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The Efficacy of New Scoring System to Predict Abdominal Wound Dehiscence Following Laparotomy

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Abstract: ***Introduction: Abdominal wound dehiscence is the partial or total disruption of the previously approximated wound edges with or without the protrusion or evisceration of abdominal contents, due to a failure of proper wound healing. This typically appears 7 - 10 days post operatively. It is a common complication of laparotomy in the Indian setup. It is associated with substantial morbidity and mortality. Hence, we have developed a scoring system which can predict wound dehiscence following elective and emergency laparotomy and prophylactic measures can be taken preoperatively to prevent this. The objectives include identification of independent risk factors for abdominal wound dehiscence and to develop a scoring system to recognize high risk patients. Materials and Methods: An observational, longitudinal, analytical and prospective study was done for a period of one year from May 2023 to May 2024 in Shimoga Institute Of Medical Science, Shimoga, Karnataka, India. The study conducted includes 100 patients who underwent laparotomy under elective and emergency basis. Pre - operative and post - operative examination was done and scoring was done for 14 indices. Patients were followed up for 30 days post operatively. Results: In the study of 100 patients 57 were operated on emergency basis and 43 on elective basis. Out of total cases 13 patients had score of more than 10 (high risk) and 87 patients with low risk. Out of the high risk cases 6 had burst abdomen. Conclusion: The new scoring system helps identify risk factors leading to burst abdomen, hence useful to take preventive measures in high risk cases to decrease morbidity and mortality of patients.***

Keywords: Abdominal wound dehiscence, Emergency laparotomy, Scoring system, abdominal complications, high risk

1. Introduction

Abdominal wound dehiscence is one of the most serious known postoperative complications in Inian setup. In about 20 - 45% of cases, evisceration becomes a significant risk factor carrying substantial morbidity and mortality. It is also associated with death during the perioperative period. The wound dehiscence rate reported in the international literature varies from 1% - 2.6%[1]. In many cases an abdominal wound bursts open and viscera are extruded mostly between 7th and 10th day after operation. In addition there is an increase in the cost of the care both in terms of increased hospital stay, nursing and manpower cost in managing the wound dehiscence and its complication[8 - 12]. The wound dehiscence starts to when the sutures opposing the deep layers tear through or even become untied. Laparotomy wound dehiscence is a term used to describe the partial or total disruption of the previously approximated wound edges with or without the protrusion or evisceration of abdominal contents, due to a failure of proper wound healing. Important risk factors for wound dehiscence include malnutrition, old age, anemia, hypo - albuminemia, wound infection, ascites, obesity, steroid use, COPD, pneumonia, diabetes mellitus, post - operative coughing, cerebrovascular accident with residual deficit, prolonged ileus, malignancy and immunocompromised state emergency operation and prolonged operative time.

The two scoring systems for predicting burst abdomen VAMC Scoring system and ROTTERDAM's scoring system.

Aims and Objectives of the Study

To identify independent risk factors for abdominal wound dehiscence and to develop a scoring system to recognize high risk patients.

2. Material and Methods

- Place of study: Department of general surgery, Shimoga institute of medical science, MCGANN DISTRICT HOSPITAL
- Duration of study: 1 year, from May 2023 to May 2024
- Study Design: Prospective, observational longitudinal and analytical study.
- Sample size: 100 cases

Inclusion Criteria

Inclusion criteria being, patients of age >18 years and of either sex who have undergone laparotomy and are willing for investigation and treatment

Exclusion Criteria

All patients with Incisional hernia, Female patients who developed wound dehiscence after any gynaecological procedures and patients who refuse investigations and treatment were excluded.

Methods of Collecting Data

Detailed history taking.
General physical examination.
Systemic examination.
Investigations.

Assessing the risk by score variables.
Post - operative score.
Follow up for 1 month.

New Scoring System		
Patient Factors		
S. No	Indices	Score
1.	Age	
	<40 Yrs	0
	40 - 60 Yrs	1
	>60 Yrs	2
2.	Co - Morbidities	
	COPD	1
	Diabetes Mellitus	1
	Chronic Steroid Intake	1
	Hypoalbuminemia	1
3.	BMI	
	<29.5	0
	>29.5	1

Bio - Chemical Factors		
S. No.	Indices	Score
1.	Hemoglobin (mg/dl)	
	>11	0
	9 - 11	1
	<9	2
2.	Serum Albumin (mg/dl)	
	>3.5	0
	<3.5	1
3.	Serum Creatinine (mg/dl)	
	<1.3	0
	>1.3	1
4.	Total Bilirubin (mg/dl)	
	<1.2	0
	>1.2	1
Operative Parameters		
S. No.	Indices	Score
1.	Peritonitis	
	Without	0
	With	1
2.	Malignancy	2
3.	Type Of Procedure	
	Elective	0
	Emergency	1
4.	Type Of Incision	
	Upper Abdomen	1
	Lower Abdomen/Both	2
5.	Duration Of Surgery (Hours)	
	<1	0
	1 - 2	1
	>2	2
6.	Experience of the Surgeon (Years)	
	>20 YRS	0
	11 - 20 YRS	1
	0 - 10 YRS	2
Minimum Score		2
Maximum Score		22
Score >10	High Risk	

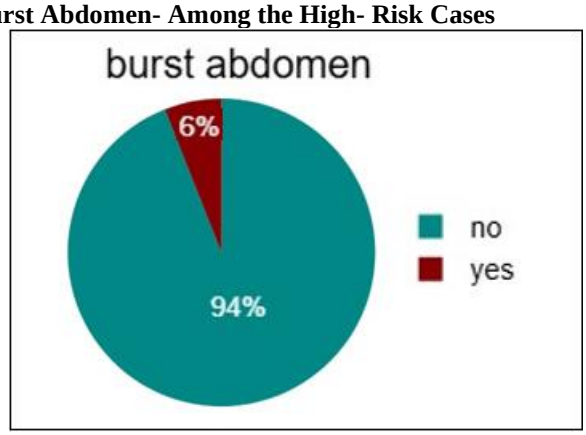
3. Results

The study conducted includes 100 patients who underwent laparotomy under emergency and elective basis with midline incision. Pre operative and post - operative examination was done and scoring was done for 14 indices. Patients were followed up for 1 month post operatively.

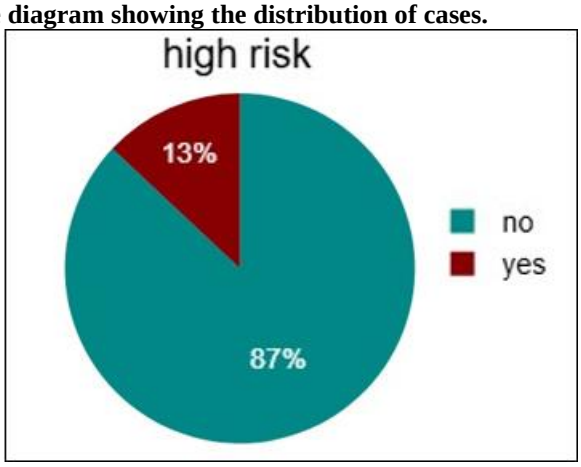
The minimum age of the patients in the study is 21years and maximum being 67 years with mean age being 43.51years

	Age
Mean	43.51
Std. Deviation	12.28
Minimum	21
Maximum	67

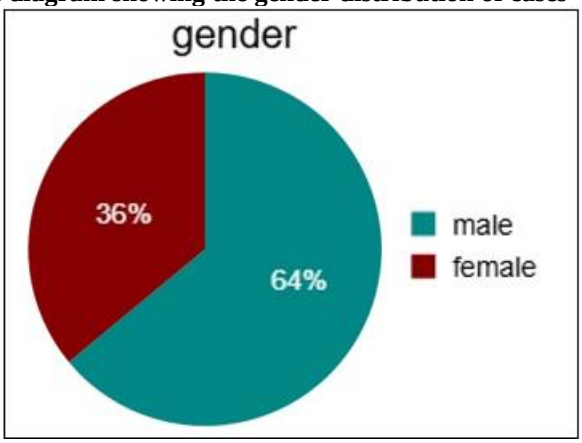
Burst Abdomen- Among the High- Risk Cases



Pie diagram showing the distribution of cases.



Pie diagram showing the gender distribution of cases



Pie diagram showing the case distribution among total cases.

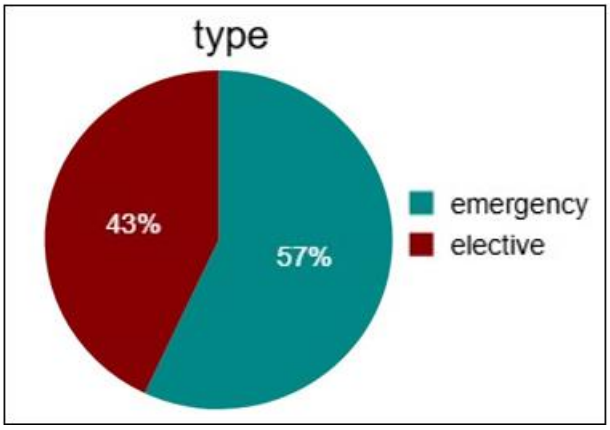


Table showing distribution of peritonitis among the cases

Malignancy	Frequency
No	82
Yes	18
Total	100
Total	100

Table showing distribution of malignancy among the cases

Peritonitis	Frequency
No	57
Yes	43
Total	100
Total	100

Table showing distribution of burst abdomen among high - risk cases

		High Risk		
		No	Yes	Total
Burst Abdomen	No	87	7	94
	Yes	0	6	6
	Total	87	13	100

4. Discussion

In the study conducted among 100 patients, 64 patients were males and 36 were females. Among the high - risk patients, 11 were males and 2 were females. Among the total number of Burst Abdomen cases 5 were males and 1 was female.

Most of the patients who had burst abdomen were between the age group of 50 - 60 years. None of the patients below 30 years had abdominal wound dehiscence. In the study 33% were in the age group 50 - 60 years. Mean age of the subjects was 43.51. The incidence of burst abdomen in the study is 6%. Among 100 total cases, 6 cases developed Burst abdomen. The total hospital stay of these patients was approximately 6.2 (mean days) more than the patients without burst abdomen. Mortality rate in the study 2%, 2 patients died because of sepsis. The incidence of burst abdomen was seen most commonly in emergency laparotomy. Among 100 patients, 13 patients had score more than 10 with 6 patients developing burst abdomen.

The most common association with burst abdomen was COPD, peritonitis, hypoalbuminemia, anemia, emergency laparotomy, diabetes mellitus, malignancy. Patients who undergo emergency surgery are generally in worse condition on presentation and nutritional state of the patient will be poor, the chance of contamination of the surgical field is higher when compared to elective surgery. The performance of the surgeon might be affected at night, which could lead to suboptimal closure of the abdomen at the end of the operation[1]. Hence, the scoring system helps to take preventive measures in high risk cases, if the score is more before closing the abdomen such as special suture technique and dressing. The duration of surgery and experience of the operating surgeon have significant impact on the development of wound dehiscence. Intraabdominal sepsis itself leads to infection spreading to the fascial layers of anterior abdominal wall[1].

Patients with chest infection require prolonged ventilator support and repeated coughing causes increase in intraabdominal pressure which results in breakage of the suture, undoing of the knots or pulling through the tissue [13].

All the cases of burst abdomen had score more than 10 with an average score of 13.2. Burst abdomen occurred between post - operative days of 6 to 10.

There was a statistically significant relationship between burst abdomen and high risk, χ^2 (1) = 42.72, p = <.001, Cramer's V = 0.65.

A Fisher exact test was performed between burst abdomen and high risk. There was a statistically significant relationship between burst abdomen and high risk, p = <.001.

Total Score at cut off of 10 had Sensitivity of 100%, Specificity of 92.55%, PPV of 50.27%, NPV of 100%.

5. Conclusion

The new scoring system can be used to predict the development of abdominal wound dehiscence in elective and emergency surgeries. The scoring system includes hypoproteinemia, anemia, duration of surgery, perinonitis, diabetes mellitus, COPD, malignancy, steroid intake, BMI of the patient, duration of surgery, experience of operating surgeon and age as independent risk factors for abdominal wound dehiscence following emergency and elective laparotomy. It can be used to identify patients who are at risk for developing burst abdomen. Hence preventive measures and extra care can be taken pre - operatively and post - operatively among high risk patients, to decrease morbidity and mortality and to improve the financial, social, psychological state of the patient.

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