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Feasibility of Single-Port Cholecystectomy With Wound Retractor and a Glove in a Rural Hospital in Mexico

Santiago Sherwell-Cabello, Mario Rodarte-Shade, Eduardo Flores-Villalba

General Surgery Department, Montemorelos General Hospital, Montemorelos, Nuevo León, México

Laparoscopic surgery has been established as the standard therapy for symptomatic cholecystolithiasis. Now, single-port cholecystectomy is a surgical option. Due to the need of special laparoscopic instruments and devices, the cost of the surgery is significantly increased, limiting its popularity in most medical centers in developing countries, especially in rural areas. This paper's objective was to show the safety, reproducibility, and feasibility of single-port laparoscopic cholecystectomy using conventional laparoscopic equipment, a wound retractor, and a sterile glove in a rural hospital in Mexico. A prospective study was carried out from July to October 2014. Patients diagnosed with uncomplicated cholecystolithiasis who agreed to participate were operated with this technique. Complications, operative time, bleeding, evolution, and length of hospital stay were recorded. A total of 24 women went onto surgery under this approach. A mean follow-up of 71 days was completed. No incisional hernias, bile duct injuries, wound infection, nor death was presented. Surgical time and cost were not significantly increased compared to conventional laparoscopic approach. Most patient discharge was done the same day of the surgery. Single-port laparoscopic cholecystectomy is a cost-effective procedure, which can be performed in all hospitals where an Alexis retractor and conventional laparoscopic equipment is available. There was no increase of surgical morbidity. The single-port cholecystectomy is a technically feasible and safe surgical option in selected patients and can be easily performed in rural hospitals at a low cost, providing the benefits of the single incision.

Key words: Single port cholecystectomy – Glove technique

Corresponding author: Santiago Sherwell-Cabello, MD, Centro Médico Zambrano Hellion, 4° Piso, Av. Batallón de San Patricio #112, Real San Agustín, San Pedro Garza García, Nuevo León, México 66278.
Tel.: +52 55 4530 1634; Fax: +52 (55) 5575 6096; E-mail: sherwell@gmail.com

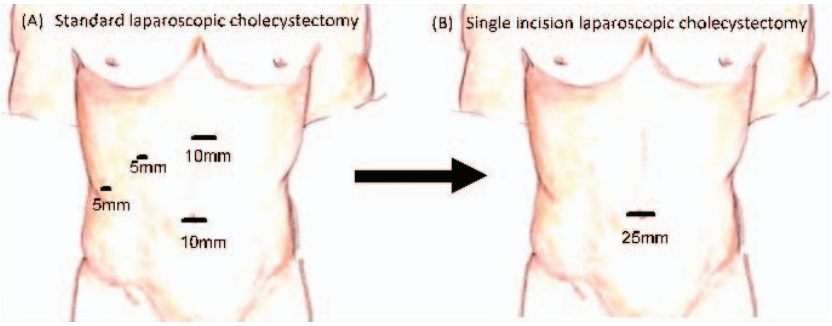

Fig. 1 (A) Incisions required for standard laparoscopic cholecystectomy and (B) for single-incision laparoscopic cholecystectomy.

Since laparoscopic revolution in the early 90s, laparoscopic surgery has been established as the standard therapy for symptomatic cholecystolithiasis. It has been well established that the laparoscopic approach allows faster recovery. Some of those advantages are reduced pain, improved respiratory function, decreased incidence of infections and hernias, less need for narcotics, and overall better cosmetic result. Compare this type of surgery to conventional cholecystectomy where a larger incision is needed. A higher postoperative pain and increased incidence of ventral hernias and wound infection are found, where the rate may vary between 2% and 25% of the patients, having thus a longer hospital stay.

Over the years, innovations and new surgical techniques have continued evolving. Currently, single-port cholecystectomy is a surgical option, which is achieved practically without scars.[1,2] Single-incision laparoscopic cholecystectomy is a novel approach, in which only a 25-mm umbilical incision is needed to perform the surgery, instead of the 4 trocars usually used in the standard laparoscopic approach. However, a major limitation to this method is that it requires the use of special devices: the working port and flexible laparoscopic instruments. The latter can be expensive and not available in most medical centers in Mexico and the rest of Latin America, limiting the popularity of this technique, especially in rural zones.

On the other hand, some of the benefits described are related to a better cosmetic appearance due the minimum scar hidden in the umbilicus, lower surgical pain, and faster recovery. If needed, use of another laparoscopic trocar is always feasible.

Objective

In this study, we set out to show the safety, reproducibility, and feasibility of single-port laparoscopic cholecystectomy using conventional laparoscopic equipment, a wound retractor, and a sterile glove in a rural hospital in Mexico.

Materials and Methods

Through this prospective study, 24 female patients diagnosed with uncomplicated cholecystolithiasis who agreed to go onto laparoscopic single-port cholecystectomy in Montemorelos General Hospital during the months of July to October 2014 were included. All patients were operated by the 3 general surgeons of this hospital and the same surgical team.

Patients with no comorbidities, no previous upper abdominal surgery, and a body mass index of 27.5 kg/m^2 or less signed. Complications, operative time, bleeding, evolution, and duration of hospital stay were recorded. A similar technique was performed in all cases.

Surgical technique

The procedures were performed under general anesthesia with the patients in supine position. Prior to the beginning of the surgical procedure, trocars are introduced through small incisions at the fingertips of the glove. A 5-mm trocar is fixated in the thumb finger of the glove and two 10-mm trocars in the second and fifth fingers of a latex glove #8.

The procedure begins with a longitudinal transumbilical incision involving the whole extension of the umbilicus scar. An incision is made in skin of about 25- to 30-mm long. Then the umbilicus deinsertion is performed and an incision of similar length in the midline aponeurosis is needed in order to reach the peritoneum and the abdominal cavity (Fig. 1).

Once the abdominal cavity is reached, absence of adhesions around the umbilicus is verified. Then, the inner ring of the Alexis retractor (Applied

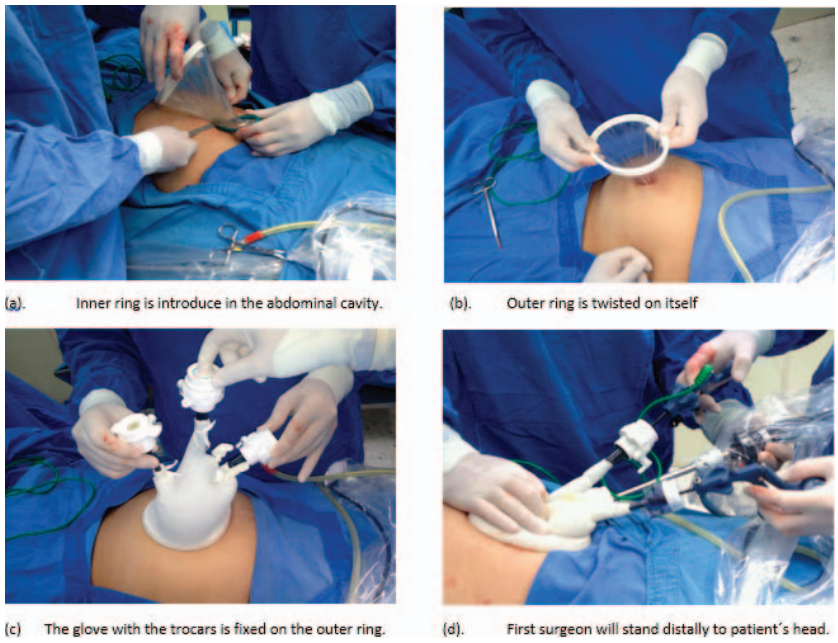

Fig. 2 Surgical technique.

Medical, Rancho Santa Margarita, CA) is placed into the abdominal cavity (Fig. 2a). The outer ring is wound on itself and finally the glove with the trocars is placed around the outer ring (Fig. 2b and 2c). The retractor was washed and sterilized after every surgery and used with no more than 5 patients.

A 10-mm port was used for the 0° lens and 2 other trocars as working ports. CO_2 pneumoperitoneum is made up to 15 mm Hg. The surgeon will stand distally to the patient's head, while the first surgical assistant will be closer to patient's head (Fig. 2d). In order to maintain the gallbladder traction with a proper exposure, the first step is to place a 2–0 polyglactin–910 seromuscular notch from the gallbladder body and the peritoneum of the right subcostal area. Then we proceed to perform the procedure following the basic principles of safe cholecystectomy.

A complete dissection of Calot's triangle is mandatory. The cystic duct, cystic artery, and the common bile duct should be visualized. A 10-mm manual stapler was used to place 2 distal and 1 proximal staples in the cystic duct and the cystic artery, before the section of both structures. Then, dissection of the gallbladder from the liver is performed. A meticulous hemostasis is achieved. Gallbladder is moved near the single incision and can be placed inside the glove. Finally, the glove, trocars, laparoscopic instruments, and gallbladder are removed.

Subsequently, the fascia was closed with a running suture of 1–0 polyglactin–910. The umbilicus scar is fixated to the aponeurosis with absorbable suture and skin is closed with absorbable or nonabsorbable suture. The patient goes to the recovery area. All the patients received a preoperative prophylactic dose of cephalosporin and analgesia was maintained with ketorolac alone. Liquid diet was initiated 4 hours after surgery.

Results

Twenty-four single port laparoscopic cholecystectomies were performed in the General Hospital of Montemorelos during the period July to October of 2014. The mean age was 38.25 years (24 to 51 years). Just elective procedures were included in this study. All cholecystectomies were able to perform satisfactorily under this method.

Eligible patients for this procedure had a body mass index of 27.5kg/m^2 or lower, with an average of 24.8 kg/m^2. The mean operative time was 67 minutes (range, 50 to 82 minutes) with an approximate average bleeding of 40 cc (range, 25 to 70 cc). The onset of oral intake was 4 hours after the surgical procedure in all patients without any complications. The average hospital stay was 16.5 hours (range, 6 to 24 hours). All patients were seen at the outpatient department 10 days after discharge. Pathologic results revealed 22 cholecystolithiasis and 2 chronic cholecystitis cases.

The mean follow-up was 71 days (range, 65 to 96 days) and no complications related to the single-port approach were found. Placement of an extra port during surgery was not needed, but if needed is always possible. During this study there were no conversions. No incisional hernias, bile duct injuries, wound infection, or death were presented.

Discussion

The single-port cholecystectomy has positioned itself as a viable alternative to conventional laparoscopic cholecystectomy.[4] Potential benefits include cosmesis (fewer wound scars), less incisional pain (theoretically less recovery time), and the feasibility of conversion to standard laparoscopic technique. In our series, no minor or major complications were presented. The in-hospital stay was brief, which is consistent with other studies.[2,3]

Currently, the use of any of several commercial ports available on the market for single-port cholecystectomy, coupled with the use of special instruments (articulated graspers and laparoscopic lenses with moveable point) is recommended, but the cost will increase.[6] These tools are expensive and are not always easy to acquire, particularly in developing countries. Therefore, it has been proposed to use alternative single port surgical glove, using an automatic Alexis retractor. Conventional instruments can be used in this technique. Due to the use of reusable instruments, this method was more cost-effective than other single-port systems.

Recently, it has been suggested that single-port cholecystectomy is a high risk for bile duct injury when compared with conventional laparoscopic cholecystectomy. Therefore, special attention is required in order to identify the structures of the Calot's triangle. Although not the case, if adequate exposure is not achieved, placement of another trocar or conversion to conventional laparoscopy cholecystectomy is always possible.

Conclusions

In selected patients, laparoscopic cholecystectomy through single-port incision is technically feasible and a cost-effective procedure. Previous laparoscopic experience is needed, but this technique can be performed in all hospitals where an Alexis retractor and conventional laparoscopic equipment is available. Surgery cost is not significantly increased, and it can be compensated due to a shorter length of stay. In our series, there was no increase in surgical morbidity, providing the benefits of the single incision. In addition, surgical time is not significantly increased compared to standard laparoscopic approach. The single-port cholecystectomy is a feasible and safe surgical option in selected patients. This technique could be easily repeatable at a minimum extra cost in any other rural hospitals with standard laparoscopic equipment available.

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