

IMPACT OF COVID-19 PANDEMIC ON ENDOSCOPY AND COLONOSCOPY PROCEDURES, A STUDY FROM TERTIARY CARE CENTER LOCATED IN RAWALPINDI, PAKISTAN

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ABSTRACT

Objective: Our objective was to evaluate the impact of COVID-19 on the services of the endoscopy unit of a tertiary care health center in Rawalpindi, Pakistan.

Design: Retrospective cross-sectional study.

Place and duration of study: The Center for liver and digestive diseases, Holy Family Hospital Rawalpindi, Pakistan from February 2019 to February 2020.

Materials and Methods: We divided the data into two time periods; pre-COVID-19 (Feb 2019 to March 2020), and the COVID-19 impacted period (March 2020 to Feb 2021). This study compared the impact of pre-COVID-19 and COVID-19 tenure in terms of frequency of endoscopy and colonoscopy procedures.

Results: Approximately, 17.4% (from 3235 to 2280) decrease in endoscopic procedures was noted in COVID-19 impacted period. This change was more pronounced in colonoscopy procedures which were reduced by 23.5% (from 430 to 266). The detection of malignancies and other diseases was also delayed due to the reduction of these procedures.

Conclusion: Our study showed a remarkable reduction in endoscopy and colonoscopy procedures due to COVID-19.

However, we suggest that such an impact can also increase morbidity and mortality rates in the future if not dealt with meticulously. Locoregional and international guidelines should be provided to the GI centers dealing with endoscopic procedures during such pandemics in line with real-life evidence.

Keywords:

Colonoscopy, COVID-19, Endoscopy, Mortality, Morbidity

INTRODUCTION

The novel coronavirus disease outbreak started in December 2019 in Wuhan, China. As the COVID-19 virus caused severe infectious disease, on 11th March 2020, WHO (World Health Organization) declared the COVID-19 outbreak a pandemic due to the uncontrolled situation^{1,2}. The pandemic caused a daunting challenge to all services including health care (endoscopic units) due to the malicious and virulent behavior of the disease³. In

comparison to previous SARS or MERS viruses, GI symptoms like abdominal pain, diarrhea, and vomiting seem to be more prevalent in COVID-19⁴. Numerous studies showed that Gastrointestinal (GI) epithelial cells had an expression of viral receptor angiotensin-converting enzyme 2 and hence SARS-CoV-2 can rapidly invade and replicate within the GI tract and cause deleterious effects⁴.

Due to aerosol transmission from COVID-19 affected patients, it was impossible to manage routine outdoor, indoor, and even emergency departments due to a 50 to 75% staff reduction including doctors, nurses, and paramedical staff⁵. Seeing these unprecedented effects of COVID-19, gastroenterology societies such as the

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Asian-Pacific, European and American societies of digestive endoscopy issued guidelines for endoscopic activity. Consensus guidelines from the British Society of Gastroenterology and Joint Advisory Group for Gastrointestinal Endoscopy were published in March 2020⁵. These societies recommended the case-to-case selection for upper and lower GI endoscopy as per the urgency and dire need of the procedure which will be done after using personal protective equipment (PPE). They also emphasized the use of negative pressure rooms and pre-procedure COVID-19 PCR testing^{5,6}.

The consensus guidelines highlighted the importance and commencement of doing only emergency GI endoscopies to avoid the risk of cross-contamination and to provide maximum protection to the endoscopy unit personnel against COVID-19. Moreover, the guidelines recommended reducing the number of onsite endoscopy staff, setting up special chains for patients, monitoring the temperature of patients as well as staff members, and questionnaires about symptoms, recent or previous exposure to COVID-19 taken. This resulted in a dramatic decline in the number of GI endoscopic procedures worldwide⁷⁻¹⁰. Furthermore, this pandemic caused a reduction in the training opportunities which were related to GI endoscopy due to the high risk of transmission virus owing to the aerosol-generating property of the respective procedure. However, PPE and recommended protocol significantly reduce virus transmission¹¹⁻¹³. This study is designed to study the pre-COVID-19 and COVID-19 tenure in terms of endoscopy and colonoscopy procedures.

METHODOLOGY

This was a retrospective cross-sectional study conducted at the “Center for liver and digestive diseases, Holy Family Hospital Rawalpindi, Pakistan”. All the patients presenting to this center from February 2019 to February 2021 were included in this study. Ethical approval was taken before the study. Data of endoscopy and colonoscopy procedures carried out at this center were collected. For analysis purposes, data were divided into two time periods; pre-COVID-19 (from Feb 2019-March 2020) and the COVID-19 impacted period (March 2020 – Feb 2021).

The average number of procedures in every period was computed, and reduction activity percentage (%) and chi-square test were applied for the comparisons of pre-COVID-19 and COVID-19 impacted periods. Patients'

age, gender, the indication of the procedure, and endoscopic findings as well as, time and procedure type were also noted. A P-value less than 0.05 was considered to be significant.

RESULTS:

COVID-19 Impact on Endoscopy:

It was observed that during the study periods; a total of 2280 patients were hospitalized in the Center for liver and digestive diseases, Holy Family Hospital Rawalpindi, Pakistan for Endoscopic procedures during the pandemic time of COVID-19 (March 2020 – Feb 2021) which was significantly lower than the number of patients (3235 patients) who were admitted during the same period before the COVID-19 pandemic (Feb 2019-March 2020) ($p=0.006$). There was a non-significant change in gender distribution in both periods, with men (59.7% vs. 56.1%) and similar proportions of women (40.3% vs 43.9 %) ($p>0.05$). In regards to the age of admitted patients, in pre-COVID-19 (Feb 2019 - March 2020 remove dates) 26.2% of the admitted patients' age was between 41-50 years in comparison to 23.2 % in the COVID-19 period. It is in contrast to the COVID-19 impacted period in which the majority of hospitalized patients' age was 51-60 years i.e., 26.6% vs. 22% in the pre-Covid-19 period with significant shifting ($p=0.006$).

The majority of patients in Pre COVID-19 period were ranging from 51-60 years (26.2%0 compared to post COVID-19 period in which the age range was 61-to 70 years (26.6%). Overall, a 17.4% reduction in the number of patients was recorded. Age distribution of endoscopy procedure according to pre-COVID-19 and COVID-19 impacted period is shown in **Figure 1**.

It was observed that, there was a significant reduction in some indications of endoscopy including corrosive intake; 109 (3.4%) vs 64 (2.9%), UGIB; 1312 (40.6%) vs 33(1.4%), dysphagia; 108 (3.3%) vs 21 (0.9%), screening for varices; 126 (3.9%) vs 24 (1%), hematemesis; 410 (12.7%) vs 41 (1.8%) and melena; 626 (19.2%) vs 446 (19.6%) ($p<0.001$). Moreover, there was a significant increase in other indications for procedure such as persistent vomiting; 180 (5.6%) vs. 514 (22.5%), anemia; 143 (4.4%) vs 296 (13.0%), chronic diarrhea; 39 (1.2%) vs 426 (18.7%), corrosive stricture; 23 (0.7%) vs 170 (7.4%), dyspepsia; 159 (5.0%) vs 245 (10.8%).

The endoscopic findings were also noted. Findings that

were significantly reduced in pre COVID-19 and post COVID-19 periods included fundal varices; 97(3%) vs 47(2%), gastric ulcer; 210 (6.5%) vs 17 (0.7%), duodenal ulcer; 21 (0.7%) vs 1 (0.01%), portal hypertensive gastropathy without varices; 173 (5.4%) vs 41 (1.8%), duodenopathy; 41 (1.2%) vs 14 (0.6%), duodenal polyp; 8 (0.2%) vs 3 (0.1%), esophagitis; 68 (2.1%) vs. 26 (1.1%), gastric polyps; 33 (1.0%) vs. 79 (0.3%), hiatal hernia; 164 (5%) vs 26 (1.1%), normal; 545 (16.9%) vs. 6 (0.2%), pyloric stenosis; 81 (2.5%) vs. 17 (0.7%) and obliterated esophageal varices; 102 (3.7%) vs. 19 (1.3%)(p=0.001).

It was observed that there was a significant increase in esophageal varices; 1209 (37.3% vs 74.6%), Mallory Weiss tear 0 vs. 54 (2.3%), gastritis; 159 (5.0%) vs. 245 (10.8%), CA stomach; 33 (1.0%) vs 29 (1.2%), CA duodenum; 32 (0.9%) vs 26 (1.1%), candidiasis; 5 (0.1%) vs 33 (1.5%), esophageal stricture; 1.11% vs 5.6%, Barrett's esophagus; 10 (0.3%) vs. 36 (1.6%) and achalasia; 9 (0.2%) vs 28 (1.2%) (p=0.001).

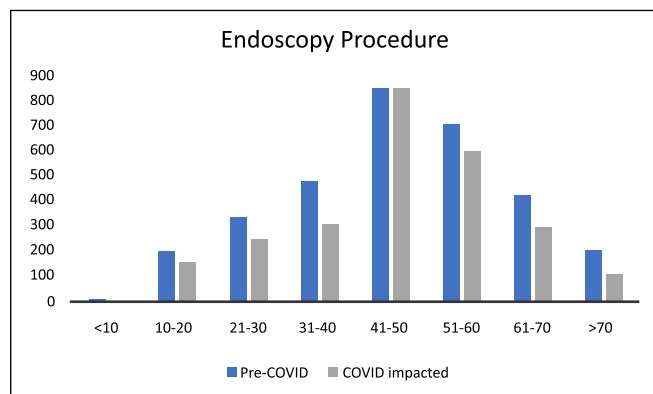


Figure 1: Age distribution of endoscopy procedure according to pre-COVID and COVID impacted period.

Table I: The distribution of age, sex, indications, and findings of endoscopy procedures of pre-COVID-19 and COVID-19 impacted period.

	Pre-COVID-19 period	Post-COVID-19 period	P-value
Age of the patient (Years)			
<10	11 (0.34%)	0	0.006
10-20	207 (6.3%)	161 (7%)	
21-30	340 (10.6%)	254 (11.1%)	
31-40	477 (14.8%)	314 (13.8%)	
41-50	850 (26.2%)	530 (23.2%)	
51-60	713 (22.0%)	605 (26.6%)	
61-70	429 (13.2%)	303 (13.2%)	
>70	208 (6.5%)	113 (5.1%)	
Total	3235 (58.7%)	2280 (41.3%)	
Sex			0.008
Male	1930(59.7%)	1278(56.1%)	
Female	1305 (40.3%)	1002(43.9%)	

Table II: The distribution of indications and findings of endoscopy procedures of pre-COVID-19 and COVID-19 impacted period.

	Pre-COVID-19 period	Post-COVID-19 period	p-value
Indication			
Persistent Vomiting	180 (5.6%)	514 (22.5%)	<0.001
Anemia	143 (4.4%)	296 (13.0%)	
Chronic Diarrhea	39 (1.2%)	426 (18.7%)	
Corrosive Intake	109 (3.4%)	64 (2.9%)	
Upper gastrointestinal bleeding (UGIB)	1312 (40.6%)	33 (1.4%)	
Dysphagia	108 (3.3%)	21 (0.9%)	
Screening Varices	126 (3.9%)	24 (1%)	
Corrosive Stricture	23 (0.7%)	170 (7.4%)	
Dyspepsia	159 (5.0%)	245 (10.8%)	
Hematemesis	410 (12.7%)	41 (1.8%)	
Malena	626 (19.2%)	446 (19.6%)	
Findings			
Esophageal Varices	1209 (37.3%)	1700 (74.6 %)	<0.001
Fundal Varices	97 (3%)	47 (2%)	
Mallory Weiss Tear	0	54 (2.3%)	
Gastric Ulcer	210 (6.5%)	17 (0.7%)	
Duodenal Ulcer	21 (0.7%)	1	
Gastropathy without Varices	173 (5.4%)	41 (1.8%)	
Duodenopathy	41 (1.2%)	14 (0.6%)	
Polyp Gastric	33 (1.0%)	79 (0.3%)	
CA Stomach	33 (1.0%)	29 (1.2%)	
CA Duodenum	32 (0.9%)	26 (1.1%)	
Duodenal Polyp	8 (0.2%)	3 (0.1%)	
Gastritis	329 (10.1%)	20 (0.9%)	
Esophagitis	68 (2.1%)	26 (1.1%)	
Candidiasis	5 (0.1%)	33 (1.5%)	
Esophageal Stricture	38 (1.11%)	127 (5.6%)	
Pyloric Stenosis	81 (2.5%)	17 (0.7%)	
Achalasia	9 (0.2%)	28 (1.2%)	
Barrett Esophagus	10 (0.3%)	36 (1.6%)	
Hiatal Hernia	164 (5%)	26 (1.1%)	
Not done	27 (0.8%)	3 (0.1%)	
Normal Findings	545 (16.9%)	6 (0.2%)	
Obliterated Varices	102 (3.7%)	19 (1.3%)	

COVID-19 Impact on Colonoscopy

It was observed that during the study periods; 266 patients were hospitalized in the Center for liver and digestive diseases, Holy Family Hospital Rawalpindi, Pakistan for colonoscopy during the pandemic time of COVID-19 (between Jan to the end of Dec 2019), which was significantly lower than the number of patients (430 patients) who were admitted during the same period before COVID-19 pandemic in the year (p=0.006).

There was a non-significant change in gender distribution in both periods, with men (61.8% vs. 61.6%) and similar proportions of women (38.2% versus 38.4 %) (p>0.05). In regards to the age of admitted patients during the study periods, in pre-COVID-19 (2019), the majority of admitted patients' age was between 51-60 years (22.8 %) in comparison to 16.1% in the Covid-19 impacted period. In COVID-19 impacted period, the majority of patients had ages ranging from 21-30 years

(27.8 % vs. 18.3%). Overall, a 23.4% reduction in the number of patients was recorded.

It was also noticed that there was significant reduction in certain indications and subsequent colonoscopy findings in total number of admitted patients for diagnostic colonoscopy in the COVID-19 period such as Per rectal bleed 226 (52.6%) vs 116 (43.6%), malignancy 17 (4%) vs 1 (0.4%), anemia 94 (21.9%) vs 4 (1.4%), constipation 17 (3.9%) vs 8 (3%), ulcerative colitis 42 (9.8%) vs 18 (6.7%), polyps 46 (10.7%) vs. 21 (7.9%), stricture 9 (2%) vs 3 (1.1%) with ($p < 0.001$).

Moreover, there was a remarkable increase in certain indications and colonoscopy findings in the number of patients admitted during the pandemic time such as chronic diarrhea 58 (13.5%) vs 110 (41.4%), intestinal TB 3 (0.7%) vs 7 (2.7%), IBS 1 (0.2%) vs 7 (2.7%), normal findings 205 (47.7%) vs. 130 (48.9%), hemorrhoids 82 (19%) vs. 66 (24.9%) and diverticulitis 3 (0.7%) vs. 4 (1.5%) with ($p < 0.001$).

Table II: Age, gender, indications, and findings of colonoscopy procedures of pre-COVID-19 and COVID-19 impacted period.

	Pre COVID-19 (2019)	COVID-19 impacted (2020)	p-value	
	No (%)	No (%)		
Gender				
Male	266 (61.8%)	164 (61.6%)		
Female	164 (38.2%)	102 (38.4%)		
Total	430 (61.7%)	266 (38.3%)		
Indication				
PR Bleed	226 (52.6%)	116 (43.6%)		
Chronic Diarrhea	58 (13.5%)	110 (41.4%)		
Malignancy	31 (7.2%)	14 (5.2%)	<0.001	
Intestinal TB	3 (0.7%)	7 (2.7%)		
Constipation	17 (3.9%)	8 (3%)		
IBS	1 (0.2%)	7 (2.7%)		
Anemia	94 (21.9%)	4 (1.4%)		
Findings				
Normal Findings	205(47.7%)	130(48.9%)		<0.001
Hemorrhoids	82(19%)	66(24.9%)		
Ulcerative Colitis	42(9.8%)	18(6.7%)		
Malignancy	17(4%)	1(0.4%)		
Polyps	46(10.7%)	21(7.9%)		
Stricture	9(2%)	3(1.1%)		
Diverticulitis	3(0.7%)	4(1.5%)		
Not Done	24(5.6%)	22(8.2%)		
Intestinal TB	2(0.5%)	1(0.4%)		

DISCUSSION

We conducted this study at the Center for Liver and Digestive Diseases, Holy Family Hospital Rawalpindi, Pakistan. Our data revealed a significantly decreased number of endoscopic and colonoscopic procedures during the pandemic. A similar reduction in the number of procedures was reported in other regions, such as the

USA, UK, Netherlands, and China¹⁴⁻¹⁷.

No data is reported about COVID-19 impact on the endoscopy unit located in Pakistan. We report a significant decline in endoscopy and colonoscopy procedures during the COVID-19 pandemic as compared with the pre-COVID-19 pandemic period. This reduction is also reported in other regions of the world^{5,18-20}.

COVID-19 played a major global impact on endoscopic services, reduced capacity with public disinclination to undergo endoscopy during the pandemic might lead to an increased mortality rate due to delayed cancer diagnosis. Endoscopic and colonoscopic procedures are mostly done in emergency settings; however, therapeutic procedures are linked with few complications and higher success rates. Only in time, we would be able to comprehend the real impact of COVID-19 on the well-being of our patients.

Upper and lower GI endoscopies are considered high-risk procedures for the endoscopist and the assisting staff as both are aerosol-generating procedures and there is also a concern for fecal shedding of the virus but still, they cannot be stopped completely being considered as lifesaving procedures. In this regard, patient selection can limit undue exposure to the concerned endoscopy unit staff.

Rutter MD et al. conducted a study in the UK in 2020, weekly average endoscopy procedures were 35,478 in the pre-COVID period, which reduced up to 12% as compared to our study 17.4% (from 3235 to 2280) decrease in COVID-19 impacted period. Due to the reduction in procedure cancer detection rate also decreased, and the weekly number of cancer detection was decreased by 58% in the UK. The most dramatic impact was noted in the number of colonoscopies up to 23.5% during the pandemic.

A study on COVID-19 Impact was conducted in a tertiary care center located in Romania, the total duration of the study was 6.5-month, and a 6.2-fold decrease was noted, Colonoscopies procedures were reduced from 916 to 42, $p < 0.001$; gastrointestinal (GI) endoscopies from 2269 to 401, $p = 0.006$; detection of cancers was reduced (57 compared to 249, $p = 0.001$). The COVID-19 pandemic has significantly altered the workflow of the endoscopy unit, lowering the number of procedures performed and potentially compromising the early detection of cancers.²¹

We compared the Pre-COVID-19 and COVID-19

periods retrospectively and concluded that endoscopy and colonoscopy during the pandemic time of COVID-19 reduced. There was a non-significant change observed in regards to gender distribution in both periods, men (59.7% vs. 56.1%) and similar proportions of women (40.3% versus 43.9 %). As far as the age is concerned, in pre- COVID-19 (2019), the majority of patients' age was between 41-50 years (26.2%) in comparison to (23.2 %). In COVID-19 the majority of patients' age was 51-60 years 26.6% vs. 22% in the pre-Covid period with significant shifting (P-value 0.006). Overall, 17.4% of services were decreased. A significant reduction in endoscopy indications including corrosive intake, UGIB, dysphagia, screening for varices, hematemesis, and melena was noted with P-value <0.001.

Moreover, there was a significant increase in other indications for the procedure such as persistent vomiting, anemia, chronic diarrhea, corrosive stricture, and APD/Gastritis. The endoscopic findings which were significantly reduced include fundal varices, gastric ulcer, duodenal ulcer, gastropathy without varices, duodenopathy, duodenal polyp, gastritis, esophagitis, polyp gastric, hiatal hernia, pyloric stenosis, and obliterated varices.

The colonoscopy services were reduced from 266 to 430 patients, including a reduction in the number of patients with PR bleed, malignancy, anemia, constipation, ulcerative colitis, and polyps. Moreover, there was a significant increase in patients presenting with chronic diarrhea, intestinal TB, hemorrhoids, and diverticulitis. These changes are implicated as a result of the direct impact of Covid-19 on endoscopic procedures and hence mark a new shift towards comparatively less commonly encountered diseases otherwise.

Although the global health crisis is over, endoscopy units started their work routinely. The COVID-19 pandemic is the 5th pandemic since the Spanish Flu in 1918, and will not be the last. The experiences that we gained during this period will provide light in future action against other potential pandemics. The use of PPE and the detailed guidance for patient and personnel hygiene will be helpful.

However, our study presents some limitations including single-center data being analyzed, and delayed complications.

CONCLUSION

Our study showed a remarkable reduction in endoscopy

and colonoscopy procedures due to COVID-19.

However, we suggest that such an impact can also increase morbidity and mortality rates in the future if not dealt with meticulously. Locoregional and international guidelines should be provided to the GI centers dealing with endoscopic procedures during such pandemic in line with real-life evidence.

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