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Original Article

A novel safe laparoscopic entry technique in obese patients: an umbilical elevation technique

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Abstract: There is a continuous search for the safest abdominal entry technique, considering the recent progressions in laparoscopic surgery. In this study, we wanted to share a novel technique that we have identified for safe laparoscopic entry in obese patients. A total of 2936 laparoscopic operations were performed in general surgery, urology, and gynecology departments of Mevlana University from 2003 to 2013. The number of patients with a body mass index (BMI) ≥30 was 764. We have identified a new technique for a safer first entry in these patients. Direct open surgery, insertion techniques in which the skin is suspended, and cases with umbilical hernia were excluded from the study. 522 (68.3%) of the cases were female, 242 (31.7%) were male, and the mean age for both genders was 51.8±12.2 years (range 27-74). The mean BMI was 34.3±3.6 (range 30-45). In 1 (0.13%) case, we had to convert to an open procedure. Wound infection developed in 7 (0.92%) of the patients. None of the patients developed intraperitoneal complication during insertion. Being safe, efficient, fast applicable, and easily learned, this new technique can be safely preferred in obese patients.

Keywords: Laparoscopy, abdominal entry, veress needle, trocar

Introduction

Creating a pneumoperitoneum is the most important step of laparoscopic surgery (LS). Complications of LS are rare and at least 50% of them occur during access to the peritoneum. To decrease the complications of laparoscopic insertion, the abdominal wall (AW) must be separated from visceral organs as much as possible during entry in procedures other than open surgery.

For separation of the AW from the visceral organs, abdominal skin is grasped and elevated with a hand or towel clamp but power cannot reach the AW sufficiently [1, 2]. Many entry techniques have been described since human laparoscopy was first reported in 1910 by Jacobaeus [3]. These include the veress-capnoperitoneum trocar, the open (Hasson) technique and so on [4]. Direct trocar entry, which is one of the most frequently used techniques, is easy but has the potential for injuries. Although an open procedure is safer than other methods, it has been regarded a time-consuming one [5].

The rate of major complications for LS varies among 1.4-5.7 in one thousand in several centers. Inadequacy of AW stabilization and elevation are reported among the causes of intra-abdominal injuries in obese patients [6]. In this study, we wanted to share a novel technique that we have identified for safe laparoscopic entry in obese patients.

Material and methods

Study design and patients

A total of 2936 laparoscopic operations were performed in general surgery, urology, and gynecology departments of Mevlana University from 2003 to 2015. Among cases with the first

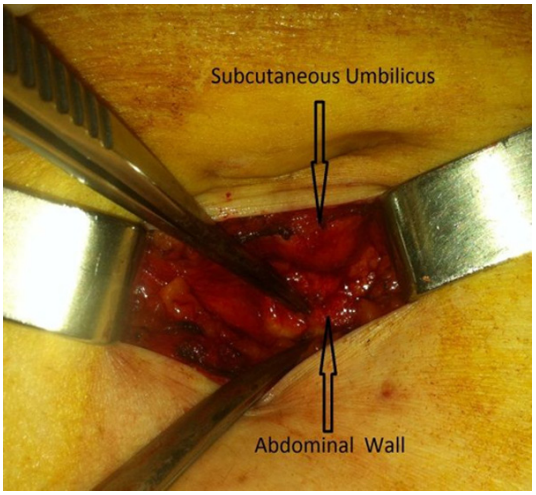

Figure 1. The umbilicus and abdominal wall.

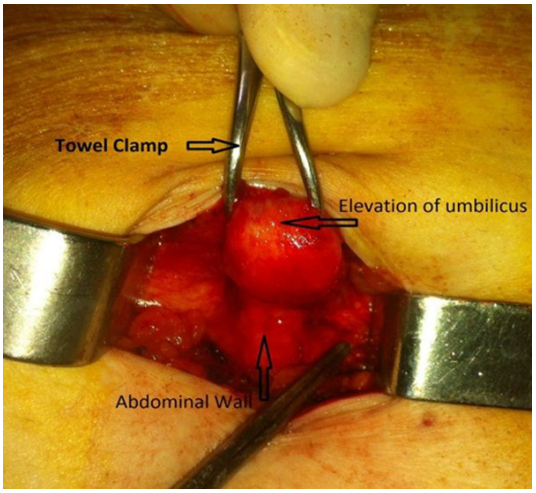

Figure 2. The umbilical elevation technique.

laparoscopic entry made from the umbilicus, in 764 patients whose BMI was ≥30, we have defined a new technique that stabilizes the AW adequately and provides sufficient space between the fascia and visceral organs for a safe entry. We totally followed the ethical rules of our institution. The patients' demographic data, BMI and procedure time were obtained from computerized medical records retrospectively. Patients were excluded if one of the following criteria were present; age less than 15 years (no upper age limit), umbilical hernia, open procedures due to prior operations and conversion to open technique (OT).

Procedures

Umbilical elevation technique (UET); in this technique, the connection of the umbilicus with the AW was exposed by dissection of the umbilicus anteriorly and on both sides with a 15 mm infraumbilical transverse incision (**Figure 1**). Then, with the help of a towel clamp, the umbilical stalk was grasped subcutaneously and the AW was elevated (**Figure 2**). After achieving proper AW stabilization and elevation with this method, a Veress needle and trocar were safely inserted into the peritoneum and pneumoperitoneum was established. During the operation, a wet tampon was placed onto the incision site. At the end of the operation, the umbilical trocar was taken out and the skin and subcutaneous tissue were sutured. We used 5 mm trocar and optic with an angle of 30° in all of patients. At the end of the operation, none of our patients required fascia suture to the umbilical trocar site.

Open technique (OT); this technique, first described by Hasson in 1971, is open entry technique. The entry is essentially a mini-laparotomy. A small incision is made transversely or longitudinally at the umbilicus. This incision is long enough to be able to dissect down to the fascia, incise it, and enter the peritoneal cavity under direct vision [7].

Statistical analysis

Data were analyzed using SPSS (Statistical Package for Social Science) for Windows 15.0 package program. For statistical analysis, descriptive tests were used. Data normality was tested by one-sample Kolmogorov-Smirnov test. Continuous variables were given as mean ± standard deviation. Non-continuous variables were given as median (min-max). A p value <0.05 was considered statistically significant.

Results

We enrolled 839 patients in this study. 42 patients with open prior laparoscopic, 32 patients with umbilical hernia and one patient converted to open technique were excluded from this study, and as a result, 764 patients were investigated. BMI and demographic data of the patients were summarized in **Table 1**.

Only 7 patients (0.92%) developed wound infection at the port site. Five of them were treated with antibiotics; the other two were treated with drainage and antibiotics. We had to convert to open technique in one patient (0.13%). In 80% of the 764 cases in which we

Table 1. Patients' demographic data and UET

Gender (n/%)	
Female	522 (68.1%)
Male	242 (31.7%)
Age (year)	
Female	52.2±13.1
Male	51.1±10.1
BMI (kg/m^2)	34.3±3.6
Procedure time (min)	2.6±0.7

BMI: Body mass index.

made the first entry from the umbilicus, we used a 5 mm trocar as a first entry instrument without establishing pneumoperitoneum, and in 20% we used a Veress needle. None of the patients developed intraperitoneal complication during entry. Also, we did not have any patients developing umbilical hernia.

Discussion

In obese patients, the thickness of subcutaneous adipose tissue, the AW, and preperitoneal adipose tissue creates difficulty for a laparoscopic entry. The umbilicus is the thinnest part of the AW and instruments can easily be inserted from this point [6]. The most used methods of entry are Veress needle insertion and open classic technique (Hasson technique) [7]. Veress needle insertion is the oldest method and was developed by Dr. Veress in 1938 [8]. The currently used Veress needles have a length of 12-15 cm and a diameter of 2 mm. In obese patients, the 15 cm length of a Veress needle cannot always reach the fascia with skin elevation [9]. The most important limitation in the use of the open technique is obese patients. This technique requires a bigger skin incision from our technique, and is regarded as hard and time consuming in obese patients. Also, it increases gas leakage and postoperative infection rates. Even in experienced hands, the mean procedure time of OT is average 6.5 min, and it takes 3-10 minutes to reach the peritoneum [7, 10]. In our study, the mean of procedure time was 2.6 min.

Although the aim of the open entry technique is to reduce intestinal and vascular entry injuries, it is not successful in totally eliminating these injuries [11, 12]. The complication rate is related to procedure count. These rates are 0.8-16.3% for the first attempt and 16.3-37.5% for the second attempt, while the rates can go up to 84.6-100% [13]. In our study, none of the patients developed intraperitoneal complication during entry.

After ruling out gastric distension and splenomegaly in obese patients and the cases with suspicion of midline adhesions, Palmer's point (the point that is 3 cm inferior to the rib margin in the left midclavicular line) can be safely used as a first entry site [14, 15]. The major part of LS entry injuries arises generally from inadequate AW elevation [16, 17]. During the operation, 30-50% of intestinal and 13-50% of vascular injuries can remain unnoticed. Thus, delayed diagnosis of intestinal injuries may cause mortality rates of 2.5-5% and lead to legal issues. The mortality rate due to vascular injuries is 15% [18, 19]. Among vascular injuries, 39.8% occur with direct Veress needle entries, 37.9% with direct trocar entries, and 22% with secondary trocar entries [6]. Urinary tract injuries take place mostly during laparoscopic hysterectomy, at the rate of 0.25% [20]. After LS, deaths due to intestinal injuries are the third most common, after deaths due to major vascular injuries and anesthetic reasons [19].

The study most similar to ours was published in 2005 by Jared et al. [21]. The technique in the study, unlike ours, was a 1 cm curvilinear skin incision at the left of the umbilicus and an additional incision of 5 mm at the fascia. The authors used this technique on 1000 cases and an entry injury occurred in one patient with a prior midline incision and prosthetic mesh. Another similar study, published in 2012 by Pawanindra, used a technique in 6000 patients. With this technique, a subumbilical 12 mm transverse incision was applied. Unlike our technique, an additional 1 cm incision to the fascia was performed. The average dimension of the port used was 15 mm, time of entry 2 minutes, covering of the port site 3 minutes, and 0.4% port site hernia was detected [22].

In the technique we used, after fascia exposure direct entry with a Veress needle or trocar was performed without an additional fascia incision. No intestinal, minor, or major vascular injuries occurred in our 764 cases. However, we performed peritoneal insertion using the open technique in the cases with a history of prior midline operation or operation near the

umbilicus. The dimension of the port we used was 5 mm, so we did not need an additional procedure to cover the port site. We used a 5 mm trocar as a first entry instrument without establishing pneumoperitoneum. Direct trocar insertion was first described by Dingfelder in 1978 [23-25]. In our technique, adequate space between the AW and visceral organs was achieved with umbilical elevation in obese patients; thus, a safe insertion could be carried out without the need for pneumoperitoneum establishment.

Conclusion

In summary, strong elevation of the AW provides adequate space for safe entry of a Veress needle or trocar. Being safe, efficient, fast applicable, and easily learned, this new technique can be safely preferred in obese patients.

Disclosure of conflict of interest

None.

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