

Surgeon at work

Techniques for difficult cases of laparoscopic cholecystectomy

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Abstract Our basic techniques for the management of difficult cases of laparoscopic cholecystectomy (LC) are presented in this article. If access to Calot's triangle cannot be gained safely, dissection should be started at the fundus or body of the gallbladder (GB), rather than the neck (fundus-first method). In cases with a short and wide cystic duct, a transfixing suture should be applied for ligation instead of clipping. EndoGIA is useful for ligating and transecting this case to avoid a subsequent stricture caused by normal method of ligation. Intraoperative cholangiography should be performed near the neck of the GB in cases in which orientation is lost during dissection. More dissection should be performed in the direction of the junction of the bile ducts after orientation is regained. In cases with GB filled with stones accompanied by severe fibrosis, part of the GB is incised to remove the stones and expose the lumen of the GB. Confluence stones can be removed by placing an incision on the GB side of the junction of the duct. The incised part is closed with suture. A cystic tube (C-tube) is placed in the common bile duct through the cystic duct for decompression. In more difficult cases in which dissection cannot be started safely at any location, the body and the fundus of the GB are excised, and a drain is placed at the neck of the GB. Dissection can be carried out from the main surgeon's or the assistant's side depending on the situation, and cooperation between the two surgeons is mandatory to achieve safe LC in difficult cases. When performing the LC, one must have a low threshold for converting to open surgery if injuries cannot be managed safely.

Key words Laparoscopic cholecystectomy · Difficult cases · Techniques

Introduction

Laparoscopic cholecystectomy (LC) has become the gold standard for removal of the gallbladder (GB).¹⁻³

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Many of the early contraindications for this evolving procedure have now been abandoned. However, even today, experienced laparoscopic surgeons still encounter difficult problems with LC. However, it is difficult to find articles that clearly describe techniques for difficult cases of LC. The aim of this article is to outline our strategies and techniques for the management of difficult cases of LC employed in Kameda Medical Center (KMC), Kamogawa, Japan.

Materials and methods

In this study, 445 cases of LC performed at KMC (Kamogawa, Japan) between April 1996 and June 2000 were reviewed. All cholecystectomy cases during this period were candidates for LC. The level of difficulty was classified into three grades: level 1 (easy), 252 cases (56.6%); level 2 (slightly difficult), 120 (27.0%); and level 3 (difficult), 73 (16.4%).⁴ By reviewing these cases, we have extracted our techniques for LC in difficult cases.

Strategies for difficult LC cases

The difficult factors most commonly encountered during LC are severe fibrosis and sclerosis in and around the Calot's triangle induced by acute or chronic inflammation or dense adhesions caused by previous surgeries. We describe our LC techniques used to handle such difficulties.⁵

Preoperative strategies

Adhesion mapping by ultrasonography

Ultrasonography is performed before operation to identify the site of severe adhesion. Disappearance of respiratory movement between intestinal tract and abdominal wall suggests the existence of adhesion.

Bowel preparation

In cases with adhesions, preoperative bowel preparation with laxatives is carried out to clean and empty the gastrointestinal tract to prevent contamination by possible bowel injury during the operation.

Patient position

The patient is placed in the reverse Trendelenburg position with 10° right tilt up.

Pressing the abdominal wall

We manually press on the right upper abdominal wall so that the bowel and its contents shift from right to left side.

Trocar placement

By referring to the preoperative ultrasonographical mapping of the adhesion site, the first trocar, usually a Hasson cannula, is placed at the site where adhesion was not present. The remaining trocars are placed under laparoscopic vision. The second trocar can be used to place a forceps to strip off the adhesion to facilitate the placement of the third and fourth trocars.

Techniques for difficult LC cases

Patients with acute cholecystitis present with the following problems:

1. Severe adhesion of the greater omentum and adjacent organs around the GB.
2. Difficulty in grasping the inflamed GB because of severe swelling and thickening of the wall.
3. Difficulty in the adhesiolysis due to severe inflammation in and around the Calot's triangle.
4. Tissues are congested, bleed easily, and are fragile due to acute inflammation.

In contrast, patients with chronic cholecystitis show unyielding adhesion, tough fibrosis, and severe scar formation in and around Calot's triangle.

The techniques used in open surgery must also be carried out in LC in difficult cases.

1. Aspiration of the distended GB. In patients with acute cholecystitis showing severe swelling of the GB or with incarcerated gallstones in the neck of the GB, aspiration of the contents of the GB is useful to expose the border between the liver and the neck of the GB. Use of a Veress needle, which can be placed in the GB without perforating the posterior wall of the GB, can safely accomplish this aspiration.

2. Fundus-first cholecystectomy. Dissection is usually initiated at the neck of the GB. However, if access to Calot's triangle cannot be gained safely because of fibrosis or inflammation, dissection should be initiated at the fundus or body of the GB. Starting the dissection at the easiest site and obtaining orientation is the most important principle in achieving successful LC in difficult cases.⁶
3. Management of a short and wide cystic duct. In patients with a wide and short cystic duct, a transfixing suture should be applied for ligation, instead of clipping. The EndoGIA also is used to ligate and transect the short and wide cystic duct to avoid a subsequent stricture.
4. Intraoperative cholangiography at an early stage. Early in the procedure, intraoperative cholangiography⁷ under fluoroscopy should be performed near the neck of the GB in cases in which orientation cannot be obtained during dissection (Fig. 1). Dissection should be advanced in the direction of the junction of the bile duct after orientation is obtained by cholangiography. Cholangiography under fluoroscopy is recommended to fully understand the entire anatomy of the biliary tree. This approach also reduces repeated exposures of X-ray due to inadequate opacification.
5. Open the GB and look inside. In cases in which the GB is filled with stones and Calot's triangle is accompanied by severe fibrosis, part of the GB is incised for stone removal; this exposes the lumen of the GB. Dissection can then be performed safely by visualizing the inside of the GB (Fig. 2).
6. Management of a confluence stone. Confluence stones can be removed by making an incision on the GB side of the junction of the cystic and common

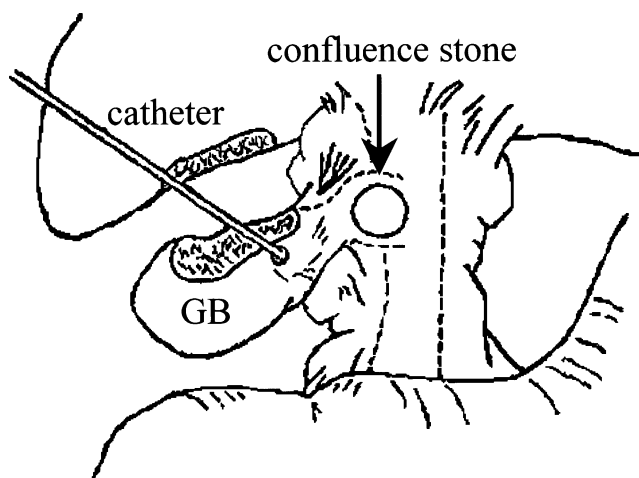


Fig. 1. Intraoperative cholangiography at the neck of the gallbladder (GB) in the procedure

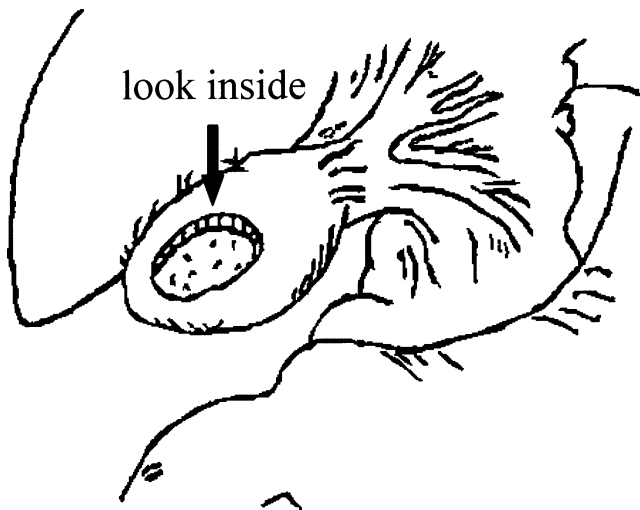


Fig. 2. Dissection can be performed safely by visualizing the inside of the GB

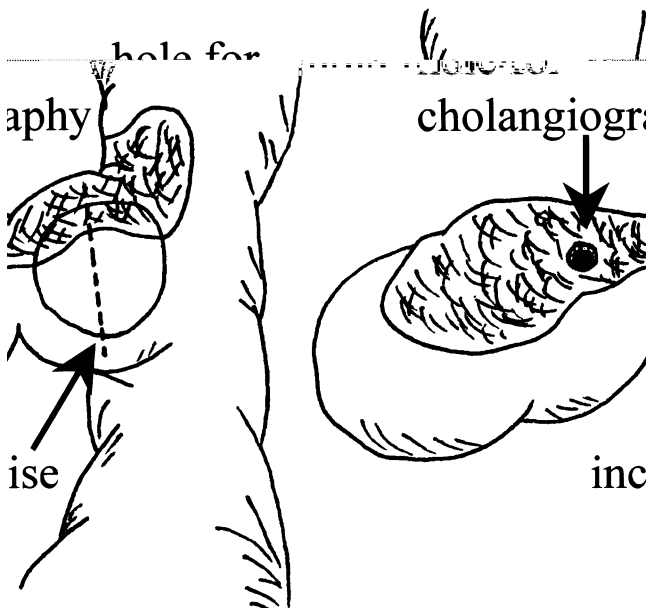


Fig. 3. Making an incision at the junction of the ducts for removal of the confluence stone

ducts (Fig. 3). The incised part of the confluence site is closed by manual suturing after removal of the stones (Fig. 4). The GB is then transected using EndoGIA and extracted.

7. Decompression by placing a C-tube in the common duct. A tube is placed in the common duct through the cystic duct (C-tube) for decompression; this avoids bile leakage after the operation, especially in cases in which the common duct or junction is incised (Fig. 4). This tube can replace a T tube in many of the choledochotomy cases.

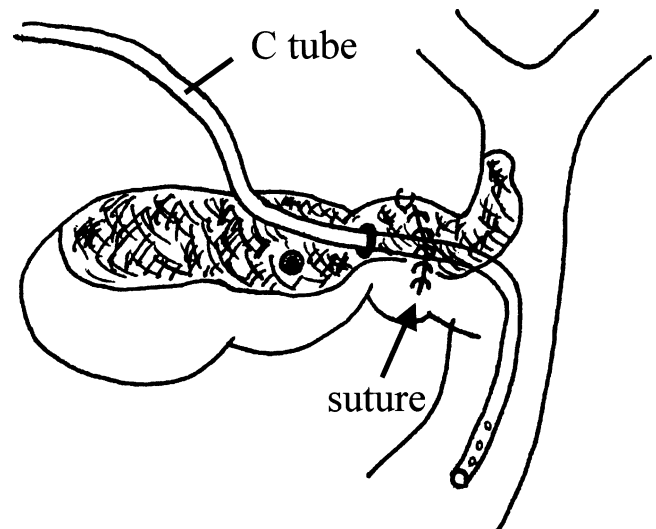


Fig. 4. Placement of C-tube and continuous suture on the incised junction

8. Unroofing of the gallbladder (Fig. 5). In more difficult cases in which dissection cannot be started or continued safely in any direction, the body and fundus of the GB are excised or unroofed. A drain is placed in the neck of the GB. The residual mucosa of the GB on the liver bed is excised or coagulated. If the orifice of the cystic duct can be identified, the opening is closed with a Z suture.
9. Approach and dissect from both sides of the operator and the assistant. In performing a difficult LC, two experienced surgeons should be involved in the team. Dissection often must be done from the assistant's side, depending on the situation.
10. Usefulness of Harmonic Scalpel-laparoscopic coagulating shears (LCS). LCS are useful in dissecting dense adhesions in cases with severe acute inflammation or dense fibrosis at Calot's triangle.
11. Adequate irrigation and separation using irrigating power. A jet of water is employed in obtaining a cleavage plane between GB and adhesion. Even a mild hemorrhage can hamper the visual field. Therefore, it is important to have a clean field and frequent irrigation is a must.

Results

Twenty-seven (6.1%) cases were converted to open surgery because of dense adhesion at Calot's triangle, uncontrollable bleeding, and cystic duct injury. All the converted cases belonged to level 3. There is no great difference in conversion rate compared with the results of other institutions.^{1-3,8}

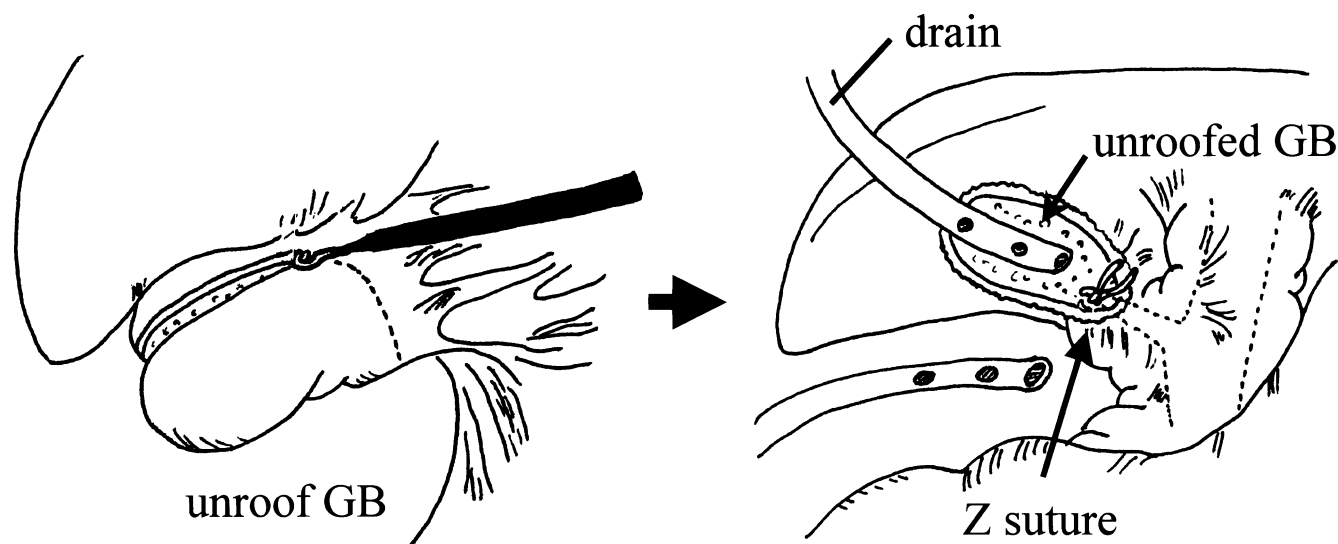


Fig. 5. Unroofing of the GB and placement of a drain

Discussion

Even after experienced surgeons have performed a significant number of LC, difficult cases cannot be avoided. The aim of LC is removal of the gallbladder. Laparoscopy is one of the techniques adopted to enter the abdominal cavity. One must not forget these fundamental facts. The techniques mentioned above are the ones used in open surgery. The basic techniques are common in both open and laparoscopic surgery. Completing cholecystectomy laparoscopically is minimally invasive and is a great advantage for patients, although it may prolong operative duration. If we adhere to the operative technique described here, severe complications and morbidity can be avoided in difficult cases.

Before we had learned the technical key points mentioned above, we had to convert to an open procedure simply because the gallbladder could not be safely dissected by the usual basic laparoscopic procedure. After liberal experience, we became able to apply the technique used in open cholecystectomy to LC. Surgeons should have some experience in laparoscopic surgery so that they can apply the same technique used in conventional open cholecystectomy.

Difficult cases in LC may also be difficult to perform by conventional open surgery. The difficulty is amplified by using the laparoscopic approach because of the limited mobility of instruments through the fixed trocars and the two-dimensional vision on laparoscopy. The most important point when performing the LC is to

have a low threshold for conversion to open surgery, if difficulties or complications cannot be managed safely. So long as the surgeon is well oriented, they do not have to convert to an open procedure. When they cannot be sure where they are dissecting in the complicated structure, however, they must not hesitate to open. Safety in the procedure should not be compromised for any reason.

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