


# First Port Access using an Optical Trocar in advanced Upper Gastrointestinal Tract Laparoscopic Surgeries

Mohab G Elbarbary<sup>1</sup>, Alaa Elashry<sup>2</sup>, Islam Hossam El-Din El-Abbassy<sup>3</sup> 

## ABSTRACT

**Background:** Multiple techniques for creation of pneumoperitoneum and first port introduction in laparoscopic surgeries are being used with a variety of benefits and hazards. Our study was conducted to present the safety and simplicity of using an optical trocar for the establishment of pneumoperitoneum and first port access through Palmer's point for advanced upper gastrointestinal tract (GIT) surgeries.

**Materials and methods:** All patients listed for advanced upper GIT laparoscopic procedures were included in the study, whereas patients who had splenomegaly, hepatomegaly or the previous left upper quadrant surgery were excluded. A 12-mm optical trocar was introduced with a 0°-degree camera through Palmer's point in a fully controlled way under complete direct vision, followed by the introduction of the required working ports to perform the targeted operation. The time of first port introduction, creating pneumoperitoneum, as well as complications during or after the procedure were recorded.

**Results:** The study included 1,560 patients who had advanced laparoscopic upper GIT surgeries. Our technique was successful except in two patients (0.12%) due to massive adhesions of previous operations. The mean time to induce pneumoperitoneum and abdominal access was 120 s. Port-site infection occurred in 0.19%, whereas enterotomy occurred in 0.12%. No port-site hematomas, hernias, or vascular injuries were noted.

**Conclusion:** Using an optical port at Palmer's point in a fully controlled way allows a fast, easy and safe method for first port access and creating pneumoperitoneum in laparoscopic surgeries. However, special care is still required for patients with the previous abdominal surgeries to decrease the risk of bowel injuries.

**Keywords:** Bowel injury, Open method, Optical port, Palmer's point, Veress needle.

*World Journal of Laparoscopic Surgery* (2021): 10.5005/jp-journals-10033-1521

## INTRODUCTION

Laparoscopy is considered the gold standard technique used nowadays in all upper GIT surgeries. Despite the rise in the learning curve of laparoscopic use and the recent technical advances in minimally invasive surgical techniques, a safe first port access and creation of pneumoperitoneum continues to be a challenge for all surgeons. Complications related to the entry technique might hinder the operation performance or could be a cause of death.<sup>1</sup> Various methods had been used for years including Veress needle technique; however, because of its slow insufflation rates and potentially life-threatening complications, it becomes an undefendable mistake to use it in many countries.<sup>2</sup>

The open technique method for port insertion in laparoscopy was first introduced in 1971 by Hasson.<sup>3</sup> This technique allows direct vision and safe entry for the first port avoiding vascular and organ injury as well as immediate recognition and repair for the injury if happened.<sup>4,5</sup> There are also other methods of intra-abdominal entry including direct trocar insertion, radially expanding trocars and visual entry systems.<sup>6</sup>

The advantages and disadvantages of closed or open methods for creation of pneumoperitoneum and introduction of first port safely were evaluated by many clinical studies. However, the definite answer to know the ideal technique is still unclear.<sup>7,8</sup> Many studies using modified techniques of both open<sup>9</sup> and closed<sup>10</sup> basic approaches have been carried out, while others are underway. The older randomized controlled studies,<sup>11,12</sup> as well as the more recent studies,<sup>13,14</sup> in many countries proved that the open technique is as quick as closed methods and associated with fewer minor complications. However, using the open technique is considered

<sup>1,2</sup>Department of General Surgery, Ain Shams University, Cairo, Egypt

<sup>3</sup>Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt; Raigmore Hospital, NHS Highland, United Kingdom; Institute of Medical Sciences, University of Aberdeen, Aberdeen, United Kingdom

**Corresponding Author:** Islam Hossam El-Din El-Abbassy, Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt; Raigmore Hospital, NHS Highland, United Kingdom; Institute of Medical Sciences, University of Aberdeen, Aberdeen, United Kingdom, Phone: +44 7871798087, e-mail: islamelabbassy@hotmail.com

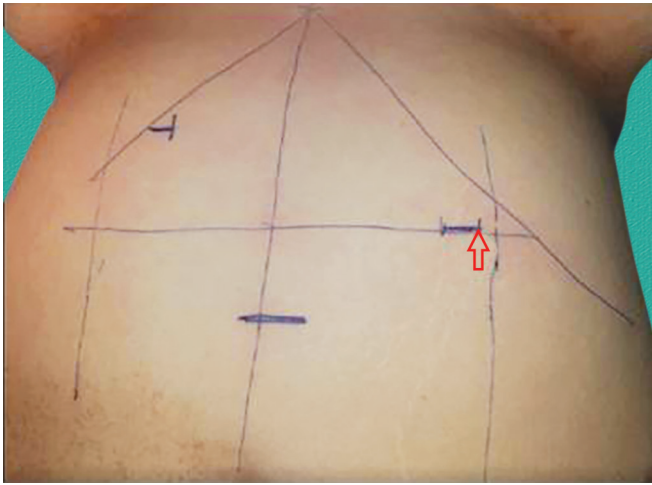
**How to cite this article:** Elbarbary MG, Elashry A, El-Abbassy IH. First Port Access using an Optical Trocar in advanced Upper Gastrointestinal Tract Laparoscopic Surgeries. *World J Lap Surg* 2021;xx(x):xx-xx.

**Source of support:** Nil

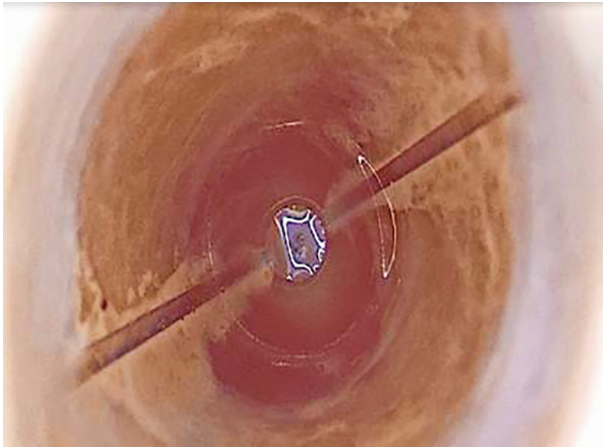
**Conflict of interest:** None

a challenge in morbidly obese patients and consume much more time for introduction with a higher rate of postoperative port-site infections and hernias.<sup>15</sup>

Palmer's point was first described by Raoul Palmer in 1974, which is a point located in the left upper quadrant, 3 cm below the costal margin in the mid-clavicular line. This entry point is utilized when midline adhesions are suspected.<sup>16</sup> It should also be considered in both obese and thin patients.<sup>17</sup> Entry through Palmer's point using Veress needle insufflation has been reported by different studies.<sup>18,19</sup> It has been mentioned that the correct placement of the Veress needle through that point would be more difficult compared to the infraumbilical entry because the



**Fig. 1:** Palmer's point shown by the arrow



**Fig. 2:** Gradual introduction of the optical port through muscle layers of the anterior abdominal wall

abdominal wall layers do not come together at the left upper quadrant as they do at the midline.<sup>20</sup>

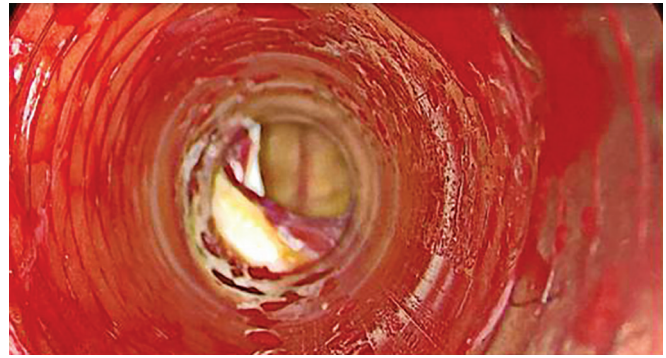
Many studies are reporting the use of optical ports through the midline,<sup>21-23</sup> whereas its use through Palmer's point has not been reported much in the literature. Our aim was to present the safety and simplicity of using an optical trocar for the establishment of pneumoperitoneum and first port access through Palmer's point for advanced upper GIT surgeries.

## MATERIALS AND METHODS

This prospective observational study was conducted during the period from December 2015 to January 2020 at Ain Shams University Hospitals and a few private hospitals in Cairo, Egypt. All patients listed for advanced upper GIT laparoscopic procedures were included in the study, whereas, the patients who had splenomegaly, hepatomegaly or the previous left upper quadrant surgery were excluded.

We conducted this study in compliance with the principles of the Declaration of Helsinki. The study's protocol was reviewed and approved by the institutional ethical committee (IRB No. 0006379). Written informed consent was obtained from all the participants.

A 12-mm incision was made over Palmer's point and a 12-mm optical trocar (ENDOPATH XCEL® trocar with OPTIVIEW® technology)



**Fig. 3:** The optical port was just at the level of the peritoneum with its tip creating a small hole to the abdomen through which insufflation was started



**Fig. 4:** The optical port was safely and easily introduced to the abdomen under complete vision after creating good pneumoperitoneum

was introduced with a 0°-degree camera (Fig. 1). A slow controlled rotating introduction of the optical trocar with the 0°-degree camera was done through the layers of the anterior abdominal wall (Fig. 2).

The introduction of the optical trocar was stopped once the peritoneum was reached and a small hole was created by the tip of the trocar. Then, pneumoperitoneum was created using low pressure less than 12 mm Hg. With the creation of good insufflation of the abdomen, the port was slowly introduced to the abdomen under complete safe vision (Figs 3 and 4).

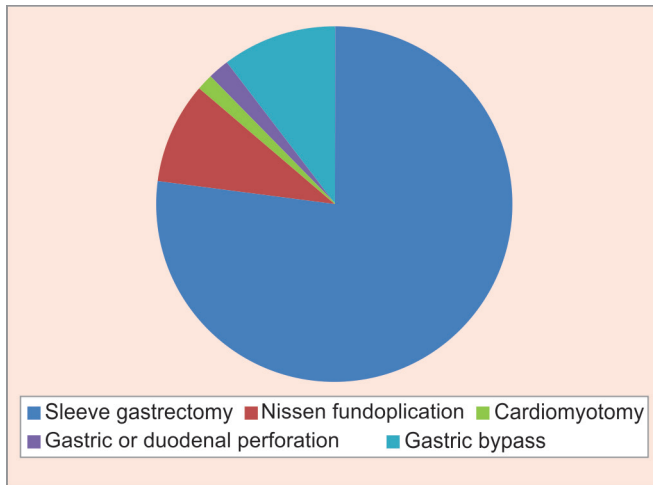
Through-and-through inspection of the abdominal cavity was done to exclude any intra-abdominal injuries. Then, all other required ports for the targeted procedure were introduced under vision. This port used for creating the pneumoperitoneum was used as a working port during the procedures. At the end of the procedure, this port site was closed using subcuticular sutures. We do not routinely perform closure of the fascial defect because the muscle-splitting nature of these trocars does not require closure.

This technique was standardized among all cases and all operations were performed by two surgeons who are experienced in laparoscopic surgery.

Time of first port introduction, creating pneumoperitoneum, as well as complications during or after the procedure were recorded.

## RESULTS

The study included 1,560 patients who had advanced laparoscopic upper GIT surgeries. Those cases included 1,200 sleeve gastrectomies (76.9%), 150 Nissen funduplications (9.6%), 20 cardiomyotomies



**Fig. 5:** Advanced laparoscopic upper GIT surgeries included in the study

**Table 1:** Complications of the technique

Complication	Event (%), N = 1,560
Enterotomy	2 (0.12)
Port-site infection	3 (0.19)
Port-site hernia	0 (0)
Vascular injury	0 (0)
Solid-organ injury	0 (0)
Conversion to open	1 (0.06)

(1.3%), and 30 emergency laparoscopies for gastric or duodenal perforations (1.9%), 160 gastric bypasses (10.3%) (20 roux-en-y and 140 one anastomosis bypasses) (Fig. 5).

Intra-abdominal access using the given technique was successfully achieved in 1,558 patients, whereas it failed in only two cases (0.12%) who were scheduled for laparoscopic gastric bypass. The first patient had a previous midline laparotomy incision for postoperative leakage and wound infection with intensive care admission, while the other patient had marked adhesions after open complicated vertical band gastroplasty (VBG). The first patient was converted to open surgery, whereas the operation was abandoned for the other patient for fear of performing further vascular or organ injuries due to massive adhesions.

The mean time taken to induce pneumoperitoneum and abdominal access was about 2.3 minutes (range, 1–5 minutes). No postoperative mortality was recorded, and no vascular or solid organ injury was observed. Enterotomy was recorded in only two cases (0.12%) who had previous adhesions from previous surgeries. Both of these enterotomies were repaired laparoscopically during the same procedure with no postoperative complications. However, one of them was converted to open (after the laparoscopic repair of the enterotomy was done) due to massive adhesions and difficulty in handling the tissues.

Postoperative port-site infection was recorded in 3 (0.19%) cases and treated safely by daily dressing of the wound and antibiotics. There were no recorded postoperative port-site hernias (Table 1).

## Discussion

Our study shows that the given technique for gaining access into the abdominal cavity using the optical trocar with 0°-degree

camera adds advantages over the conventional blind method using Veress needle and also the open technique. It allows a completely safe and fast method for insufflation and first port access under complete direct vision. This technique may be used as well in re-do operations and patients having previous surgeries, but still great care during access is required to avoid complications. The point of entry described in our technique needed to be well recognized to allow to get the benefits of avoiding vascular or organ injury and easy manipulation of the instruments during carrying out the procedure required; otherwise, it might add more burden during the operation. The incidence of postoperative hernia in our technique was zero compared to other techniques especially the open one which had higher incidence rates because of introduction through the linea alba or close to it.<sup>24</sup>

In our study, the mean time taken to induce pneumoperitoneum and abdominal access using an optical trocar was about 2.3 minutes (range, 1–5 minutes). In a study done on 200 patients, Hallfeldt et al. reported a mean entry time of 4 minutes (range, 2.30–11.0 minutes),<sup>22</sup> whereas in another study, Bernante et al. reported a mean entry time of 20 seconds (range, 10–50 seconds).<sup>25</sup> Studies reported that the blind Veress technique requires around 214–300 seconds for abdominal cavity access,<sup>11,26</sup> whereas the open technique may require about 240–300 seconds.<sup>27,28</sup> Thus, using the optical trocar technique is quicker than using the Veress needle and the open technique.

Hasson reported complications using the open technique on 5,284 patients. Twenty-one of them had minor wound infection, four had a minor hematoma, one developed umbilical hernia, and one had an injury to the small bowel. Hence, if there are dense adhesions, bowel injury could still happen even if an open technique is used.<sup>29</sup> In our study, we reported two cases of bowel injury due to massive intra-abdominal adhesions that were repaired laparoscopically, and three cases of port site infection. String et al. reported one case of bowel injury and one case of gall bladder injury in a series of 650 patients using an optical trocar,<sup>21</sup> whereas Rable et al. reported three cases of superficial mesenteric and greater omentum lacerations in their series of 196 morbidly obese patients.<sup>22</sup>

In a series of 821 patients using optical trocars, Wong WS reported no complications related to the induction of pneumoperitoneum or port insertion on gynecological patients.<sup>23</sup> Similarly, no complications were reported by Bernante et al. in their series of 200 morbidly obese patients who had bariatric procedures.<sup>25</sup> Similar results were reported by Bernante et al.<sup>25</sup> and Berch et al.<sup>30</sup> on a series of 200 morbidly obese patients who had bariatric procedures and 349 patients who had gastric bypass, respectively.

The use of optical access trocar through Palmer's point was reported by Berch et al.<sup>30</sup> in their case series on 349 patients who had gastric bypass, and no complications were documented. The same technique was adopted by Aust et al.<sup>17</sup> on their 15 patients who had gynecological procedures, and no complications were reported either.

Although using the optical trocar is not a new technique, to our knowledge, our study is considered to be the biggest in the literature documenting the outcomes from using this technique, emphasizing the idea of insertion of the first trocar under direct vision through Palmer's point to perform different types of laparoscopic upper GIT surgeries combining the benefits of shorter time of introduction of the closed method and the complete visualization of the trocar during its access of the open method.

Therefore, we encourage using this technique routinely especially in advanced upper GIT laparoscopic surgeries due to



its simplicity, safety, and low risk of complications guided by the excellent results of this study compared to other known techniques.

## CONCLUSION

Using the aforementioned technique using the optical trocar at Palmer's point in a fully controlled way allows a fast, easy and safe method for first port access and creating pneumoperitoneum in upper GIT laparoscopic surgeries. However, a special care is still required for re-do operations and patients with previous abdominal surgeries to decrease the risk of bowel injuries.

## ORCID

Islam ElAbbassy  <https://orcid.org/0000-0001-9359-9726>

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