

Submission ID #: 69432

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**Title: Laparoscopic Cholecystectomy with Indocyanine Green
Fluorescence: Choledochoscopic Stone Extraction and Primary Duct
Suture**

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Author Questionnaire

1. We have marked your project as author-provided footage, meaning you film the video yourself and provide JoVE with the footage to edit. JoVE will not send the videographer. Please confirm that this is correct.

✓ Correct

2. **Interview statements:** Which interview statement filming option is the most appropriate for your group? **Please select one.**



Interview Statements are read by JoVE's voiceover talent.

3. **Proposed interview filming date:** Please indicate the proposed date that your group will self-film interviews: **MM/DD/YYYY**

Current Protocol Length

Number of Steps: 11

Number of Shots: 19

Introduction

NOTE to VO producer:

Please generate the VO for the interview answers

INTRODUCTION:

~~What is the scope of this research?~~

- 1.1. This research aims to optimize a minimally invasive protocol for safely removing common bile duct stones and achieving primary duct closure.

- 1.1.1. *B-roll: 2.3.1*

~~What technologies are currently used to advance research in the field?~~

- 1.2. A combination of fluorescence cholangiography and choledochoscopy for precise stone extraction is being used in the field currently.

- 1.2.1. *B-roll: 2.4.1*

CONCLUSION:

~~What advantage does this protocol offer compared to other techniques?~~

- 1.3. This technique's main advantage is avoiding a T-tube, which promotes faster recovery and improves patient's quality of life.

- 1.3.1. *B-roll: 3.2.1*

~~How will the findings advance research in your field?~~

- 1.4. This protocol provides a new standard for safe, efficient primary duct closure, advancing minimally invasive biliary surgery.

- 1.4.1. *B-roll: 4.1.1*

Ethics Title Card

This research has been approved by the Ethics Committee at the Guangzhou First People's Hospital

Protocol

2. Preparation and Cholecystectomy Under Laparoscopic Guidance

Demonstrator: Kaiwen Wu

2.1. To begin, make the required infraumbilical incision and insert the first 12-millimeter Trocar using the open technique [1]. Under laparoscopic guidance, place four additional Trocars: one in the epigastric region [2], one in the right midclavicular line subcostal [3], one in the right anterior axillary line subcostal, and one in the left paramedian point midway between the xiphoid and umbilicus [4].

2.1.1. LAB MEDIA: 69432-1_1.mp4 00:00—00:10

2.1.2. LAB MEDIA: 69432-1_1.mp4 00:44—00:49

2.1.3. LAB MEDIA: 69432-1_1.mp4 01:23—01:28

2.1.4. LAB MEDIA: 69432-1_1.mp4 02:13—02:19

2.2. Press the **camera mode (M)** button once to switch to color fluorescence mode. Adjust the gain to 50 percent to 60 percent [1]. Observe the structures of Calot's triangle and confirm the fluorescence imaging of the cystic duct, common hepatic duct, and common bile duct [2].

2.2.1. LAB MEDIA: 69432-2_2.mp4 01:15—01:30

2.2.2. LAB MEDIA: 69432-2_2.mp4 01:36—01:42

2.3. Then, dissect Calot's triangle [1]. Isolate the cystic artery, doubly clip it with 5-millimeter hemoclips [2], and then transect the artery [3].

2.3.1. LAB MEDIA: 69432-2_2.mp4 02:36—02:42

2.3.2. LAB MEDIA: 69432-3.mp4 01:36—01:42 And 03:48—03:50

2.3.3. LAB MEDIA: 69432-3.mp4 08:20—08:45

2.4. Free the cystic duct until approximately 1 centimeter from its junction with the common bile duct [1].

2.4.1. LAB MEDIA: 69432-4_1.mp4 01:25—01:33

2.5. Dissect the gallbladder from its bed using electrocautery while ensuring hemostasis [1].

2.5.1. LAB MEDIA: 69432-4_1.mp4 08:59—09:03 and 69432-5_1.mp4 06:40—06:45

3. Common Bile Duct (CBD) Exploration and Primary CBD Closure

Demonstrator: Jiefeng Weng

3.1. Now, mobilize the serosa overlying the planned common bile duct incision site to expose the duct course [1].

3.1.1. LAB MEDIA: 69432-6_1.mp4 01:30—01:45

3.2. Then, make a 0.8-centimeter longitudinal choledochotomy using laparoscopic scissors and preserve adequate duct wall for subsequent closure [1]. Insert a 3-millimeter choledochoscope via the epigastric port to examine the common bile duct and intrahepatic ducts [2-TXT].

3.2.1. LAB MEDIA: 69432-9.mp4 05:20—05:30

3.2.2. LAB MEDIA: 69432-9.mp4 07:03—07:14 **TXT: Retrieve identified stones completely using a retrieval basket**

3.3. Now, begin suturing at the distal incision margin. Maintain 2-millimeter stitch intervals and 1-millimeter edge margins during suturing [1].

3.3.1. LAB MEDIA: 69432-11_.mp4 05:30—05:35 and 69432-12.mp4 08:55—09:05

3.4. After completing the primary suture, transect the cystic duct carefully [1].

3.4.1. LAB MEDIA: 69432-13_1.mp4 07:53-07:56 and 08:23—08:26

3.5. Verify bile flow from the cystic duct stump and confirm absence of residual stones [1].

3.5.1. LAB MEDIA: 69432-14_1.mp4 01:48—01:50 and 02:11—02:15

3.6. Finally, place a closed-suction drain in Winslow's foramen and exteriorize it through the right anterior axillary port [1].

3.6.1. LAB MEDIA: 69432-17_1.mp4 09:01—09:05 and 69432-18_1.mp4 00:45—00:52

Results

4. Results

- 4.1. Indocyanine green fluorescence clearly delineated the cystic duct [1], the common bile duct [2], and the common hepatic duct, supporting precise anatomical localization [3].
 - 4.1.1. LAB MEDIA: Figure8. *Video editor: Highlight the label “CD” next to the cystic duct.*
 - 4.1.2. LAB MEDIA: Figure8. *Video editor: Highlight the label “CBD” on the main bile duct.*
 - 4.1.3. LAB MEDIA: Figure8. *Video editor: Highlight the label “CHD” marking the common hepatic duct.*

- 4.2. The procedure was completed in 196 minutes [1] with minimal blood loss of 15 milliliters [2].
 - 4.2.1. LAB MEDIA: Table 1. *Video editor: Highlight the cell showing “196 min” in the row labelled “Duration”.*
 - 4.2.2. LAB MEDIA: Table 1. *Video editor: Highlight the cell showing “15 mL” in the row labelled “Blood loss”.*

- 4.3. The patient was discharged on postoperative day 5 [1] with a satisfactory recovery status at follow-up [2].
 - 4.3.1. LAB MEDIA: Table 1. *Video editor: Highlight the cell showing “5 days” in the row labelled “Hospital stay”.*
 - 4.3.2. LAB MEDIA: Table 2. *Video editor: Highlight the phrase “Status post-op satisfactory” in the row labelled “Recovery Status”.*

- 4.4. No postoperative bile leakage or stricture was observed, as reflected by the absence of complications [1].
 - 4.4.1. LAB MEDIA: Table 2. *Video editor: Highlight the row labelled “Complications”*

Pronunciation guide:

- Infraumbilical

Pronunciation link: <https://www.merriam-webster.com/dictionary/infraumbilical>

IPA: /,ɪn.frə.ʌmˈbɪl.ɪ.kəl/

Phonetic Spelling: in·fruh·uhm·bil·ih·kuhl

- Trocar

Pronunciation link: <https://www.merriam-webster.com/dictionary/trocar>

IPA: /ˈtroʊ.kɑːr/

Phonetic Spelling: troh·kahr

- Laparoscopic

Pronunciation link: <https://www.merriam-webster.com/dictionary/laparoscopic>

IPA: /,ləp.ə.rəˈskaː.pɪk/

Phonetic Spelling: lap·uh·ruh·skah·pik

- Epigastric

Pronunciation link: <https://www.merriam-webster.com/dictionary/epigastric>

IPA: /,ɛp.ɪˈgæs.trɪk/

Phonetic Spelling: eh·puh·gas·trik

- Subcostal

Pronunciation link: <https://www.merriam-webster.com/dictionary/subcostal>

IPA: /sʌbˈkɑː.stəl/

Phonetic Spelling: suhb·kah·stuhl

- Axillary

Pronunciation link: <https://www.merriam-webster.com/dictionary/axillary>

IPA: /ˈæks.ɪ.lər.i/

Phonetic Spelling: ak·suh·leh·ree

- Paramedian

Pronunciation link: <https://www.merriam-webster.com/dictionary/paramedian>

IPA: /,pær.əˈmiː.di.ən/

Phonetic Spelling: pah·ruh·mee·dee·uhn

- Xiphoid

Pronunciation link: <https://www.merriam-webster.com/dictionary/xiphoid>

IPA: /ˈzaɪ.fɔɪd/

Phonetic Spelling: zy·foyd

- Umbilicus

Pronunciation link: <https://www.merriam-webster.com/dictionary/umbilicus>

IPA: /ʌmˈbɪl.i.kəs/

Phonetic Spelling: uhm·bil·ih·kuhs

- Fluorescence

Pronunciation link: <https://www.merriam-webster.com/dictionary/fluorescence>

IPA: /flʊˈres.əns/

Phonetic Spelling: floo·reh·suhns

- Calot's triangle

Pronunciation link: <https://www.howtopronounce.com/calot-s-triangle>

IPA: /kæˈlouz ˈtraɪ.æŋ.ɡəl/

Phonetic Spelling: kah·lohzh try·ang·guhhl

- Cystic duct

Pronunciation link: <https://www.merriam-webster.com/dictionary/cystic%20duct>

IPA: /ˈsɪs.tɪk dʌkt/

Phonetic Spelling: sis·tik duhkt

- Hemoclips

Pronunciation link: <https://www.howtopronounce.com/hemoclip>

IPA: /ˈhiː.moʊ.klɪps/

Phonetic Spelling: hee·moh·klips

- Electrocautery

Pronunciation link: <https://www.merriam-webster.com/dictionary/electrocautery>

IPA: /ɪˌlek.trəˈkɔː.tə.ri/

Phonetic Spelling: ih·lek·truh·kaw·tuh·ree

- Hemostasis

Pronunciation link: <https://www.merriam-webster.com/dictionary/hemostasis>

IPA: /ˈhiː.məˈsteɪ.sɪs/

Phonetic Spelling: hee·muh·stay·suhs

- Serosa

Pronunciation link: <https://www.merriam-webster.com/dictionary/serosa>

IPA: /səˈroʊ.sə/

Phonetic Spelling: suh·roh·suh

- Choledochotomy

Pronunciation link: <https://www.howtopronounce.com/choledochotomy>

IPA: /ˌkoʊ.ləˈdɑːˈkɑː.tə.mi/

Phonetic Spelling: koh·luh·dah·kah·tuh·mee

- Choledochoscope

Pronunciation link: <https://www.howtopronounce.com/choledochoscope>

IPA: /koʊˈlɛd.ə.kəˌskoʊp/

Phonetic Spelling: koh·led·uh·kohp

- Intrahepatic

Pronunciation link: <https://www.merriam-webster.com/dictionary/intrahepatic>

IPA: /ˌɪn.trə.hɪˈpæt.ɪk/

Phonetic Spelling: in·truh·hih·pa·tik

- Suture

Pronunciation link: <https://www.merriam-webster.com/dictionary/suture>

IPA: /ˈsuː.tʃə/

Phonetic Spelling: soo·cher

- Transect

Pronunciation link: <https://www.merriam-webster.com/dictionary/transect>

IPA: /trænˈsekt/

Phonetic Spelling: tran·sekt

- Winslow's foramen

Pronunciation link: <https://www.howtopronounce.com/winslow-s-foramen>

IPA: /ˈwɪnz.loʊz fəˈreɪ.mən/

Phonetic Spelling: winz·lohzh fuh·ray·muhn

- Indocyanine green

Pronunciation link: <https://www.howtopronounce.com/indocyanine-green>

IPA: /ˌɪn.doʊˈsaɪ.ə.niːn ɡriːn/

Phonetic Spelling: in·doh·sy·uh·neen green

- Anatomical

Pronunciation link: <https://www.merriam-webster.com/dictionary/anatomical>

IPA: /ˌæn.əˈtɑː.mɪ.kəl/

Phonetic Spelling: an·uh·tah·mih·kuhl

- Postoperative

Pronunciation link: <https://www.merriam-webster.com/dictionary/postoperative>

IPA: /ˌpoʊstˈɑː.pə.rə.tɪv/

Phonetic Spelling: pohst·ah·puh·ruh·tiv

- Stricture

Pronunciation link: <https://www.merriam-webster.com/dictionary/stricture>

IPA: /ˈstriːk.tʃə/

Phonetic Spelling: strik·cher