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Incisional Hernia, risk factors, management and relation to Surgical Abdominal Incisions

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Abstract:
Background: *Incisional hernia is a hernia that protrudes through a defect in a previous abdominal wound, and is one of the complications after abdominal surgery. Many risk factors seem to be associated with its development, and there are different treatment modalities from conservative management to operative repair whether open or laparoscopic.*
Objective: *To assess the relation between the type of surgical abdominal incision, and the occurrence of incisional hernia.*
Patients and Methods: *A prospective study of 70 patients (58 cases: female, and 12 cases: male) diagnosed as having abdominal incisional hernia, admitted to the Surgical Department of Sulaimaniyah Teaching Hospital during the period from 1st May 2011 to 30th November 2012. History was taken and physical examination was done for all the patients. Modes of repairs for incisional hernia have been reported.*
Results: *Transverse incisions (including Pfannenstiel) were more prone for incisional hernia about 30 cases (42.86%) whereas vertical incisions developed in 25 cases (35.71%) and only 11 cases (15.71%) were oblique incisions.*
Conclusion: *We found that transverse incisions and elective cases were more prone for incisional hernia. Obesity and wound infection also play an important role in the development of incisional hernia. Now mesh repair is the modality of choice which is used frequently in our cases which was 68.57% of all incisional hernia cases.*
Keywords: *Surgical abdominal incision, risk factor, incisional hernia*

I. Introduction

The term ventral hernia encompasses incisional, epigastric, paraumbilical, spigelian, and traumatic hernias. Incisional hernias form the largest group of ventral hernias[1.]This is a hernia that protrudes through a defect in an abdominal wound. [2]

The highest incidence is seen with midline and transverse incisions, laparoscopic port sites may also develop hernia defects in the abdominal wall fascia.[3] Modern rates of incisional hernia range from 2-11%. [4]

Many factors are involved in the development of incisional hernia, patient related factors including obesity, diabetes mellitus, jaundice, malignancy, hypoproteinemia, anemia, steroid use, cytotoxic drugs and irradiation are all factors conductive to disruption of a laparotomy wound, [5] surgical factors are related to the type of incision, choice of suture material, and method of wound closure, [6] and postoperative factors including surgical site infection which is the most important independent risk factor, [7] the development of postoperative chest infection resulting in coughing and gross distension from paralytic ileus are important in both wound dehiscence and incisional hernia. [8]

II. Patients and methods

A prospective study conducted at the Surgical Department of Sulaimaniyah Teaching Hospital. Data has been collected from 70 patients (58 cases: female, and 12 cases: male) with incisional hernia during the period from 1st May 2011 to 30th November 2012. History taken and physical examination were done for all patients, data collected including age, gender, occupation, type of operation whether emergency or elective, type of incision, duration of appearance of incisional hernia, associated risk factors including obesity, smoking, diabetes mellitus, drug history, malignancy, wound infection, chronic constipation, chronic cough, prostatism and urine retention are obtained from all patients, investigations such as complete blood count, blood sugar, blood urea, serum creatinine, ECG and chest X-ray are sent for all patients, data obtained about the treatment mode for repairing the incisional hernia whether primary suture repair with mesh, suture repair or only mesh repair. Type of the mesh which was used in our cases is polypropylene mesh.
Biostatic method used in data analysis, using software IBM SPSS statistics version 21, Chi-Square test used for obtaining P value.
Exclusion criteria were emergency incisional hernia and recurrent inguinal hernias.

III. Results

In this prospective study of 70 patients, the incidence of incisional hernia was 12 (17.14%) in male and 58 (82.86%) in female.

Patients age 40-49 years had the highest incidences; 26 (37.14%) of the cases as shown in table 1.

Table1: Relation between age groups and incisional hernia.

Age(year)	No.	%
20-29	4	5.71
30-39	12	17.14
40-49	26	37.14
50-59	16	22.86
>60	12	17.14
Total	70	100

In this study, transverse incisions (including Pfannenstiel) were more prone for incisional hernia in 30 cases (42.86%),while 25 cases (35.71%) had a vertical incision (midline & paramedian); 11 cases (15.71%) had an oblique incision (gridiron & Kocher) and 4cases (5.71%) had other incisions (lumbar & port site) as shown in **table 2**.

Table2: Relation of incisional hernia to the type of incision.

Type of incision	Site of incision	No. of cases	Total no. of cases	%
Transverse	Transverse supra or infraumbilical	20	30	42.86
	Pfannenstiel	10		
Vertical	Midline	24	25	35.71
	Paramedian	1		
Oblique	Kocher	6	11	15.71
	Gridiron	5		
Others	Lumbar	2	4	5.71
	Laparoscopic Port site	2		
Total	_	70	70	100

Regarding the period of appearance of the incisional hernia after the last operation, in 28 cases (40.00%), incisinal hernia appeared between 1-5 years, in 26 cases (37.14%) they appeared in < 1 year, and in 16 cases (22.86%) they appeared after >5 years as shown in **table 3**.

Table3: Period of occurrence of incisional hernia from the previous operation.

Duration (years)	No.	%
<1	26	37.14
1-5	28	40.00
>5	16	22.86
Total	70	100

The number of patients who had been operated on previously for elective surgeries were 45 (64.29%) while those who had been operated on previously for emergency surgeries were 25 (35.71%).

The most frequent risk factor was obesity(more than 75% above the ideal body weight) which was found in 39 cases (55.71%) followed by wound infection in18 cases (25.71%), diabetes mellitus in 9 cases (12.86%), chronic constipation in 9 cases (12.86%), malignancy in 5 cases (7.14%), smoking in 2 cases (2.86%), steroid use in 2 cases (2.86%), immunosuppression in one case (1.43%), malnutrition in one case (1.43%) and no risk factors in 13 cases (18.57%) as shown in **table 4**.

Table4: Risk factors frequently associated with incisional hernia.

Risk factors	No.	%
Obesity	39	55.71
Wound infection	18	25.71
DM	9	12.86
Chronic constipation	9	12.86
Malignancy	5	7.14
Chronic Cough	4	5.71

Anemia	3	4.29
Chemotherapy	3	4.29
Steroid use	2	2.86
Smoking	2	2.86
Urine Retention	2	2.86
Uremia	2	2.86
Malnutrition	1	1.43
Immunosuppression	1	1.43
No risk factor	13	18.57

The commonest type of surgical operations complicated by incisional hernia was the paraumbilical hernia in 20 cases (28.57%) followed by laparotomy which was 16 cases (22.86%), and 12 cases (17.14%) for cesarean section as shown in table 5.

Table5: Types of surgical operations complicated by incisional hernia.

Type of previous operation	**No.**	**%**
Paraumbilical hernia	20	28.57
Laparotomy	16	22.86
Cesarean section	12	17.14
Open cholecystectomy	7	10.00
Open appendectomy	6	8.57
Open nephrectomy	3	4.29
Total abdominal hysterectomy	3	4.29
Lap. cholecystectomy	2	2.86
Abdominoplasty	1	1.43
Total	70	100

About the type of wound in the previous operation, 51 cases (72.86%) had a clean wound, 14 cases (20%) had a clean/contaminated wound, and only 5 cases (7.14%) had a contaminated wound as shown in table 6.

Table6: Types of the wound in the surgical operations complicated by incisional hernia.

Types of the wound in the previous operations	**No.**	**%**
Clean	51	72.86
Clean/contaminated	14	20
Contaminated	5	7.14
Total	70	100

About the treatment modalities of incisional hernia, those patients who underwent primary repair and mesh were 48 cases (68.57%), while those who underwent primary repair were 20 cases (28.57%), and those that underwent only mesh repair were 2 cases (2.86%).

T**able 7 shows the correlation between sex, types of operations, risk factors (obesity and wound infection) and types of incisions by using chi-square tests.**

Correlation	**P-value**
Sex and types of incisions	0.07
Types of operations and types of incisions	0.00
Risk factors (obesity and wound infection), and types of incisions	0.03

P value less than 0.05 is statistically significant.

IV. Discussion

In this study, we found that the female gender predisposed more for incisional hernia (82.86%) than the male (17.14%), but statistically is not significant (p value 0.07) with a ratio of 4.8:1. This correlates with a study of Shah N [9] in which females had a higher incidence of incisional hernia than males, and the ratio was 3:1, this can be explained by the fact that most of our patients with incisional hernia were housewives with obesity or could be due to parity.

Regarding age, most of the patients were between 40-49 years of age (37.14%) 26 patients and the mean age was 47 years. This correlates with a study done by Dhia'a H M in Baghdad's Teaching Hospital [10] who found that the mean age for his studied incisional hernia patients was 48 year whereas Bhopal et al in their study of 30 patients with incisional hernia found that the mean age was 42 years, [11] while Mathonnet et al found that the mean age was 61.3 years. [12]

Most of the studies agreed that incisional hernia is more common after vertical incisions in comparison to transverse incisions. Halm J. A. et al found in their study of one hundred and fifty female patients after upper abdominal surgery that only 2% developed incisional hernia after a transverse incision whereas 14% develop incisional hernia after a midline incision. [13] This finding contradicts with the current study, as we found that transverse incisions (including Pfannenstiel) were more prone for incisional hernia 30cases (42.86%) in comparison with vertical incisions (midline and Paramedian) 25cases (35.71%). This is related to that most of our cases were paraumbilical hernias operated on through a transverse incision, and developed an incisional hernia which was about (28.57%)

Those patients that developed an incisional hernia after Pfannenstiel incision were 10 cases (14.29%); this figure is slightly higher if we compare it with a study done by Luijendijk Rw et al [14] who found that the risk for incisional hernia was (9.8%).

Another finding in this study was the cases in which surgery was done on an elective basis that were more prone for incisional hernia (64.29%) in comparison with emergency cases (35.71%) which is statistically significant (p value is 0.00.) This finding is not going with the study done by Cavit et al who observed that the incidence of incisional hernia was 12% in emergency and 4% in elective laparotomies.[15]

Obesity was the most frequent and main risk factor for incisional hernia in our study which was found in 39 cases (55.71%). This is in agreement with other studies as a strong risk factor especially morbid obesity. [16]

Wound infection was another important risk factor for incisional hernia in this study found in (25.71%). This goes with a study done by Bucknall et al in which they found that incisional hernia occurred in up to (23%) of those with post-operative wound infection. [17]

History of diabetes mellitus was found in (12.86%) of patients who developed incisional hernia. This goes with a study done by Idhm M J at Al-Kadhmiya Teaching Hospital [18] which found that (12%) of cases with incisional hernia had diabetes mellitus.

Other risk factors as malignancy (7.14%), steroid use (2.86%), uremia (2.86%) and malnutrition (1.43%) were found in this study as the least frequent risk factors for incisional hernia. This goes with studies done by Bucknall TE, [26] and Manninen M.J [19] who revealed that these are less significant risk factors for incisional hernia.

Sorensen et al found that smokers had fourfold a higher risk for incisional hernia than non-smokers [20] while in our study smoking was a less frequent risk factor (2.86%). The explanation is that most of our patients were female and non-smoker.

Several authors have reported favorable results with mesh repair. [21, 22] In a prospective randomized, multicenter trial in which suture repair was compared with mesh repair; the latter was determined to be more effective. [23]

Most of our cases were managed with mesh repair.48 cases (68.57%) underwent primary repair and mesh whereas 20 cases (28.57%) underwent primary repair and 2 cases (2.86%) underwent only mesh repair.

Mesh repair is a good choice and has become a model in most of the world[23]

Unfortunately we did not have any cases of laparoscopic repair for incisional hernia which has a less recurrence rate, and complication if compared to open repair.[24]

V. Conclusions

Elective surgery and transverse incisions were more prone for incisional hernia, female patients were more affected by incisional hernia, obesity and wound infection play an important role in the development of incisional hernia.

VI. Recommendations

1. Special attention is required in obese patients, and weight reduction is vital prior to surgery.
2. Every effort should be made to prevent, and treat wound infection with controlling diabetes mellitus before surgery.
3. Protecting nerves and vascularity of the tissues by avoiding unnecessary big incisions, and gentle tissue handling are important in preventing incisional hernia.
4. It's recommended to do laparoscopic hernia repair to know the exact recurrence rate.

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