Original Research Paper

Obstetrics & Gynaecology

ACCURACY OF ULTRASOUND SLIDING SCALE IN PREOPERATIVE EVALUATION OF INTRA ABDOMINAL ADHESIONS COMPARED TO INTRAOPERATIVE FINDINGS

Sai Spandana Makkapati	Post Graduate in Department of OBG.
Dr. Sunitha Sudhir	Professor & HOD, Department of OBG.

ABSTRACT
Background: An accurate prediction of abdominal wall adhesions would be extremely beneficial to help preventing injuries during the initial abdominal entry. **Aim And Objectives:** Our aim was to evaluate preoperatively the accuracy of presence of bowel, bladder or omental adhesion using Visceral sliding scale by Ultrasonography and to compare ultrasonographic finding with intraoperative Laparoscopy or Laparotomy. **Materials And Method:** This was prospective study conducted on 100 patients, scheduled for abdominal surgeries, after following inclusion and exclusion criteria and also after informed consent obtained from patients. Ultrasound examination was done by a radiologist using a 3.5 MHz curvilinear probe. The sliding scale was used to grade the degree of adhesion formation. The findings of the ultrasound examination were compared to intraoperative findings regarding the presence, location, and severity of adhesions. Collected data were analysed with the help of SPSS Version 25, qualitative data were expressed in terms of frequency and proportion while quantitative data were expressed in terms of mean and SD. Screening test were used to find severity of test. **Results:** All 100 enrolled patients underwent surgery, of which 69 patients (69%) underwent laparotomy, and 31 patients (31%) had a laparoscopy. The mean age of the women was 41.8 ± 7.7 years. The mean BMI was 29.1 ± 6.8 kg/m2. Visceral slide test for prediction of adhesions showed an overall accuracy of 89.6% with sensitivity of 79.4%, specificity of 87.3%, PPV of 57.3% and NPV was 91.42%. **Conclusion:** From overall study can conclude that visceral slide test is non-invasive and reliable method for predicting abdominal wall adhesion among women undergoing surgeries.

KEYWORDS : Abdominal wall adhesions, Abdominal surgeries, Visceral sliding scale

INTRODUCTION

- Intra-abdominal adhesions are fibrous bands of tissue that can form between organs and tissues within the abdominal cavity.
- These adhesions are often the result of surgery or inflammation and can cause various health problems. Intra-abdominal adhesions typically form as part of the body's natural healing process.
- Although CD is frequently performed as per fetal indications, it can also result in various severe maternal and fetal complications in comparison to vaginal delivery, including severe hemorrhage, shock, cardiac arrest, fetal loss, major infections, venous thromboembolism, uterine rupture, and hysterectomy [1].
- Additionally, one of the most important complications of CD is intra-abdominal adhesions.
- Previous studies have shown that adherence between the abdominal wall and visceral organs occurs in 25–50% of patients undergoing surgery [2-4]. Intrabdominal adhesions may be of the thin, filmy, or dense type [5].
- These adhesions to the abdominal wall bring bowel and blood vessels close to sites of laparoscopic entry. During insertion of the Veress needle or trocar, serious injury to the bowel or blood vessels may occur and unrecognized injuries can have catastrophic morbidity and mortality [1].

AIMS AND OBJECTIVES:

To evaluate the accuracy of the visceral sliding scale test in detecting the presence of intra-abdominal adhesions by ultrasonography before the surgery to prevent complications related to adhesions, and compare ultrasonographic findings with intraoperative Laparoscopy or Laparotomy

MATERIALS AND METHODS

Study Sample: In the study we have included total of 100 samples after getting consent from the patients and after following inclusion and exclusion criteria given bellow.

Inclusion Criteria:

1. Patients aged 18 years and above.
2. Patients with a history of intra-abdominal surgery.
3. Patients with suspected or confirmed intra-abdominal adhesions based on clinical history, physical examination, or radiological imaging.

Exclusion Criteria:

1. Patients with contraindications to ultrasound examination such as allergies to ultrasound gel or discomfort lying flat.
2. Patients with a history of acute abdominal conditions, such as acute pancreatitis, acute cholecystitis, acute appendicitis, or acute bowel obstruction.
3. Patients with pregnancy or suspected pregnancy.
4. Patients with known liver cirrhosis or chronic liver disease.
5. Patients who have received any medical treatment, such as steroid therapy or radiotherapy.

METHOD:

- Patients scheduled for abdominal surgeries were included in the study.
- Ultrasound examination were done by a radiologist using a 3.5 MHz curvilinear probe.
- The findings of the ultrasound examination were compared to intraoperative findings regarding the presence, location, and severity of adhesions.
- This site movement during each breathing cycle were recorded as spontaneous visceral slide (SVS).
- Also, the distance was measured during the deep breathing as induced visceral slide (IVS) the distance less than 1 cm is known as intra-abdominal adhesion.
- The single radiologist determined the content of intra-abdominal adhesions. Also, the single surgeon recorded the surgery date, type of surgery (laparotomy or laparoscopy), causes of surgery, type of incision and complications during surgery (e.g. perforation, bleeding).

Statistical Analysis:

Collected data was analyzed with the help of software SPSS version 25. Categorical data was expressed in terms of frequency and percentage, while quantitative data was expressed in terms of mean and standard deviation. Proportion difference finds with the help of Z-test. Sensitivity and Specificity were found to know the accuracy of test. P-value < 0.05 considered statistical significant.

Table 1: Age And Weight Distribution Among Study Population

Parameters	Frequency	Percentage/ Range
Age (Years)		
20 - 30 Years	42	42
31 - 40 Years	53	53
> 40 Years	5	5
Mean±SD	38.2±4.29	20 - 46 Years
Weight (Kg)		
50 - 60	6	6
61 - 70	14	14
70-80	69	69
> 80	11	11
Mean±SD	74.23±8.37	51-90

Table 2 : BMI And Parity Distribution Among Study Population

Parameters	Frequency	Percentage/ Range
BMI		
Normal	10	10
Overweight	32	32
Obese	58	58
Mean±SD	28.7±6.09	25 - 30
Parity		
1	20	20
2	52	52
3	23	23
≥ 4	5	5

Table 3 : Distribution Of History Of Previous Abdominal Surgeries Among Study Population

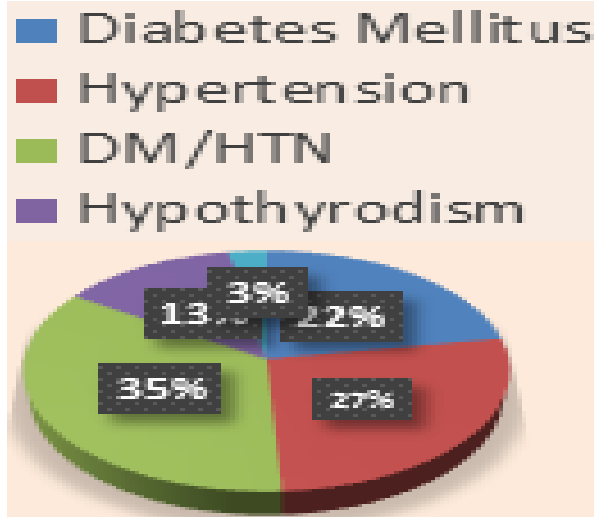| Parameters	Frequency	Percentage/ Range
History of Previous Abdominal Surgeries		
1	61	61
2	28	28
≥3	11	11

Figure 1 : Distribution Of Risk Factors Of Adhesion Among Studied Patients (*n* = 100)

Table 4 : Distribution Of Adhesion Based On USG Findings

Sliding Test	Frequency	Percentage
Positive	33	33
Negative	67	67
Total	100	100

Table 5 : Distribution Of Adhesion Based On Intraoperative Findings

Severity of Adhesion	Score	Numbers	Percentage
	Score 0	66	66
	Score 1	19	19
	Score 2	12	12
	Score 3	3	3

Score 0 : No adhesion;
Score 1 : Thin-film avascular adhesion;
Score 2 : Dense and Vascular adhesion;
Score 3 : Adhesion that connects surrounding organs with the peritoneal surfaces

Table 6 : Comparison Between USG Guided Adhesion And Intraoperative Adhesion

Slide test Output	Adhesion during operation		Total	Chi-square Test	P-value
	Adhesion	No adhesion			
Positive	27(27%)	6(6%)	33(33%)	50.18	<0.001 (Significant)
Negative	7(7%)	60(60%)	67(67%)		
Total	34(34%)	66(66%)	100(100%)		

Table 7 : Screening Parameters Of The Sliding Test To Predict Adhesions

Statistics	Value	95% Confidence Interval
Sensitivity	79.41%	62.10% to 91.30%
Specificity	90.90%	81.26% to 96.59%
Positive Predictive Value	81.81%	4.00 to 19.09
Negative Predictive Value	89.55%	0.12 to 0.44
Accuracy	87.00%	78.80% to 92.89%

RESULTS

Table 1: Mean age of the study population was 38.2±4.29 years and majority of the study population were from the age group of 20 to 40 years (95%). Mean Weight of the patients was 74.23±8.37Kg, and majority of the patients were from the weight group of > 70 years of age (80%)

Table 2: Mean BMI of the patients was 28.7±6.09, and majority of the patients were overweight to obese (90%). 95% of the patients had parity 1 to 3

Table 3: 89% of the study population observed with previous history of abdominal surgery.

Table 4: 33% of the study population were observed positive on the basis of sliding test.

Table 5: On the basis of intraoperative finding 19%, 12% and 3% of the patients were observed with severity score of 1, 2 and 3 respectively.

Table 6: We have observed there was statistically significant difference observed between USG guided adhesion and Intraoperative adhesion (p-value<0.01)

Table 7: Predictive ability of the sliding sign for the detection of intra-abdominal adhesions was observed with the sensitivity of 79.41%, specificity of 90.90% and accuracy of 87%

DISCUSSION
- Safe entry of the abdomen is important, especially in patients who have had previous operations. In these patients, complications due to adhesions at the entrance of the abdomen should be predictable and preventable using noninvasive methods such as USG, which would increase the preference for endoscopic surgical methods even in this risky patient group.
- Preoperative detection of abdominal adhesions remains a difficult task. Nevertheless, there are ongoing studies to identify the optimal noninvasive method of identifying anterior abdominal wall adhesions to provide safer surgical access to the abdomen.
- This concept is extremely important in laparoscopy because the initial entry is usually performed blindly.
- Blind trocar entry may lead to complications, and 75% to 82% of laparoscopy-related complications result from the insertion of the first trocar [6].

- Complications are seen mainly in patients who have a risk factor for intraabdominal adhesions. In 68.9% of cases of bowel injuries in laparoscopy, adhesions or previous abdominal surgeries were documented in a literature review [7].
- The ability to predict the presence of such adhesions would help the surgeon to minimize the risk of entry complications in laparoscopy.
- Ultrasonographic visceral slide test was first described in 1991 by Sigel *et al.* [8].
- In the present study, we have included 100 patients The visceral sliding scale test parameters showed a sensitivity of 79.41% and specificity of 90.90% and a diagnostic accuracy of 87%
- Comparison our results with other studies as shown in the bellow table.

Table 9 : Diagnostic Comparison Of Our Results With Other Studies

Studies	Specificity	Specificity
Present Study	79.41%	90.90%
Kolecki et al. [9]	90%	92%
Kothari et al. [10]	40%	90%
Sanad et al.[11]	78.80%	95.90%
Lee M et al [12]	97.20%	68.60%
Minaker et al. [13]	69.60%	98.70%
Nezhat CH et al [3]	83.30%	100%

CONCLUSION

Visceral slide test is a simple and useful method in detecting intra-abdominal adhesions before a surgical procedure which helps in preventing intraoperative injuries and complications related to adhesions.Due to the technological advances in ultrasound imaging techniques, detection of even thin, filmy adhesions has become possible in experienced hands.

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