

*Original Research Article*

## Port site hernia: What are the risk factors?

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**Abstract: Background & Aim:** The port site hernia is a type of incisional hernia that occurs at port sites after laparoscopic surgery. Various factors have been implicated in the development of port site hernia. The aim of this study was to know the risk factors of the port site hernia.

**Patients & Methods:** A retrospective study of patients who underwent different elective laparoscopic procedures in Rizgary Teaching Hospital in Erbil, involving a period from March 2013 to September 2014.

**Results:** Out of 300 patients, only 8 (2.7%) patients developed port site hernia. The time of the hernia occurrence ranged from 3 weeks to six months postoperatively. Half of the hernias were found in cases of age group (60-80) years. Six (75%) of the cases were female patients. All 8 hernias developed after laparoscopic cholecystectomy. Six (75%) hernias developed after open port entrance technique. All hernias occurred when the fascia in 10 mm port was not closed. Seven hernias (87.5%) occurred in patients with BMI ranged (25-34).

**Conclusion:** Age of the patients, technique of entrance, and site and size of the port with unclosed fascial layer are all important factors in developing port site hernia.

**Keywords:** Hernia; port Site; laparoscopic surgery

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## 1. Introduction

The Port site hernia (PSH) is a type of incisional hernia that occurs at port or trocar sites after laparoscopic surgery<sup>[1,2]</sup>. It causes considerable morbidity requiring surgical intervention. It was first reported after laparoscopy in gynecological surgery<sup>[3]</sup>. Maio and Ruchmanthen reported on the PSH with small bowel obstruction occurring immediately after cholecystectomy, which was the first report on trocar site hernia in digestive surgery<sup>[4]</sup>.

PSH is classified into 3 types according to the reported cases: the early onset, the late onset, and the special type<sup>[1]</sup>. The diagnosis may not be immediately apparent, so often there is no superficial skin bulge<sup>[5]</sup>. Various factors have been implicated in the development of PSH<sup>[6-9]</sup>.

The aim of this study was to know the risk factors of the PSH.

## 2. Patients and methods

A retrospective study of patients who underwent different elective laparoscopic procedures in Rizgary Teaching Hospital in Erbil, Iraq, which involved a period between March 2013 to September 2014.

Exclusion criteria were: cholecystitis, chronic cough, ascites, extended port site, and patients having paraumbilical hernia.

The data collected regarded the age, gender, smoking, co-morbidity, indications of surgery, date of the operation,

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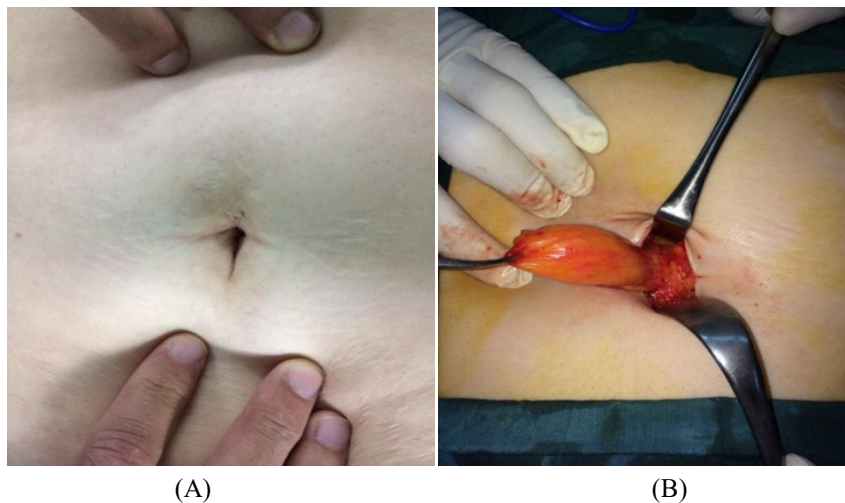
duration of the operation, port entry and closure technique, port site and size, port site infection, site and onset of the hernia, and details of the hernia repairing operations. The study was approved by the local ethical committee. Data was analyzed using the SPSS (version 19). Fisher's exact test was used for comparison between the outcomes. A P value of 0.05 or less was considered statistically significant.

### 3. Results

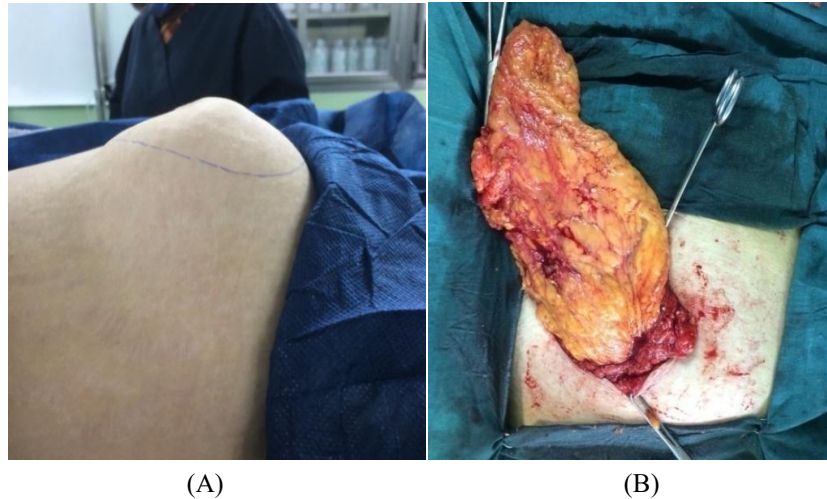
The number of the patients was 300. The mean age of the patients was 41.2 years (Range 18-80 years), with 66 cases being male (22%) and 234 being female (78%): male:female ratio was 1:3.5. The mean BMI was 27 (Range 19-37). Forty six (15.3%) of the patients were smokers. Twenty (6.7%) of the patients had diabetes mellitus, and 40(13.3%) of them had hypertension. Only 4 (1.3%) of them had history of ischemic heart disease. Thirty eight (12.7%) of them had past history of hernia and 131 (43%) of cases had family history of hernia.

The duration of operations ranged 15-120 minutes (mean 46.52). Port site infection occurred in 15 (5%) of the patients with 1 case exhibiting biliary leakage (0.3%).

Out of 300 patients only 8 (2.7%) patients developed PSH. All the hernias were of late onset type. The time of the PSH occurrence ranged from 3 weeks to 6 months postoperatively. All hernias contained only omentum. The hernias were treated by simple repair of the defect by using double layer nylon in 6 cases (figure 1). In the other 2 cases, where the defect was larger, hernioplasty was done (figure 2). All of them were discharged from the hospital after 24 hours.



**Figure 1.** Demonstrates a port site hernia at the umbilical region repaired by simple repair. A: scar of previous umbilical port B: the hernia sac and fascial defect



**Figure 2.** A large port site hernia at umbilical region that repaired by hernioplasty. A: preoperatively. B: the hernial sac and fascial defect

The mean age of the PSH cases was 52 years (range 27-75). Half of the hernias (4 cases) were found in cases of age group (60-80) years. Three hernias (37.5%) occurred in cases of age group (18-40), only 1 hernia (12.5%) occurred in patients aged (40-60) years. P value=0.028. Six (75%) hernias occurred in female patients. Only 2 (25%) cases occurred in male patients. P value=0.689.

One (1.41%) out of 71 patients whose BMI was less than 25 developed PSH. Furthermore, 5 (3.6%) in group BMI 25-29 and 2 (2.3%) in group BMI 30-34 developed PSH. None of the patients in group BMI > 35 developed hernia. P value=0.685. **Table 1** shows the correlation between the factors related to the patients & incidence of PSH.

Patients Characteristics	Patients without hernia	Patients with hernia	P-Value
Age (years):			
Below 60	246 (98.4%)	4 (1.6%)	0.028*
Above 60	46 (92%)	4(8%)	
Gender:			
Male	64 (97%)	2 (3%)	0.689
Female	228 (97.4%)	6 (2.6%)	
Smoking	45 (97.8%)	1 (2.2%)	1.0
Comorbidity:			
Nil	232 (98.3%)	4 (1.7%)	0.066
Diabetes	18 (90%)	2 (10%)	0.092
Hypertension	38 (95%)	2 (5%)	0.289
Heart disease	4 (100%)	0 (0%)	1.000
Past History of hernia	36 (94.7%)	2 (5.3%)	0.268
Family History of hernia	125 (95.4%)	6 (4.6%)	0.083
BMI:			
Below 25	70(98.59%)	1(1.41%)	0.685
Above 25	222(96.94%)	7(3.6%)	

\*statistically significant

**Table 1.** Correlation between factors related to the patients and the incidence of port site hernia

All 8 hernias developed after laparoscopic cholecystectomy and no hernia developed after other laparoscopic

operations (P value = 0.611).

Six hernias (75%) developed after open port entrance technique (the incidence was 18.75%). Only 2 (25%) of the hernias developed after veress technique (the incidence was 0.75%). P value <0.0001

All hernias occurred at port size 10. P value <0.0001. All hernias occurred when the fascia in 10 mm port was not closed. P value <0.0001. In 2.4) 7%) patients, PSH occurred through umbilical port and only one through epigastric port site (0.3%), however, no hernia occurred in laterally sited ports. P value <0.0001 **Table 2** shows correlation of the factors related to the operations with incidence of the hernia:

Operative factors	Patients without hernia	Patients with hernia	P-Value
Type of Operations:			
Cholecystectomy	247(96.86%)	8(3.14%)	0.611
Appendicectomy	15(100%)	0(0%)	
Overian cystectomy	11(100%)	0(0%)	
diagnostic	19(100%)	0(0%)	
Port Size:			
10	292 (97.3%)	8 (2.7%)	0.007*
5	300(100%)	0 (0%)	
Port site:			
Umbilical	293 (97.6%)	7 (2.4%)	0.007*
Epigastric	299(99.6)	1 (0.3%)	
Lateral	300(100)	0 (0%)	
Port entrance technique:			
Veress	266(99.25%)	2(0.75%)	<0.0001**
Open	26(81.25%)	6(18.75%)	
Fascial layer of port sized 10:			
closure	264 (100%)	0 (0%)	<0.0001**
Non Closure	28(77.8)	8(22.2%)	
Biliary Leakage	1 (100%)	0 (0%)	1.000
Port site infection	15 (100%)	0 (0%)	1.000

\* Very statistically significant \*\* extremely statistically significant

**Table 2.** Correlation between the factors related to the operations and the incidence of port site hernia

## 4. Discussion

The incidence and spectrum of laparoscopic complications are greater than previously perceived<sup>[10]</sup>. The continuing improvement of access techniques, instruments, and laparoscopic training are important to reduce these avoidable complications, especially the PSH<sup>[11]</sup>.

PSH incidence is variable from centre to centre depending on factors which include surgical technique and experience<sup>[12]</sup>. Its incidence ranged from 0.02 to 6%<sup>[6,7,13]</sup>. In this study, the incidence of PSH was 2.7 %, which is nearly similar to the study done by Jassim *et al*, in which the incidence of PSH was 2.5%<sup>[14]</sup>.

Among our patients, PSH was more common in elderly patients. This is comparable to the studies done by Kabir and Haque<sup>5</sup>, Uslu *et al*,<sup>[15]</sup> and Comajuncosas *et al*<sup>[16]</sup>. This is due to weakness of the fascia and muscles of the abdominal wall in these patients.

Some authors regard obesity as a risk factor for PSH<sup>[1,15]</sup>. The explanation for this is higher intra-abdominal pressure and technical difficulties of achieving full thickness closure<sup>[17-24]</sup>. Although 75% of our cases occurred in patients having BMI higher than 25, the P value indicated statistically insignificant because of the small number of our PSH cases.

The studies done by Memonetal<sup>[12]</sup>, Comajuncosas *et al*,<sup>[16]</sup> and Khatami and Fanaie<sup>[25]</sup> concluded that there is no significant association between gender and PSH, while Uslu *et al*<sup>[15]</sup> and Jassim *et al*<sup>[14]</sup> found that PSH occurred more in females. With our patients, 6 out of 8 cases of PSH occurred in female patients, but the P value was statistically insignificant.

The studies done by Memonetal<sup>[12]</sup>, Jassim *et al*<sup>[14]</sup>, Khatami and fanaie<sup>[25]</sup> revealed that all PSH developed after laparoscopic cholecystectomies in comparison with other laproscopic operations. This is the same result in our study

(although P value was statistically not significant).

The comorbidities in our patients had no significant statistical relation with PSH, similar to the study done by Jassim *et al*<sup>[14]</sup>.

In this study, the PSH occurred most frequently at the midline (umbilical and epigastric) ports rather than off midline sites ( $p < 0.0001$ ), which is the same conclusion by Azurinetal<sup>[26]</sup> and Ahmad *et al*<sup>[27]</sup>, This is probably due to absence of midline muscle and fascia overlapping<sup>[19]</sup> as well as the frequent use of a larger trocar in this site.

Many studies show that most hernias occur at 10 mm or larger ports, which is related to larger fascial defect<sup>[14,5]</sup>. In this study all PSH developed at 10 mm ports. We found that there is a significant association between fascial closure and development of PSH, which is also concluded by Khatami and Fanaie<sup>[25]</sup>.

The post-operative wound infection and biliary leakage was found to be a causative factor and had significance in some studies done by Memon *et al*,<sup>[12]</sup> but in our study, wound infection was not a significant causative factor.

Six (75%) cases of hernia had positive family history of hernia. P value revealed that this is statistically non-significant because of a small number of cases.

## 5. Conclusion

Main risk factors for PSH are:

1. Port entrance technique: more common in open method.
2. Size of the port: more common in 10 mm ports especially when the facial layer has not been closed.
3. Site of the port: common in midline ports specially in umbilical area.
4. Age of the patients: more common in elderly patients.

We recommend further researches on a large number of PSH cases to study other risk factors.

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