



# Comparison of Abdominal Initial Entry Techniques in Gynecological Laparoscopy

## Jinekolojik Laparoskopide Abdominal İlk Giriş Tekniklerinin Karşılaştırılması

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### Abstract

**Aim:** The aim of this study is to assess the safety of laparoscopic entry techniques.

**Material and Method:** Within the scope of the study, medical records of patients who underwent laparoscopy due to various gynecological indications at our clinic between January 1, 2011, and July 1, 2015, were examined. Evaluation was conducted using our hospital's electronic database.

**Results:** In the patient cohort, direct trocar placement was preferred in 91.8% (1025 patients), Veress needle placement was used in 7.4% (82 patients), and an open technique was used in 0.8% (9 patients). In terms of entry sites, umbilicus was the most commonly chosen option, being preferred in 97.2% (1085 patients) of cases. In 2.4% of patients (27 patients), the midline abdominal trocar was preferred as the initial trocar insertion site. Among these patients, suprapubic incision was preferred in 62% (17 patients), while Lee-Huang point was chosen as the entry site in 38% (10 patients). Looking at the history of previous surgeries, 18.5% (206 patients) had a history of prior abdominal surgery, and 3.5% (39 patients) had undergone two previous surgical procedures. Only 0.1% (1 patient) had undergone three or more abdominal surgeries.

**Conclusion:** No clear superiority of one initial entry technique over another has been proven. Despite the extensive literature on laparoscopic entry, debates regarding the most effective method to prevent significant complications continue.

**Keywords:** Abdominal entry, direct trocar entry, laparoscopy, technique, complication

### Öz

**Amaç:** Bu çalışmanın amacı, laparoskopik giriş tekniklerinin güvenliğini değerlendirmektir.

**Gereç ve Yöntem:** Çalışma kapsamında, 1 Ocak 2011 ile 1 Temmuz 2015 tarihleri arasında kliniğimizde çeşitli jinekolojik endikasyonlar nedeniyle laparoskopi geçiren hastaların tıbbi kayıtları incelenmiştir. Hastanemizin elektronik veritabanı kullanılarak değerlendirme yapılmıştır.

**Bulgular:** Hasta kohortu içinde, doğrudan trokar yerleştirilmesi %91.8'lik bir tercih oranıyla (1025 hasta), Veress iğnesi yerleştirilmesi %7.4'lük bir oranla (82 hasta) ve açık bir teknik %0.8'lik bir oranla (9 hasta) kullanılmıştır. Giriş bölgeleri açısından, umbilikus vakaların %97.2'sinde (1085 hasta) tercih edilmiştir. Hastaların %2.4'ünde (27 hasta), ilk trokar giriş yeri olarak trokar orta hat abdomen tercih edilmiştir. Bu hastaların %62'sinde (17 hasta) suprapubik insizyonu tercih edilirken, %38'inde (10 hasta) giriş noktası olarak Lee-Huang noktası seçilmiştir. Geçmiş cerrahi öyküsüne bakıldığında, hastaların %18.5'inde (206 hasta) bir önceki karın cerrahisi operasyonu bulunurken, %3.5'inde (39 hasta) iki önceki cerrahi operasyonu bulunmaktadır. Yalnızca %0.1'i (1 hasta), üç veya daha fazla abdominal cerrahi geçirmiştir.

**Sonuç:** Bir ilk giriş tekniğinin diğerine göre açık bir üstünlüğü kanıtlanmamıştır. Laparoskopik giriş hakkında yaygın literatür olmasına rağmen, önemli komplikasyonları önlemek için en etkili yöntem konusundaki tartışmalar devam etmektedir.

**Anahtar Kelimeler:** Abdominal giriş, direkt trokar girişi, laparoskopi, teknikler, komplikasyon



## INTRODUCTION

Laparoscopic surgery has gained significant recognition over the past three decades, emerging as a preferred technique in various procedures like tubal sterilization, salpingectomy, and endometriosis.<sup>[1]</sup> This approach offers notable advantages, including lower risk of complications, quicker recovery, reduced postoperative discomfort, and improved cosmetic results.

Performing laparoscopic surgery necessitates adapting to a two-dimensional visual field on a screen, utilizing elongated instruments, grasping depth perception, and operating with minimal tactile feedback.<sup>[2-4]</sup> Proficiency in these skills hinges on proper training, embracing laparoscopic methods, and investing time to master them.<sup>[2,3]</sup>

The evolution of three-dimensional imaging methods and advancements in laparoscopic equipment have contributed to the expansion and widespread adoption of endoscopic procedures. Enhanced educational initiatives have the potential to establish laparoscopy as the preferred approach, making it more economically accessible and stimulating increased industrial research due to its growing popularity.

Despite the rapid progress in laparoscopic surgery, complications linked to initial trocar insertion remain a major concern, accounting for around 40-50% of the most frequent complications and representing the riskiest phase of the operation. Ensuring safe entry systems in laparoscopy is of utmost importance. A range of laparoscopic entry techniques exists, and multiple strategies, instruments, and approaches have been explored to lower complication rates. This study aims to assess the safety of laparoscopic entry methods through a retrospective analysis of patient records selected for laparoscopy for various gynecological reasons in our clinic.

## MATERIAL AND METHOD

The study was carried out with the permission of Bağcılar Training and Research Hospital Non-interventional Clinical Researches Ethics Committee (Date: 07.08.2015, Decision No: 2015-407). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This study encompassed all individuals who underwent laparoscopic procedures at a tertiary care hospital's Obstetrics and Gynecology clinic between January 1, 2011, and July 1, 2015. We retrospectively gathered patient information from both medical records and the computerized information system. Our investigation aimed to explore various facets, including the approach utilized for the initial laparoscopic entry, the selected entry point, previous surgical history, the presence of adhesions, and the intended surgical procedure. In total, our study involved 1116 patients. Prior to the operation, all patients were duly informed about potential complications, and their informed consent was duly obtained. Statistical analysis of the data was performed using SPSS (Statistical Package for Social Sciences) software version 15.0.

## RESULTS

When we analyzed the data, we found that 91.8% of cases (1025 patients) used direct trocar insertion, 7.4% (82 patients) used the Veress needle technique, and 0.8% (9 patients) underwent an open approach for the initial laparoscopic entry. Among the different entry sites, the most popular choice was the umbilicus, selected by 97.2% of cases (1085 patients). In a subset of patients (2.41%), the first trocar was inserted through the midline abdomen. Among them, the suprapubic region was the preferred entry site for 62% (17 patients), while the Lee-Huang point was chosen by 38% (10 patients). A small proportion of patients (0.35%) used the Palmer point as their entry site.

During the surgery, it was observed that 25.2% (281 patients) had adhesions, while 74.8% (835 patients) did not have adhesions. Among the patients, 77.95% (870 patients) had no history of abdominal surgery. On the other hand, 18.45% (206 patients) had undergone one abdominal surgery, 3.49% (39 patients) had undergone two, and only one patient had experienced three or more abdominal surgical procedures (**Table 1**).

**Table 1. Distribution of Patients According to Entry Site, Presence of Adhesions, and History of Previous Surgery**

	Number of Patients	Percentage
Entry Site		
Umbilicus	1085	%97,2
Midline abdomen	27	%2,41
Palmer's point	4	%0,35
Presence of Adhesions		
Present	281	%25,2
Absent	835	%74,8
History of Previous Surgery		
Absent	870	%77,95
1	206	%18,45
2	39	%3,49
3	1	%0,0008

When evaluating patients with umbilical entry as the initial site for laparoscopy, it was observed that direct entry was applied in 1006 patients. The Veress needle entry technique was used in 75 patients, while the open technique was employed in 4 patients, making a total of 1085 patients with the umbilical region chosen as the first entry site. Among the 27 patients with midline abdominal entry, it was found that 19 chose direct entry, 3 chose the Veress needle technique, and 5 preferred the open technique. Additionally, out of these patients, 5 had undergone 1 previous surgery, 2 had undergone 2 surgeries, and 20 had previous surgical history.

In the case of 4 patients where the Palmer point was selected as the initial entry site, the Veress entry method was also used. Among these patients, 1 had undergone 1 previous abdominal surgery, 1 had undergone 2 surgeries, and 2 had no previous abdominal surgeries.

Among the group of patients without any previous surgeries (870 patients), Veress needle entry was chosen for 64 of them, while 6 opted for the open technique for entry.

Among the patients who preferred the Veress needle entry, 12 had undergone 1 previous surgery, and 2 had undergone 2 surgeries. In the case of a patient who had undergone laparoscopic surgery three times due to infertility, direct entry through the umbilicus was selected as the first entry site, and adhesions were noted.

Furthermore, among patients with previous surgical history, the most common choice for the entry method was direct entry. Among the 1025 patients where the direct entry method was preferred for the initial site for laparoscopy, 796 had no prior abdominal surgeries, while 191 had undergone one, 37 had undergone two, and 1 had undergone three abdominal surgeries. (Table 2).

	Entry Technique			Total
	Direct	Veress	Open Technique	
Entry Site				
Umbilicus	1006	75	4	1085
Midline Abdomen	19	3	5	27
Palmer's Point	0	4	0	4
History of Previous Surgery				
Absent	796	64	6	870
1	191	12	3	206
2	37	2	0	39
3	1	0	0	1

Umbilical entry was chosen in 848 patients who had no prior abdominal surgeries, representing the highest proportion. Among the 246 patients with previous abdominal surgeries, umbilicus was also the most commonly selected entry site in 237 cases. For patients in whom the Palmer point was chosen as the entry site, one had undergone 1 previous abdominal surgery, one had undergone 2 surgeries, and two had no prior abdominal surgeries. Out of the 246 patients with previous abdominal surgeries, the open technique for entry was chosen in only 3 cases during the patients' surgeries.

Out of the 870 patients without prior surgical history, 184 had adhesions, while 686 did not exhibit any. Among the 281 patients with adhesions, 82 had undergone 1 previous surgery, 14 had undergone 2 surgeries, and 1 had undergone 3 surgeries. Notably, out of the 206 patients with one previous abdominal surgery, 124 had adhesions, and among the 39 patients with two previous abdominal surgeries, 25 had adhesions (Table 3).

	History of Previous Surgery			
	Absent	1	2	3
Entry Site				
Umbilicus	848	200	36	1
Midline abdomen	20	5	2	0
Palmer's Point	2	1	1	0
Presence of Adhesions				
Absent	184	82	14	1
Present	686	124	25	0

## DISCUSSION

Upon analyzing the data from this study, it becomes evident that the preferred method in our clinic, chosen for 1029 out of 1116 patients, is the direct trocar entry technique. Particularly during the initial 8-month period of introducing laparoscopic surgery, the Veress needle technique was employed for entry; however, subsequent phases saw a shift towards the direct entry technique, accounting for 87.5% of cases. In this notable change in laparoscopic entry, the primary distinction lies in the fact that the Veress needle entry involves three blind steps compared to the direct trocar entry. These blind steps encompass two blind insertions and one blind gas insufflation. Furthermore, the decision to opt for direct trocar entry is influenced by the potential for damage related to needle entry being overlooked for an extended duration after removing the Veress needle from the abdomen prior to the primary trocar entry.

In contrast to the Veress needle, direct trocar entry reduces the number of blind steps from three to one. This technique not only offers the advantage of fewer blind insertions but also theoretically mitigates complications linked to blind gas insufflation often encountered in the Veress needle technique. Utilizing direct trocar entry anticipates encountering fewer instances of preperitoneal insufflation, subcutaneous or omental emphysema, needle-associated vascular or visceral injuries, delayed diagnosis of gas embolism, or bowel damage. The increased occurrence of preperitoneal insufflation, subcutaneous and omental emphysema, or gas embolism observed in patients entered using the Veress needle may be attributed to blind gas insufflation.<sup>[5]</sup> Furthermore, subcutaneous emphysema can extend from the facial planes to the neck, serving as an indicator of mediastinal emphysema development, which could lead to pneumothorax and cardiovascular collapse in severe cases.<sup>[6]</sup>

The direct trocar entry technique does not require secondary confirmation tests, allowing the surgical focus to remain on anatomical knowledge during laparoscopic entry, and immediate confirmation is achieved through direct observation. Direct trocar entry also reduces the risks of multiple attempts and failed entry. Studies have indicated that preperitoneal insufflation is associated with difficulties in placing the primary trocar, numerous entry attempts, failed entry, and prolonged operation duration.<sup>[6]</sup> Consistently, compared to direct trocar entry, the Veress needle group has shown a significant increase in the risks of multiple attempts and failed entry; after two entry attempts, the risk of preperitoneal insufflation was found to be 50%. Unfortunately, in our study, data could not be examined from this perspective as we couldn't access the number of initial laparoscopic entry attempts from hospital database and patient records.

Altun et al. conducted a study in 2010 to assess the reliability of the direct trocar entry method in laparoscopy. Their findings suggest that the direct trocar entry method can be

deemed as as rapid and reliable technique.<sup>[7]</sup> In laparoscopic surgery, the direct trocar entry technique proves advantageous due to its immediate confirmation without the need for secondary tests. This approach allows surgeons to focus on anatomical knowledge during entry. Moreover, it reduces the risks associated with multiple attempts and failed entries. Previous studies have linked preperitoneal insufflation to challenges in placing the primary trocar, numerous entry attempts, failure, and prolonged operation time.<sup>[6]</sup>

In comparison, the Veress needle technique has been observed to pose a higher risk of multiple attempts and failure. Studies indicate that after two entry attempts with the Veress needle, the risk of preperitoneal insufflation soars to 50%. Unfortunately, our study couldn't assess the exact number of initial laparoscopic entry attempts due to data accessibility constraints from our hospital database and patient records. Despite these concerns, a 2006 research paper by Cakir et al. emphasized the safety profile of the Veress needle. They found that it hasn't been definitively associated with organ damage, highlighting its safety.<sup>[8]</sup> However, the Veress needle's use in laparoscopic surgery has been tied to several complications in prior studies.<sup>[9]</sup> A notable finding is the documented incidence of major injuries during Veress needle entry into the peritoneal cavity at 0.9/1000 cases.<sup>[10]</sup> In response to such concerns, the open laparoscopic entry technique was introduced to reduce the chances of vascular and visceral injuries through direct visualization. This technique is particularly favored in high-risk patient populations with a history of multiple abdominal surgeries, severe endometriosis, or pelvic inflammatory disease. However, compared to other methods, the open technique is relatively less preferred due to its relatively longer duration and greater difficulty in achieving pneumoperitoneum without gas leakage. In 2012, Bozkurt et al. executed a prospective study comparing the outcomes, complications, and postoperative pain associated with the direct trocar entry method versus open entry method. Their conclusion indicated that each technique possesses its own set of advantages and disadvantages.<sup>[11]</sup>

The modified Hasson technique, a variant of the open entry technique, was introduced at the Labbafinejad Medical Center by Shayani-Nasab and colleagues.<sup>[12]</sup> However, existing scientific data do not conclusively establish the advantages of this method, particularly in preventing intra-abdominal damage, including bowel injuries.

Upon analyzing our clinic's data, we observed that the open entry technique was utilized in a total of 9 cases. Among these patients, only 3 had undergone a single previous abdominal surgery, suggesting limited preference for the open technique in such scenarios. Surprisingly, Surgeons did not opt for the open technique in patients with a history of 2 or more previous abdominal surgeries. Instead, the direct trocar entry method was preferred by 95% of these

patients (38 patients). Notably, the umbilicus was the most commonly selected entry site.

Although previous abdominal surgery could be a confusing variable, studies conducted have not shown a significant difference between the direct trocar and Veress needle entry techniques in patients with a history of previous surgery. While laparoscopic entry complications could be a risk factor in the context of previous abdominal surgery, there is no study that has conducted subgroup analysis on this matter. Therefore, the question of whether direct trocar entry reduces complications in this patient group remains unanswered. In our study as well, no superiority of one technique over another has been determined.

## CONCLUSION

Our analysis highlights the significant advantages of the direct trocar entry technique, offering a streamlined, immediate, and anatomically precise approach that effectively reduces the risks associated with multiple attempts and unsuccessful entries. However, while this method holds potential benefits, the question of its superiority over the Veress needle technique in patients with a history of prior abdominal surgery remains a topic worth exploring further.

Despite the merits of laparoscopic techniques, the initial trocar entry remains a point of concern, contributing to 40% of laparoscopic complications and a noticeable number of laparoscopy-related deaths. This concerning statistic has remained consistent over the past 25 years, leading to ongoing research and discussions about the methods and entry locations. The trajectory of future laparoscopic tools aims to enhance precision and minimize trauma during surgical procedures. As technology continues to advance, we can anticipate the emergence of instruments tailored for smaller ports and the development of more compact laparoscopes enriched with advanced digital capabilities. This trajectory envisions a future of laparoscopic surgery characterized by fewer, less invasive, and less painful incisions.

However, conducting meta-analyses capable of providing substantial insights into the safety outcomes of the initial laparoscopic entry technique faces notable challenges. Only a comprehensive study involving multiple centers, randomized control, and encompassing over 10,000 patients in each group, rigorously assessing the direct trocar, Veress needle, and open entry techniques for major complications, could definitively establish conclusive evidence (6). However, the feasibility and cost-effectiveness of such an ambitious study are subject to doubt. Consequently, potential correlations and trends are extrapolated from clinical data and meta-analyses. Research studies that generously share clinical information, similar to the one at hand, become very important resources for this effort.

## CONCLUSION

Drawing from our study and the existing body of literature, we maintain the perspective that complication rates are intricately linked to the surgical expertise of the operator. Moreover, such rates are expected to decrease with accumulated experience, solidifying the notion that proficiency in surgical practice holds the key to reducing complications over time.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Bağcılar Training and Research Hospital Non-interventional Clinical Researches Ethics Committee (Date: 07.08.2015, Decision No: 2015-407).

**Informed Consent:** Because the study was designed retrospectively, no written informed consent form was obtained from patients.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

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