ORIGINAL ARTICLE

A retrospective study of a novel non-umbilical laparoscopic entry port in thin patients—Jain point

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Abstract

Background: To bring forth a novel non-umbilical entry port in case of thin patient.

Methods: This is a retrospective study carried out at Vardhman Trauma and Laparoscopy Centre on thin patients from 2011 to 2019. Out of 7324 patients operated between 1 January 2011 and 31 December 2019 at this hospital, 398 met the criteria for thin patients (BMI < 18.5 kg/m^2).

Results: A total of 398 patients who underwent laparoscopy surgery through the Jain point were classified as thin (BMI < 18.5 kg/m^2) patients. Infertility evaluation hystero-laparoscopy (30.40%), endometriosis (17.08%), and myomectomy (13.32%) followed by genital tuberculosis (11.5%) and ovarian tumors (4.01%) were the most common indications for surgery. None of the thin patients operated had any major vascular or bowel injury.

Conclusion: The Jain point can be an alternative non-umbilical primary entry port in thin patients especially when conventional techniques are contraindicated.

Keywords: Laparoscopic entry, Palmer's point, Jain point, Lee-Huang point, Hasson's technique, Veress needle, Thin patients, Retroperitoneal major vessel injury

Introduction

Nowadays, minimally invasive surgery has gradually taken over as the preferred technique and enjoys vast popularity in patients and surgeons. Despite tremendous advances in newer techniques and instrumentation, certain complications specifically related to the laparoscopic approach need to be considered with the utmost attention. The complications, such as vascular or visceral injuries that occur during the first blind Veress needle or primary trocar insertion, are completely unknown in conventional open procedures. The most concerning issue is that though the incidence of these catastrophic complications is very low (.05%) but mortality ranges

between 8% [1] and 17% [1–4]. Many authors have expressed the degree of perplexity above the reliability of these figures and consider the incidence of major vessel injury (MVI) to be underestimated as it might be grossly under-reported [3, 5–8]. Still, the incidence over so many years has remained unchanged, irrespective of all innovations to make laparoscopic entry safer, and these have found no correlations with the severity of procedures. Further, to tide over these situations, a laparotomy is needed failing which the morbidly and mortality remains significantly high. This incidence might appear insignificant in consideration of the large number of procedures carried out worldwide, but the sudden catastrophic episode could be unnerving for all present in the theater. Such episodes have long-term legal implications which may be sorted out, but their mental imprint can scar a novice surgeon for life. Such complications are more common in low-BMI patients due to anatomical predispositions. The anatomical vulnerability of the

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Jain et al. Gynecological Surgery   (2020) 17:13

Page 2 of 11

abdominal aorta, inferior vena cava, iliac vessels, or visceral vessels in thin patients has been emphasized [3, 5, 6, 9]. Sharp also emphasized the need of non-umbilical entry in low-BMI patients [10]. All these concerns prompted us to analyze an alternate entry method as a first blind non-umbilical entry that we call "the Jain point" [11–15]. It is located 10–13 cm lateral in the left para-umbilical position (Figs. 1, 2, 3, and 4a). This non-umbilical entry site also gives an additional benefit of avoiding bowel and omental adhesions at blind umbilical entry [12–14] (Fig. 4a, b). This study presents the data about the Jain point as an alternate non-umbilical entry port especially in thin patients.

Materials and methods

This is a retrospective study conducted at our tertiary hospital for advanced laparoscopy with active trainings and fellowship programs. Out of 7324 patients operated between 1 January 2011 and 31 December 2019 at this hospital, 398 met the criteria for thin patients (BMI < 18.5 kg/m^2). All patients who required laparoscopic surgery for various indications with or without previous surgery were included. The study includes the age group in the range of 10 to 75 years. Eleven patients of 10–18 year age group presented with congenital Mullerian anomalies, adenexal torsion, and ovarian cysts. The inclusion criteria for thin patients were BMI less than 18.5 with or without previous surgery with upper and lower abdominal scars, and big masses which add on more complexity to the surgery (Table 1). The exclusion criterion was patients with BMI greater than 18.5. Since a decade, we are practicing this technique of non-umbilical lateral port entry to execute all laparoscopic entries in all our cases. In all 7324 patients operated during this


Fig. 2 Inserting the Veress needle at 90° without lifting the abdominal wall in a vertical direction and guarded by the index finger
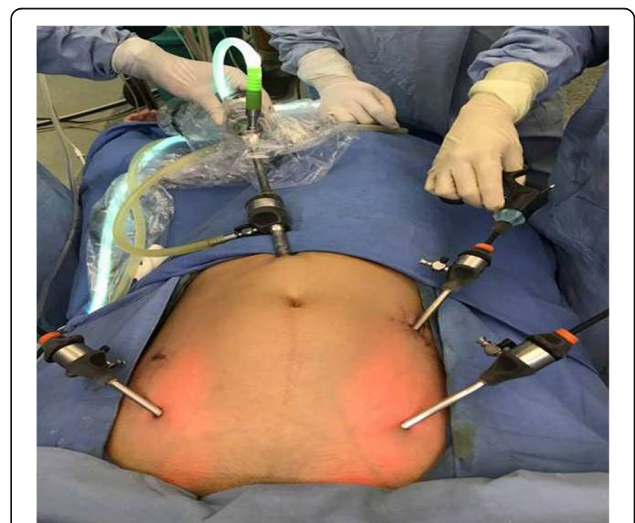
study period, this technique was used for Veress needle insertion and creation of pneumoperitoneum followed by primary port 5-mm trocar insertion and insertion of 10-mm telescope under the vision of 5-mm telescope, which later on is used as the main working port (Fig. 3). Hereby, in the present study, we discuss various problems faced during port entry, associated complications, and how this novel entry point can be beneficial in thin patients.
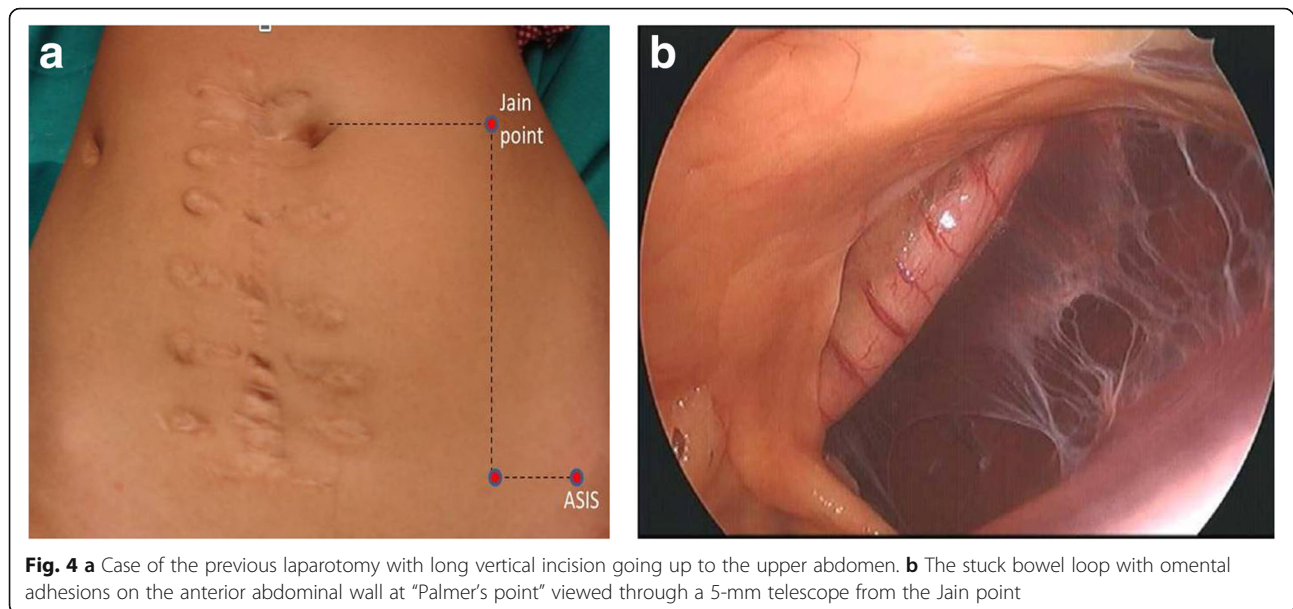
Technique of Jain point entry

To locate the surface marking of the Jain point, firstly, ASIS which is a fixed bony landmark in the sterile surgical field is located and vertical line is drawn 2.5 cm
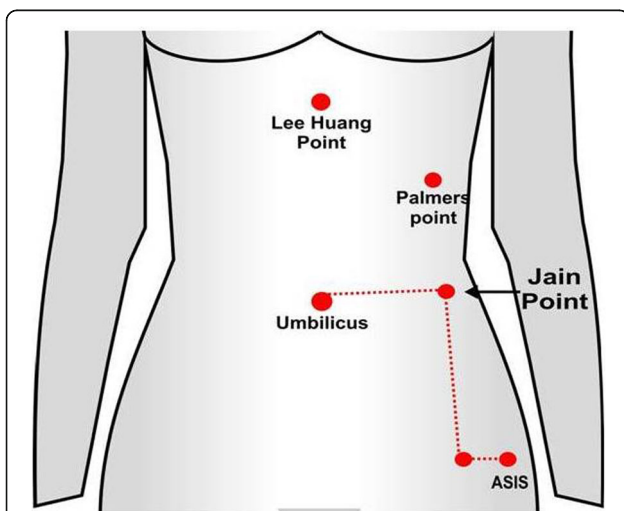
Fig. 1 Location of various entry ports including the Jain point

Fig. 3 The Jain point becomes the ergonomic main working port

Fig. 4 a Case of the previous laparotomy with long vertical incision going up to the upper abdomen. **b** The stuck bowel loop with omental adhesions on the anterior abdominal wall at "Palmer's point" viewed through a 5-mm telescope from the Jain point

medial to ASIS up to the level of the umbilicus (Figs. 1 and 4a). Then, a horizontal line is drawn at the upper margin of the umbilicus. The point where these two perpendicular lines meet is the "Jain point," located 10–13 cm lateral to the umbilicus (depending on the patient's BMI) (Figs. 1, 2, 3, and 4a). Describing the technique of Jain point entry, for creating pneumoperitoneum, the preoperative preparation comprised low-residue diet for 48 h prior to surgery. The stomach is emptied of secretions and air by the use of an orogastric tube by an anesthetist after endotracheal intubation. The operating table is laid in a horizontal position. A 1–2-mm nick is made just enough for the Veress needle's entry. Before insertion, neither there is a need to lift the abdominal wall as the point is away from major retroperitoneal vessels nor the need to change the direction of the Veress needle to 45° as required in umbilical entry (Fig. 2). Veress needle is just inserted perpendicular to the abdominal wall, in a vertical direction irrespective of the patient's BMI. The index finger is put as a guard on the Veress needle according to the patient's abdominal wall thickness, as a safety measure to avoid overshoot of the Veress needle (Fig. 2). On inserting Veress through this technique, two pops are clearly appreciated: first, at entry through the external oblique aponeurosis and second, through entry by the fused aponeurosis of the transversalis and internal oblique muscle making peritoneal entry precisely discernible and insertion continues in a single vertical direction. In thin patients, rigid abdominal wall further makes pops clear. After insertion of the Veress needle, the routine saline drop test and very initial intra-abdominal pressure test performed and then

insufflation are started [16]. Then, 5-mm port and telescope are inserted at the Jain point after achieving good pneumoperitoneum. The abdomen is thoroughly inspected in all quadrants, and then a 10-mm port is inserted as per the mandate of the case, under direct vision of a 5-mm telescope. After the insertion of the telescope through the 10-mm port, the Jain point port becomes the main working port with the ipsilateral ports on the left side (Fig. 3). Endoscopic surgeons familiar with the technique of direct trocar entry have been using Jain point without prior the Veress needle insertion [14].

As per ergonomics considerations, the Jain point later on works as an ipsilateral working port along with routine 5-mm lower accessory port. The distance between the upper and lower ports on the left side is around 10–12 cm which gives good ergonomics and stress-free working (Fig. 3). Manasnayakorn et al. [17] studied the animal models and indicated that the best efficacy is obtained with an ideal working angle between 45 and 60° and achieved by correct placement of ports. Manipulation angle ranging from 45 to 75° with equal azimuth angles is recommended. The same efficacy is seen in the Jain point where it is in the dominant hand, and the lower port is 10–12 cm apart on the same side of the patient. This technique also gives stress-free working in prolonged suturing in cases of multiple or large myomas, maneuvers of adhesiolysis, cutting, and coagulation, and the ports do not cause chopstick effect. Mohapatra and Bhusan [18] have also reported the benefit of the left lateral port as the main working port as well as the entry port, indicating dual benefit with good ergonomics. Even Sharp [10] has considered it as a good operating port throughout the surgery.

Table 1 Type of laparoscopy surgery performed on thin patients

Categories, total cases (N = 398)	Grading of severity			Previous surgery status in the cases
	Mild (n=190)	Moderate (n = 136)	Severe (n = 72)	(N = 39 + 31 = 70) Total cases with previous open surgeries = 39 • Transverse scar = 24 (61.53%) • Vertical scar = 11(28.20%) • McBurney's scar = 3(7.69%) • Kocher's scar = 1(2.56%) # 3 cases with large vertical scar extending into the upper abdomen Total cases with previous laparoscopy = 31
1. Myomectomy (n = 53)	(n = 26)	(n = 18)	(n = 9)	Total: 7 cases with previous surgeries 6 = open Open myomectomy = 3 (2 vertical scars, 1 transverse scar) Laparotomy for ectopic pregnancy = 2 (1 vertical scar, 1 transverse scar) Open appendectomy = 1 (McBurney's scar) 1 = laparoscopic appendectomy *7 cases with previous 1 surgery
Range of duration of surgery	60–70 min	120–130 min	180–240 min	
Weight of specimen (g)	< 300 (n = 26)	300–999 (n = 18)	> 1000 (n = 9) # includes 2 cases of 2500 g myoma each	
2. TLH (n = 20)	(n = 15)	(n = 3)	(n = 2)	Total: 5 cases with previous surgeries 5 = open Open cholecystectomy = 1 (Kocher's incision) LSCS = 4 (3 transverse, 1 vertical) *4 cases with previous 1 surgery
Range of duration of surgery	50–70 min	90–120 min	150–180 min # includes a case with previous 3 surgeries	
Weight of specimen (g)	< 300 (n = 16)	300–999 (n = 3)	> 1000 (n = 1) # include 1 case of 1200 g uterus	*1 case with previous 3 surgeries (2 LSCS, 1 laparoscopic ovarian cystectomy)
3. Endometriosis (N = 69)	–	(n = 20)	(n = 49)	Total: 9 cases with previous surgeries 5 = open surgeries Endometrioma = 1 (vertical above the umbilicus) Myomectomy = 2 (transverse) Open for endometriosis = 2 (transverse) 4 = laparoscopies Endometriosis II/III (1) Lap for adhesions (2) DIE (1) *8 cases with previous 1 surgery *1 case with previous 2 surgeries
Range of duration of surgery	–	90–120 min	150–180 min	
Per op findings	Grade I/II (n = 0)	Grade III (n = 20)	Severe grade IV endometriosis with endometriotic cyst (n = 14) DIE (n = 35)	
4. Adenomyoma (n = 4)	–	(n = 2)	(n = 2)	Total: 1 case with previous surgeries 1 = laparoscopy for extensive endometriosis *1 case with previous 1 surgery
Range of duration of surgery	–	90–120 min	120 min # includes a case with previous laparotomy with vertical scar and dense adhesions	
5. Ovarian cysts (n = 12)	(n = 2)	(n = 6)	(n = 4)	No case with previous surgery
Size of cysts (cm)	6–8 cm	> 8 cm without adhesions	> 8 cm with adhesions	
Range of duration of surgery	60–80 min	80–120 min	120–150 min	

Table 1 Type of laparoscopy surgery performed on thin patients (Continued)

6. Urogynecological surgeries (n = 2) (pectopexy/sacrocolpopexy/for prolapse uterus)	(n = 2)	–	–	Total: 1 case with previous surgery 1 = open surgery TAH for large multiple fibroids (transverse) *1 case with previous 1 surgery
Range of duration of surgery	70–120 min	–	**–**	
7. Koch's abdomen (n = 46)	(n = 40)	–	(n = 6)	Total: 8 cases with previous surgeries 6 = open surgeries Ectopic = 1 (transverse) LSCS = 2 (1 transverse, 1 vertical) Dense adhesions, caseoma = 1 (transverse) Frozen pelvis = 1 (vertical scar extending above the umbilicus) Myoma = 1 (transverse) 2 = laparoscopies 1 = endometriotic cyst 1 = dense adhesion *7 cases with previous 1 surgery *1 case with previous 2 surgeries
Range of duration of surgery	60–90 min	–	90–130 min # include cases with frozen pelvis, caseoma, extensive bowel adhesions	
8. Mullerian anomalies (n = 29)	(n = 29)	–	–	Total: 12 cases with previous surgery 7 = open surgeries LSCS = 2 (transverse scar) Myomectomy = 2 (1 vertical, 1 transverse) Ovarian cystectomy = 1 (transverse) Laparotomy for ectopia vesicae = 1 (vertical above the umbilicus) Open appendectomy = 1 (McBurney's scar) 5 = laparoscopies Septate resection, adhesiolysis, adenomyoma, adenomyosis *10 cases with previous 1 surgery *2 cases with previous 2 surgeries
Range of duration of surgery	60–120 min	–	–	
9. Vaginoplasty (n = 4)	(n = 4)	–	–	No previous surgery
Range of duration of surgery	70–90 min	–	–	
10. Video laparoscopy hysteroscopy for infertility evaluation (n = 121)	(n = 121)	40–60 min	–	–	Total: 19 cases with previous surgeries 5 = open surgeries LSCS = 3 (2 transverse, 1 vertical) Appendectomy = 1 (McBurney's scar) Ectopic = 1 (transverse) 14 = laparoscopies 3 = lap for endometriosis 2 = lap for Koch's 2 = lap for myoma 1 = lap for ovarian torsion 1 = lap for prolapse repair 5 = lap for infertility evaluation *17 cases with previous 1 surgery *2 cases with previous 2 surgeries
11. PCOS (n = 20)	(n = 20)	–	–	Total: 2 cases with previous surgeries 2 = laparoscopies Myomectomy = 1
Range of duration of surgery	30–60 min	–	–	

Jain *et al. Gynecological Surgery*   (2020) 17:13

Page 6 of 11

Table 1 Type of laparoscopy surgery performed on thin patients (Continued)

12. Ectopic pregnancy (n = 10)	(n = 6)	(n = 4)	–	Appendectomy = 1 *2 cases with previous 1 surgery
Range of duration of surgery	40–70 min	70–90 min	▬	Total: 4 cases with previous surgeries 4 = open surgeries Tubal recanalization = 1 (vertical) LSCS = 3 (transverse) *2 cases with previous 1 surgery *2 cases with previous 2 surgeries (LSCS, lap for endometriosis)
13. Tubal block (n = 4)	–	(n = 4)	–	Total: 2 cases with previous surgeries 2 = laparoscopies TO mass = 1 PCOS = 1 2 case with previous 1 surgery
Range of duration of surgery	–	60–120 min	▬	
14. Dermoid cyst (n = 4)	–	(n = 4)	–	No previous surgery
Range of duration of surgery	–	90–100 min	▬	

DIE deep infiltrating endometriosis, *TLH* total laparoscopic hysterectomy, *TAH* total abdominal hysterectomy, *n* number, *LSCS* lower segment Cesarean section, *PCOS* polycystic ovarian syndrome, *VLH* video laparo-hysteroscopy, *TO mass* turbo ovarian mass

Jain *et al. Gynecological Surgery*   (2020) 17:13

Page 7 of 11

Statistical analysis

Data were collected from medical records of the patients and entered in Statistical Package for Social Sciences (SPSS version 21). The data analysis was done using the SPSS version 21.

Results

In total, 7324 patients underwent laparoscopy using the Jain point entry technique from 2011 to 2019. Out of this, 398 patients were thin built. The mean BMI of the patients studied was $17.10 \, kg/m^2$ (range 12.66 to18.45 kg/m^2), and the mean age was 29.38 years (range 10 to 75 years). Ten patients (14.49%) were young unmarried females. Seventy (17.59%) patients had a history of previous surgeries. Among these previous surgery cases, 31 had previous laparoscopy while 39 cases had previous open surgeries (Table 2). The previous surgery cases included 24 (61.53%) cases with transverse scar, 11 (28.20%) vertical scars, 3 (7.69%) McBurney's incision, and 1 Kocher's incision (Table 3). In 3 patients, the vertical scars extended up to the upper abdomen giving rise to more safety concerns in the entry (Fig. 4a, b). Thirty-one laparotomy cases had previous one surgery, 7 cases had previous two surgeries, and 1 case with previous three surgeries (Table 2). In case of multiple scars, the count was included in the scar with a higher probability of adhesions, and possible complications like vertical were considered over transverse scar. Laparoscopy was indicated for infertility evaluation, hystero-laparoscopy (121), endometriosis (69), myomectomy (53), genital tuberculosis (46), and total laparoscopy hysterectomy (20) followed by ovarian tumors (12) [Table 1]. Other surgeries included pectopexy and sacrocolpopexy; 29 cases of Mullerian anomalies include unicornuate, bicornuate, and septate uterus; imperforate hymen; transverse vaginal septum; non-communicating rudimentary horn with a functional endometrium; and 4 cases of neovagina creation by modified Vecchietti technique for MRKH syndrome. In all surgeries, the primary port insertion was done through this novel port. Of the 398 cases, all were successfully completed without any major complication of the vessel or visceral injury, and no mortality reported. None of the surgeries was converted to laparotomy. There were very few minor complications including pre-peritoneal insufflation in 2 patients (0.50%), skin emphysema, and omental insufflation were

Table 2 Previous surgery cases with number of previous scars

Number of previous surgeries	Total cases	Laparoscopy	Laparotomy
1	61 (87.14%)	30 (49.18%)	31 (50.81%)
2	8 (11.42%)	1 (12.50%)	7 (87.50%)
3	1 (1.42%)	0 (0%)	1 (100%)
Total	70 (100%)	31 (44.28%)	39 (55.71%)

Table 3 Types of scars in previous open surgery

Total number	Transverse scar	Vertical scar	McBurney	Kocher's scar
39 (100%)	24 (61.53%)	11 (28.20%)	3 (7.69%)	1 (2.56%)

seen in very few patients which subsided on its own. None of the cases reported any immediate or delayed postop complications as per records. They were routinely discharged within 24–48 h and followed up after 1 week and then after 4 weeks. None of the patients reverted back with any delayed sequelae or port site complication to date.

The surgeries were classified into varying severities as mild, moderate, and severe on the basis of our defined criteria. The criteria included duration of surgeries, weight of myomas, size of ovarian cysts, preoperative staging of endometriosis, and previous surgery details. So, the safety of this technique can be evaluated in all grades of severities.

In 20 cases of TLH, 2 cases were categorized as severe that included a case of TLH with previous 3 surgeries (2 Cesarean and 1 laparoscopy for DIE). Another case had previous one surgery and uterus weighing 1200 g. Among 53 cases of myomectomy, 9 cases of fibroid weighed 1000 g and above. The largest being 2 cases of 2500 g (Table 4). Myoma bed was sutured by continuous curved needle suturing in multiple layers, needing even up to 3 to 4 layers thereby increasing the duration of surgery in large myomas. The largest group of 69 patients was for endometriosis cases. It included 35 cases of DIE, 14 cases of severe endometriosis with endometriotic cysts, and 7 cases with previous surgeries for endometriosis. A case of ovarian torsion in a pre-menarchal girl was also done (complete case details in Table 1).

Discussion

This study describes our experience with the Jain point in 398 thin patients. As already discussed, the major concerns in laparoscopic entry are the catastrophic complications including major vessel injury (MVI) and visceral injuries that increase the morbidity and mortality of a patient. This study is an attempt to bring forth a newer technique of entry especially in a vulnerable population of low BMI. As described earlier the ergonomics and its role as an entry and working port, this technique can serve a good purpose in all grades of complexities (Table 1). Secondly, as per the experience of our own fellows and trainees over the study period, they found this technique easy to learn and replicable.

Table 4 Big solid masses in thin patients

Total cases of large masses	300–999 g	1–2 kg	> 2 kg
30	20	8	2

As entry through the Jain point is in a vertical direction, so there is no need to change the angulation of the Veress with the changing BMI or lift the abdominal wall [19, 20] (Fig. 2). As per literature among MVIs, the aorta is more vulnerable to injury in slender patients because thin patients have a variable umbilical aortic bifurcation relationship which poses technical challenges in blind entry through the umbilicus. The umbilicus moves caudally in relation to the aortic bifurcation with increasing BMI and is more likely to overlie the unbifurcated aorta [21]. Even the aortic bifurcation can lie as low as the L5–S1 level [22]. In an average built patient, the distance from the skin to the retroperitoneal vessels is 6 cm, but a study reported that during general anesthesia, with muscular relaxation, this distance can reduce to 2 cm [3, 6, 23]. Aortic injuries have been reported during Veress needle entry [24] or during primary trocar insertion. The major concern is that a milder injury on major vessels can lead to retroperitoneal hematoma formation that can be missed due to the absence of free blood in the peritoneal cavity. The delay in diagnosis or dilemma whether the sudden hypotension is due to CO_2 embolism or MVI [25, 26] can increase morbidity or mortality.

Hurd et al. [21] also stated that the major vessel and visceral injuries related to laparoscopic surgery are more common in patients with extremes of BMI. A prospective study by Narendran and Baggish [27] on 101 women undergoing laparoscopy measured distances from the entry trocar and perpendicular distance to the aortic bifurcation, oblique distance to the right and left common iliac vessels, oblique distance from the sub-umbilical peritoneal opening to the right and left common iliac vessels, etc. They showed a significant difference in the perpendicular distance from the entry trocar to aortic bifurcation with changes in BMI.

Narendran and Baggish [27] also showed that laparoscopic trocar thrusting is a dynamic process. and force further reduces the distance between the entry point and retroperitoneal vessels even when counter traction is applied by lifting the abdomen. This is more apparent in obese patients. But thin patients have relatively rigid anterior abdominal wall due to good muscle tone, hence difficult to lift and may require greater thrusting force with more vulnerability for the great vessels. However, through this lateral port technique, the good muscle tone in thin patients serves advantageous as two clear pops are heard during vertical direction Veress needle entry. Even shorter distance between the great vessels and the abdominal wall does not make them vulnerable through this lateral point. The access to the peritoneal cavity is the most crucial part of laparoscopy especially for upcoming surgeons. The foremost advantage of the Jain point is anatomical as it prevents any direct hit to these major retroperitoneal vessels as it lies a minimum of 10 cm lateral to the bifurcation of the aorta.

Hasson introduced the concept of open laparoscopy to eliminate the risks associated with the insertion of the Veress needle and trocar. It involves direct trocar insertion through a 12-mm skin incision at the lower umbilical margin without prior pneumoperitoneum. As sutures are taken in the fascia and then the entry is made with Hasson reusable trocar, it takes 5–10 min longer. In more than 1000 consecutive operations done by Hasson, the frequency of minor wound infection was 0.6% and that of small bowel injury was 0.1% [28]. In a survey conducted by Penfield, intestinal laceration was the most serious complication of open laparoscopy, and most of those lacerations occurred during the early use of this technique [8, 28]. In 10,840 open laparoscopies attempted by 18 obstetrician/gynecologists, six bowel lacerations were reported, four were recognized and repaired, and two were not suspected until several days postoperatively. Yet, data is uncertain as to the superiority of open technique over closed. A metanalysis of 760, 890 closed and 22,465 open laparoscopy cases reported that the incidence of vascular injury rate in closed laparoscopy was 0.44% compared with 0 % in open laparoscopy [29]. According to this study, considering that open technique totally eliminates the risk of MVI as was made to believe, seems inaccurate and can create catastrophic complications as well [30]. Even cases of MVI have been reported with open Hasson technique which occurred during the skin knife incision that lacerated the aorta [6, 23, 30, 31] and that is a major concern for slender patients [32].

With the present technique, we did not encounter any bowel or vessel injury. We cannot compare with such large studies as our series number of cases is very small, but we can offer this technique as an alternative entry port in thin patients. Hasson technique has the risk of leakage of CO_2 gas and trouble in accomplishing pneumoperitoneum as it employs a larger incision of 12 mm [6]. The majority of gynecologists use the Veress needle to create pneumoperitoneum [33] and are not much exposed to the Hasson technique. Moreover, the Hasson technique does not safeguard against type II bowel injuries where the bowel loop is densely adherent to the parities especially midline [6]. A study shows the open-entry technique did not reduce bowel injuries [34]. Lastly, postoperative wound infection and delayed incisional umbilical hernia may occur with open technique due to comparatively larger port size. These downfalls do not come across through the Jain point being a 5-mm port

The incidence of bowel injury in laparoscopy is 0.13% [35] mainly during primary trocar entry [36]. Incidence of bowel injuries by Veress needle is around 2.8% [37]. In the present study, we did not encounter any bowel injury during Veress or primary trocar insertion. In our

previous publications, the Jain point has been proposed as an alternative safe entry port in previous surgery cases [10–13] (Fig. 4a, b). In the present study, there were 4 cases with upper abdomen incision, 1 case with Kocher's incision for gall bladder surgery, and 3 cases with vertical scars extending above the umbilicus. Therefore, in such cases, concern for upper abdomen adhesions remains but the left lateral port offers benefit because of its anatomic rationale of being lower and lateral with respect to the most preferred method of entry Palmer's point (Fig. 1). The lateral location of the Jain point overcomes midline adhesions and can be versatile to be used in upper abdomen surgical scars (Fig. 4a, b). We have reported the safety of the Jain point in previous surgery cases with upper abdominal scars like chevron incision and found it safe [11–13]. Being lower down at the level of L4, it avoids upper abdomen incision-related adhesions. It totally avoids the stomach, enlarged spleen (T10–l1), and kidney, which are at the T12 to L3 level. On the left side, the sigmoid colon adheres to the pelvic brim, and till the level of the kidney, there is a large nascent area where no bowel or viscera is noted. So, due to anatomic location, it is found to be free of adhesions and risk of visceral injury [11, 12] (Table 1). We propose these few points of differences with respect to Palmer's point which we came across working with the Jain point over a decade. Firstly, making the surface marking for the entry point in relation to any bony landmark in the sterile working field makes the entry easier. In Palmer's point entry, two bony landmarks need to be identified, the clavicle, to mark the midclavicular line which cannot be easily demarcated in the sterile surgical field and the subcostal margin. So, it would be better to demarcate it before the surgery before painting and draping the patient for better accuracy. Whereas to locate the Jain point, ASIS is the only very prominent and fixed bony landmark in the sterile surgical field making surface marking easy. The Jain point is located on a vertical line drawn 2.5 cm medial to ASIS at the level of the umbilicus, so this surface marking comes in very handy and accurate (Fig. 2), Secondly, complications related to organ puncture during blind entry have been noted mainly the puncture of the left lobe of the liver, seen in about 15 cases [38–40]. Palmer's point has been reported safe with a low failure rate of 1.5%, but the surface marking of Palmer's point overlies the bloated stomach [41]; hence, it has a very common occurring fallacy, the injury to a bloated stomach. Many researchers have entered the stomach in trying to avoid bowel and omental adhesion at the umbilicus, but for obvious reasons, the true incidence could be grossly underreported [41]. Thirdly, in case of previous upper abdomen scars, the non-umbilical entry ports located in the upper abdomen like Palmer's and Lee-Huang may

have doubtful safety. Tulikangas et al. [38] have also reported Palmer's point limitations. Likewise, in large gastro-pancreatic masses, splenomegaly and portal hypertension Palmer's entry point are contraindicated. Jain point entry can be proposed as an alternate port in cases where Palmer's point is contraindicated due to its lower and lateral location [11, 12, 42]. Suspected generalized adhesions as in surgeries for genital Koch which were 11.55% in our series were better entered by the Jain point, avoiding the upper abdomen adhesions [42, 43]. Fourthly, in comparison with Palmer's point to avoid major retroperitoneal vessel injury, the Jain point is still more lateral in location so anatomically at a greater advantage. Lastly and quite importantly, the higher location of Palmer's point precludes its use as a routine working port, but the Jain point continues as a working port with good ergonomics [18, 44]. Sharp [10] in UpToDate proposed the Jain point as an alternative non-umbilical site as it is "lower and more lateral in position compared with Palmer's point and may, therefore, be more easily to use as the Veress needle entry and then main operating port throughout the surgery."

Lee Huang's point (Fig. 1) is also a non-umbilical entry port which is well indicated for cases in malignancy for para-aortic lymph node dissection [45] and large masses. But most of the concerns for Palmer's point hold true for this port also. This being higher in the abdomen in the supraumbilical region cannot be used in the upper abdominal previous surgical scars, cases of previous generalized adhesions, big gastropancreatic masses, bloated stomach, and portal hypertension as the first blind entry port. We have used this port extensively in our practice for the 10-mm trocar for the telescope in big masses but, always, after the first blind primary port inserted from the Jain point

Finally, to prevent entry-related injuries, industry played a proactive role and devised protective sleeve for trocars, blunt-tipped trocars, optical Veress needles, shielded cannula, and optical trocars including Optiview (ENDOPATH XCEL-Johnson & Johnson) and Optical trocar (VisiPort). This was a major breakthrough that allowed direct recognition of each layer of the abdominal wall during access to the peritoneal cavity [46]. However, none of these safety devices could eliminate the risk of MVI and a number of MVI and bowel injuries occurring despite the use of these instruments [2, 5, 47]. In fact, the FDA debarred the manufacturers of safety shields not to use the name Safety Shield which was found in practice to be quite misleading.

Though several entry techniques exist, however, there is no clear consensus on the optimal method of entry to the peritoneal cavity [3]. Even a recent Cochrane database systematic review showed no evidence of benefit with regard to the safety of one technique over another

[4]. Still, meticulous and cautious entry techniques are required. By concept, non-umbilical ports make more possibilities to reduce vessel and bowel injury. This novel port can be proposed to keep in the surgical armamentarium and can be used whenever a need arises. Our study duration spanning over a decade gives us an experience to study the safety and efficacy of this entry point over a long period without any significant major complications. We are analyzing the results on thin patients in this paper, but we have used this port universally in all 7324 laparoscopic cases done in the study period.

Our study is not without limitations. The major limitation is that it is retrospective and lacks in randomization. As such, we recommend that more randomized controlled trials be conducted by higher volume centers.

Conclusion

Jain point entry is proposed as an alternate non-umbilical entry in thin patients with the view of primarily avoiding 'VVAB '- Vessels,Viscera,Adhesions on anterior abdominal wall and Bowel injuries,. To summarize, it has a well-defined bony landmark, ASIS, making surface marking precise. Due to good muscle tone in thin patients, entry pops are very clearly heard. There is a comfortable vertical entry, so it is easily replicable with short learning curve. It also continues to function as the main working port in due course of surgery. It is of use in limitations of Palmer's point or whenever need arises according to clinical situations.

Availability of data and materials
All data including photos have been taken from our institute only. All cases have been done at our hospital. All the data is maintained on a daily basis and readily available. The datasets generated and/or analyzed during the current study are not publicly available as it is a private limited hospital. But it can be available from the corresponding author on request.

Ethics approval and consent to participate
This paper is the description of a technique that uses a different anatomical approach for an established procedure of blind port insertion in laparoscopic surgeries and does not come under the World Medical Association Declaration of Helsinki definition of human experimentation. Still, the procedure and relevant risk involved were presented and discussed in our institution's review and audit board meeting. The board agreed upon the safety aspect of the technique and concluded that since it is a retrospective study and does not disclose the identity of the patient, it does not require ethical committee approval. It was believed that this technique is undertaken in the best interest of the patients and does not violates the Indian Council of Medical Research ethical guidelines (2017).

Consent for publication
Since we are in the publication of textbooks and research papers on gynecological endoscopy, we have routinely incorporated in our consent form in the local language that without disclosing patients' identity, her data could be used for academics and research purposes.

Competing interests
The authors declare that there is no competing interests, financial or non-financial. Authors' interpretation of data or presentation of information is not influenced by any personal or financial relationship with other people or organizations.

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