Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

PST017

Risk of Malignancy of Pelvic and Peritoneal Fluid Cytology with Histological Correlation Using the International System for Reporting Serous Fluid Cytopathology: Experience of a Large Healthcare System

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Introduction: Peritoneal effusion fluids (PF) and pelvic/peritoneal washings (PW) are specimens that are commonly utilized to render primary diagnosis of malignancy and for staging malignant tumors. The International System for Reporting Serous Fluid Cytopathology (ISRSFC) aims to standardize reporting of fluid cytology. This is a retrospective study to determine risk of malignancy (ROM) and pertinent performance indicators of PF and PW using the new classification.
Materials and Methods: All PF and PW samples reported at our institution between January 2017 to December 2017 were included in our study (n=939). The samples were classified as non-diagnostic (ND), negative for malignancy (NFM), atypia of undetermined significance (AUS), suspicious for malignancy (SFM) and malignant (M) based on ISRSFC. Risk of malignancy (ROM), sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy (DA) were analyzed. Cases with no follow-up were excluded from these calculations.
Results: Of the 939 cases, 350 PF and 365 PW had surgical, clinical and/or radiologic follow-up. The distribution of samples in the categories of ISRSFC with demographics, ancillary studies, and ROM are tabulated in Table 1. Immunohistochemistry (IHC) was performed in 56.4% and 30.5% of cases within the cytologic categories of AUS and above in PF and PW respectively. IHC performed in the negative category for PF and PW were 5.6% and 3.3% respectively. The sensitivity, specificity, PPV, NPV, DA considering the category of M as positive, for PF are 55.84%, 99.63%, 97.72%, 88.88% and 90%; for PW are 35.41%, 100%, 100%, 91.09% and 91.50%. Considering both SFM and M categories of cytology as positive, for PF are 62.33%, 98.90%, 94.11%, 90.30%, 90.85% and for PW are 50.00%, 99.68%, 96%, 92.94% and 93.13 % respectively.
Conclusions: Utilizing ISRSFC for fluid cytology facilitates standardization of reporting, improves communication between pathologists and clinicians leading to improved patient care.

Table 1.

Type of sample	Demographics And ROM	ND	NFM	AUS	SM	M	Total
Peritoneal/ ascitic fluid	Sample size	4	402	32	8	53	499
	Age (mean in years)	60.5	53	60	57.5	63.5	
	Sex (F:M)	1:1	0.9:1	1.4:1	1.6:1	7.8:1	
	Cell block	4	320	27	8	50	
	IHC	0	18	12	7	29	
	Flow cytometry	0	4	0	0	0	
	ROM	33.33%	6.56%	44.0 %	61.42%	97.72%	
Pelvic wash	Sample size	5	354	32	19	30	440
	Age (mean in years)	49.5	52	61	88.5	94	
	Sex(F:M)	5:0	58:1	15:1	5.33:1	9:1	
	Cell block	1	118	12	9	15	
	IHC	0	4	1	8	2	
	Flow cytometry	0	0	0	0	0	
	ROM	0%	6.4%	60%	75%	100%	

PST018

The Impact of COVID-19 on Exfoliative Cytology Practice

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Introduction: During the lockdown period of the coronavirus disease 2019 (COVID-19) pandemic, cytopathology specimen volumes markedly declined at our institution. Given the importance of cytopathology specimens in screening for malignant disease, this raised the question whether the rate malignant diagnoses decreased as well and if particular anatomic sites were more drastically affected. Herein, we compiled cytology specimens received in April 2020 (during COVID-19) and compared to the previous year, April 2019 (pre-COVID-19).
Materials and Methods: All in-house exfoliative cytopathology specimens were compiled for the months of April 2019 and April 2020. The following information was obtained: specimen ID, cytology diagnostic category (nondiagnostic, benign, atypical, suspicious, and malignant), anatomic site, and reviewing cytopathologist and pathologist. The total specimens within each cytology diagnostic category and from each anatomic site were quantified. For anatomic site and diagnosis type, the percentage of total cases was calculated and compared to the previous year standard using the Chi-squared test method.
Results: The exfoliative cytology sample volume overall was lower in 2020 (n=200) compared to 2019 (n=589). The number of samples diagnosed as malignant also decreased, however the proportion of malignant diagnoses increased, though not statistically significant (n=25,12.5%; n=54,9.2%, p=0.1799). Likewise, suspicious for malignancy and atypical samples were proportionally increased (n=11,5.5%; n=8,1.4%, p=0.0012 and n=33,16.5%; n=73,12.4%, p=0.1421, respectively). Conversely, benign diagnoses were less frequent (n=127,63.5%; n=443,75.2%, p=0.0014). For anatomic site, the frequency of urine specimens markedly decreased (n=18,9.0%; n=230,39.0%, p=0.0112), while the proportion of CSF specimens significantly increased (n=61,30.5%; n=83,14.1%, p=0.0174).
Conclusions: The COVID-19 lockdown period serves as a prototypical state of emergency, wherein the volume of diagnostic procedures, and accordingly, pathology specimens are decreased. Understanding expected trends in the types of diagnoses made during states of emergency can help the practicing pathologist prepare for similar events and to prioritize the limited resources available during these periods.

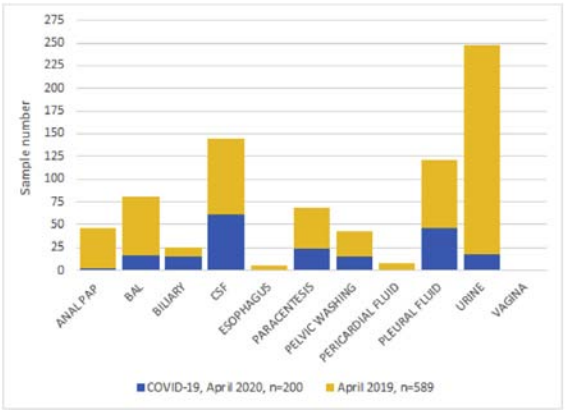

Figure 1. Compares the case numbers for each body site in April 2020 (lockdown time) and its corresponding month in 2019.

	April 2020 During COVID-19		April 2019 Pre-COVID-19			
By Anatomic Site	**n**	**%**	**n**	**%**	**Difference**	**P value**
ANAL PAP	2	1.0%	44	7.5%	6.5%	0.7311
BAL	17	8.5%	63	10.7%	2.2%	0.070
BILIARY	15	7.5%	10	1.7%	5.8%	0.5299
CSF	61	30.5%	83	14.1%	16.4%	**0.0174**
ESOPHAGUS	1	0.5%	4	0.7%	0.2%	0.9842
PARACENTESIS	24	12.0%	44	7.5%	4.5%	0.5403
PELVIC WASHING	15	7.5%	28	4.8%	2.7%	0.7200
PERICARDIAL FLUID	1	0.5%	7	1.2%	0.7%	0.9534
PLEURAL FLUID	46	23.0%	75	12.7%	10.3%	0.1412
URINE	18	9.0%	230	39.0%	30%	**0.0112**
VAGINA	0	0.0%	1	0.2%		
By Diagnostic Category						
INADEQUATE/NONDIAGNOSTIC	4	2.0%	11	1.9%	0.1%	0.9292
BENIGN	127	63.5%	443	75.2%	11.7%	**0.0014**
ATYPICAL	33	16.5%	73	12.4%	4.1%	0.1421
SUSPICIOUS	11	5.5%	8	1.4%	4.1%	**0.0012**
MALGINANT	25	12.5%	54	9.2%	3.3%	0.1799
Total	**200**		**589**			

Figure 2. The case numbers for each body site and the diagnostic categories are compared during the lockdown and the corresponding month of the year prior.

PST019

Hide in Plain Sight: Diagnostic Pitfalls in Malignant Cytology Fluid Specimens with Subtle Cytomorphological Changes

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Introduction: The cytological evaluation of fluid specimens plays an important role in clinical practice for cancer diagnosis, staging of malignancy, and monitoring disease progression. Due to the dynamic process of neoplastic disease, tumor cells can be scanty and dispersed in a background of exuberate reactive mesothelial cells/histiocytes, and inflammatory cells. The cytomorphological features of tumor cells can be subtle and overlapping with reactive mesothelial cells/histiocytes. A careful approach is necessary for accurate diagnosis without missing obscured malignant cells in cellular fluids.
Materials and Methods: 9 representative malignant cytological fluid cases with subtle cytopathological changes were collected during routine practice at the University of Colorado Anschutz Medical Campus and UCHealth Highlands Ranch Hospital Department of Pathology from 2019-2021. Clinical information and cytopathological features including the gross appearance are summarized.
Results: Common malignancies encountered in our collected cases include adenocarcinoma, renal cell carcinoma, and lymphoma/leukemia. The cytomorphological characteristics of the malignant cells that might be overlooked include scant tumor cells, relatively small cell size, lack of marked cytological atypia, abundant background reactive mesothelial cells, and inflammatory cells. One common scenario making diagnosis challenging is scant tumor cells in a background of inflammation with reactive mesothelial cells/histiocytes. Additionally, benign mesothelial cells with vacuolated cytoplasm in cell block can mimic tumor cells with signet-ring features, in which case immunohistochemical study is essential for definitive diagnosis.
Conclusions: An appropriate strategy to eliminate possible false-negative diagnoses in cellular fluid specimens must include integration of clinical history, gross appearance of the fluid, cytomorphologic features, and immunohistochemical studies. Recurrent and cloudy fluid specimen raises the concern for malignancy-related effusion. The alerting cytomorphologic features include but not limited to single cells, small clusters with hyperchromatic nuclei, and solid cytoplasmic mucinous vacuole. Last but not least, immunohistochemical studies should readily be performed in cases with any known history of malignancy.

PST020

Herpes Virus and Cytomegalovirus-associated Pneumonia in Patients with COVID-19: A Case Series

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Introduction: Herpes simplex virus (HSV), Cytomegalovirus (CMV), and severe acute respiratory syndrome-associated coronavirus 2 (SAS-CoV-2) are three well-established causes of viral pneumonia. While there are variable responses to evolving treatments of COVID-19, established effective treatment options for HSV and CMV exist. Therefore, the identification of herpesvirus-family infections superimposed on COVID-19 infections is critical in management and ultimate outcome of these patients. The purpose of this study is to highlight the importance of searching for and identifying HSV and CMV infections in individuals infected with COVID-19.
Materials and Methods: Broncho-alveolar lavage (BAL) specimens, viral PCR databases, and patient medical records from our institution were searched from March 2020 to September 2020. The findings in each BAL were interpreted by a cytopathologist and reported promptly to the clinical teams.
Results: Four patients with COVID-19 coinfected with HSV and/or CMV were identified. Each BAL demonstrated a few cells with characteristic nuclear features of HSV or CMV infection. Immunohistochemical staining was utilized to confirm the presence of HSV in one of the patients. Three of the four cases had molecular confirmation of the diagnosis, and each patient received antiviral therapy following cytologic diagnosis.
Conclusions: All four patients had clinical management altered based on their cytological diagnoses. Herpesvirus-family co-infections in COVID-19 positive patients should be considered, especially since both HSV and CMV have effective treatment options which can greatly reduce morbidity and mortality. We present this series to demonstrate the occurrence of coinfections with herpesviruses in COVID-19 and highlight the important role of cytopathologic diagnosis in the management of these patients.

PST021

Psammoma Bodies in Body Cavity Fluids: A Clinical Pathologic Study

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Introduction: Psammoma bodies in body cavity fluid (BCF) are rarely observed. Their presence may indicate a malignancy. Several benign lesions can be associated with psammoma bodies and mimic a malignant effusion. We undertook a retrospective study to assess the presence of psammoma bodies in BCFs and their clinical/ cytologic significance.
Materials and Methods: Our pathology database between 1991 and 2020 was searched for cases with presence of psammoma bodies in BCF. The pertinent clinical and cytological data were reviewed in detail.
Results: A total of 9707 BCF cases were retrieved (6513 pleural effusions and 3194 peritoneal fluids). 453/9707 (4.7%) BCFs were malignant, including 427 high grade serous carcinomas, 4 low grade serous carcinomas, 2 endometrioid carcinomas, 1 clear cell carcinoma, and 19 malignant mesotheliomas. Psammoma bodies were present in 59/453 (13%) malignant BCFs, including 56 serous carcinomas (52 high-grade, 4 low grade), 2 endometrioid carcinomas and 1 clear cell carcinoma. The 19 malignant mesotheliomas did not show any psammoma bodies. 9254/9707 (95%) BCF cases were benign, including 9237 cases showing mesothelial cells, 9 endosalpingiosis, 6 endometriosis and 2 serous cystadenofibroma. Psammoma bodies were present in 14/9254 (0.15%) benign BCFs, including 9 reactive mesothelial cells, 4 endosalpingiosis and 1 serous cystadenofibroma. The 6 endometriosis cases were negative for psammoma bodies.