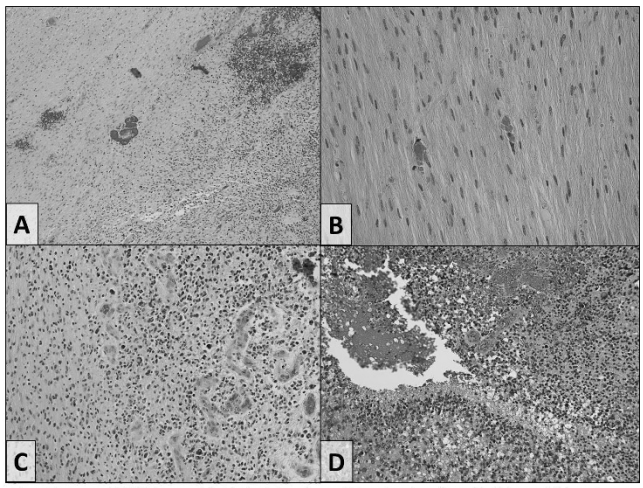

Figure 1. Low power (10x) histology reveals the interface between low- and high-grade regions of tumor (A). High power (40x) reveals a well-differentiated astrocytic neoplasm with spindle-shaped tumor cells containing elongated nuclei and abundant Rosenthal fibers (B). 20x views of the high-grade area of tumor reveal pleomorphic hypercellularity with multinucleation, nuclear lobularity and vascular endothelial proliferation (C), and pseudopalisading necrosis (D).

Molecular and immunohistochemical analysis revealed an unusual phenotype of loss of alpha thalassemia/mental retardation syndrome X-linked (ATRX) protein expression immunoreactivity, combined with wild type IDH1 and IDH2. Neither 1p nor 19q deletions were detected. Additional molecular analysis by next generation sequencing (NGS) revealed an ATM (Ataxia-telangiectasia mutated) D860N variant in both the low- and high-grade areas of the tumor.

Conclusions: Progression of NF1-associated pilocytic astrocytomas is quite rare, and the molecular features of such tumors have not been described. Recognition of unique phenotypic signatures and better understanding of the molecular events involved may lend insights into the development of high-grade astrocytomas.

30 A Novel Case of Liver-Restricted Burkitt Lymphoma in the Setting of Concomitant HBV and HCV Infections

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Background: Primary hepatic lymphomas are rare: primary hepatic non-Hodgkin lymphomas (NHL) comprise 0.4% of all primary extranodal lymphomas and 0.016% of all non-Hodgkin's lymphomas. Diagnosis is often challenging due to the non-specific nature of the clinical signs and symptoms and difficulty distinguishing these from other primary liver malignancies. Further, up to 10% of patients are asymptomatic at the time of diagnosis. There is increasing evidence for the association of hepatitis C virus infection (HCV) and primary hepatic NHL, with diffuse large B-cell lymphoma being the most common of this group. Similarly, infection with hepatitis B virus is associated with other primary hepatic NHL, most commonly mucosa-associated lymphoid tissue (MALT) lymphoma. Primary hepatic Burkitt lymphoma is an exceedingly rare entity, with <20 cases reported in the literature, at least one of which was associated with HBV infection.

Design: We performed a search and systematic review of all autopsy reports in the electronic database of Saint Louis University Hospital from 1996-2016 using the search term 'lymphoma' (any mention in the report). The inventory of discovered cases were then organized into categories based on the number and type of organs affected by the lymphoma, concomitant neoplastic processes, association with distinct infections, and unique and potentially interesting cases.

Results: One case of primary hepatic Burkitt lymphoma was identified in a patient with a known history of HBV and HCV infections as well as cirrhosis. The patient presented with mental status changes attributed to hepatic encephalopathy. At autopsy, the liver was 2150 g and extensively nodular, including areas of central necrosis surrounded by a hemorrhagic rim. A focal area of grey-white parenchyma obscuring the cirrhotic nodules was determined to be Burkitt lymphoma by histomorphologic and immunohistochemical evaluation. Extensive evaluation revealed no other organs or lymphoid tissues to be involved by Burkitt lymphoma.

Conclusions: This appears to be the first case described in the literature of a patient co-infected with both HBV and HCV who presented at autopsy with a previously undiagnosed, primary hepatic Burkitt lymphoma. The case raises new questions about a) the role of the specific hepatitis B and C viruses, including indirect effects on immunocompetency, in the development of a non-endemic Burkitt lymphoma; b) the role of the tissue microenvironment (cirrhotic liver) in development of lymphoid malignancies in general; c) the challenging diagnosis of primary hepatic lymphoma.

Bone and Soft Tissue Pathology

31 Desmoplastic Small Round Cell Tumors (DSRCT) with Atypical Presentations: A Report of 26 Cases

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Background: The overwhelming majority of DSRCTs arise in the abdominal cavity/pelvis of adolescents and young adults. Even though these tumors have a distinctive morphologic appearance, the diagnosis may be challenging when DSRCT occurs outside of this classic setting.

Design: Institutional and consultation archives were queried for cases of DSRCT presenting in patients >30 years of age or outside of the abdominal cavity/pelvis. For cases arising at an atypical location, imaging was reviewed, when available, to exclude the presence of an abdominal/pelvic mass. Only cases with 1) the presence of *EWSR1-WT1* by RT-PCR or 2) desmin/keratin immunoreactivity and the presence of *EWSR1* rearrangement by FISH were included. For cases meeting inclusion criteria, morphologic features and clinical follow-up were assessed.

Results: 26 cases were identified. Eleven (7 males, 4 females; age range 6-64 years) arose at atypical sites including neck (n=3), brain (n=3), groin (n=2), shoulder (n=1), thigh (n=1) and axilla (n=1). The remaining 15 patients were >30 years at initial presentation (13 males, 2 females;age range 32-53 years, median age 42); these tumors all involved the abdomen or pelvis. Morphologic review of the tumors showed 4 architectural patterns: micronodular (n=14), macronodular (n=5), sheet-like (n=3), and mixed (n=4). Cytomorphologic features were cataloged as: round cell (n=9), epithelioid (n=5), rhabdoid (n=5), small cell carcinoma-like (n=3), and mixed (n=4). Desmoplasia was noted in all but one case (n=25, 96%).Nine cases (36%) had punctate necrosis,and 8 cases (32%) showed geographic necrosis. The mitotic rate (per 10 high power fields) ranged from 1 to 40 (median 14). Of the 9 patients with follow-up (4 to 66 months), 7 (78%) developed metastasis, 3 (33%) were alive with disease,and 6 (67%) had died of disease.

Conclusions: DSRCT may present in patients >30 years or outside of the abdominal cavity/pelvis. Intra-abdominal tumors arising in older patients may mimic carcinoma, particularly neuroendocrine carcinoma, or rhabdomyosarcoma. It is important for pathologists to be aware that DSRCT may arise at non-abdominal locations. DSRCTs presenting in adults and at unusual sites seem to exhibit a similar male predominance and aggressive behavior as their counterparts with classic presentation.

32 Well-Differentiated Liposarcoma of the Retroperitoneum: Is There Signifcance to Histologic Subtyping?

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Background: Atypical lipomatous tumor/well differentiated liposarcoma (ALT/WDL) is a malignant mesenchymal neoplasm usually arising within the retroperitoneum, trunk or extremities of adults. There are different histologic variants including lipoma-like, sclerotic, inflammatory and cellular. We compared the clinical outcomes of the two most common subtypes--lipoma-like and sclerotic--in a series of patients with retroperitoneal WDL.

Design: The resected primary WDL tumors of 19 patients with at least three years follow-up were histologically evaluated by a soft tissue pathologist blinded to the clinical outcomes. Tumors with ≥25% fibrosis (low-power histologic assessment) were labeled as sclerotic subtype while tumors with <25% fibrosis were labeled as lipoma-like. Cellular and inflammatory WDL tumors were not included in the study due to low prevalence.

Results: The histologic evaluation identified 5 lipoma-like WDL and 14 sclerotic WDL. The clinical follow up ranged from 3 to 11 years. At the last clinical follow up, none of patients with lipoma-like tumors died of disease (0/5; 0%) while (4/14; 28%) of sclerotic subtype patients died of disease. 25% (1/5) of lipoma-like patients were alive with disease versus 43% (6/14) of sclerotic subtype patients. 80% (4/5) of lipoma-like patients were alive without disease versus 29% (4/14) of sclerotic subtype patients.

Conclusions: In this pilot study, lipoma-like WDL of retroperitoneum showed more favorable outcome when compared with the sclerotic WDL subtype. This was evidenced by less association with death of disease and higher association with disease free survival. We are currently expanding this pilot study to include additional cases.

33 Recurrent *SRF-RELA* Fusions Define a Novel Subset of Cellular Myofibroblastic Neoplasms in the Spectrum of Cellular Myofibroma/Myopericytoma: A Potential Diagnostic Pitfall with Sarcomas with Myogenic Differentiation

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Background: Cellular myofibroblastic tumors other than desmoid-type fibromatosis are often diagnostically challenging due to their relative rarity, lack of known genetic abnormalities, and expression of muscle markers which may be confused with sarcomas with myogenic differentiation. In this study we investigate the molecular alterations of a group of cellular myofibroblastic lesions showing morphologic overlap with the myofibroma and myopericytoma spectrum for better sub-classification.

Design: Two index cases were studied by paired-end RNA sequencing for potential fusion gene discovery. One chest wall soft tissue tumor in a 3 month-old girl case showed