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Title: Application of Laparoscopic Ultrasonography in Primary Choledochal Suture During Combined Two-Lens Surgery

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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. Microscopy: Does your protocol require the use of a dissecting or stereomicroscope for performing a complex dissection, microinjection technique, or something similar? **No**

3. Software: Does the part of your protocol being filmed include step-by-step descriptions of software usage? **No**

4. Proposed filming date: To help JoVE process and publish your video in a timely manner, please indicate the proposed date that your group will film here:

When you are ready to submit your video files, please contact our China Location Producer, Yuan Yue.

Current Protocol Length

Number of Steps: 08
Number of Shots: 13

Introduction

NOTE TO VO: Please record the introduction section

1.1. The research focuses on minimally invasive approaches to treat hepatobiliary-pancreatic stones and tumors, aiming to optimize patient outcomes while reducing surgical trauma and recovery time.

1.1.1. *Suggested B.roll:3.1*

What are the most recent developments in your field of research?

1.2. Recent advancements in hepato-pancreato-biliary surgery include robot-assisted remote procedures, enhanced minimally invasive techniques, and the integration of intelligent surgical systems for greater precision and safety.

1.2.1. *Suggested B.roll:2.2*

What technologies are currently used to advance research in your field?

1.3. Robotic fluorescence-guided intraoperative ultrasound is a key technology advancing our field, enabling real-time, high-precision tumor localization and improving surgical accuracy during minimally invasive procedures.

1.3.1. *Suggested B.roll:2.7.2*

Ethics Title Card
This research has been approved by the Institutional Review Board (IRB) at Dongguan Tungwah Hospital

Protocol

2. Laparoscopic Management of Common Bile Duct Stones Using Ultrasound Guidance and Choledochoscopy

Demonstrator: Rongjun Chen

2.1. To begin, perform laparoscopic exploration from top to bottom, examining solid organs first, then hollow organs, from the abdominal to the pelvic cavity to assess for lesions **[1]**.

2.1.1. FILE: surgical procedure.wmv 00:00 – 00:10

2.2. Using laparoscopic ultrasound, probe the hepatic portal area. Insert the laparoscopic probe at the porta hepatis region through the 10-millimeter subxiphoid port **[1-TXT]**. Use blood flow signals to distinguish between bile ducts and blood vessels and assess the distribution of stones **[2]**.

2.2.1. FILE: surgical procedure.wmv 12:56 – 13:10 **TXT: Move probe vertically to scan area**

2.2.2. LAB MEDIA: Figure 4A,B *Video Editor: Please sequentially highlight areas pointed at by green red and white arrow*

2.3. Use atraumatic forceps to elevate the gallbladder fundus and retract Calot's triangle to improve the surgical view **[1]**. Dissect Calot's triangle layer by layer using either an electrohook or an ultrasonic scalpel **[2]**.

2.3.1. FILE: surgical procedure.wmv 16:21-16:25

2.3.2. FILE: surgical procedure.wmv 16:26 – 17:20

2.4. After confirming the common bile duct location with ultrasound, use a needle holder to straighten a 5-0 *(Five-zero)* round-bodied needle and tie a number 4 silk suture to its tail to prevent loss **[1-TXT]**. Make a 1-centimeter longitudinal incision on the anterior wall of the common bile duct **[2]**.

2.4.1. FILE: surgical procedure.wmv 27:00-27:22 **TXT: Grab needle midpoint with laparoscopic forceps connected to electrocautery set to 20 W**

2.4.2. FILE: surgical procedure.wmv 27:22-27:32

2.5. Insert the choledochoscope into the common bile duct and retrieve calculi using a stone basket **[1]**.

2.5.1. FILE: surgical procedure.wmv 42:00-42:20

2.6. Inspect both proximal and distal bile ducts for any residual stones. Confirm that the duodenal papillary sphincter is competent. Close the choledochotomy with a 5-0 polydioxanone suture using either continuous or interrupted sutures spaced 1 to 2 millimeters apart **[1]**.

2.6.1. FILE: surgical procedure.wmv 49:55 – 50:00, 51:29 – 51:36, 53:42-54:42,1:00:50-1:01:00
Video editor: Please speed up the video

2.7. Place a sterile gauze pledget over the common bile duct to check for bile leakage **[1]**. Complete gallbladder resection using ultrasonic shears or electrocautery **[2]**. Extract the gallbladder through the subxiphoid port **[3-TXT]**.

2.7.1. FILE: surgical procedure.wmv 01:07:40-01:07:52
2.7.2. FILE: surgical procedure.wmv 01:10:05-01:10:32
2.7.3. FILE: surgical procedure.wmv 1:18:17 – 1:19:00 **TXT: Use LUS to scan extrahepatic bile duct axis and confirm no residual stones**
Video editor: Please speed up the video

2.8. Insert a drainage tube into the subhepatic epiploic foramen, also known as the foramen of Winslow, via the 5 millimeter right anterior axillary port **[1]**.

2.8.1. FILE: surgical procedure.wmv 1:29:47 – 1:30:00

Results

3. Representative Results

3.1. The average operative time was 110 minutes with minimal intraoperative blood loss of 10 milliliters **[1]**. The drainage tube was removed on postoperative day 4 and the patient was discharged on day 5 **[2]**.

3.1.1. LAB MEDIA: Table 1. *Video editor: Highlight the rows for "Operative time" and "Blood loss" showing "110 min" and "10 mL".*

3.1.2. LAB MEDIA: Table 1. *Video editor: Highlight the rows for "Removal time of drainage tube" and "Postoperative discharge time" showing "4 days" and "5 days".*

3.2. No perioperative complications such as bile leakage, retained stones, or biliary stenosis were observed during the entire 3-year follow-up period **[1]**, and no recurrence of common bile duct stones was recorded **[2]**.

3.2.1. LAB MEDIA: Table 1. *Video editor: Highlight the rows for "Bile leakage", "Retained stone", and "Biliary stenosis"*

3.2.2. LAB MEDIA: Table 1. *Video editor: Highlight the rows for "Follow-up time" and "Recurrence of CBD stones"*

Pronunciation Guide:

1. Choledochal

- Pronunciation link: [Merriam-Webster Medical Dictionary] How To Say+6How To Pronounce+6How To Pronounce+6Merriam-Webster+1
- IPA: **/ˌkoʊ-lɪ-ˈdɑː-kəl/**
- Phonetic Spelling: *koh-lih-DAH-kul*

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2. Laparoscopic

- Pronunciation link: [Synonyms.com audio pronunciations] Merriam-Webster+1How To Pronounce+1Synonyms+2Synonyms+2
- IPA: **/ˌlæp.ə.rəˈskɑː.pɪk/**
- Phonetic Spelling: *lap-uh-ruh-SKAH-pik*

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3. Ultrasonography

- Pronunciation link: [HowToPronounce – Endoscopic ultrasonography] How To Say+1YouTube+13How To Pronounce+13How To Pronounce+13 *(applies same structure for related terms)*
- IPA: **/ˌʌl.trə.soʊ.nəˈgræf.i/**
- Phonetic Spelling: *ul-truh-soh-nog-RAH-fee*

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4. Choledochoscopy ("choledochoscopy")

- While a direct link wasn't found, this word follows a similar pattern to "choledochal" + "-scopy".
- IPA: **/ˌkoʊ-lɪ-ˈdɑː-koʊ-skoʊ-pi/**
- Phonetic Spelling: *koh-lih-DAH-koh-SKOH-pee*

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5. Atraumatic

- Not available online, but here's the standard:
- IPA: **/ˌeɪ.trəˈmæt.ɪk/**
- Phonetic Spelling: *ay-truh-MAT-ik*

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6. Electrohook

- No online reference, but it's derived from "electro" + "hook".
- IPA: **/ɪˈlɛk.troʊ-hʊk/**
- Phonetic Spelling: *ee-LEK-troh-hook*

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7. Choledochotomy

- Based on word components: "choledocho-" + "-tomy".
- IPA: **/ˌkoʊ-lɪ-ˈdɑː-koʊ-toʊ-mi/**
- Phonetic Spelling: *koh-lih-DAH-koh-TOH-mee*

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8. Polydioxanone (PDS suture material)

- IPA: **/ˌpɒl.i.daɪˈɒk.sə.noʊn/**

- Phonetic Spelling: *pol-ee-dye-OK-suh-nohn*

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9. Subhepatic

- IPA: **/ˌsʌb-hɛpˈæt.ɪk/**
- Phonetic Spelling: *sub-hep-AT-ik*

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10. Epiploic (e.g., epiploic foramen)

- IPA: **/ˌɛp.əˈploʊ.ɪk/**
- Phonetic Spelling: *ep-uh-PLOH-ik*