

Cytopathology Practice in the Covid-19 Pandemic, During the Lockdown and Post-lockdown Period: A Tertiary-Care Center Experience

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ABSTRACT

Background: Covid-19 pandemic has changed the healthcare delivery and cytopathology practice worldwide. We evaluated our cytopathology laboratory workload during the lockdown and post-lockdown period and compared it with the same period in 2019, to see the impact of the Covid-19 pandemic.

Methods: The cytological reports issued during the lockdown (10 March - 31 May 2020) and the post-lockdown period (1 June - 31 August 2020); and the corresponding periods in 2019 were retrospectively reviewed from the database. Sample type, sampling site, and diagnostic categories were recorded.

Results: During the Covid-19 lockdown period, the total number of cytological specimens, was reduced from n=3197 to n=745, with a rate of 76,7%. The most reduction was in thyroid fine-needle aspiration (FNA) and cervicovaginal smears. Relative increases were observed for soft tissue, lung, and liver FNA samples (p<0.05) and cerebrospinal fluid, peritoneal and pleural fluid samples (p<0.05). In the post-lockdown period, the total number reduced from n=2461 to n=2032 with a rate of 17.4%. Significant reduction continued for thyroid FNAs, but other samples have nearly reached the pre-covid levels. During the total six months period, the rate of the *malignant* category increased while the *negative for malignancy* category decreased compared to 2019.

Conclusion: During the Covid-19 lockdown period, the reduction was primarily observed in the samples taken for screening purposes, and high-risk oncological patients continued to receive healthcare services. In the initial phase of the post-lockdown period, health services and cytopathology practice have rapidly reached almost the levels of the pre-pandemic period.

Keywords: Covid-19 pandemic, fine-needle aspiration, malignancy rate, workload.

INTRODUCTION

We have been fighting against the Covid-19 (coronavirus disease 2019) pandemic for two years, and many things have changed during this time, primarily the healthcare services. The first pneumonia case caused by severe acute

respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified in Wuhan, China, In December 2019 [1]. The World Health Organization (WHO) designated Covid-19 in February 2020 and declared it a pandemic on March 13, 2020.

The first case was detected in Turkey on March 10, 2020 [2]. Protective measures such as avoiding crowds, social distancing, isolation of patients, and sanitation have been the primary strategy to prevent the spread of disease [3]. To ensure that, the lockdown period began in March 2020, and this has changed the way of life and reshaped the healthcare delivery in Turkey as in most other countries. Many hospitals, including ours, were declared the center of Covid-19 diagnosis and treatment, with changes in the healthcare organization. This situation has induced significant changes in histopathology and cytopathology laboratory practice. Elective procedures and cytologic sampling for screening activities were canceled or postponed, prioritizing urgent or high-risk patients. These strict restrictions lasted until June 1, 2020; after this date, measures were eased, and the post-lockdown period began.

In this study, we evaluated our cytopathology laboratory workload during the lockdown and post-lockdown period, with the corresponding periods in 2019, to compare and see the impact of the Covid-19 pandemic. We aimed to share our institutional experience, how the pandemic has changed our cytopathology practice, and whether our workload has returned to normal in the initial phase of the post-lockdown period.

MATERIALS & METHODS

This is a retrospective descriptive study performed at Hacettepe University, Department of Pathology. All the cytological reports issued during the lockdown period (10 March 2020- 31 May 2020) and the initial three months phase of the post-lockdown period (1 June 2020- 31 August 2020) were reviewed from the database of Hacettepe University Hospital with the corresponding periods in 2019.

The total number of specimens was recorded and divided into exfoliative cytology and fine-needle aspiration cytology. Then according to the sampling site, exfoliative cytology cases were distributed into six groups; cervicovaginal smear (CVS), cerebrospinal fluid (CSF), urine, peritoneal fluid, pleural fluid, and others (bronchial lavage, etc.). Fine-needle aspiration cytology cases were

distributed into seven groups; thyroid, lymph node, soft tissue, lung, liver, pancreas, and others (salivary gland, etc.).

The final diagnoses were evaluated excluding cervicovaginal smears and categorized into four groups; inadequate, negative for malignancy, malignant, and indeterminate (atypical cells/suspicious for neoplasm, atypia of undetermined significance/follicular lesions of undetermined significance (AUS/FLUS), suspicious for follicular neoplasm).

Between-year variations in sample type, sampling site, and rate of diagnostic categories were evaluated using the chi-square test. P values <0.05 were considered statistically significant.

RESULTS

Specimens accepted in our cytopathology laboratory during the lockdown period between 10 March – 31 May 2020 were compared with those of the same days of 2019. The total number of cytological specimens during the Covid-19 lockdown period was reduced from n=3197 to n=745, with a rate of 76,7%. Exfoliative cytological samples dropped from n=2593 to n=592, and fine-needle aspiration (FNA) cytology samples dropped from n=604 to n=153.

When the specimen sampling site was considered, there was a reduction in the number of all specimen types. This reduction was significant, with a p-value of <0.05 in thyroid FNA and cervicovaginal smear samples. Relative increases were evident for FNA samples obtained from soft tissue, lung, and liver (p<0.05) and exfoliative cytology samples of cerebrospinal fluid, peritoneal and pleural fluid (p<0.05). The variation in the proportion of urine samples and FNA samples of lymph nodes and pancreas wasn't significant.

After that, specimens accepted in our laboratory in the post-lockdown period between 01 June– 31 August 2020 were compared with the same period in 2019. The number of cytological specimens processed during the post-lockdown period was reduced from n=2461 to n=2032 with a rate of 17.4%.

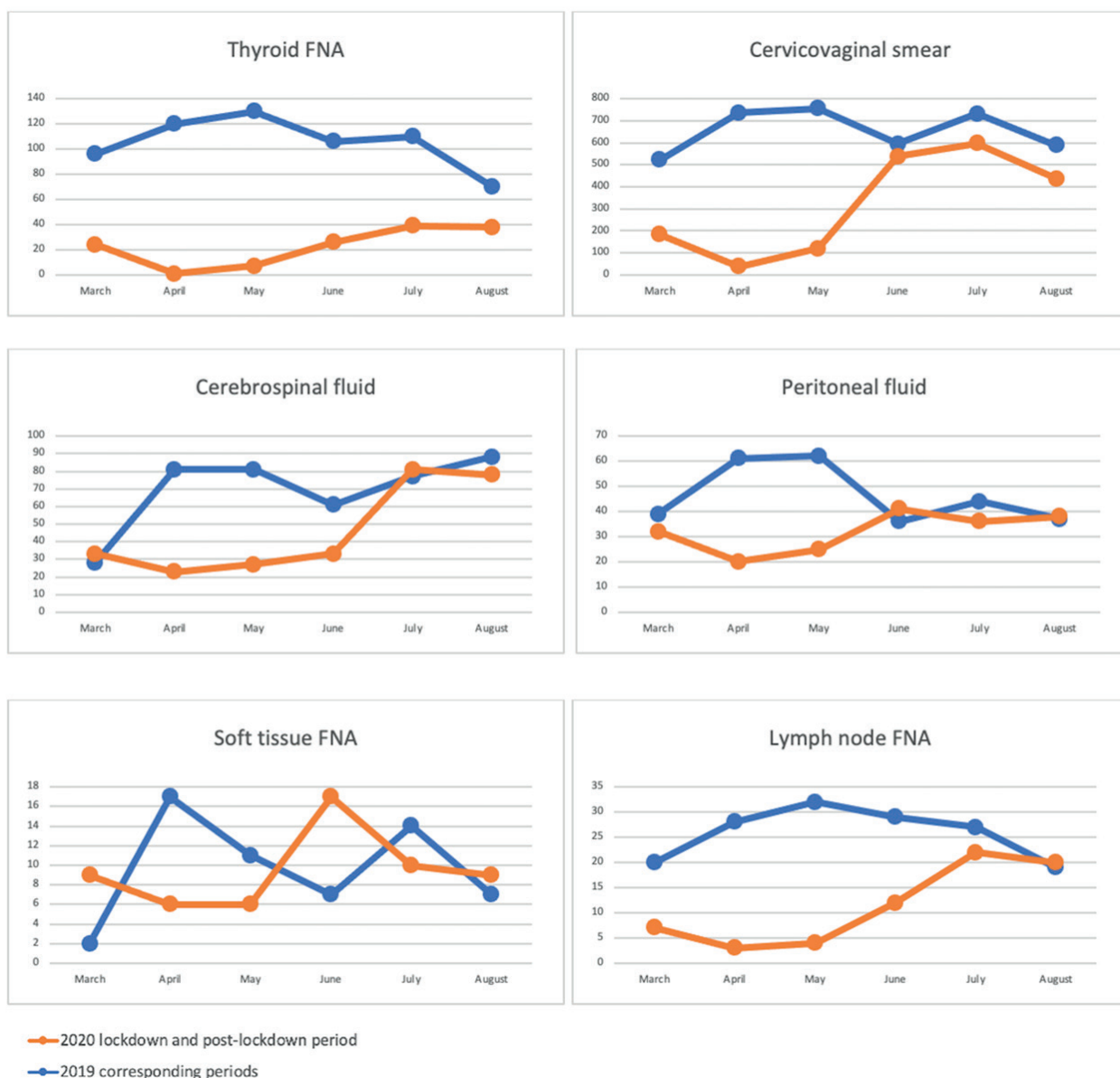


Figure 1. Line charts of the overall workload for most common cytological sample types on a per-month basis, three consecutive lockdowns, and three successive post-lockdown (2020) periods (orange line), compared with the corresponding period in 2019 (blue line).

There was still a reduction in the absolute number of samples, except urine, soft tissue, and liver samples. A statistically significant decrease in the number of thyroid FNAs was observed in the post-lockdown period. The absolute number of CVS samples was dropped, yet a significant relative increase was noted. The proportion of soft tissue samples increased, while the variation in the percentage of other samples wasn't significant. Data are summarized in Table 1 and Figure 1.

When the diagnostic categories of cytological samples were considered, the lockdown and post-lockdown periods were similar. The rate of the malignant category increased while the negative for malignancy category decreased compared to the same periods in 2019. Inadequate and indeterminate categories were slightly reduced in the Covid-19 period but were not statistically significant. Data are summarized in Table 2.

Table 1. Total number and proportion of specimens and specimen type distribution between Covid-19 national lockdown and post-lockdown periods and corresponding time in 2019

	Lockdown Period			Post-lockdown Period		
	2019	2020		2019	2020	
Specimen type	n (%)	n (%)		n (%)	n (%)	
Exfoliative cytology	2593 (81%)	592 (80%)		2461 (82%)	2032 (87%)	
CVS	2012 (63%)	340 (46%)	<0.05	1914 (64%)	1570 (67%)	P<0.05
CSF	190 (6%)	83 (11%)	<0.05	226 (8%)	192 (8%)	P=0.395
Peritoneal fluid	162 (5%)	77 (10%)	<0.05	117 (4%)	115 (5%)	P=0.078
Pleural fluid	71 (2%)	50 (7%)	<0.05	73 (2%)	62 (3%)	P=0.639
Urine	78 (2%)	15 (2%)	0.490	61 (2%)	61 (3%)	P=0.173
Others	80	27		70	32	
FNA	604 (19%)	153 (20%)		531 (18%)	314 (13%)	
Thyroid	346 (11%)	32 (4%)	<0.05	286 (10%)	103 (4%)	P<0.05
Lymph node	80 (3%)	14 (2%)	0.315	75 (3%)	54 (2%)	P=0.629
Soft tissue	30 (1%)	21 (3%)	<0.05	28 (1%)	36 (2%)	P<0.05
Lung	34 (1%)	26 (3%)	<0.05	47 (2%)	43 (2%)	P=0.460
Liver	25 (1%)	22 (3%)	<0.05	35 (1%)	35 (1%)	P=0.305
Pancreas	22 (1%)	7 (1%)	0.470	15 (1%)	10 (0%)	P=0.69
Others	67	31		45	34	
Total	3197	745		2992	2346	

**Abbreviations: CVS: cervicovaginal smear, CSF: cerebrospinal fluid, FNA: fine-needle aspiration.

Table 2. Diagnostic category distribution between Covid-19 national lockdown and post-lockdown periods and the corresponding time in 2019

	Lockdown Period			Post-lockdown Period		
	2019	2020		2019	2020	
Diagnostic category	n (%)	n (%)		n (%)	n (%)	
Inadequate	285 (24%)	78 (19%)	P=0.053	250 (23%)	175 (23%)	P=0.747
Negative for malignancy	651 (55%)	184 (46%)	P<0.05	539 (50%)	335 (43%)	P<0.05
Malignant	149 (13%)	116 (29%)	P<0.05	190 (18%)	196 (25%)	P<0.05
Indeterminate	103 (9%)	26 (6%)	P=0.155	99 (9%)	70 (9%)	P=0.904
Total	1188	404		1078	776	

DISCUSSION

The first Covid-19 case in Turkey was detected on March 10, 2020, and strict protective measures were implemented in daily life and healthcare services [2]. These implementations caused a dramatic reduction in the volume of particular cancer screening programs and also the global histopathological and cytological workload [4-7].

In our study, an absolute reduction was observed during the lockdown period in the total number of samples; both major categories, fine-needle aspiration and exfoliative cytology [4,6,7]. There

was a marked reduction in cervicovaginal smears among the exfoliative cytology samples because periodic cervical cancer screening programs were suspended during the lockdown period. However, there was a relative increase in serous fluid (peritoneal-pleural) and cerebrospinal fluid samples, suggesting prioritization of patients with high-risk diseases and urgent clinical symptoms.

Among the FNA samples, thyroid FNAs were markedly decreased. Most thyroid nodules are not urgent, even if malignant; most are differentiated thyroid cancer and have an indolent course, so postponing the diagnosis is reasonable [8,9]. This

reduction suggests that an FNA procedure was performed for only high-risk patients based on the ultrasonographical features of the nodule and clinical-laboratory parameters.

The absolute numbers of soft tissue, lung, and liver samples were reduced, but their percentage was significantly increased considering the overall cytological sample volume. Considering the higher oncological risk of these sites, FNAs were directly performed on suspicious lesions.

In the post-lockdown period, although healthcare services increased their routine activities and cytological samples began to increase, a lower number of specimens and a higher malignancy rate continued to be seen compared to the pre-Covid-19 period.

Samples such as soft tissue, lung, and liver fine-needle aspirates and CSF, peritoneal and pleural fluids showed a faster tendency to recover. In the post-lockdown period, the absolute number of these cases nearly reached pre-Covid-19 practice levels, in agreement with the literature [10].

The increase in the number of thyroid FNA samples wasn't that fast, and the reduction was still significant compared with the pre-Covid-19 levels. However, cervicovaginal smear samples returned almost to the same numbers in 2019 with a rapid tendency, and the percentage of CVS increased significantly in the post-lockdown period. The gynecology clinic brought a faster return to screening programs in our hospital.

When we consider the overall data, both in the lockdown and post-lockdown period, there was a significant increase in the malignancy rate compared to the same periods of 2019. That shows that high-risk oncological patients continued to receive necessary preventive and diagnostic health services during this period.

The cytopathology practice is not only a screening tool but also has a vital role in the diagnostic management of patients with cancer [11]. In the Covid-19 pandemic, the screening role has lagged while the diagnostic part of cytopathology remains. Fewer people underwent routine preventive healthcare and cancer screening, leading to fewer

cancer diagnoses. The issue is that the delay in detecting cancer increases the risk of getting a cancer diagnosis at a later stage, requiring more complex treatment and lowering the possibility that patients will respond to therapy and be cured of the disease. And in the years, it may result in an overall increase in cancer mortality. Early cancer detection through screening is the most effective treatment and curing cancer [12,13].

Our study had some limitations. We analyzed only a three-month period of lockdown and post-lockdown and compared it with the corresponding period of 2019. Our study doesn't have information on the same period of 2021. And also a clinical perspective can be brought to our study.

In conclusion, although the data shows a significant reduction in the total cytological workload during the Covid-19 lockdown period, most samples were taken for screening purposes, and high-risk oncological patients continued to receive healthcare services. In the initial phase of the post-lockdown period, despite patients' reluctance to go to the hospital and the still ongoing high occupancy rate, screening programs and routine activities of the healthcare services and cytopathology laboratory have rapidly reached almost the levels of the pre-pandemic period.

Author contribution

Study conception and design: OK and SÇÖ; data collection: OK; analysis and interpretation of results: OK and SÇÖ; draft manuscript preparation: OK. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study does not need ethical approval.

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Conflict of interest

The authors declare that there is no conflict of interest.

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