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Laparoscopic cholecystectomy by the modified bikini line approach as a simple and safe technique

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SUMMARY

OBJECTIVE: The gold standard technique for laparoscopic cholecystectomy (LC) is using four ports in the upper abdomen. However, this operative approach may not provide aesthetic satisfaction for some patients because of visible incision marks. This study sought to demonstrate that these incision marks can be hidden by safely changing the port locations.

METHODS: For patients with symptomatic cholelithiasis undergoing LC between March 2019 and March 2020, the modified bikini line approach was used. With the patient in the supine position with open legs, the first trocar (10 mm) was inserted into the abdomen through an 11-mm incision in the umbilicus. The other three trocars were placed in the abdomen at the bikini line with the help of a camera. The standard equipment for LC was then used to perform the surgery.

RESULTS: The modified bikini line approach to LC was used for 38 patients. Average operative time was 28.65 min, and the average hospital stay was 1.07 days. No perioperative or postoperative complications occurred. Follow-up was at 1 week, 1 month, and 6 months. Cosmetic results were satisfactory for all patients.

CONCLUSIONS: As an alternative to the standard LC approach, the modified bikini line technique is safe and useful in patients for whom postoperative aesthetic appearance is important. The modified approach is simple to learn and use and is effective to hide the incision marks well.

KEYWORDS: Laparoscopy. Cholecystectomy. Bikini line.

INTRODUCTION

Laparoscopic cholecystectomy (LC) is one of the most common surgical procedures performed globally. However, LC may not be cosmetically satisfactory because of visible scars[1]. Although many new techniques have been developed for better cosmetic results, these methods have not become widespread because of application and learning difficulties. Two best known methods are natural orifice transluminal endoscopic surgery (NOTES) and single-incision laparoscopic surgery (SILS)[2,3]. In NOTES, the peritoneal cavity can be accessed through transvaginal, transgastric, transcolonic, and transurethral approaches, without abdominal incisions[4]. Widespread use of this method in surgical practice is limited, however, because of its high cost, unsafe orifice closure, and a prolonged learning period. In SILS, the incision is made at the umbilicus, and all the ports are inserted through this single incision. Although this method is safer than NOTES, the lack of angulation between the trocars prolongs the operative time. In addition, extra instrumentation is mandatory[5]. For these reasons, SILS has not become a widely used method throughout the world.

The placement of laparoscopic ports in less visible areas of the body, such as the bikini line — termed alternative port site selection — may result in further improved cosmesis[6]. Bachmann et al. described a new laparoscopic technique using the umbilicus and bikini line area in a patient undergoing hysterectomy. In their technique, a 5-mm camera was placed in the umbilicus; other trocars were placed at the bikini line; and LC was performed with long-handle instruments[7].

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In the technique described by Ersoz et al., all port entries were placed in the bikini area using a closed method. Although the desired results for cosmesis were achieved, the approach was difficult in practice[8]. In addition, the use of this technique creates a risk of trocar injuries in patients who have undergone previous pelvic surgery.

With the high frequency at which LC is performed globally, new techniques are needed with more aesthetic results, easy application, and low risk of complications. In the technique defined in this current study, the first 10-mm trocar was placed at the umbilicus incision site with an open technique and then the other three ports were placed in the bikini line area with camera guidance. In this way, the surgical team aimed to prevent possible organ and vascular injuries and to provide an adequate cosmesis.

METHODS

For patients with a diagnosis of symptomatic cholelithiasis who underwent LC between March 2019 and March 2020 at the authors' institution, the modified bikini line approach was used. Exclusion criteria were incision scars in the upper abdomen due to previous surgery, body mass index >40, and age >65 years. The study was conducted in accordance with the Declaration of Helsinki and was approved by local ethics committee (KAEK-50, decision number: 2,479). Informed consent was obtained from all patients and their relatives.

Procedure for modified bikini line approach to LC

All patients were placed in the reverse Trendelenburg position with open legs under general anesthesia. First, an 11-mm median incision was made into the umbilicus by working on the right of the patient in a straight position. The peritoneum was reached with a 1-cm median incision made to the fascia through this opening. The abdomen was insufflated with carbon dioxide at a pressure of 14 mmHg. At the bikini line, one 10-mm trocar was placed at the midline and two 5-mm trocars were placed on the right side (Figure 1). The laparoscope was operated through a 10-mm trocar on the bikini line. While working with 5-mm trocars located medially in the bikini area and in the umbilicus, the 5-mm trocar located in the lateral in the bikini area was used for retraction. However, depending on the intra-abdominal characteristics of the individual patient, all ports could be used as working ports.

Standard LC equipment was used throughout the entire procedure. Dissection and clipping of the artery and ductus cysticus was performed through a 10-inch trocar in the umbilicus. The gallbladder was separated from the bed with a hook, working in a retrograde manner. The gallbladder was visually removed from the trocar in the umbilicus. The laparoscope was inserted into the umbilicus, and any bleeding in the other trocar areas was observed by removing trocars and intervening as needed. When necessary, a drain was placed through the rightmost 5-mm trocar (Figure 2).

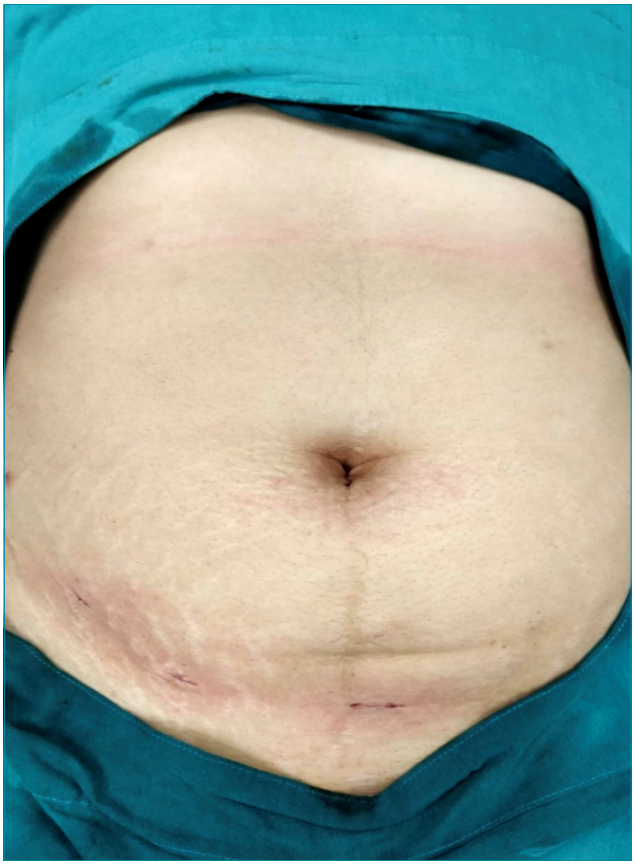

Figure 1. Trocar positions for the modified bikini line approach to laparoscopic cholecystectomy.

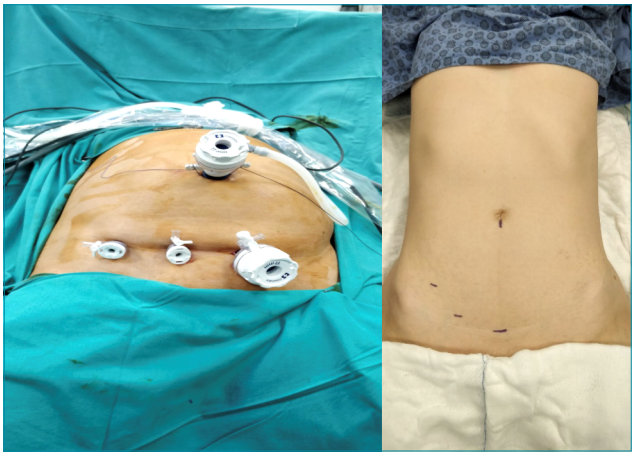

Figure 2. Postoperative view of incisions in the operation room.

Postoperative follow-up was conducted at 1 week, 1 month, and 6 months. Cosmetic satisfaction of the patients was questioned at each follow-up visit.

RESULTS

The modified bikini line approach to LC was used for 38 patients: 35 women and 3 men. The age of patients ranged from 15 to 65 years; average age was 42.7 years for women and 50.3 years for men. Mean body mass index was 27.9 kg/m^2 in women and 30.4 kg/m^2 in men.

Indications for LC were acute cholecystitis in 5 (13.16%) patients, chronic cholecystitis in 11 (28.95%), and symptomatic gallstones in 22 (57.89%). Concurrent umbilical hernia was detected in 5 (13.15%) patients; all underwent herniotomy and Mayo repair. Surgical history of the 38 patients included section in 10 (26.31%) patients, hysterectomy in 2 patients, endoscopic retrograde cholangiopancreatography in 2 patients, bladder operation in 1 patient, and open appendectomy in 1 patient. Significant adhesions were observed in the pelvic area in three patients who had previous surgery in the lower abdominal and pelvic area. Classical LC was performed in three patients due to adhesions in the pelvic area during exploration with a trocar entered from the navel at the beginning of the operation.

The gallbladder was removed from the umbilicus in all patients. A gangrenous gallbladder was removed with an endobag in two patients because of a large stone (>2 cm), for which the median incision in the umbilicus was enlarged and gallbladder was removed from the same incision. Average operative time was 28.65 (15–42) min.

No complications developed in any patient during postoperative follow-up at 1 week, 1 month, and 6 months. Drains were removed on the first postoperative day for all, except for two patients whose drains were removed on the second day. The average hospital stay of the patients was 1.1 days. At all follow-up visits, all 38 patients reported that the cosmetic results were satisfactory.

DISCUSSION

The gold standard procedure for gallbladder removal is LC. The traditional laparoscopic approach results in better cosmetic outcome than open cholecystectomy. In addition, the postoperative hospital length of stay, pain, and time to recovery are better in the classic laparoscopic method than with open surgery. As the two main other approach, both NOTES and SILS were developed as minimally invasive procedures[2-4]. In the NOTES technique, cholecystectomy is performed by making an internal incision[4]. Although the benefits of NOTES are not yet clear, less postoperative pain and fewer complications are expected[9], especially if the transvaginal route is used. Marescaux et al. published the first report of transvaginal endoscopic cholecystectomy as the first example of NOTES; however, this surgery was not a complete NOTES because they used an umbilical port or upper abdominal port[10]. In addition, both NOTES and SILS are expensive, have a prolonged operative time, and have a long learning curve[11].

A systematic review of the transvaginal approach in laparoscopic surgery in nongynecological intra-abdominal procedures to assess the risk of complications found an overall complication rate of 4.4%. Conversion rate to open surgery was 3.4%. Mean operative time was 119 min. Mean hospital length of stay was 3.1 days[12]. The risk of peritonitis is also present with the transvaginal approach and especially in the transgastric and transcolonic approaches. Also, no safe closure method has been found to date for the transvaginal approach. Moreover, the infection rate in animal models is 10–20%[13]. In addition, sociocultural and psychological barriers can be important issues for transvaginal access[14]. During the preoperative interview, most of female patients declined transvaginal cholecystectomy, not for medical concerns, but instead for personal reasons[14-17]. For all these reasons, the number of transvaginal cholecystectomies was very limited and could not be widely reviewed.

Therefore, many new methods have been tried to facilitate cholecystectomy. One of these methods is SILS, which was developed with the aim of reducing the invasiveness of LC. With SILS, only one umbilical incision is made and three ports are inserted into the abdomen through this single access[2,3]. In this technique, reticulator instruments were used to create the necessary operative angle because their insertion points are very close to one another[2,5]. Also, the gallbladder is emptied by a percutaneous needle and needs two sutures to the suspensions of the gallbladder from the abdominal wall. In this procedure, the peritoneal area can become contaminated by bile, which may cause biliary peritonitis. Also, the operative time is longer than for classic LC. In contrast to NOTES, SILS does not require the opening of a hollow organ, such as the stomach, colon, or vagina; therefore, complications such as gastrostomy or colostomy leakage are avoided. However, SILS has a longer operative time than LC and has a notable learning curve. Furthermore, because all instruments are closely placed together in SILS, conflict occurs between the operative instruments and camera[2,5]. After LC, the rate for infection and herniation is reported as 2% and 5.2%, respectively[10]. In SILS, the umbilical incision is larger than the LC incision, which may lead to local complications[18,19].

Although the LC-modified bikini line approach used in the present study is similar to the technique described

by Bachmann et al., the selected trocar diameters, entrance technique, and entry placements of the trocars are different[7]. In contrast, Ersoz et al. described the "full bikini line cholecystectomy" and aimed to keep the scars completely in the bikini area by carrying all the ports to the bikini area versus using one port in the umbilicus as in the current study[8]. However, in the technique used by Ersoz et al., the fact that the first trocar is entered into the abdomen with a Visiport optical trocar in the midline bikini line area may cause organ injuries, especially in patients with a history of pelvic field surgery. In addition, the fact that all ports are away from the operative area may cause the technique to be difficult to use in patients who are tall, obese, or have intensive gallbladder adhesions.

The current technique described herein is a modified version of the techniques described by both Bachmann et al.[7] and Ersoz et al.[8]. Thanks to the 10-mm port placed at the umbilicus with the open technique, the current approach provides safe access to the abdomen, safe placement of other ports, better control of the operating area, and a safe LC, even in patients with acute cholecystitis. In this technique, a 10-inch trocar inserted through the umbilicus can be used as both a camera and a working port. This site of trocar provides not only an appropriate angle in the dissection of the ductus cysticus and arteria cystica but also significant convenience in clipping. In this technique, interference of instruments is prevented by the distance between the trocar entrances. The application of the technique is difficult in patients with a body mass index >40 and in cases in which abdominal obesity is present. When placing the trocars in the bikini area, the epigastric arteries should be visualized and then the trocars should be placed. Long-hand instruments may be preferred in patients with a long distance between the gallbladder and the bikini area. The gallbladder is preferably visually removed from the umbilicus. In this way, it can be protected from possible strain, perforations, bile leakage, and falling abdominal stones. The fact that all 38 patients expressed significant satisfaction with the cosmetic result showed that the aesthetic results of the technique were highly acceptable.

CONCLUSIONS

In patients with symptomatic cholelithiasis undergoing LC, the use of the modified bikini line approach can be a satisfactory and safe method for patients who care about cosmesis and desire hiding all incision scars in the umbilicus and bikini area (Figure 3). At the same time, the surgeon does not need special training and does not use special laparoscopic equipment, which are important advantages of this technique.

Figure 3. Cosmetic appearance of incisions at 6-month follow-up.

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