



Use of Palmer's Point in Creation of Pneumoperitoneum in Patients of Previous Abdominal Surgeries and To Check Efficacy of the Visceral Slide Technique for Detection of Abdominal Wall Adhesions

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Abstract

In patients with history of previous abdominal surgery, creation of pneumoperitoneum during laparoscopic procedure involves risk of complications as there is association of underlying adhesions at the umbilicus site. Palmer's point is alternative site of primary port insertion. For creating pneumoperitoneum, visceral slide technique is used to detect the movement of viscera immediately deep to the abdominal wall. This technique is reliable in identifying adhesion-free areas of the abdominal wall. This study was undertaken to evaluate use of Palmer's point in creation of pneumoperitoneum in patients of previous abdominal surgeries and to check the efficacy of the visceral slide technique for detection of umbilical adhesions in these patients. This one-year study was conducted on 30 patients with previous history of abdominal surgery in the Government Medical College, Jammu. Visceral slide test was conducted using a real time ultrasonography machine with a 7.5 MHz abdominal transducer placed in a sagittal plane at the umbilicus and the ultrasound scan focused on the infraumbilical region between the anterior abdominal wall and the aortocaval complex. A normal visceral slide (positive test) is movement of the viscera more than 1 cm. An abnormal visceral slide (negative test) is defined as movement of the viscera less than 1 cm. At the end of the surgery, intra-operative, early and late complications were evaluated. Adhesions under the umbilicus were present and absent in 15 (50%) patients each. The visceral slide technique was negative in 9 (30%) and positive in 21 (70%) patients. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of visceral slide technique was 60%, 100%, 100%, 72% and 70% respectively. Definitive evidence of the efficacy of Palmer's point in creation of pneumoperitoneum could not be established due to the small sample size and patients with limited spectrum of abdominal surgeries. Further studies in the form of multicenter randomized control trials are needed to verify the utility of Palmer's point for creation of pneumoperitoneum and to evaluate the role of visceral slide technique in diagnosing intra-abdominal adhesions preoperatively.

Key Words

Previous abdominal surgery, Laparoscopic procedure, Palmer's point, Pneumoperitoneum, Abdominal wall adhesions, Visceral slide technique

Introduction

Creation of pneumoperitoneum is the first and most critical step of a laparoscopic procedure since the access may be associated with injuries to gastrointestinal tract and major blood vessels. In at least 50 per cent of the cases, these major complications occur prior to commencement of the intended surgery. This complication rate has remained the same during the past

one-quarter of a century (1).

The risk is increased manifolds in case of patients having previous history of abdominal surgery, as in this group there is association of underlying adhesions at the umbilicus site. When the primary (first) port is inserted at the umbilical site, the injury to the underlying gut, omentum and vessels is increased several times as

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compared to the patient having no such history of abdominal surgery in the past. Thus, alternative site of primary port insertion arises. One such site is the Palmer's point which is located in the left upper quadrant 3 cms below the subcostal border in the mid-clavicular line (2).

One method of creating pneumoperitoneum is the closed method using Veress needle. The umbilicus is the thinnest area of the abdominal wall and needle insertion at this point is easiest. The saline drop test and the confirmation of an initial low intra-abdominal pressure are crucial for establishing proper intra-abdominal placement. Another alternative for creating pneumoperitoneum is the use of the open insertion technique with a Hasson trocar. Left subcostal Veress needle approach is a safe method for creating pneumoperitoneum (3).

While using Palmer's point, it should be taken care that spleen should not be palpably enlarged and the stomach should be decompressed with a Ryle's tube while taking due care during the insertion of this tube to avoid any complications. Also, the right upper quadrant should be avoided because of the size of the liver and the presence of the falciform ligament. In case of enlarged liver, there is a chance of risk of injury to liver and also if care is not taken during the insertion of Veress needle in right hypochondrium part of the body (4). However, insertion of the Verres needle into the left hypochondrium has been reported as safe, with reduced risk of iatrogenic injury (5). As the stomach is immediately below the anterior abdominal wall at the site where the left hypochondrium puncture is made, if the stomach is accidentally perforated, its contents will not necessarily leak. This is due to the protection provided by the three layers of gastric muscle, which tend to close the puncture (1).

Another safe method for creating pneumoperitoneum is by using visceral slide technique. This is a real time ultrasonography which detects the movement of viscera immediately deep to the abdominal wall. This motion of abdominal content is called visceral slide and is produced by the force of respiratory motion called spontaneous visceral slide, by manual ballottement of the abdomen which is termed as induced visceral slide. This spontaneous and induced viscus is restricted to excursions of less than 1 cm abdominal wall adhesions. The visceral slide technique can be easily learned, is rapid to perform, and reliable to identify adhesion-free areas of the abdominal wall (6). Measuring visceral slide improves

preoperative prediction of both presence and absence of bowel adhesions in patients with previous abdominal operations of infections; this technique may assist in avoiding iatrogenic bowel injury (7).

The present study was conducted to evaluate use of Palmer's point in creation of pneumoperitoneum in patients of previous abdominal surgeries and to check the efficacy of the visceral slide technique for detection of umbilical adhesions in these patients.

Material and Methods

This one-year prospective study was conducted on patients having previous abdominal surgeries in the Postgraduate Departments of Surgery and Radiodiagnosis, Government Medical College, Jammu. Prior approval from the Institutional Ethics Committee was taken before commencement of the study.

Patients excluded from the study were those with splenomegaly, splenectomy, gastro-pancreatic masses, gastric outlet obstruction or any other pathology resulting in distended stomach. Also excluded were patients with contraindications for the creation of pneumoperitoneum like severe cardiac, pulmonary, renal and hepatic dysfunction.

Materials used for laparoscopy included routine instruments like insufflation systems, camera, light source, TV monitor, telescopes, light guide cable, abdominal access instruments, trocar – 5 cms and 10 mm, Veress needle, Ryle's tube for decompression of stomach and real time sonographic machine with linear probe.

Preoperatively, the visceral slide test was conducted using a real time ultrasonography machine with a 7.5 MHz abdominal transducer placed in a sagittal plane at the umbilicus and the ultrasound scan focused on the infraumbilical region between the anterior abdominal wall and the aortocaval complex. A stable echogenic focus corresponding to omentum or intestine was identified and the distance this focus traveled was recorded as the participant performed an exaggerated inspiration and exhalation. The visceral slide, the longitudinal distance the viscera traveled as visualized on ultrasonography from point A to point B, was noted. A normal visceral slide (positive test) is movement of the viscera more than 1 cm. An abnormal visceral slide (negative test) is defined as movement of the viscera less than 1 cm.

During surgery, the patient is placed in supine position. By inserting Ryle's tube (nasogastric tube) stomach is decompressed. An incision is made of about 0.5 cm at about two finger breadth below left subcostal margin *i.e.*

3 cm below left subcostal margin in mid-clavicular line; lateral to superior epigastric artery by using the Veress needle, perpendicular to the abdominal wall, inserted into the peritoneal cavity.

Confirmation of Veress needle in proper place, *i.e.* inside the peritoneal cavity is done by well-established tests.

- *Aspiration test:* Using a syringe attached to the Veress needle. Considered positive when no material is aspirated.
- *Injection test:* Performed by injecting 5 ml of saline through the needle. Resistance to liquid flow is observed. This test is considered positive in cases of no increased resistance to liquid flow.
- *Recovery test:* Consisted in trying to aspirate the saline solution injected. This is considered positive in cases where no liquid is recovered.
- *Saline drop:* Consisted in pouring 2 ml of saline into the needle. This test is considered positive if the liquid disappears after removing the syringe. When any of the above tests were considered negative, the procedure is aborted. Failed attempts to reach the peritoneal cavity are recorded and entire procedure started again. In case initial intraperitoneal pressure is over 8 mmHg during the first 10 seconds of insufflation, initial pressure test is considered negative; the procedure aborted and failed attempt is again recorded. It is then connected with CO₂ supply. Maximum intraperitoneal pressure kept at 15 mmHg is dropped down to 12 mmHg when trocars are inside the peritoneal cavity. On inserting the 5-mmHg trocar at Palmer's point, other trocars are guided under direct visual guidance.

At the end of surgery, complications were divided into:

- *Intra-operative complications:* Trocar injuries detected during the operation of the patients.
- *Early complications:* Trocar injuries detected within 4 hours of surgery.
- *Late complications:* Trocar related injuries detected after 48 hours of surgery.

Results

After written informed consent, 30 patients with a history of previous midline laparotomies were enrolled in the study, comprising 28 (93.33%) females and 2 (6.67%) males. The age ranged from 24 to 70 years with a mean

of 39 years. Maximum number of patients were in the age group of 20 to 35 years (16; 53.33%), followed by 36 to 50 years (10; 33.33%), 51 to 65 years (3; 10%) and least in ≥ 66 years age group (1; 3.33%).

The most common comorbidity observed in patients was hypertension (14; 46.67%), hypothyroidism (10; 33.33%), type-2 diabetes mellitus and highly active antiretroviral therapy (3; 10% each). Majority of the patients had a history of lower segment caesarean section (LSCS) (22; 73.33%), followed by gynaecological laparotomies (4; 13.33%), LSCS and other laparotomy (3; 10%), others (2; 6.67%), appendectomy and hemicolectomy (1; 3.33% each) (Table 1).

Table 1: Characteristics of the Patients Enrolled in the Study

Parameters		No. (%)
Sex	Male	2 (6.67)
	Female	28 (93.33)
Age group (in years)	20 – 35	16 (53.33)
	36 – 50	10 (33.33)
	51 – 65	3 (10.00)
	≥ 66	1 (3.33)
Comorbidities	Hypertension	14 (46.67)
	Hypothyroidism	10 (33.33)
	Type-2 diabetes mellitus	3 (10.00)
	HAART	3 (10.00)
Previous laparotomies	LSCS	22 (73.33)
	Gynaecological	4 (13.33)
	LSCS + Other laparotomies	3 (10.00)
	Others	2 (6.67)
	Appendectomy	1 (3.33)
	Hemicolectomy	1 (3.33)
Umbilicus adhesion	Present	15 (50.00)
	Absent	15 (50.00)

Adhesions under the umbilicus were present and absent in 15 (50%) patients each. Out of 15 patients having the adhesions, adhesiolysis was done in 9 (60%) patients, in whom adhesions were obscuring the vision of operative field.

The visceral slide technique was negative in 9 (30%) and positive in 21 (70%) patients. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of visceral slide technique was 60%, 100%,



100%, 72% and 70% respectively (Table 2). There were no intraoperative or postoperative complications in our study.

Table 2: Sensitivity, Specificity, PPV, NPV and Accuracy of Visceral Slide Technique

Sensitivity	60%
Specificity	100%
Positive Predictive Value	100%
Negative Predictive Value	72%
Accuracy	70%

Discussion

In the present study, pneumoperitoneum was created using Palmer's point in all the 30 patients. No intraoperative or postoperative complications, associated with creation of pneumoperitoneum, were found. All patients had a history of previous midline laparotomies. Adhesions were present in 15 (50%) of the patients. In a study conducted by Aust *et al.*, no entry-related complications were found, while periumbilical adhesions were seen in 12 (80%) of the 15 patients enrolled (8). Nezghat *et al.* conducted laparoscopic surgery in 70 women, 6 (8.6%) of whom were diagnosed with periumbilical adhesions, while 18 (25.7%) had adhesions located in the abdomen or pelvis (9). Chang *et al.* used Palmer's point for insertion of the operative laparoscope in 17 patients who had known or suspected intra-abdominal adhesions. Five of them were found to have extensive periumbilical adhesions. No complication occurred during the laparoscopic procedure. The postoperative courses were uneventful in all 17 patients (10).

In the present study, visceral slide technique could predict the presence of adhesions in 9 out of 15 patients who had adhesions. The test was found to be 60% sensitive, 100% specific with a positive predictive value of 100% and negative predictive value of 72%. Accuracy of the test was 70%. Nezhat *et al.* reported sensitivity, specificity, positive predictive value and negative predictive value of visceral slide test to be 80%, 100%, 100% and 97.6% respectively (6), which is similar to the present study. In another study by Kolecki *et al.*, viscera slide ultrasound demonstrated sensitivity of 90%, specificity of 92%, positive predictive value of 90%, negative predictive value of 92% and overall accuracy of 91%. Nine out of 10 false results involved misinterpretation of ultrasound images of the lower one-

third of the abdomen. The authors concluded that ultrasonic imaging of viscera slide is highly accurate in detecting abdominal wall adhesions. This technique is most useful in guiding the insertion of trocar in laparoscopic surgery, and as a noninvasive method in studying the formation of adhesions (11). Hsu *et al.* found that out of 180 patients with previous abdominal surgery only two cases with bowel adhered to the periumbilical area were found by visceral sliding technique. No patients suffered any bowel injury. They concluded that the proposed technique was useful and highly effective in guiding the insertion of the Verees needle and trocar to prevent bowel injury in laparoscopy (12).

Larciprete *et al.* estimated the feasibility of preoperative ultrasound evaluation of the umbilical region in patients undergoing laparoscopy with a previous history of abdominal surgery. Absence of the "sliding viscera" sign was observed in 16 out of 25 patients and all these patients had subumbilical fibrous adhesions during laparoscopy (13). Zinther *et al.* conducted a study on detection of abdominal wall adhesions using visceral slide and validated use of transabdominal ultrasonography (TAU) in detecting adhesion-free areas in the abdominal wall. They added that TAU may serve as a diagnostic tool for future planning of laparoscopic surgery, elucidation of adhesion-related symptoms and as a tool in the follow-up after ventral hernia repair and implantation of intraperitoneal mesh (14).

Ayachi *et al.* highlighted the role of the transvaginal ultrasound sliding sign in predicting pelvic adhesions in women with a previous history of abdominopelvic surgery. In their study, the sliding sign technique had a total sensitivity of 96.3% and a total specificity of 92.6%. The study concluded that detecting adhesions in the pelvis by a non-invasive and well tolerated technique like the sliding sign could help in the planning and counselling of the surgery for patients with previous abdominopelvic surgery (15).

Laparoscopic surgeries have been the highlight of minimal access surgeries in recent times. Creation of pneumoperitoneum is the most critical step in performance of laparoscopic procedures as majority of injuries are encountered during the same. In patients with previous abdominal surgeries, creation of pneumoperitoneum poses more troublesome problems during creation of the umbilical port.

Various techniques have been evaluated for creation of pneumoperitoneum in patients of previous abdominal surgeries. The present study was conducted in a tertiary



care institute to evaluate the outcome of one such technique, the Palmer's point, in creation of pneumoperitoneum in patients with history of previous abdominal surgeries and to note the role of visceral slide method to identify intra-abdominal adhesions.

Conclusion

In the present study, intra-abdominal adhesions were noted in 50% of patients with history of previous abdominal surgeries, while visceral slide test employed for detection of intra-abdominal adhesions preoperatively had a sensitivity of 60% and specificity of 100%. The study concludes that definitive evidence of the efficacy of Palmer's point in creation of pneumoperitoneum cannot be established due to the small sample size and patients with limited spectrum of abdominal surgeries. Further studies in the form of multicenter randomized control trials are needed to verify the utility of Palmer's point for creation of pneumoperitoneum and to evaluate the role of visceral slide technique in diagnosing intra-abdominal adhesions preoperatively.

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