

# The Role of Choledochoscopy in Hepatopancreatobiliary Diseases

## *Hepatopankreatobilyer Hastalıklarda Koledokoskopinın Rolü*

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### Abstract

**Objective:** Advances in choledochoscopy technology lead to an improvement in the diagnosis and treatment of hepatopancreatobiliary diseases. The aim of this study is to reveal the role of choledochoscopy in hepatopancreatobiliary pathologies.

**Materials and Methods:** Choledochoscopy was used under general anesthesia in operation rooms. Flexible choledochoscope inserted via a vertical choledochotomy line, which was closed by primary closure, T-tube application, or choledochoduodenal anastomosis. Olympus CHF T 20 flexible choledochoscope and related endoscopic instruments were used for the procedures. The records were evaluated retrospectively.

**Results:** This study presents the findings of 235 intraoperative choledochoscopy procedures. The most common indications were suspected common bile duct stone in 96 patients (40.9%), serum cholestatic enzyme increase without jaundice in 52 (22.1%), obstructive jaundice and/or serum bilirubin increase in 46 (19.6%), and presence of dilated choledoch in 42 (17.9%). Additional endoscopic diagnostic and/or therapeutic procedures were performed 156 times in 125 patients (53.2%), and endoscopic biliary stone removal was the most used procedure (87 patients, 37.0%). The mean choledochoscopy duration was 8.5 minutes (range: 5-25 minutes). Choledochoscopy confirmed preliminary diagnosis in 117 patients (49.8%), while different data were elicited in 68 (28.9%), and normal findings were found in 50 (21.3%). In this series, no choledochoscopy-related mortality was seen, and some complications occurred in 4 patients (1.7%).

**Conclusion:** Intraoperative flexible choledochoscopy is a proper technique in the diagnosis and treatment of hepatopancreatobiliary disorders.

**Keywords:** Intraoperative flexible choledochoscopy, ERCP, MRCP

### Öz

**Amaç:** Koledokoskopi teknolojisindeki gelişmeler, hepatopankreatobilyer hastalıkların tanı ve tedavisinde iyileşmelere yol açmıştır. Bu çalışmanın amacı, hepatopankreatobilyer patolojilerde koledokoskopinın rolünü araştırmaktır.

**Gereç ve Yöntem:** Koledokoskopi, ameliyat odalarında genel anestezi altında gerçekleştirildi. Fleksibl koledokoskop, vertikal bir koledokotomi hattından uygulandı ve bu hat primer kapama, T-tüp uygulaması veya koledokoduodenal anastomoz ile kapatıldı. İşlemlerde Olympus CHF T 20 koledokoskop ve ilişkili aletler kullanıldı. Kayıtlar retrospektif olarak değerlendirildi.

**Bulgular:** Bu çalışmada 235 intraoperatif koledokoskopi işlemi sonuçları sunulmaktadır. En sık endikasyonlar 96 hastada (%40,9) koledok taşı şüphesi, 52'sinde (%22,1) sarılık olmaksızın serum kolestatik enzim yüksekliği, 46'sında (%19,6) tıkanma sarılığı ve/veya serum bilirubin yüksekliği ve 42'sinde (%17,9) de geniş koledok varlığıydı. Ek endoskopik tanısal ve/veya terapötik işlemler 125 hastada (%53,2) 156 kez uygulandı ve safra taşı çıkarılması en sık kullanılan işlem (87 hasta, %37,0). Ortalama koledokoskopi süresi 8,5 dakikayı (5-25 dakika arasında). Koledokoskopi 117 hastada (%49,8) ilk tanıyı doğrularken 68'inde (%28,9) farklı bulgular verdi, 50'sinde (%21,3) ise normal bulgular elde edildi. Bu seride koledokoskopi ile ilişkili ölüm görülmedi, 4 hastada (%1,7) bazı komplikasyonlar gelişti.

**Sonuç:** Intraoperatif fleksibl koledokoskopi, hepatopankreatobilyer hastalıkların tanı ve tedavisinde yararlı bir tekniktir.

**Anahtar Kelimeler:** Intraoperatif fleksibl koledokoskopi, ERCP, MRKP

### Introduction

Many medical records determined that biliary stones were known and treated from the ancient times [1, 2]. The revolution of the diagnosis and treatment in medical sci-

ences was experienced with the application of fiberoptic technology since 1960's [3]. Technology was started to scan gastrointestinal system, and than choledoch, one of the narrowest channels of the body, was visualised by the endoscopes. After the first experience of Kawai et al. [4] in

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1976 with choledochoscope, improvements in the shapes, optic system and mobilisation capability of the endoscopes made the choledochoscopy as valuable method in the diagnosis and treatment of hepatopancreatobiliary system diseases [5-8].

The aim of this study is to evaluate the results of 235 intraoperative flexible choledochoscopy procedures performed in a 25-year period between July 1998 and July 2013.

## Materials and Methods

In Atatürk University, School of Medicine, Department of General Surgery, 235 intraoperative flexible choledochoscopy procedures were performed in the period above mentioned. Age, gender, indications, addictive diagnostic and therapeutical endoscopic procedures, choledochoscopy time, diagnosis, mortality and morbidity were evaluated retrospectively. Endoscopic procedures performed in patients, in whom general anesthesia and open surgical procedures due to hepatobiliary system disorders were performed in the operation rooms. Olympus CHF T 20 flexible choledochoscope and related instruments, including

electrocoagulators, balloon and basket catheters, lithotriptors, biopsy and sitology forceps, and other devices were used.

## Results

In this study 235 patients included with a mean age of 63.1 years (range: 19-92 years). Of the patients, 148 (63.0%) were female, and 87 (37.0%) were male.

The most common indications of choledochoscopy were suspected common bile duct stone in 96 patients (40.9%), serum cholestatic enzyme increase without jaundice in 52 (22.1%), obstructive jaundice and/or serum bilirubin increase in 46 (19.6%), and presence of dilated choledoch in 42 (17.9%), as shown in Table 1. Additional diagnostic and therapeutic procedures were applied 156 times in 125 patients; stone extraction in 87 patients (37.0%), biopsy in 25 (10.6%), hydatid cyst vesicles extraction in 12 (5.1%), balloon dilatation in 10 (4.3%), brushing cytology in 8 (3.4%), stent extraction in 8 (3.4%), and stent application in 6 (2.6%). Mean choledochoscopy time was 8.5 minutes (range: 5-25 minutes, excluding the choledochotomy and closure times). As seen in

**Table 1. The indications and results of choledochoscopy**

Indication	Patient	%	Diagnosis confirmed	%	Normal	%	New diagnosis	%
Choledoch stone	96	40.9	71	74.0	21	21.9	4	4.2
Serum cholestatic enzyme increase without jaundice	52	22.1	-	-	15	28.8	37	71.2
Obstructive jaundice and/or serum bilirubin increase	46	19.6	-	-	11	23.9	35	76.1
Wide choledoch	42	17.9	32	76.2	5	11.9	5	11.9
Abnormal cholangiogram	18	7.7	-	-	8	44.4	10	55.6
Biliary tract malignancy	15	6.4	11	73.3	2	13.3	2	13.3
Choledoch hydatid cyst	14	6.0	11	78.6	2	14.3	1	7.1
Choledoch cyst	13	5.5	8	61.5	3	23.1	2	15.4
Papillar stenosis	12	5.1	8	66.7	2	16.7	2	16.7
Choledoch stenosis	9	3.8	7	77.8	1	11.1	1	11.1
Occluded stent	7	3.0	5	71.4	1	14.3	1	14.3
Extrinsic compression	6	2.6	4	66.7	1	16.7	1	16.7
Hemobilia	4	1.7	4	100.0	-	-	-	-
Sclerosing cholangitis	2	0.9	2	100.0	-	-	-	-
Ischemic injury	1	0.4	1	100.0	-	-	-	-
Total	337*/235	-	164*/117	49.8	72*/50	21.3	101*/68	28.9

\*In some patients more than one

Table-1, choledochoscopy confirmed preliminary diagnosis in 117 patients (49.8%), while different data were elicited in 68 (28.9%), and normal findings were found in 50 (21.3%).

In this series, mortality was not seen due to the endoscopic procedures. A choledochal tear in choledochotomy line, as a complication, occurred in 4 patients (1.7%), and these patients were treated by primary closure.

## Discussion

In spite of the surgeons remarkable efforts, the residual biliary stone incidence is still high [9,10]. On the other hand, not only the biliary stones, but also papilla tumors and stenosis, choledoch tumors, cysts and parasites, liver tumors and cysts, and pancreas tumors and cycts, which are the major hepatopancreatobiliary pathologies, make the choledochoscopy important [10-12].

Although cholestasis, with or without jaundice, is one of the major indications of MRCP or ERCP, intraoperative choledochoscopy is an alternative diagnostic and therapeutic method, particularly in patients in whom MRCP or ERCP is not performed, inadequate, or unsuccessful [3, 6-8], as was in our study. Choledoch stones, as well as the residual biliary stones, are the most important factors that affect the cost effectiveness, mortality, and morbidity in patients with biliary system stones, which are benign diseases [3, 13, 14]. MRCP and ERCP have some restrictions; MRCP is not a therapeutic procedure in addition to its 28% of false negativity and 11% of false positivity diagnostic rates for biliary system stones [3, 6-8], while ERCP is an invasive procedure, even if minimal, with a mean 15% of complication rate in addition to its 5-20% of impossible cannulation rate [3, 15]. Additionally, to palpate or to determine the choledoch stones during laparoscopic surgery is difficult, even if possible, so it is important to diagnose them before surgery. Similarly, a mean 10% of false negative visualization or exploration rate of choledochal stones during open or laparoscopic surgery may create need for choledochoscopy for the biliary system stones [3, 7, 16-20]. In intraoperative choledochoscopy, the stones or stone particles can be directly seen, as well as the stones are easily differentiated from blood coagulum or air bubbles [3,11]. Additionally, electrohidrolic or laser lithotripsy can be performed by this technique [3, 18, 21-27]. On the other hand, some other major application areas of choledochoscopy are biopsy or cytology for the diagnosis of biliary tract malignencies, intrabiliary rupture of hydatid cysts, balloon dilatation of the biliary tract, electrocoagulation, or stent application for biliary malignencies [3, 6, 7, 11, 12, 14, 16, 17, 26, 28-33], similar to our study.

The anticipated diagnostic rate of choledochoscopy is between 45.4% and 59%, while the additional unanticipated diagnostic rate is between 29.5% and 31.5% [3,6], similar to our results.

Although the mortality and morbidity rates of the operative choledoch exploration are given as 1-5% and 2-17%, respectively [30], and our results are compatible to the literature data, the prognosis of the choledochoscopy itself is not well known [3].

In conclusion, choledochoscopy is a reliable procedure in diagnosis and treatment of the hepatopancreatobiliary diseases, particularly in patients in which the other methods are inadequate or unsuccessful.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the local ethics committee of Atatürk University School of Medicine.

**Informed Consent:** Written informed consent was not obtained due to the retrospective nature of this study.

**Peer-review:** Externally peer-reviewed.

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