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Direct Trocar Insertion with Elevation of the Rectus Sheath in Bariatric Surgery: A Novel Technique

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ABSTRACT:

Introduction. Initial trocar entry, the first step in laparoscopic surgery, is associated with several complications. In morbidly obese patients, initial trocar placement is associated with a greater number of complications compared to non-obese patients.

Materials and Surgical Technique. In this study, we describe our use of an initial trocar entry technique which is direct trocar insertion with elevation of the rectus sheath by a single Backhaus towel clamp and we would like to evaluate the sa fety and efficacy of its administration in bariatric surgery.

Discussion. Our results indicate that gaining initial trocar entry using our technique leads to successful laparoscopic bariatric surgery. Our technique is a safe, effective, and reliable first step in successful laparoscopic surgery for almost all patients, and is only contraindicated in patients with severe hepatomegaly.

KEYWORDS: bariatric surgery, direct trocar insertion, rectus sheath elevation

INTRODUCTION

Initial trocar entry, the first step in laparoscopic surgery, is associated with several complications, including abdominal wall injuries and visceral injuries. Moreover, the procedure is often time--consuming due to such a complication as peritoneal insufflation, as well as the need to repeat the procedure due to failure. In morbidly obese patients, initial trocar placement is associated with a greater number of complications compared to non-obese patients [1]. With an increasing number of laparoscopic bariatric surgery procedures performed over recent years, there is an increasing number of researchers that investigate the safety and feasibility of different techniques used for initial trocar entry. In this study, we describe our application of the initial trocar entry technique that we adapted from the method developed by Gunenç et al. [2] and evaluate the safety and efficacy of its use.

MATERIALS AND SURGICAL TECHNIQUE

We examined 376 consecutive patients with no history of any previous upper open abdominal surgery, who had undergone laparoscopic sleeve gastrectomy at the Bakirkoy Dr. Sadi Konuk Training and Research Hospital between May 2013 and May 2015. Initial trocar entry had been performed in all patients by three consultant surgeons using our technique. All cases of initial trocar entry-induced injuries (injuries of the abdominal wall, viscera, and solid organs), failed entry, and subcutaneous emphysema were documented. Before initiating surgery, a nasogastric tube was inserted to empty the stomach. After placing the patient in a 30-degree reverse Trendelenburg position, a transverse skin incision was made approximately 10 cm below the xyphoid process and 1 cm left lateral from the midline to prevent falciform ligament injuries (Figure 1-a). Subcutaneous fat tissue was dissected by a dissector and a finger, and the observed rectus sheath was grasped from the inferior side and lifted using a Backhaus towel clamp (Figure 1-b and 1-c). While the rectus sheath was being lifted, a 12-mm disposable shielded trocar was directly inserted up to the rectus sheath immediately in front of the clamp and then advanced into the peritoneal cavity using a controlled twisting movement (Figure 1-d). A laparoscope was introduced and placement was confirmed after the obturator had been removed.

DISCUSSION

A total of 376 consecutive patients met the National Institutes of Health criteria for bariatric surgery and were included in the study. They had no history of previous upper open abdominal surgery and had laparoscopic sleeve gastrectomy. The mean body mass index was 48.7 kg/m2 (range 37.2-73.2kg/m2). The mean age was 37.3 years (range 15-67 years). As many as 277 (63.7 %) of the patients were female (Table 1). Liver injury was detected in 4 patients (1.06%) and all of those injuries could be managed by compression. Subcutaneous emphysema occurred in 4 patients (1.06%) and minor omental injuries occurred in 3 patients (0.08%) (Table 2).

Almost all bariatric procedures performed worldwide are now coducted laparoscopically. Nevertheless, there is no consensus regarding the best technique for initial trocar entry. The commonly used entry methods include Veress needle insertion (VNI), open (Hasson) technique, optical trocar insertion, and direct trocar insertion (DTI)[1]. The use of the open (Hasson) technique in morbidly obese patients is difficult (because of a very thick abdominal wall and peritoneum in this population [1]) and time-consuming due to the need for dissection and carbon dioxide leakage [1,2]. Even though several non-randomized studies have demonstrated that the use of optical trocars is safe and effective in gaining initial access in bariatric surgeries, they also found that it does not completely eliminate the risk of injury and is more costly than other techniques [3].

One difficulty in identifying an optimal initial trocar technique is that almost all randomized controlled studies comparing two

Tab. I. Patient Characteristics.

PATIENT CHARACTERISTICS	VALUE
Number of Patients (n)	376
Sex (female/male)	277/99
Mean age (y)	37.3 (15-67)
Mean BMI (kg/m2)	48.7 (37.2-73.2)

Tab. II. Complications.

COMPLICATIONS	VALUE (%)
Liver injuries	4 (1.06%)
Minor omental injuries	3 (0.08%)
Subcutaneous emphysema	4 (1.06%)
Total Complication	11 (2.9%)

blind-entry techniques, VNI and DTI, have been conducted in non-obese populations [4]. Among those studies, a meta-analysis identified four cases of major complications in the VNI group in contrast to none in the DTI group, as well as significantly higher rates of minor complications and of failed first attempts in the VNI group [5]. A recent randomized controlled study investigating an obese population found that the use of DTI decreased the insertion time compared to VNI but resulted in two major complications, one being transverse mesocolon injury, and the other one severe injury to the jejunal branch of the superior mesenteric vein [4].

Here, we described a technique slightly modified from the technique developed by Gunenç et al. [2] that we routinely use in our clinical laparoscopic bariatric surgery practice. We believe that lifting the abdominal wall by grasping the rectus sheath instead of the skin is safer in obese patients compared to non-obese patients because of a very thick subcutaneous tissue in the first population. In our modification of Gunenç et al.'s technique, we grasped the rectus sheath with one Backhaus towel clamp from the middle, instead of two from the sides, which provided for safer entry controlled by a single surgeon instead of two. Among the 376 patients we examined, 4 (1.06%) experienced a minor liver injury, which we managed by a single compression; 3 (0.08%) had minor omental injuries; and 4 (1.06%) subcutaneous emphysema. All the patients with liver injury had massive hepatomegaly, such that the liver was elongated down to the area in which we introduced the trocar. None of our patients developed subcutaneous emphysema, and we experienced no cases of initial entry failure such that we would have to repeat entry using another technique.

A common English proverb states, "A good beginning is half the task." Our results indicate that gaining initial trocar entry using our technique leads to successful laparoscopic bariatric surgery, affirming the veracity of this oft-quoted proverb. Our technique is a safe, effective, and reliable first step in successful laparoscopic surgery for almost all patients, and is only contraindicated in patients with severe hepatomegaly.

Fig. I. Insertion of a 12-mm trocar by elevation of the rectus sheath

Fig. I. a. Determination of the trocar insertion site

Fig. I. b. Dissection of fat tissue by a dissector and a finger

Fig. I. c. Grasping and lifting the rectus sheath by a towel clamp

Fig. I. d. Insertion of the trocar

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Competing interests: The authors declare that they have no competing interests.

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