E-Z Point: A New Safe and Reproducible Laparoscopic Entry in the Left Upper Quadrant Using a Veress Needle

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ABSTRACT

Background: Over half of all fatal complications occur during primary laparoscopic entry. In our practice, we developed a novel modification of closed LUQ entry at Palmer’s point and designated it “E-Z” entry. Aims: To evaluate the risks and safety of left subcostal entry, a technique we have designated ‘E-Z’ entry at our institution. Settings and Design: A retrospective chart review was conducted at a tertiary care medical centre of patients who underwent laparoscopic procedures by a single surgeon known to perform left subcostal entry for the last 10 years, using the E-Z entry technique. Materials and Methods: Retrospective chart review and description of surgical technique. Statistical Analysis Used: Simple descriptive statistics and univariate two-group comparisons. Results: One hundred ninety-eight laparoscopic cases were identified as performed by a single surgeon in the last 10 years: 149 underwent umbilical entry and 49 underwent E-Z entry. The average number of previous abdominal surgeries was higher in the E-Z entry group compared to the umbilical group, 1.3 versus 0.5, respectively (P = 0.003). The umbilical entry group had no complications. One complication was noted with the E-Z entry technique, in which the Veress needle was noted to perforate the liver capsule but was managed expectantly. Conclusion: We propose the E-Z entry technique for Veress needle entry as an ergonomic and easily reproducible entry technique in the left upper quadrant in the setting of suspected intraperitoneal adhesions.

Keywords: E-Z point, laparoscopic entry, left upper quadrant, minimally invasive gynaecologic surgery, Palmer’s point, umbilical entry, Veress needle

INTRODUCTION

Since its introduction in the early twentieth century, laparoscopic surgery has been shown to be a safe and efficacious alternative to traditional open laparotomy.[1] Due to its capacity to improve patient safety, reduce hospital stay duration and decrease healthcare costs, laparoscopic surgery has become standard of care for many types of procedures.[2-4] Despite many advances in laparoscopic surgery, over half of all fatal complications occur during primary laparoscopic entry.[3,4] Blunt injury to intra-abdominal viscera and major vessels is estimated to occur in 0.03%–0.1% and 0.08%–0.14% of cases, respectively.[3,5] In a survey of 407 minimally invasive gynaecologic surgeons in Canada, 26.4% and 25.6% reported having experienced injury to a large artery or organ secondary to Veress needle and primary trocar insertion, respectively.[4,6] Despite being a pivotal step in laparoscopic surgery, there are limited guidelines to optimise the safety and effectiveness of primary laparoscopic entry. Closed laparoscopic entry, in which a Veress needle is

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inserted blindly followed by insufflation, remains the most common entry approach in minimally invasive gynaecologic surgery. Veress needle insertion typically takes place at the umbilicus at the midsagittal plane; however, there exist numerous alternative entry points that are advantageous under various circumstances. Specifically, left upper quadrant (LUQ) entry has been endorsed in the setting of intraperitoneal adhesions or after three failed attempts at achieving pneumoperitoneum. LUQ entry historically takes place at Palmer’s point, located 3 cm below the subcostal margin at the midclavicular line. Although alternative entry points in the LUQ region have been described in the literature, there are no evidence-based recommendations to guide surgical decision-making and support one technique over the other.

In our practice, we developed a novel modification of closed LUQ entry at Palmer’s point and designated it ‘E-Z’ entry in acknowledgement of and fondness for the surgeon who invented it, and who is also senior author on this paper. The E-Z entry technique entails insertion of the Veress needle immediately inferior to the 12th rib at the midclavicular line, 3 cm rostral to Palmer’s point. To our knowledge, there are no other descriptions of this laparoscopic entry technique in the literature to date. Therefore, the aim of this study is to describe this technique as performed by the single surgeon who had invented it in comparison to traditional umbilical entry. We hypothesise that E-Z entry is a safe and reproducible entry technique within our institution. Furthermore, we hypothesise that the rostral positioning of E-Z point relative to Palmer’s point confers increased effectiveness of primary Veress needle insertion.

**Materials and Methods**

**Surgical technique**

The E-Z entry technique was introduced by a single gynaecologic surgeon at our institution in 2009 and has been taught and reproduced by obstetrics and gynaecology residents and advanced trainees in minimally invasive gynaecologic surgery fellowship positions over the past 13 years. The E-Z entry technique employs a closed laparoscopic approach with blind insertion of the Veress needle in the LUQ. E-Z point is located immediately caudal to the subcostal margin at the midclavicular line and is a modification of Palmer’s point which is found 3 cm caudal to E-Z point.

After ruling out hepatosplenomegaly, an oblique line is drawn along the left subcostal margin and a straight line is drawn along the left midclavicular line: E-Z point is marked at their intersection [Figure 1a and b]. A Veress needle is inserted perpendicularly through the abdominal wall at E-Z point. The Veress needle should not be angled rostrally to avoid the neurovascular bundle at the inferior margin of the 12th rib. As recommended by Vilos, safe and successful Veress needle insertion is confirmed by starting CO$_2$ insufflation and testing for low intraperitoneal pressure at approximately 8–10 mmHg for the first 10s before pneumoperitoneum is created via high pressure CO$_2$ insufflation to 20 mmHg.

We then insert a 5 mm trocar at either the umbilicus or left lower quadrant. This is executed after achieving pneumoperitoneum to prevent iatrogenic injury and under direct visualisation with a camera attached to the trocar to monitor safe progression through anatomical layers. A zero-degree 5-mm laparoscope is inserted at this ancillary trocar site to visualise our Veress needle and ensure its safe placement without injury to bowel or vasculature [Figure 2]. Once safe Veress needle placement is confirmed, the intraperitoneal space is inspected from this perspective to discern potential locations for ancillary trocar placement under direct visualisation and without obstruction by the anterior abdominal wall.

In our experience, the E-Z entry technique is easily reproducible and allows effective and successful insufflation for laparoscopic gynaecologic procedures.

**Study design**

Following approval by our institutional review board (No. 11770), we conducted a retrospective chart review of all patients who underwent a minimally invasive gynaecologic procedure by the single surgeon who developed the E-Z entry technique beginning when the technique was introduced in August 2009 until August 2019 at a large, multicentre, urban, academic health facility. Charts were identified by querying the operative database for minimally invasive surgeries performed by the single surgeon. Manual chart review of operative and peri-operative notes was performed to obtain patient variables including primary entry technique. Patients who were >18 years-old and underwent a laparoscopic or robotic procedure were included in the study. Patients...
were excluded if they were under 18 years old, if primary entry was performed by a different surgeon or if their procedure was performed via open-entry technique. Informed consent was waived due to the retrospective nature of this observational study.

**Ethical statement**
This study and its procedures are in accordance with the ethical standards of the Helsinki Declaration of 1975, as revised in 2013.

**Statement of informed consent**
Informed consent was waived by our institutional review board due to the retrospective nature of this study.

**Patient variables**
The variables recorded for each patient are shown in Tables 1 and 2. These include demographic data and pertinent surgical history. Complications within the intra- and post-operative periods (4 weeks following the procedure) were also recorded.

**Statistical analysis**
Descriptive statistics were used to analyse continuous variables (mean ± standard deviation for normally distributed variables, median (range) for non-normally distributed variables) and categorical variables were reported as frequencies and percentages. For continuous variables, univariate two-group comparisons were performed using independent samples t tests when the variable was normally distributed and Wilcoxon rank sum tests when the variable was non-normally distributed. For categorical variables, univariable two-group comparisons were performed using the Pearson’s Chi-square test when expected cell counts were >5 and the Fisher exact test when expected cell counts were <5. Normality was assessed using the Shapiro–Wilk test ($P > 0.05$). All statistical analyses were performed using Stata 16.1 statistical software (StataCorp, LLC, College Station, TX).

**Results**
One hundred ninety-eight medical charts for patients undergoing minimally invasive gynaecologic surgery by a single surgeon from August 2009 to August 2019 were included in this study: 49 patients underwent the E-Z entry technique and 149 underwent standard umbilical entry.

**Patient demographics**
Table 1 shows the baseline demographic characteristics comparing patients who underwent standard umbilical entry and those who underwent E-Z entry over the follow-up period. All patients underwent a minimally invasive gynaecologic procedure by a single surgeon. No statistically significant differences were detected for race ($P = 0.400$) or body mass index (BMI) ($P = 0.260$) between the two groups. Patients who underwent E-Z entry were significantly older in age than patients who received standard umbilical entry (42.4 vs. 38.9 years, respectively; $P = 0.040$); however, this difference does not hold any clinical significance.

**Operative characteristics and pre-operative indications**
Table 2 compares the operative characteristics and pre-operative indications between the standard umbilical and E-Z entry groups. Patients who underwent E-Z entry had a significantly higher number of prior abdominal surgeries compared to those in the standard umbilical entry group (1.3 vs. 0.5 procedures on average, respectively; $P = 0.003$). A statistically significant difference was also detected for the type of minimally invasive procedure performed ($P = 0.024$). Sterilisation procedures (e.g., bilateral tubal ligation, salpingectomy, filshie clip application) and myomectomy were more common among the standard umbilical entry group compared to the E-Z entry group (14.8% vs. 8.2% and 26.2 vs. 12.2%, respectively). There was also a statistically significant difference for the indication for surgery ($P = 0.013$). Patients presenting with a non-fibroid pelvic mass were more likely to undergo E-Z entry than standard umbilical entry (20.4% vs. 6.0%, respectively). Patients presenting with fibroids were more likely to undergo standard umbilical entry than E-Z entry (57.7% vs. 42.9%, respectively). Finally, patients undergoing E-Z entry had significantly shorter lengths of stay at the hospital following their operation (0.32 vs. 0.58 days on average, respectively; $P = 0.031$). However, this difference does not appear to be significant in clinical practice as both groups reflect hospital discharge on postoperative day 0.

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**Figure 2:** Veress needle in the intraperitoneal space from the perspective of the umbilical point
Complications

Table 2 displays complication data for the participants in our study. There was no statistically significant difference detected for the incidence of complications between the E-Z entry and standard umbilical entry groups ($P = 0.080$). One intraoperative complication was recorded for the E-Z entry group, whereas the umbilical entry group did not reveal any intra- or post-operative complications. The complication reported for the E-Z entry group included perforation of the liver capsule by the Veress needle following 2 failed attempts at insertion at E-Z point. The operation was converted to open entry to repair the laceration. No long-term complications were recorded and the patient was discharged from the hospital on postoperative day 0. Our data revealed no injury to the neurovascular bundle at the 12th rib in either group.

Discussion

The most common techniques for primary laparoscopic entry include closed entry, utilising either blind puncture with a Veress needle or direct trocar insertion and open (Hasson) entry.\textsuperscript{[a,b,c]} Despite many advances in laparoscopic surgery, safe insertion of the Veress needle remains the most consequential and difficult step in laparoscopy. Our study describes the E-Z entry technique as developed and performed by a single surgeon at our institution and compares surgical indications and outcomes to those of standard umbilical entry by the same surgeon. The E-Z entry technique employs a closed entry approach and is a rostral modification of traditional LUQ entry at Palmer’s point. In our experience, E-Z entry confers enhanced anatomical landmarks in patients with suspected
intraperitoneal adhesions and who are at the extremes of BMI compared to Palmer’s point.

Palmer’s point was originally introduced in 1974 as an alternative to umbilical entry for patients with previous abdominal surgeries.\(^2\) Many studies have demonstrated a positive correlation between intraperitoneal adhesions and number of prior surgeries, with open laparotomy conferring the highest incidence of adhesions compared to laparoscopic approaches.\(^{12,16,19,21}\) In a prospective cohort study, Levraut et al. found anterior abdominal wall adhesions in 59% of patients with a history of midline vertical laparotomy compared to no patients with a history of laparoscopic surgery.\(^{19}\)

Traditionally, Palmer’s point is the primary alternative to umbilical entry in the setting of previous laparotomy and large uterine fibroids or pelvic mass.\(^{9,22,23}\) However, we posit that E-Z point is more optimally positioned for primary laparoscopic entry in patients with these indications due to its relatively rostral positioning compared to Palmer’s point. Although E-Z point is only marginally more rostral than Palmer’s point, 3 cm is clinically significant in the setting of both intraperitoneal adhesions and fibroid uterus or large pelvic masses. In our study, 20.4% and 42.9% of patients who underwent E-Z entry presented with a pelvic mass or fibroids, respectively [Table 2]. Although our study did not include any pregnant patients, we expect similar advantages in the setting of a gravid uterus. In addition, Palmer’s point is traditionally preferred over umbilical entry among patients at the extremes of BMI.\(^{15}\) Our experience demonstrates increased stasis of the abdominal wall layers due to proximity to the costal margin at E-Z point compared to Palmer’s point. This is clinically significant and useful for patients at the extremes of BMI who have an altered relationship of the abdominal wall with their underlying anatomy. Thus, based on our experience with E-Z entry, we hypothesise that future investigations will show higher success rates for primary Veress needle insertion at E-Z point compared to Palmer’s point due to its relatively more rostral position.

At our institution, Veress needle insertion at E-Z point has improved technical reproducibility and surgical confidence via obvious anatomical landmarks. Rather than estimating Palmer’s point at 3 cm inferior to the subcostal margin, E-Z point is positioned immediately inferior to the subcostal margin thereby improving stasis of the abdominal wall layers and alleviating subjective decision-making on behalf of the surgeon. Increased proximity to the costal margin improves turgidity of the surgical field and allows continual palpation of the twelfth rib throughout insertion of the Veress needle. In the setting of an academic teaching hospital, these technical advantages of E-Z entry improve confidence among resident trainees. Therefore, E-Z entry may improve surgical reproducibility and uniformity of technical skill across multiple surgeons.

Our study did not detect a significant difference in the incidence of intra- or post-operative complications between the E-Z entry and umbilical entry groups (2.0% vs. 0%; \(P =0.080\)). Among the E-Z entry group, there was one incident where perforation of the liver capsule during Veress needle insertion following 2 failed attempts resulted in conversion to open entry. The patient recovered and was discharged on postoperative day 0 with no consequential sequelae. In addition, although E-Z entry does not utilise a laparoscope to visualise subsequent trocar insertion, we employ direct visualisation with a camera attached to the trocar to prevent blind entry at two points instead of one. There is a corpus of literature reporting similar low complication incidence in evaluations of alternative upper quadrant entry points in the setting of intraperitoneal adhesions. Childers et al. and Agarwala et al. reported 1 (2.4%) and 2 (0.4%) complications related to Veress needle puncture, respectively, in evaluations of ninth intercostal entry techniques.\(^{12,24}\) In a retrospective study investigating a novel entry point at the right costal margin, Abd Ellatif et al. reported complications in 13 (2.3%) patients.\(^{13}\) No complications were reported in various retrospective studies evaluating the safety of closed entry at Palmer’s point.\(^{22,25,26}\) Similar to Palmer’s point, E-Z point and other LUQ approaches should not be considered in patients with a history of left hemidiaphragmatic disease, splenectomy, bowel resection or supracolic omentectomy.\(^{12,27,28}\) However, our study supports E-Z point as a potentially safe and reproducible alternative to umbilical entry when a LUQ approach is indicated in the setting of prior midline laparotomy, large pelvic masses or extreme BMI.

Although our findings support E-Z point as a potentially safe alternative with similar incidence of complications compared to Palmer’s point, our sample size does not have the power to conclude its safety or reproducibility. Our sample size only included...
49 patients who underwent E-Z entry over a follow-up period of 10 years. Due to billing requirements at our institution, many cases employing the E-Z entry approach documented general LUQ entry in operative notes, limiting our ability to accurately capture all cases of E-Z entry. In addition, our study would have ideally included comparison data for patients who had undergone traditional LUQ entry at Palmer’s point by the same surgeon to demonstrate differences between two similar approaches; however, due to the surgeon’s preference for the E-Z entry technique over entry at Palmer’s point when a LUQ approach is indicated, there were not enough cases to make evidence-based comparisons between these two subgroups. Therefore, we included umbilical entry cases by the same surgeon as our comparison group.

Overall, complications in closed laparoscopic entry using blind Veress needle puncture are rare, irrespective of specific entry point. Garry et al. estimated that 828,204 patients undergoing laparoscopic surgeries would be necessary to detect a significant reduction in bowel injuries from 0.3% to 0.2%. As a result, randomised controlled trials to demonstrate the efficacy of E-Z entry is not feasible or valid. Therefore, a large, prospective study evaluating E-Z entry compared to entry at Palmer’s point by a single surgeon with longitudinal post-operative follow-up is needed to conduct a rigorous evaluation and formulate evidence-based recommendations regarding the safety, reproducibility and effectiveness of this novel LUQ laparoscopic entry technique. The addition of E-Z entry to a laparoscopic surgeon’s toolbox would allow enhanced reproducibility and uniformity and improved rates of successful primary entry in gynaecologic laparoscopic procedures.

**Conclusion**

The E-Z entry technique is an ergonomic and easily reproducible modification of traditional LUQ entry through Palmer’s point, making it our ‘go-to’ approach in patients with prior midline laparotomy, fibroid uterus and pelvic masses. In our experience, closed Veress needle insertion at E-Z point is easily reproducible due to enhanced anatomical landmarks and enhanced stasis of abdominal wall layers. We predict that future prospective evaluations of E-Z point will demonstrate higher success rates improved safety for primary entry compared to Palmer’s point due to its advantageous location at 3 cm rostral. Therefore, E-Z point should be considered as an alternative to umbilical entry when a LUQ approach is needed for patients with previous midline laparotomy, pelvic masses and at BMI extremes.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

**Data availability statement**

The data set used in the current study is available upon request from Ghadeer Shukr (gshukr1@hfhs.org).

**References**

1. Rosen DM, Lam AM, Chapman M, Carlton M, Cario GM. Methods of creating pneumoperitoneum: A review of techniques and complications. Obstet Gynecol Surv 1998;53:167-74.
2. Lam KW, Pun TC. Left upper quadrant approach in gynecologic laparoscopic surgery using reusable instruments. J Am Assoc Gynecol Laparosc 2002;9:199-203.
3. Urrutius S, Ozkan OV, Tomasch G. Safe and easy access technique for the first trocar in laparoscopic surgery. Langenbecks Arch Surg 2016;401:909-12.
4. Vilos GA, Ternamian A, Dempster J, Laberge PY, Clinical Practice Gynaecology Committee. Laparoscopic entry: A review of techniques, technologies, and complications. J Obstet Gynaecol Can 2007;29:433-47.
5. Zaraca F, Catarci M, Gossetti F, Muleti G, Carboni M. Routine use of open laparoscopy: 1,006 consecutive cases. J Laparoendosc Adv Surg Tech A 1999;9:75-80.
6. Yuzpe AA. Pneumoperitoneum needle and trocar injuries in laparoscopy. A survey on possible contributing factors and prevention. J Reprod Med 1990;35:485-90.
7. Jansen FW, Kolkman W, Bakkum EA, de Kroon CD, Trimbos-Kemper TC, Trimbos JB. Complications of laparoscopy: An inquiry about closed- versus open-entry technique. Am J Obstet Gynecol 2004;190:634-8.
8. Lingam K, Cole RA. Laparoscopic entry port visited: A survey of practices of consultant gynaecologists in Scotland. Gynaecol Endosc 2001;10:335-342.
9. Ng SF, Cheung VY, Pun TC. Left upper quadrant approach in gynecologic laparoscopic surgery. Acta Obstet Gynecol Scand 2011;90:1406-9.
10. Palmer R. Safety in laparoscopy. J Reprod Med 1974;13:1-5.
11. Jain N, Sareen S, Kanawa S, Jain V, Gupta S, Mann S. Jain point: A new safe portal for laparoscopic entry in previous surgery cases. J Hum Reprod Sci 2016;9:9-17.
12. Childers JM, Brzechffa PR, Surwit EA. Laparoscopy using the left upper quadrant as the primary trocar site. Gynecol Oncol 1993;50:221-5.
13. Abd Ellatif ME, Ghabban WM, Abbas A, Basheer M, Dawoud I, Ellahi D, Latif’s point: A new point for veress needle insertion for pneumoperitoneum in difficult laparoscopy. Asian J Endosc Surg 2018;11:133-7.
14. Vilos GA. The ABCs of a safer laparoscopic entry. J Minim Invasive Gynecol 2006;13:249-51.
15. Angioli R, Terranova C, De Cicco Nardone C, Cafà EV, Damiani P, Portuese R, et al. A comparison of three different entry techniques in gynecological laparoscopic surgery: A randomized prospective trial. Eur J Obstet Gynecol Reprod Biol 2013;171:339-42.
16. Tu FF, Lamvu GM, Hartmann KE, Steege JF. Preoperative ultrasound to predict infraumbilical adhesions: A study of diagnostic accuracy. Am J Obstet Gynecol 2005;192:74-9.
17. Tulikangas PK, Robinson DS, Falcone T. Left upper quadrant cannula insertion. Fertil Steril 2003;79:411-2.
18. Kolecki RV, Golub RM, Sigel B, Machi J, Kitamura H, Hosokawa T, et al. Accuracy of viscera slide detection of abdominal wall adhesions by ultrasound. Surg Endosc 1994;8:871-4.
19. Levrant SG, Bieber EJ, Barnes RB. Anterior abdominal wall adhesions after laparotomy or laparoscopy. J Am Assoc Gynecol Laparosc 1997;4:353-6.
20. Brill AI, Nezhat F, Nezhat CH, Nezhat C. The incidence of adhesions after prior laparotomy: A laparoscopic appraisal. Obstet Gynecol 1995;85:269-72.
21. Nezhat CH, Dun EC, Katz A, Wieser FA. Office visceral slide test compared with two perioperative tests for predicting periumbilical adhesions. Obstet Gynecol 2014;123:1049-56.
22. Granata M, Tsimpanakos I, Moeity F, Magos A. Are we underutilizing Palmer’s point entry in gynecologic laparoscopy? Fertil Steril 2010;94:2716-9.
23. Shigemi D, Aso S, Matsui H, Fushimi K, Yasunaga H. Safety of laparoscopic surgery for benign diseases during pregnancy: A nationwide retrospective cohort study. J Minim Invasive Gynecol 2019;26:501-6.
24. Agarwala N, Liu CY. Safe entry techniques during laparoscopy: Left upper quadrant entry using the ninth intercostal space – A review of 918 procedures. J Minim Invasive Gynecol 2005;12:55-61.
25. Agresta F, Mazzarolo G, Bedin N. Direct trocar insertion for laparoscopy. JSLS 2012;16:255-9.
26. Chang FH, Lee CL, Soong YK. Use of palmer’s point for insertion of the operative laparoscope in patients with severe pelvic adhesions: Experience of seventeen cases J Am Assoc Gynecol Laparosc 1994;1:S7.
27. Dar S, Lazer T, Baratz A. Is Palmer’s point really safe? J Obstet Gynaecol Can 2013;35:1063.
28. Krishnakumar S, Tambe P. Entry complications in laparoscopic surgery. J Gynecol Endosc Surg 2009;1:4-11.
29. Molloy D, Kaloo PD, Cooper M, Nguyen TV. Laparoscopic entry: A literature review and analysis of techniques and complications of primary port entry. Aust N Z J Obstet Gynaecol 2002;42:246-54.
30. Ahmad G, O’Flynn H, Duffy JM, Phillips K, Watson A. Laparoscopic entry techniques. Cochrane Database Syst Rev 2012;CD006583. https://doi.org/10.1002/14651858.CD006583.pub5.
31. Garry R. Towards evidence-based laparoscopic entry techniques: Clinical problems and dilemmas. Gynaecol Endosc 2001;8:315-326.