ตำแหน่งการเข้าช่องท้องทางเลือกในการผ่าตัดผ่านกล้องทางนรีเวช: การทบทวนวรรณกรรมและบรรยายสรุป

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Alternative Access Sites for Abdominal Entry in Gynecologic Laparoscopy: A Literature Review and Narrative Summary of Findings

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บริเวณสะดือเป็นตำแหน่งที่มักใช้สำหรับการเข้าช่องท้องในการผ่าตัดผ่านกล้องทางนรีเวช โดยเป็นตำแหน่งแรกที่แพทย์ใช้เข็มแทงเพื่อใส่แก๊สเข้าในช่องท้อง ซึ่งอาจเป็นอันตรายได้ในกรณีที่ผู้ป่วยมีปัจจัยเสี่ยงของการมีพังผืดในบริเวณดังกล่าว ตำแหน่งอื่นๆที่แพทย์อาจเลือกใช้ในการเข้าช่องท้อง ได้แก่ Palmer's point ซึ่งอยู่บริเวณช่องท้องส่วนบนในด้านซ้าย ใต้ต่อขอบกระดูกซี่โครงลงมาสามเซนติเมตร ในตำแหน่งเดียวกับจุดกึ่งกลางกระดูกไหปลาร้า และตำแหน่ง Lee-Huang point ซึ่งอยู่บริเวณกึ่งกลางระหว่างสะดือและลิ้นปี่ ซึ่งตำแหน่งทั้งสองดังกล่าวมีรายงานว่าทำได้ง่ายและปลอดภัย ตำแหน่งทางเลือกอื่นๆได้แก่ บริเวณใต้ต่อขอบชายโครง ในตำแหน่งเดียวกับจุดกึ่งกลางกระดูกไหปลาร้า และบริเวณช่องว่างระหว่างซี่โครงคู่ที่เก้าหรือสิบทางด้านซ้าย และเมื่อไม่นานมานี้ มีผู้ได้เสนอตำแหน่งใหม่ในการเข้าช่องท้อง (เช่น Jain point และLatif's point) สำหรับผู้ป่วยที่อาจมีพังผืดจากประวัติที่เคยได้รับการผ่าตัดมาก่อน อย่างไรก็ดี ควรมีหลักฐานการศึกษาเพิ่มเติมในอนาคตเพื่อยืนยันความปลอดภัยของเทคนิคใหม่ดังกล่าว

คำสำคัญ: การเข้าช่องท้องในการผ่าตัดผ่านกล้อง; ภาวะแทรกซ้อนของการเข้าช่องท้องในการผ่าตัดผ่านกล้อง; พังผืดบริเวณสะดือ

The periumbilical area is the typical site for initial abdominal entry during gynecologic laparoscopy. Placing a gas insufflation needle and primary trocar through the umbilicus, however, is deemed hazardous in cases in which there is a risk of peritoneal and visceral adhesions to the umbilical region. Common alternative sites for an abdominal entry during gynecologic laparoscopy are Palmer's point, which is located in the left upper quadrant 3 cm below the costal margin in the midclavicular line, and the Lee-Huang point, which is located at the midline between the umbilicus and sternal xiphoid process. Available evidence has shown both of these points to be both feasible and safe as the initial entry site during gynecologic laparoscopy. Other alternative access sites include the subcostal margin in the mid-clavicular line and the left ninth or tenth intercostal space. Recently, new laparoscopic entry sites (i.e., Jain point and Latif's point) have been proposed for cases in which there is suspected adhesion due to previous surgery. Further studies, however, are needed to verify the safety and feasibility of these entry techniques.

Keywords: laparoscopic entry; complications of laparoscopic entry; periumbilical adhesions; primary port

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Introduction

Minimally invasive approaches for gynecologic surgery have become increasingly popular in recent years, as they have thus far yielded promising perioperative outcomes. Abdominal access for gynecologic laparoscopy is often initiated in a peri-umbilical location in the midsagittal plane[1]. At the level of the umbilicus, the skin of the abdomen is attached to the fascial layer and anterior parietal peritoneum without any intervening subcutaneous fat or muscle, thus offering the least resistance during access[2].

Placing a gas insufflation needle or primary trocar through the umbilicus, however, is deemed hazardous in cases with peritoneal and visceral adhesions to the umbilical region[3]. Prior history of abdominal surgery is a strong predictor for periumbilical adhesion formation[4,5]. Periumbilical adhesions may form following laparoscopic surgery through an umbilical incision in up to 21% of cases[4]. Patients who have previously undergone abdominal laparotomy carry the highest risk of adhesions to the umbilical undersurface, with rates of up to 20% in cases of horizontal supra-pubic incision and 50% in those of midline incision[5,6] Common adhesive organs (in order of decreasing prevalence) include the omentum, small intestine, uterus, transverse colon, and sigmoid colon[7]. Abdominal entry using an alternative site, therefore, has been recommended in patients with a history of abdominal surgery in order to avoid iatrogenic injury to adhesive organs. Abdominal entry can also be accomplished via an alternative access site when umbilical placement of a trocar is not advised, such as in pregnant women or patients with large pelvic masses.

Literature search

An electronic search was performed through PubMed, Scopus, and Google Scholar for relevant literature published from the date of the database's inception to April 2020 based on a preliminary scope of studies involving the safety of alternative access sites for abdominal entry in gynecologic laparoscopy. The following keywords were used: laparoscopy, previous laparotomy, Palmer's point, Lee-Huang point, Jain point, intercostal, subcostal, transvaginal, and transuterine.

To ensure that the searches were comprehensive, the titles of all relevant articles were identified via Google Scholar, and then further related searches were conducted focusing on the first 20 records identified[8]. We excluded studies published in languages other than English[9].

We also examined the citation lists of previous reviews for potentially relevant references[1, 10-13]. In cases in which there were multiple publications by the same team on a similar topic, the report that contained the largest number of patients or the most complete data was included.

Review findings

Left upper quadrant of the abdomen

Palmer's point has been proposed as an alternative access site for pelvic laparoscopy[14]. It was first described by Raoul Palmer in 1974 as the point located in the left upper quadrant 3 cm below the costal margin in the midclavicular line (Fig 1). Palmer's point has also been proposed as an initial access site for obese patients, exceptionally thin patients, and when prominent aortic pulsations are palpated near the umbilicus to avoid the potential of vascular injury[10-12]. This access technique should be avoided in patients who have previously undergone splenic or gastric surgery or have significant hepatosplenomegaly, portal hypertension, or gastropancreatic masses [10]. Gastric decompression is required before initiating this procedure[10].

A report by Granata et al.[15] noted that Palmer's point was used as a location for gas insufflation and primary trocar insertion in one-third of women undergoing gynecologic laparoscopy at their institute. The common reasons for using Palmer's point in this study were a history of laparotomy, the presence of large uterine fibroids, and intra-abdominal adhesions

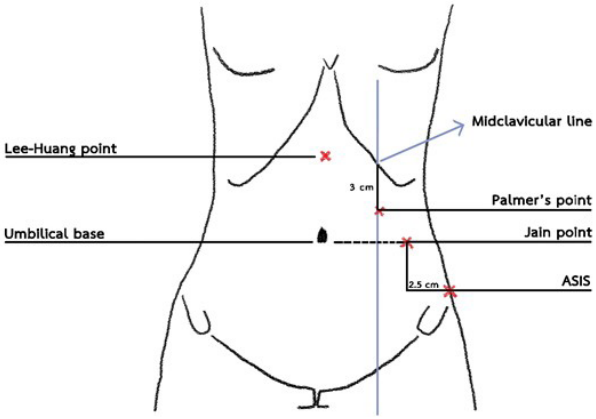

Figure 1 Umbilical and alternative access sites for abdominal entry including Lee-Huang point, Palmer's point and Jain point.

documented during a previous surgery. Entry via Palmer's point was successful in 98.5% of the patients, and there were no entry-related complications[15].

Recently, Abd Ellatif et al.[16] noted an approximately 4.1% rate of entry-related complications when using Palmer's point as an access site for a gas insufflation needle in patients with at least one of the following conditions: (i) obesity, (ii) previous midline laparotomy, (iii) previous intestinal surgery, (iv) irreducible ventral hernia, and (v) three failed attempts to create pneumoperitoneum through the periumbilical area. The most commonly injured organs were the omentum (2.6%), stomach (1.1%), and large intestine (0.4%)[16].

Because the skin, fascial layers, and parietal peritoneum at the left upper quadrant of the abdomen do not attach together, placing a gas insufflation needle through Palmer's point is more difficult than at the umbilicus[17]. Abdominal entry using an optical entry trocar may eliminate this potential problem. Aust et al.[17] found no entry-related complications with direct optical entry through Palmer's point during gynecologic laparoscopy, indicating that the technique is safe.

Another alternative point for placing a gas insufflation needle and primary trocar in the left upper quadrant is the subcostal margin in the midclavicular line (Fig 2). Entry via the left subcostal margin is successful in 98.5% to 100% of cases[18,19]. One of the most common entry-related complication is puncture of the left lobe of the liver, which occurs in approximately 1% of cases[18].

Left intercostal space port entry

Left intercostal spaces (usually the ninth or tenth) have been proposed as alternative sites for a gas insufflation needle placement. The entry site is on the left anterior axillary line or at the site of an acute change in direction of the costal margin (Fig2) [6,7,20,21].

In a study by Ngu et al.[6], insertion of the gas insufflation needle at the ninth or tenth intercostal space (at the site of an acute change in direction of the costal margin) followed by insertion of the primary trocar just below the left subcostal margin was performed in approximately 5% of women undergoing gynecologic laparoscopy. The common reasons inserting the gas insufflation needle at left intercostal spaces included history of abdominal laparotomy (79.0%), the patient being pregnant (11.1%), and the presence of a large pelvic mass (6.2%). Initial access was successful in all patients. One woman developed subcutaneous emphysema over the entry site followed by an uneventful recovery[6].

A study by Kumakiri et al.[7], which was undertaken to assess the safety of microlaparoscope insertion via the ninth intercostal space (on the left anterior axillary line), found no abdominal entry-related complications among 172 women undergoing gynecologic laparoscopy.

In a series of women with a previous vertical abdominal laparotomy incision extending close to or through the umbilicus who underwent gynecologic laparoscopy, abdominal entry by placing Veress needle at the ninth or tenth intercostal space (at the site of an acute change in direction of the costal margin) for insufflation followed by insertion of primary trocar just below left subcostal margin was successfully carried out in all women without any entry-related complications[20].

In the 918 gynecologic laparoscopies in which the left ninth intercostal space was used for Veress needle entry, there were two (0.39%) Veress-needle related injuries: iatrogenic pneumothorax and stomach perforation[21].

Middle upper abdominal port entry or Lee-Huang point

The Lee-Huang point lies in the midline between the umbilicus and the sternal xiphoid process (Fig 1) [10]. This alternative entry site for a Veress needle and primary trocar insertion was introduced by Lee, et al. in 2001[22], and its use is recommended in women with an elevated risk of subumbilical adhesions due to previous abdominal surgeries or a history of gynecologic cancer[10]. Lee, et al.[22] reported that none of the procedures in which this point was used were converted to laparotomy, and 98.4% of the patients experienced no complications. The complications that did occur were injury to the omentum (1.1%) and large bowel (0.5%)[22]. Subsequent studies have confirmed the safety and feasibility of the Lee-Huang point as an alternative portal for insertion of a gas insufflation needle and primary trocar in women with a risk of abdominal entry-related complications[23-25].

There are two fundamental advantages of using Lee-Huang point as the first entrance site for gynecologic laparoscopy. First, obstacles, such as periumbilical adhesions and large pelvic masses, can be avoided. The second advantage is that it provides

central vision of the operative field, which allows the surgeons to have easy access to both sides of the pelvic cavity[10]. The only contraindication is a prior history of abdominal surgery at the supra-umbilical region[10].

Left lateral abdominal port entry (Jain point)

The Jain point lies in the left paraumbilical region vertically upward from a point 2.5 cm medial to the anterior superior iliac spine (Fig 1)[26]. This entrance site was proposed by Jain et al.[26] in 2006 as an alternative access site for patients with prior history of laparotomy, particularly those with a history of upper abdominal surgery. This is due to the risk involved in placing a gas insufflation needle and primary trocar via a site located in the upper abdomen (i.e., Palmer's point or the Lee-Huang point). In a series of 624 patients with a history of abdominal surgeries who underwent initial abdominal entry at the Jain point, there were no reported complications associated with entry [26].

Because the Jain point is lower and more lateral than Palmer's point and the Lee-Huang point, the risk of injury to some visceral organs (i.e., the stomach, spleen, liver, and kidneys) when using it as first entrance site may be lower. In addition, there are no major blood vessels beneath the Jain point[27].

Right upper quadrant of the abdomen (Latif's point)

Latif's point, proposed by Abd Ellatif et al. in 2018[16], is in the right angle between the xiphoid process and the right costal margin (Fig 2). The Veress needle is introduced through the incision at a 45° angle relative to the skin's surface, directed toward the right axilla. In a series of 570 patients undergoing this entry technique, 13 (2.3%) experienced entry-related complications (liver puncture) but required no specific treatment. No other viscera were punctured. This entry site should be avoided in cases right upper abdominal operations and right upper abdominal masses[16].

The fundamental advantage for using Latif's point as the initial entry site is less prominent of fat layer even in obese patients[16]. Although this new entry point seems to be a promising alternative access site for laparoscopic surgery, additional data from further studies are required to confirm its clinical safety and feasibility.

Transvaginal and transuterine port entry

Pneumoperitoneum can be created via the insertion of a long gas insufflation needle transvaginally through the fundus of the uterus or posterior vaginal fornix. This entry technique may be considered in obese women in whom transabdominal laparoscopic entry may be risky or difficult. However, these methods are not commonly used as they carry the risk of infection and injury to the rectum, especially in women with pelvic adhesions[13].

Conclusion

The most used alternative sites for an abdominal entry during gynecologic laparoscopy are Palmer's point and the Lee-Huang point. Available evidence has shown both points to be both feasible and safe as the initial entry site during gynecologic laparoscopy. Other alternative access sites include the subcostal margin in the midclavicular line and left intercostal spaces (usually the ninth or tenth) on the left anterior axillary line or at the site of an acute change in direction of the costal margin. Although new laparoscopic entry sites (i.e., the Jain point and Latif's point) have been proposed, further studies are needed to verify their safety and feasibility.

What is already known on this topic

Creating pneumoperitoneum is an important initial step in laparoscopy. Traditionally, the periumbilical area is the most common access site in gynecologic laparoscopy. However, entry through this site may be harmful in patients with periumbilical adhesions, who are pregnant, or who have large pelvic masses. Various alternative access sites, such

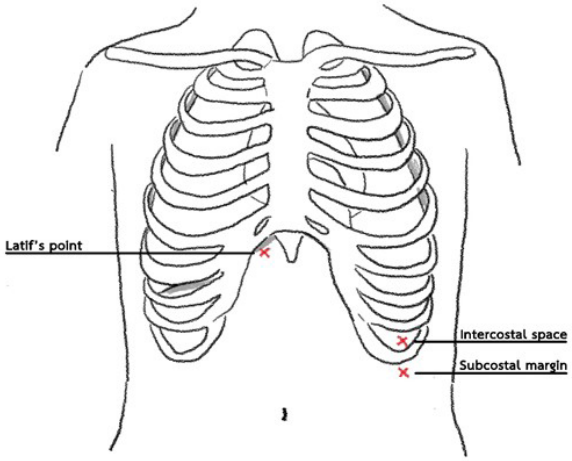

Figure 2 Alternative access sites for abdominal entry including Latif's point, Intercostal space, and subcostal margin.

as Palmer's point and the Lee-Huang point, have thus been proposed.

What this study adds

Palmer's point and the Lee-Huang point are the most used alternative access site for gynecologic laparoscopy and carry a less than 3% risk of severe entry-related complications. Novel access sites, such as the Jain point and Latif's point, have also been proposed. Entry through the Jain point may lower the risk of visceral organ injury (i.e., stomach, spleen, liver, and kidneys). Entry via Latif's point is easier and less time-consuming than other methods due to the thinness of the fat layer at this site. However, more studies are needed to determine the clinical feasibility of abdominal access via these two alternative sites.

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Conflicts of interest

The authors declare no conflict of interest.

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