

# Covid-19: A retrospective Study About The Challenges for ERCP

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## ABSTRACT

**INTRODUCTION:** We aimed to investigate the effects of Covid-19 on Endoscopic retrograde cholangiopancreatography (ERCP) and to investigate what should be considered in the next possible epidemic situations.

**METHODS:** In our study, patients who applied to Trakya University School of Medicine, Department of General Surgery for ERCP (Endoscopic retrograde cholangiopancreatography) between March 2019 and March 2021 were evaluated, retrospectively. Percentages, mean, standard deviation, median and interquartile range were used as the descriptive statistics. Mann-Whitney U test was used for the variants which are contrary to the normal distribution range in the comparison of two groups. The relations between qualitative variants were studied by the Pearson Chi-Square test and Fisher's Exact Chi-Square test. Significant value was determined as 0.05 for all statistical analyses.

**RESULTS:** Prior to COVID-19, ERCP indications were in the order of stone (90.1%), stent removal (8%) and tumor (1.1%), while in the period of COVID-19, the ranking changed to stone (73.8%), tumor (13.7%), and stent removal (12.4%). The diagnostic use of ERCP has been greatly reduced (from 0.7% to 0.0%). No perforation was detected in both periods, there was no bleeding, but a small increase (4.7% to 5.9%) was found in pancreatitis in the COVID-19 period. In the pre-COVID-19 period, stones were detected in 46.2% of the patients and all of them were successfully removed, but during the COVID-19 period, stones were detected in 50.6% of the patients and the stones could not be removed in 1.3% of the patients.

**DISCUSSION AND CONCLUSION:** It was observed that the number of ERCPs decreased due to the delay in admissions to the hospital and the fear of coming to the hospital during the Covid-19 epidemic period, and the number of malignancies diagnosed with ERCP increased in this process. In such epidemic periods, more scheduled health services will provide better results for both patients and health personnel.

**Keywords:** Endoscopic Retrograd Cholangiopancreaticography, Choledoch, Covid, Gall stone, Mechanic icterus

## Covid-19: ERCP'de Karşılaşılan Zorluklar Hakkında Bir Retrospektif Çalışma

### ÖZET

**GİRİŞ ve AMAÇ:** Covid-19'un Endoskopik Retrograd Kolanjiyopankreatikografi (ERCP) üzerindeki etkilerini araştırmayı ve bundan sonraki olası salgın durumlarında nelere dikkat edilmesi gerektiğini araştırmayı amaçladık.

**YÖNTEM ve GEREÇLER:** Çalışmamızda Mart 2019-Mart 2021 tarihleri arasında Trakya Üniversitesi Tıp Fakültesi Genel Cerrahi Anabilim Dalı'na ERCP (Endoskopik retrograd kolanjiyopankreatografi) için başvuran hastalar geriye dönük olarak değerlendirildi. Tanımlayıcı istatistikler olarak yüzdelere, ortalama, standart sapma, ortanca ve çeyrekler arası aralık kullanıldı. İki grubun karşılaştırılmasında normal dağılım göstermeyen değişkenler için Mann-Whitney U testi kullanıldı. Nitel değişkenlerin gruplar arası karşılaştırmaları için Pearson Ki-Kare testi ve Fisher's Exact ki-kare testi ile incelenmiştir. Tüm istatistiksel analizler için anlamlı değer 0.05 olarak belirlendi.

**BULGULAR:** COVID-19 öncesi ERCP endikasyonları taş (%90.1), stent (%8) ve tümör (%1.1) iken, COVID-19 döneminde sıralama taş (%73.8), tümör (%13.7) ve stent (%12.4) olarak değişti. ERCP'nin tanınan kullanımı büyük ölçüde azaltıldı (%0,7'den %0,0'a). Her iki dönemde de perforasyon saptanmadı, kanama olmadı ancak COVID-19 döneminde pankreatitte küçük bir artış (%4,7 ile %5,9) bulundu. COVID-19 öncesi dönemde hastaların %46,2'sinde taş tespit edildi ve tamamı başarıyla çıkarıldı, ancak COVID-19 döneminde hastaların %50,6'sında taş tespit edildi ve hastaların %1,3'ünde taşlar çıkarılamadı.

**TARTIŞMA ve SONUÇ:** Covid-19 salgını döneminde hastaneye başvuruların gecikmesi ve hastaneye gelme korkusu nedeniyle ERCP sayısının azaldığı ve bu süreçte ERCP tanısı konan malignite sayısının arttığı gözlemlendi. Böyle salgın dönemlerinde daha planlı sağlık hizmetleri hem hastalar hem de sağlık personeli için daha iyi sonuçlar sağlayacaktır.

**Anahtar Kelimeler:** Endoskopik kolanjiyopankreatikografi, Safra yolu, Covid, Safra taşı, Tıkanma sarılığı

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**E**ndoscopic retrograde cholangiopancreatography (ERCP) is a procedure that uses synchronous radiology and endoscopy in the diagnosis and treatment of gallbladder, pancreatic and upper gastrointestinal system diseases (1, 2, 3). When it was introduced in the 1970s, being able to treat pancreaticobiliary diseases without making an incision in the patient and being able to view the channels unhindered created a stir (2, 3, 4, 5). ERCP has started to be used more therapeutically in the 1990s with the emergence of magnetic resonance cholangiopancreatography (MRCP) and similar non-surgical methods, as well as its usage for diagnostic purposes in distinguishing surgical and medical jaundice and in the diagnosis of late-onset advanced pancreatic cancer (2, 3, 4, 5, 6). It is still performed today as a therapeutic procedure, as stated in the guidelines of the American Society of Gastrointestinal Endoscopy (3).

In addition to all these comprehensive therapeutic and diagnostic benefits, it is risky to usage in some patients due to the potential for complications (7). In fact, with more therapeutic use, the complication rate in these ERCPs was also found to be higher (2). There are many complications post-ERCP such as pancreatitis, perforation, infections such as cholangitis or cholecystitis, and hemorrhage (4, 7, 8). Although cholangitis and cholecystitis are less common, the perforation rate was higher (8). Although the mortality rate post ERCP varies according to its purpose, it was found to be higher in ERCP performed for therapeutic purposes (8).

Covid-19 severe acute respiratory syndrome is an infectious disease caused by the coronavirus 2 (SARS-CoV-2), which was declared a global pandemic by WHO in March 2019 (9, 10, 11, 12). Although it presents with symptoms such as fever, myalgia, shortness of breath, and cough, it can also progress asymptotically (9, 11). They can be transmitted by respiratory droplets or faecal-oral, and they can also remain for a long time on surfaces contaminated with stool and endoscopic biopsy specimens (9, 10). Healthcare workers are more vulnerable than the general population due to their high level of contagiousness, transmission routes, and long-term survival (9, 11, 13).

During the pandemic period, a consensus could not be reached in critical and urgent procedures, but new procedures were published by adding infection prevention measures in order to avoid support and ethical dilemmas (11, 14). In these guidelines, the operating area of the health system, the length of stay in the hospital, the care

potential of the hospital and the duration of the operation; there are many items such as age and other existing diseases such as diabetes (14).

Appointments and non-urgent procedures were postponed by following the instructions, and the number of endoscopic procedures decreased (12, 13, 14). It was observed that the postponing process increased the number of deaths and workload due to postponement after the pandemic (12, 13, 14). Simultaneously, patients were afraid of leaving home and coming to the hospital during the pandemic, and due to late admission and restrictive policies, diseases were detected in late stages (11, 12).

It is unclear how the accumulated workload and postponed operations will be performed and how patients are affected because we have limited data on these (13, 14).

In this study, we aimed to reveal the difficulties and results of the ERCP procedure during the Covid-19 pandemic, compare it with other studies and contribute to the literature.

## MATERIAL AND METHOD

### *Ethics*

This study was approved by the Scientific Research Ethics Committee of Trakya University School of Medicine (Protocol Code: TÜTF-GOBAEK 2022/146).

### *Patients*

This study was approved by the Ethics Committee of the Trakya University, Edirne, Turkey, and written informed consent was obtained from each participant in accordance with the institutional guidelines. Between March 10, 2019 and March 10, 2021, 427 consecutive patients who underwent ERCP were retrospectively recruited from the Trakya University, Edirne, Turkey.

### *Inclusion Criteria*

The predefined inclusion criteria were as follows: (1) undergoing ERCP. (2) Being older than 18. The predefined exclusion criteria were as follows: (1) having a pre-ercp anesthetic complication. (2) Being younger than 18.

### *Statistical Analysis*

Shapiro-Wilk test used for test of normality. Mann-Whitney U test was used for the variants which are not fit to normal distribution in the comparison of two groups. The relations between qualitative variants were studied by the the Pearson Chi-Square test and Fisher's exact test.

When necessary assumptions were met, Phi and Cramer V tests were used to compare qualitative variables. Median and quarter values has been given for the quantitative variants and percentage and frequency rates were given for the qualitative variants as descriptive statistic evaluation. Significant value was determined as  $p \leq 0.05$  for the all statistical analysis. All statistical analyses were performed by the using of Statistical Package for the Social Sciences (SPSS), version 22.0 (IBM®, Chicago, USA) statistical software program.

## RESULTS

In our study, we evaluated 427 patients, and the rate of female patients (%64) was found to be higher than the rate of male patients(%36) (Figure 1). No statistical difference was found in the comparison of the pre- and post-Covid groups in terms of age ( $p=0,501$ ) (Table 1).

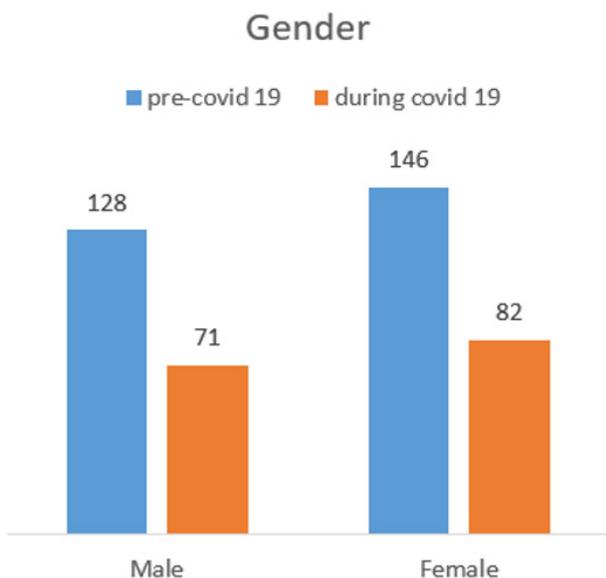


Figure 1. Gender

	Group		p
	Pre-covid 19	During covid 19	
<b>N</b>	274	153	0.501
<b>Median</b>	67	66	
<b>IQR</b>	18.8	20	
<b>Minimum</b>	20	30	
<b>Maximum</b>	93	88	
<b>SD</b>	14.9	14.5	

*IQR: Interquartile Range  
SD: Standart Deviation*

We observed a significant decrease in the drainage success and quality of the ERCP technique ( $p=0,03$ )(Table 3). We did not find a significant difference in terms of the development of complications ( $p=0.776$ ). We observed that the rate of diagnosis of choledocholithiasis decreased (17%) but the rate of diagnosis of malignancy increased (%17,6). In the order of ERCP indications in the COVID19 period, while stone, stent, tumor in the pre-COVID19 period, this situation changed to stone, tumor, stent (Figure 2). We observed that while all stones were successfully removed before COVID19, the rate of stones that could not be removed in the period of COVID-19 increased to 1.3% (Table 2).

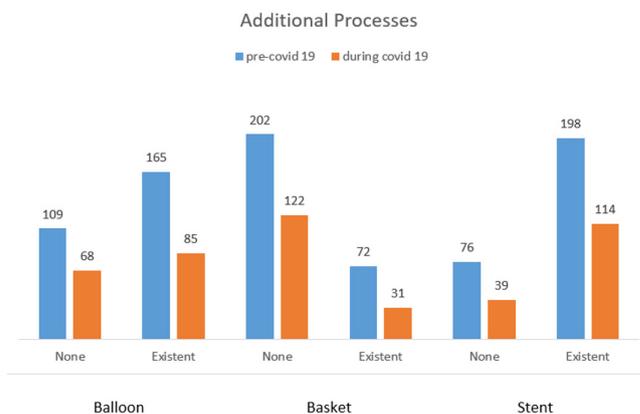


Figure 2. Additional Processes

Table 2: Comparison of p values of indication, stone, pathology, complications and diagnosis between covid 19 periods

		Group		p (Phi or Cramer's V)
		Pre-covid 19	During covid 19	
<b>Indication</b>	Stone	90.1 %	73.8 %	< 0.001 (0.282)
	Tumor	1.1 %	13.7 %	
	Diagnostic	0.7 %	0.0 %	
	Stent removal	8.0 %	12.4 %	
<b>Stone</b>	None	53.8 %	49.4 %	0.129
	Stone removal	46.2 %	49.4 %	
	No stone removal	0.0 %	1.3 %	
<b>Pathology</b>	None	96.7 %	94.1 %	0.200
	Adenocarcinoma	3.3 %	5.9 %	
	Neuroendocrine tumor	0.0 %	0.0 %	
	Gastrointestinal tumor	0.0 %	0.0 %	
<b>Complications</b>	None	94.9 %	94.1 %	0.776
	Pancreatitis	4.7 %	5.9 %	
	Perforation	0.4 %	0.0 %	
<b>Diagnosis</b>	Choledocholithiasis	96.7%	79.1%	< 0.001 (0.287)
	Malignancy	3.3%	20.9%	

No difference was detected in the additional procedures, except for a significant decrease in the number of stents (Figure 3). We observed that the decrease in drainage success (98.8% to 95.6%) was parallel to the increase in the diverticulum (12.4% to 18.3%) (Table 3).

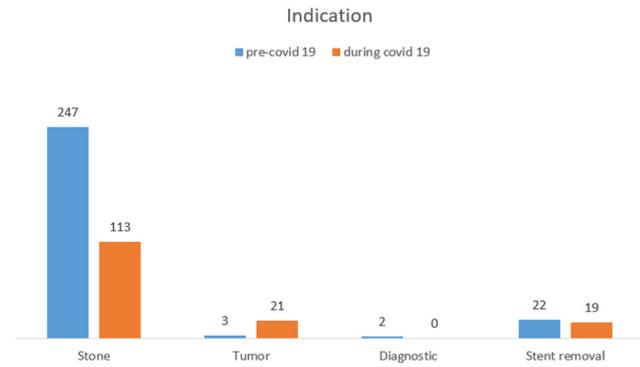


Figure 3. Indication

	Group				p (Phi or Cramer's V)
	Pre-covid 19		During covid 19		
	none	existent	none	existent	
<b>Drainage</b>	1.2%	98.8%	4.4%	95.6%	0.039
<b>Additional Processes</b>	21.5%	78.5%	23.5%	76.5%	0.816
<b>Balloon</b>	39.8%	60.2%	44.4%	55.6%	0.464
<b>Basket</b>	73.7%	26.3%	79.7%	20.3%	0.141
<b>Stent</b>	51.8%	48.2%	79.1%	20.9%	< 0.001 (0.269)
<b>Diverticulum</b>	87.6%	12.4%	81.7%	18.3%	0.098

## DISCUSSION

Endoscopic retrograde cholangiopancreatography (ERCP) is a procedure used in the diagnosis and treatment of pancreaticobiliary system diseases. It is a life-saving procedure in the treatment of obstructions caused by biliary system stones and malignancies, acute pancreatitis and biliary sepsis (15).

The success of the ERCP procedure varies according to the endoscopist's experience, case, indication and techniques used. Also some undesired outcomes may occur due to the complications such as bleeding perforation pancreatitis and cholangitis (11).

During the Covid-19 pandemic, which has turned into a global health crisis, complicative situations due to delay in applying to the hospital and from being unable to reach the diagnosis due to the limitation in working conditions in all diseases appear as a major problem (14).

Some countries changed the pattern of endoscopies and reduced the number of endoscopy during and after the lockdown (16, 17). In the study of Kim et al, They present to the mean ages were 73, 72 and 66 in 2018, 2019 and 2020 respectively. In addition, the dominant gender was woman in 2018, comparison of that, it was man in 2020. They argue that older people do not consult to a doctor until complications become serious for fear of leaving home and going into quarantine, so the mean age in 2020 is lower than in other years (18). Another research indicates that 18 ERCP procedures done in 16 patients between 15 March and 1 July 2020 and the vast majority were male, with an average age of 65 (13).

In our study, we found that while the median age was 67 in the pre-Covid period, it was 66 in the covid period, in line with the literature. Again, as in other articles in the literature, the rate of women in our study was found to be higher than men in both pre-Covid and Covid periods.

They assert the number of procedures in 2020 decreased than 2018 and 2019. So it is fact that covid-19 significantly reduced the number of ERCP but no difference was observed in indications (18).

According to our retrospective study, we found a major decrease in the number of patients by 44% (from 274 to 123) in the period of COVID-19 compared to the pre-COVID-19 period.

The most common uses of ERCP are stone disease, malignancy, bile duct obstruction manifested by jaundice as well acute procedures such as acute pancreatitis or cholangitis (12). According to some studies, 3 most common indications for ERCP are bile duct stones, abdominal pain and distal tumors. Furthermore, following by these jaundice, fever, biliary duct stricture, kolangitis (12, 13, 18, 19, 20).

Prior to Covid 19, ERCP indications were in the order of stone (90.1%), stent removal (8%) and tumor (1.1%), whereas during the COVID19 period, the ranking changed to stone (73.8%), tumor (13.7%) and stent removal (12.4%). The diagnostic use of ERCP has been greatly reduced

(from 0.7% to 0.0%). A significant change was found between the two periods in terms of indication percentages.

When specific endoscopic procedures are compared between 2019 and 2020, not an important difference is found. Balloon trawl, stent deployment or both were the most frequently used techniques in both years and not common techniques were use of a basket and lithotripter (12).

In our study, no significant difference was found between the two periods in the number of patients who underwent specific endoscopic procedures (78.5% to 76.5%). While no significant difference was found in balloon trawl and basket between the two periods, there was a significant decrease in stent deployment in the post-covid 19 period (27.3%,  $p=0.001$ ).

To another study remarks, there were not differences between 2018, 2019, 2020 . Moreover, endoscopic retrograde biliary drainage (ERBD) was the first on the list of the ERCP procedures and followed by bile duct stone removal ,endoscopic sphincterotomy (EST) and endoscopic nasobiliary drainage (ENBD) (18).

In the pre-Covid19 period, stones were detected in 46.2% of the patients and all of them were successfully removed, whereas during the COVID19 period, stones were detected in 50.6% of the patients and unfortunately, the stones could not be removed in 1.3% of the patients. There was a slight decrease in success, which was thought to be due to the delay of patients in applying to the clinic, the operator's performing ERCP under difficult conditions, or the localization and size of the stone.

In addition, cannulation made successfully in all patients, as well guide-wire assisted cannulation was the first choice followed by double-guidewire and contrast-guided technique. Additionally covid 19 patients and the others in term of cannulation methods were not different from each other (13).

In our study, no significant difference was found in terms of cannulation techniques in the period before and during COVID19. The increase in the number of patients with diverticulum during the COVID19 period was also reflected in the success of cannulation and reduced the probability of success. It is thought that the increase in the number of patients who applied repeatedly during the COVID19 period may also be related to the decrease in the success of cannulation in this period.

We searched the study about the complications that occur in patients with covid-19 and without. It is indicated, there was a decreased of success and Covid-19 was the only risk factor for that which it is the low possibility but there is no significant differences in terms of complications (12, 13). To their opinion, it will continue that quality of ERCP and success during COVID-19 like before (12).

Donato G et al, investigated 804 patients. 23 of 804 patients had post ERCP acute pancreatitis, 16 of 804 patients had bleeding, 14 of 804 patients had cholangitis/ cholecystitis and 4 of 804 patients had perforation but none of these turn to critical situation. There is no death because of ERCP but 3 of 804 patient died due to COVID-19 (19).

The European Society of Gastrointestinal Endoscopy (ESGE) has given priority to emergency procedures and has suggested some changes in endoscopies for situations requiring urgent intervention (14). Among these measures, the patient's position change during the endoscopy, ventilation in the area to be applied to the endoscopy, and the use of personal protective equipment by the staff and the patient are ( 9, 10, 14). According to the ESGE directive, personal protective equipment was evaluated as gloves, mask (N95, FFP2), apron, goggles and hairnet (9, 10). These equipments can create reluctance in the operator due to their bulky structure as well as their protectiveness and indirectly cause a decrease in ERCP success (13).

There was no significant change in the number of complications before and during COVID19. In both periods, no perforation was detected, there was no bleeding, but a small increase (4.7% to 5.9%) was found in pancreatitis in the covid 19 period. As in all diseases, the number of hospital admissions decreased during the COVID19 period, but despite some uncomfortable conditions (wearing protective equipment and the stress of the pandemic period), it did not change the quality of the procedure and the occurrence of complications. In addition, one of our patients died after ERCP performed before COVID19, not because of ERCP, but because of fulminant cholangiopepsis.

We think that this delay in diagnosis is caused by the fear of COVID19 in patients, delaying admission to the clinic, and delaying cases that are not considered urgent, and that the health system is more affected by this. We attribute the increase in tumor incidence to the decrease in the use of ERCP for diagnosis and screening. We think that the comfort of protective equipment should be increased and the operator will be less affected by the conditions under appropriate conditions.

## DECLARATIONS

### Funding

None. The authors declare that this study has received no financial support.

### Ethical Approval

This study was approved by the hospital's institutional review board.

### Conflicts of Interest

All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. The authors have no independent disclosures or conflicts of interest.

### Contributors

IEC: concept, design, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing and manuscript review; MYK: data acquisition, data analysis, manuscript review, SNC: literature search, data acquisition, data analysis; MNY: data analysis, statistical analysis, manuscript preparation; DA: manuscript preparation, manuscript editing and manuscript review.

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