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ORIGINAL RESEARCH

Scarless Cholecystectomy with Standard Laparoscopic Instruments in Selected Patients

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ABSTRACT

Laparoscopic cholecystectomy is a gold standard for treatment of gallstone-related diseases. We have now modified this technique and introduced scarless cholecystectomy with standard laparoscopic instruments. Patients with normal body mass index and with no previous history of acute cholecystitis are suitable candidates for scarless cholecystectomy. Operation is performed through two 10 mm ports placed just above and below the umbilicus. Surgical exposure is created by applying two traction sutures, one placed in fundus and another in infundibulum of gallbladder. The ends of these sutures are pulled out the abdomen by means of percutaneously inserted suture passer. Applying different traction to these stitches, enable appropriate exposure of the Calot's triangle and gallbladder bed for dissection. We have concluded that scarless cholecystectomy is technically feasible and safe. Further validation of this approach, however, awaits randomized clinical trials and accurate comparison with outcomes of more conventional approaches.

Keywords: Laparoscopic cholecystectomy, Minimally invasive, Scarless cholecystectomy, Two-port laparoscopic cholecystectomy, Pain, Gallbladder.

INTRODUCTION

Laparoscopic cholecystectomy (LC) is a gold standard for treatment of gallstone-related diseases. This procedure is usually performed with four-or three-ports of entry into the abdomen around the world. Recent developments in LC have been directed toward reducing the size or number of ports to achieve the goal of minimal invasive surgery. Less abdominal wall trauma and subsequent postoperative pain and early recovery are major goals in order to achieve better patient care and cost-effectiveness. Several studies demonstrated that less postoperative pain was associated with reduction in either size or number of ports. Poon et al published the result of first randomized clinical trial comparing two-port versus four-port LC in 120 patients. They concluded that two-port LC resulted in fewer surgical scars, less individual port-site pain and similar clinical outcomes compared with four-port LC.[1] Additionally, cosmetic issue is important for patients. In recent surveys, it has been shown that patients would largely favor NOTES (natural orifice translumenal endoscopic surgery) cholecystectomy compared with standard LC, unless the risks of NOTES cholecystectomy drastically exceeded those of conventional LC. This shows the importance of cosmesis and should warrant surgeons to look for less invasive surgical procedures.[2,3]

The first brief report about single incision LC was published in 1997, when Navarra et al described a series of 30 cases performed with two 10 mm ports placed via a single umbilical incision. The gallbladder was retracted using three traction sutures through the abdominal wall. Even cholangiography was performed in some cases.[4,5] Piskun et al used the same concept of multiple trocars deployed through a single umbilical incision in 1999, but used two 5 mm ports. These authors also used traction sutures to retract the gallbladder.[6] Bresadola et al compared similar technique with standard LC and showed lower pain scores in the single-port group.[7] Recently, Cuesta et al describe a procedure that uses two transumbilical 5 mm ports and a 1 mm Kirschner wire instead of sutures for gallbladder traction.[8] Poon et al and Bucher et al published the result of single transumbilical access LC using modified laparoscope with extra working channel.[1,3] Romanelli et al reported a single-port cholecystectomy using the TriPort and AirSeal port.[4,9]

Most of these single access procedures need special devices and instruments. Several types of access devices, such as TriPort (Advanced Surgical Concepts, Wicklow, Ireland), AirSeal (SurgiQuest, Orange, CT, USA), SILS port (Covidien, Inc, Norwalk, CT, USA), different type of articulating instruments and modified telescope with operating channels have been innovated for this purpose.[4] Two other advances in recent years in the field of less invasive cholecystectomy are NOTES cholecystectomy and needlescopic cholecystectomy. However, the two important drawbacks with application of these instruments and innovations are the cost and need for learning of technically demanding procedures.[1,3]

Herein, we report our experience of scarless LC using a simple technique with standard laparoscopic instruments. This represent a safety concern, as use of standard laparoscopic instruments enables to conform to surgical principles of standard cholecystectomy, which have been used for years. Surgeons are familiar with application of standard instruments. The use

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of newly developed instruments and techniques may expose patients to additional risk.[1,3]

OPERATIVE TECHNIQUE

After initial experience in pig model, this procedure was performed in human. Patients with normal body mass index and with no previous history of acute cholecystitis are suitable candidates for elective scarless LC. Preoperative preparations are similar to standard LC.

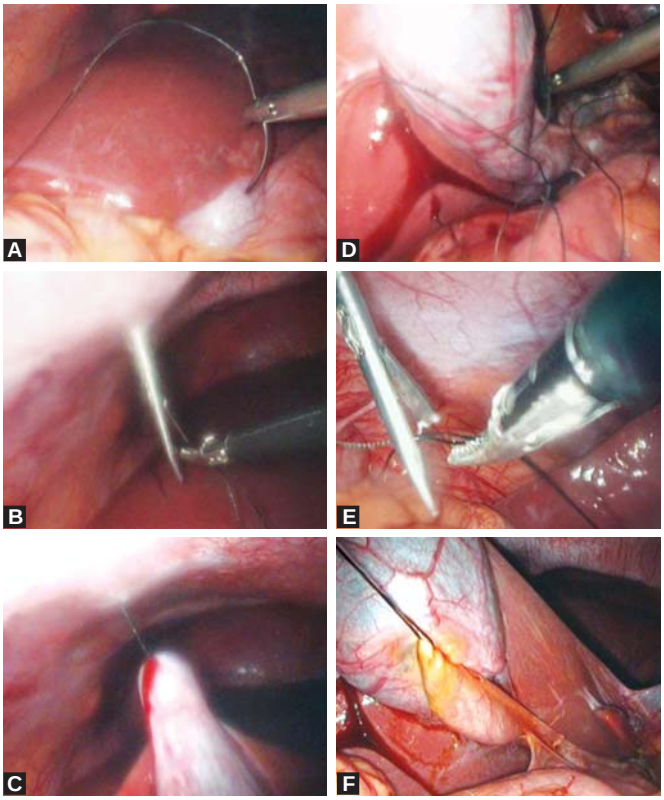
This procedure is performed by using a surgical principal similar to standard LC, except that it is conducted through two periumbilical ports. Surgeon stands at the left side of operating table and holds the laparoscope with left hand and instruments with right hand, similar to diagnostic laparoscopy (Fig. 1). The patient is placed in the reverse Trendelenburg position and rotated to the left. Insertion of orogastric tube may be necessary, as indicated in standard LC.

After incising of skin overinfraumbilical ridge, insertion of Veress needle and creation of pneumoperitoneum, first 10 mm port is introduced. If the gallbladder is seemed suitable for this procedure during the first inspection, then the second 10 mm trocar is inserted in supraumbilical ridge. Before introducing the second port, it is necessary to remove 30º laparoscope from abdomen and lift up the abdominal wall to facilitate entering of the second port. If surgeon encounters with gallbladder inflammation, adhesion, inappropriate working space, unclear anatomy especially around the cystic pedicle, or no progress over a set period of time whenever during the procedure, then addition of other ports and conversion to standard LC is considered.

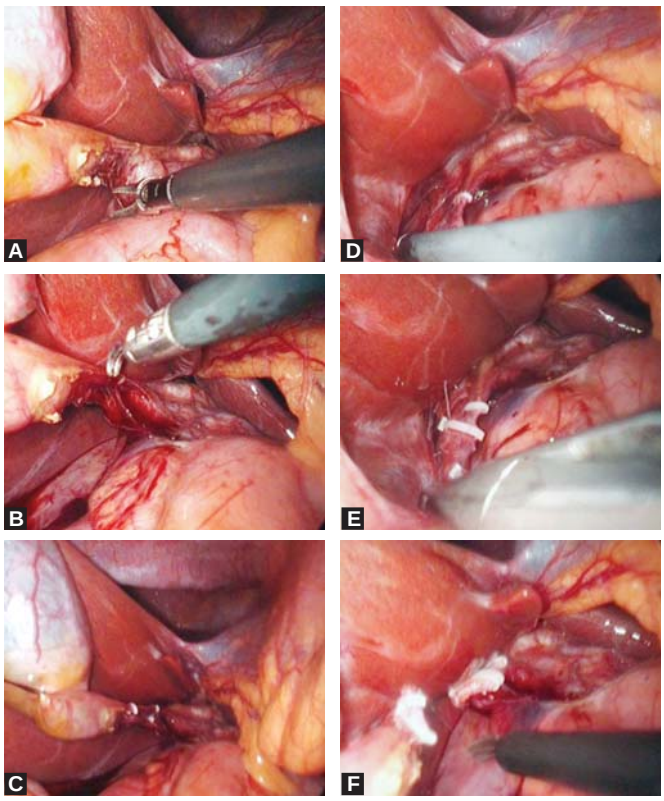
Surgical exposure is created by applying two traction sutures (Silk 3/0 with cutting modified ski needle) in gallbladder. The first needle is introduced through supraumbilical port and passed through the fundus of gallbladder taking a good bite (Fig. 2A). The needle is cut and removed. Suture passer is introduced percutaneously below the costal cartilage. The two ends of suture are pulled out by the help of suture passer (Fig. 2B). By pulling on this suture, the gallbladder and liver are pulled up toward costal margin, exposing the inferior portions of gallbladder (Fig. 2C). This suture mimics the action of the fundal grasper that is normally used to perform this function. The second stitch is placed over infundibulum (Fig. 2D). This thread is also pulled out through the right side of abdomen by means of suture passer (Fig. 2E). Applying different traction to these stitches enables appropriate exposure of the Calot's triangle and gallbladder bed for dissection (Fig. 2F).

Dissection of cystic pedicle is performed with aid of curved or right-angle dissectors (Figs 3A and B). After identification of important anatomical structures, three Hem-o-lok clips (Weck Closure Systems, Research Triangle Park, NC, USA) are placed to the cystic artery and duct; two on the proximal part and one on the distal part which would be removed (Figs 3C to F). Then dissection of gallbladder from its bed is started by the help of hook. It may be necessary to change the place of second traction suture from right side of abdomen to epigastric area in order to get better visualization of gallbladder bed (Figs 4A to D). At the end of dissection, irrigation and suction and control of hemostasis are performed (Fig. 5A). Grasping forceps is introduced through supraumbilical port and the gallbladder is removed under direct vision (Figs 5B to D). The periumbilical fascia and skin are closed. Postoperative care is similar to standard LC.

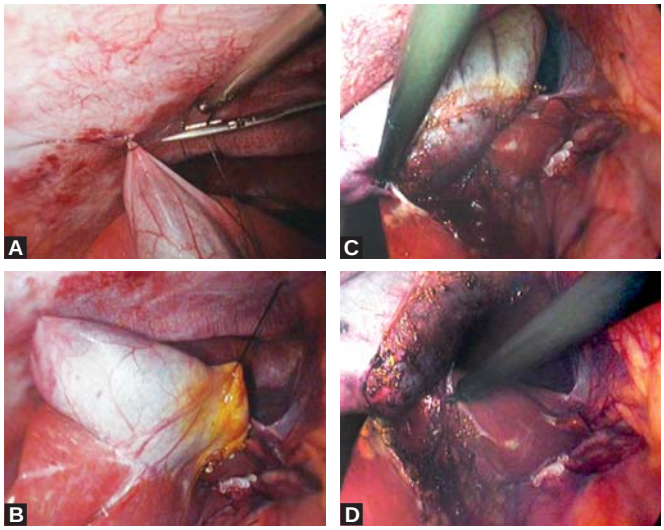
Fig. 1: Surgeon stands at the left side of patient and holds the laparoscope with left and instruments with right hand



Figs 2A to F: Traction sutures: (A) First stitch in fundus of gallbladder, (B) holding the threads with suture passer, (C) pulling up the gallbladder, (D) second stitch in infundibulum, (E) holding the threads with suture passer, (F) exposure of Calot's triangle



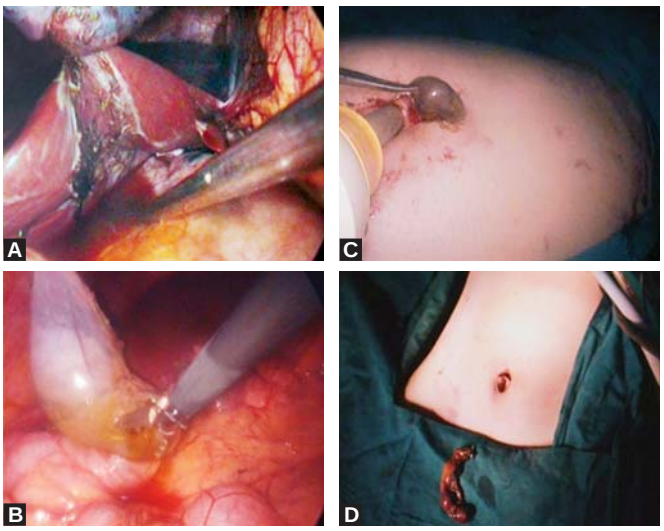
Figs 3A to F: (A and B) Dissection of cystic pedicle, (C) clipping of anteriorly located cystic artery, (D) ensuring the anatomy of cystic duct, (E) application of Hem-o-lok clips overcystic duct, (F) cutting of cystic duct



Figs 4A to D: (A and B) Changing the position of second traction stitch to epigastric area in order to facilitate the dissection (C and D). Dissection of gallbladder from its bed

CONCLUSION

As mentioned above, descriptive studies and at least one randomized clinical trial showed that patients experience less postoperative pain and discomfort and faster recovery by these less invasive techniques.[1-9] Our modification of scarless



Figs 5A to D: (A) Irrigation and suction and control of hemostasis, (B and C) gallbladder extraction through supraumbilical port, (D) result of scarless cholecystectomy

cholecystectomy performed with standard instruments is technically feasible and safe. It also provides good cosmetic result. Further validation of these approaches, however, awaits randomized clinical trials and accurate comparison with outcomes of the more conventional approaches.

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