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Original Research Article

Study prevalence of risk factors and clinical presentation of ventral incisional hernia an observational study

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ABSTRACT

Background: Incisional hernia is the second most common type of hernia after inguinal hernia. It is a complication of abdominal surgery, reported in up to 11% of patients generally and in up to 20% of those who developed post operative wound infection. The list of predictive factors associated with development of incisional hernia is obesity, diabetes mellitus, steroid, smoking, old age, malnutrition, COPD and type of incision.
Methods: This was a hospital based cross sectional observational study carried out from February 2018 - October 2019 in surgery department of Dr. B.R.A.M. Hospital Raipur C.G, with diagnosis of incisional hernia. Total 100 patients were included in the study.
Results: In present study the mean age of study subjects was 47.27±13.16 years. Around two-third 64% were females. 40% of perforation and 35% of LSCS cases later develop to Incisional hernia. Risk factors profile showed that 31% were alcoholic, 27% smokers, 48% pre-obese and 5% were obese. 36% were hypertensive, 48% diabetic, and 12% had constipation. 25% had prolonged cough, 35% had surgical site infection, 45% had anemia. Clinical presentation of study subjects showed that 63% had swelling, 33% had swelling and pain and 4% had obstruction.
Conclusions: Incisional hernia is more common in female than males and in cases above the age of 45 years. It is more common in patients who underwent the previous surgery on an emergency basis especially in perforation and obstruction and LSCS cases. Risk factors associated with incisional hernia are smoker, alcoholic, obesity, hypertension, diabetes, constipation, prolong cough and anemia.

Keywords: Incisional hernia, Prevalence, Risk factors, Clinical presentation

INTRODUCTION

Incisional hernia is the hernia occurring through the operative scar. It is the result of failure of the line of closure of the abdominal wall following laparotomy. Incisional hernia (IH) is defined by the European hernia society as "any abdominal wall gap with or without a bulge in the area of postoperative scar perceptible or palpable by clinical examination or imaging".[1]

It is the second most common type of hernia after inguinal hernia. It is a complication of abdominal surgery, reported in upto 11% of patients generally and in up to 20% of those who developed post-operative wound infection.[2,3] It is an important source of morbidity. Treatment involves further major surgery and the result may be poor, with recurrence rates of up to 49%. Incisional hernias after laparotomy are mostly related to failure of the fascia to heal and involve technical and biological factors. Approximately 50% of all incisional hernias develop or present within the first 2 years following surgery, and 74% occur within 3 years.[4] In spite of the frequency of the condition and its potential morbidity, no consensus on the best method of repair has

been established. A wide spectrum of surgical techniques has been developed ranging from sutured techniques to the use of various types of prosthetic mesh. This has created uncertainty and confusion among surgeons regarding the optimum method of repair.

The list of predictive factors associated with development of incisional hernia is obesity, diabetes mellitus, steroid, smoking, old age, malnutrition, COPD, type of incision, type of suture material and SSI post laparotomy. The present study was done to evaluate the risk factors and clinical presentation of incisional hernia to reduce its occurrence by developing a preventive strategy to patients undergoing laparotomy.

METHODS

This was a hospital based cross sectional observational study carried out from February 2018 to October 2019 with aim to identify the prevalence of physical, behavioral, medical and modifiable risk factors for the development of incisional hernia and their clinical presentation. During the study period all patients attending at outpatient department of surgery and those admitted in surgery ward of Dr. B.R.A.M. Hospital Raipur C.G, with diagnosis of incisional hernia and who fulfill the inclusion criteria. Total 100 patients were taken in the study.

Inclusion criteria

All patients with incisional hernia above 18 years of age, patients who were willing to give consent to be part of the study were included.

Exclusion criteria

Patients who did not give consent for study, seriously ill patient, pregnancy with incisional hernia were excluded.

All the patients were investigated about the duration of hernia, progression and the main associated symptoms like pain, vomiting, cough, dysuria, reducibility of the swelling, association with pregnancy. Past-history pertaining to previous surgery its nature, duration, type of surgery and closure was recorded. Patients were also asked about wound infection of previous surgery. Recording about the scar of the previous surgery, the hernia defect its position, size, shape, cough impulse, reducibility and the overlying skin over the defect were made. Other co-morbidities like anaemia, jaundice, hypertension, obesity, physical stress were recorded. Behavioral aspects like smoking, alcohol and tobacco uses were also asked from the patients.

All relevant data entered into predesigned proforma was analysed using Microsoft SPSS software for windows TM version 20.0, IBM TM Corp NY and Microsoft excel TM, Microsoft Inc USA. Logistic regression analysis was done to predict the odds of being the risk factor to develop incisional hernia in different earlier surgeries. P value <0.05 is considered as statistically significant.

RESULTS

In present study total 100 patients were enrolled with the mean age of study subjects was 47.27±13.16 years. Table 1 showed the socio-demographic details of study subjects with incisional hernia. Around two-third 64% were females. 41% of the study subjects were living in rural areas and 59% were in urban areas. Socioeconomic status showed that 27% belongs to lower class of socioeconomic profile (as per modified GB Prasad), 37% belongs to lower middle class and 36% belongs to middle class. Occupational status showed that, 61% were house wives and 17% were farmers.

Table 1: Socio-demographic information of study subjects.

	Frequency	Percentage (%)
Age (in years)		
20-40	37	37
41-60	46	46
61-80	17	17
Sex		
Male	36	36
Female	64	64
Place of residence		
Rural	41	41
Urban	59	59
Education		
Illiterate	2	2
Middle school	12	12
Higher secondary	62	62
Graduate	24	24
Marital status		
Married	96	96
Unmarried	4	4
Socioeconomic class		
Lower class	27	27
Lower middle class	37	37
Middle class	36	36
Occupation		
Farmer	17	17
Housewife	62	62
Informal work	9	9
Formal work	12	12
Total	100	100

Table 2 showed that 40% cases were perforation and obstruction, 35% were LSCS, 10% were hysterectomy and 5% were cholecystectomy. Nature of surgery showed that 22% of the surgery were elective and 78% of the surgery was emergency. Nature of surgery 22% of the surgery were elective and 78% of the surgery was emergency.

Table 2: Type of surgical procedure later develop to Incisional hernia and nature of surgery.

	Frequency	%
Type of surgical procedure		
Surgery for perforation and obstruction	40	40
Cholecystectomy	5	5
Hysterectomy	10	10
Incisional hernia	1	1
Iliostomy closure	1	1
LSCS	35	35
Sigmoid volvulus	2	2
Umblical hernia	2	2
Deroofing hydratid cyst	2	2
Gastrojejunostomy	1	1
Bilateral ovarian mass excision	1	1
Total	100	100
Nature of surgery		
Nature		
Elective	22	22
Emergency	78	78
Total	100	100

Table 3 showed different risk factors in study subjects. Behavioral risk factors profile showed that 31% were alcoholic, 27% were smokers, and 20% were tobacco users. Modifiable risk factors profile showed that, 48% were in pre-obese category of BMI, 5% were obese class I of obesity scale. Hypertension status in study subjects showed that 3% had high normal, 19% had grade I hypertension, 12% had grade II hypertension and 2% had Grade III hypertension. Diabetic profile showed that 48% of study subjects were diabetic and 12% were having constipation.

Medical risk factors in study subjects showed that 64% female were having pregnancy.25% had history of prolong cough, 35% had surgical site infection, 37% had mild anemia and 8% had moderate anemia.

Physical risk factors profile showed that only 2% of the study subjects were exposed to radiation, 11% of the study subjects were exposed to heavy physical stress, 36% were exposed to moderate physical stress and 53% were exposed to sedentary work.

Clinical presentation of study subjects showed that 63% had swelling, 33% had swelling/pain and 4% had obstruction.

Table 4 showed the defect size in study subjects (USG finding). The mean defect size was 4.60 cm. 40% of the study subjects had defect size 2-3 cm, 24% had 1-2 cm, 17% had 3-4 cm, 12% had 4-5 cm, 5% had 5-6 cm and 2% had more than 6 cm.

Table 3: Risk factors profile in study subjects.

Risk factors	Frequency	%
Behavioral risk factors profile in study subjects		
Alcoholic	31	31
Smoking	27	27
Tobacco user	20	20
Modifiable risk factors in study subjects		
BMI		
Normal weight (BMI 18.5-24.9)	47	47
overweight (BMI 25-29.9)	48	48
Obese class I (BMI 30-34.9)	5	5
Hypertension		
High normal (130-139/85-89)	3	3
Grade I (140-159/90-99)	19	19
Grade II (160-179/100-109)	12	12
Grade III (≥180/>110)	2	2
Diabetes	48	48
Constipation	12	12
Medical risk factors in study subjects		
Pregnancy	60	60
Prolong cough	25	25
Surgical site infection	35	35
Anemia		
Mild (9-11 gm/dl)	37	37
Moderate (7-9 gm/dl)	8	8
Physical risk factors in study subjects		
Exposure to radiation	2	2
Physical stress		
Heavy	11	11
Moderate	36	36
Sedentary	53	53

Table 4: Defect size in study subjects (USG finding).

Size (cm)	Percentage (%)	Mean size (cm)
1-2	24	1.61
2-3	40	2.8
3-4	17	3.63
4-5	12	4.67
5-6	5	6.08
>6	2	9.35
Total	100	4.69

Table 5 showed the risk factor for developing incisional hernia in perforation cases. Risk factors which have high odds ratio were smoking (OR 20.213, p value 0.04), anemia (OR 3.321, p value 0.08) and moderate physical stress (OR 2.906, p value 0.122). In all the risk factor smoking was statistically significant also (p value 0.05). Table 6 showed the risk factor for developing incisional hernia in LSCS cases. Risk factors which have high odds ratio were obese (OR 10.82, p value 0.133), overweight (OR 2.274, p value 0.244) and constipation (OR 1.160, p value 0.754). In all the risk factor hypertension, prolong cough were statistically significant (p value <0.05).

Table 5: Risk factor for developing incisional hernia in perforation and obstruction cases.

Risk factors for perforation	Odds ratio (OR)	Std. Err.	P value	95% Conf. interval	
Alcohol use	1.570	1.725	0.681	0.182	13.523
Smoking	20.213	30.554	0.047	1.045	391.125
Tobacco use	0.507	0.719	0.632	0.031	8.195
Overweight	0.242	0.160	0.032	0.066	0.882
Obese	0.658	0.869	0.751	0.050	8.750
Diabetes	1.206	0.831	0.786	0.312	4.655
Hypertension	2.319	1.769	0.27	0.520	10.344
Constipation	1.640	1.844	0.66	0.181	14.847
Prolong cough	1.778	1.106	0.355	0.525	6.019
Anemia	3.321	2.314	0.085	0.847	13.016
Surgical site infection	0.658	0.403	0.495	0.198	2.188
Moderate physical stress	2.906	2.005	0.122	0.752	11.235
Heavy physical stress	1.067	1.322	0.958	0.094	12.097
Cons	0.117	0.096	0.009	0.023	0.588

Table 6: Risk factor for developing incisional hernia in LSCS cases.

Risk factors for LSCS	Odds ratio (OR)	Std. err.	P value	95% Conf. interval	
Overweight	2.274	1.604	0.244	0.571	9.062
Obese	10.820	17.133	0.133	0.486	241.018
Diabetes	0.732	0.568	0.687	0.160	3.353
Hypertension	0.048	0.047	0.002	0.007	0.326
Constipation	1.435	1.652	0.754	0.150	13.701
Prolong cough	0.231	0.177	0.056	0.052	1.036
Anemia	0.298	0.219	0.099	0.071	1.255
Surgical site infection	1.160	0.762	0.821	0.320	4.202
Moderate physical stress	0.694	0.512	0.62	0.164	2.944
Cons	6.466	5.772	0.037	1.124	37.189

Table 7: Risk factor for developing incisional hernia in cholecystectomy cases.

Risk factors for cholecystectomy	Odds ratio (OR)	Std. Err.	P value	95% Conf. interval	
Alcohol use	0.845	1.776	0.936	0.014	51.929
Smoking	0.589	1.594	0.845	0.003	118.645
Tobacco	2.521	5.687	0.682	0.030	209.813
Overweight	1.111	1.282	0.928	0.116	10.673
Diabetes	0.703	0.796	0.756	0.076	6.474
Hypertension	0.695	1.059	0.811	0.035	13.792
Prolong cough	0.747	0.816	0.789	0.088	6.358
Anemia	0.980	1.255	0.988	0.080	12.060
Surgical site infection	1.271	1.383	0.826	0.151	10.724
Exposure of radiation	22.277	39.497	0.08	0.690	719.516
Moderate physical stress	1.543	2.015	0.74	0.119	19.952
Cons	0.056	0.079	0.041	0.004	0.886

Table 7 showed the risk factor for developing incisional hernia in cholecystectomy cases. Risk factors which have high odds ratio were exposure to radiation (OR 22.277, p value 0.08), tobacco uses (OR 2.521, p value 0.682) surgical site infection (OR 1.271, p value 0.151) and overweight (OR 1.111, p value 0.928). Table 8 showed the risk factor for developing incisional hernia in Hysterectomy cases. Risk factors which have high odds ratio were hypertension (OR 20.638, p value 1.760), prolong cough (OR 1.536, p value 0.241) and anemia (OR 1.199, p value 0.179). In all the risk factor hypertension was statistically significant (p value <0.05).

Table 8: Risk factor for developing incisional hernia in hysterectomy cases.

Hysterectomy	Odds ratio (OR)	Std. Err.	P value	95% Conf. Interval	
Overweight	0.438	0.434	0.405	0.063	3.056
Diabetes	0.425	0.461	0.43	0.051	3.555
Hypertension	20.638	25.925	0.016	1.760	242.061
Constipation	0.633	1.049	0.783	0.025	16.303
Prolong cough	1.536	1.452	0.65	0.241	9.797
Anemia	1.199	1.164	0.852	0.179	8.040
Surgical site infection	0.711	0.579	0.676	0.144	3.503
Moderate physical stress	0.319	0.390	0.35	0.029	3.507
Cons	0.152	0.178	0.109	0.015	1.520

DISCUSSION

This cross sectional observational study a total of 100 patients with ventral incisional hernia were evaluated for the prevalence of risk factors and clinical presentational of ventral incisional hernia was conducted in surgery department of Dr. B.R.A.M. Hospital, Raipur Chhattisgarh.

In present study the mean age of study subjects was 47.27±13.16 years. Maximum 46% of study subjects were b/w 41-60 years age group and 64% of the study subjects were female. Kumar et al did a similar study and patient age group of 30-60 years found to have highest incidence, females outnumbered the males with the ratio of 4:1. Llaguna et al found that mean age was 62 years and 52% were male.[5,9]

In present study type of major surgical procedure later develops to Incisional hernia showed that 40% cases were perforation, 35% were LSCS, 10% were hysterectomy and 5% were cholecystectomy. Agbakwuru et al reported that index surgeries leading to the hernias were emergency caesarian section (59.1%), emergency exploratory laparotomy (13.6%), and elective surgeries (27.3%).[7] In present study out of 100 ventral incisional hernia cases, 22% of the surgeries were elective and 78% of the surgeries were emergency. Sidhu et al reported that there were equal numbers of elective (n=22) and emergency (n=23) operations that developed an incisional hernia.[3]

In present study the behavioral risk factors profile of study subjects showed that out of 100 study subjects 31% were alcoholic, 27% were smokers and 20% were tobacco users. Smoking (OR 20.213, p value.0.04) was the major risk factor for developing incisional hernia in (40/100) perforation cases. Obesity (BMI 30-34.9) was the major risk factor for (OR 18.820) for incisional hernia in LSCS cases. Surgical site infection was also there in 35% of study subjects. In present study 25% of the study subjects had history of prolong cough and 75% had no history of prolong cough. Prolong cough (OR 1.535) was the risk factor for development of incisional hernia in Hysterectomy cases. Risk factor for developing incisional hernia in cholecystectomy cases which have high odds ratio were exposure to radiation (OR 22.277), tobacco uses (OR 2.521) surgical site infection (OR 1.271) and overweight (OR 1.111).

Weissler et al evaluated the development of incisional hernia risk model after colectomy significant risk factors were obesity (odds ratio=1.49; p<0.0001), and alcohol abuse (odds ratio=1.39; p=0.010). Shah et al found that obesity, smoking, cough and diabetes were implicated as the common etiological factors for the development of ventral hernias. Sorensen et al reported that smokers had a 4-fold higher risk of incisional hernia (odds ratio (OR), 3.93 (95% confidence interval (CI), 1.82-8.49)) independent of other risk factors and confounders.[6,8,13]

Nagaraju et al revealed that obesity is a common predisposing factor. Obese female has an increased predilection toward incisional hernia. Obesity is associated with more risk of post-operative wound infection and both resulted in an increased incidence of incisional hernia.[12] Walming et al also reported that BMI 30–35 was a risk factor for incisional hernia.[14] Degloorkar et al reported that wound infection was the risk factor in 26% patients. Repeat surgery history was given by one patient.[15]

In present study modifiable risk factors profile of study subjects showed that 46% of the study subjects had their high blood pressure, 48% were diabetic and 12% had constipation and 45% of had anemia. Hypertension (OR 2.319), anemia (or 3.321), constipation (or 1.640) and diabetes were the risk factors for development of incisional hernia in perforation cases. Constipation (OR 1.435) was also the risk factor for development of incisional hernia in LSCS cases. Hypertension (OR 20.638) and anemia (OR 1.199) were also the risk factor for development of incisional hernia in Hysterectomy cases. Sidhu et al revealed that on univariable analysis diabetes (OR=2.73, p value=0.004) and hypertension (OR=2.17, p value=0.016) were identified as independent risk factors for ventral hernia development.[3] A study by Beltrán et al to identify risk factors for development of incisional hernia were female gender (p=0.011), diabetes (p<0.0001) and wound infection (p=0.034).[10] Hornby et

al reported that diabetes mellitus (3.54; 1-12.56) significantly increased the risk of incisional hernia.[11] Jaykar et al did a clinical study of ventral hernia. Obesity and constipation were found to be the major predisposing risk factors.[16]

CONCLUSION

In this paper, various risk factors, clinical presentation of incisional hernia were evaluated in all the cases which were patients attending at outpatient department of surgery and those admitted in surgery ward of Dr. B.R.A.M. Hospital Raipur Chhattisgarh. Incisional hernia is more common in female than males and in cases above the age of 40 years. Incisional hernia is more common in patients who underwent the previous surgery on an emergency basis especially in perforation, obstruction and LSCS cases. Behavioral risk factors associated with incisional hernia are smoker, alcoholic and tobacco user. Modifiable risk factors are Obesity, hypertension, diabetes, constipation, prolong cough and anemia. Medical risk factors are h/o prolong cough, surgical site infection. Two third of the study subjects had swelling and one third had swelling with pain. Size of the defect can vary in our study ranged from 1 cm to >10 cm diameter.

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