IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 10 Ver. I (Oct. 2015), PP 47-54
www.iosrjournals.org

Abdominal wound dehiscence- A look into the risk factors

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Abstract:
Background and Objectives: *Abdominal wound dehiscence is a very serious post operative complication associated with high morbidity and mortality. This study is conducted in 36 patients admitted in Sri Venkateswara Ramnarain Ruia Government General Hospital, attached to Sri Venkateswara Medical College, Tirupati, who have developed postoperative abdominal wound Dehiscence.*
The Aim *of this study is to :1. To identify the risk factors involved in causing abdominal wound dehiscence. 2. To identify the disease involved in causing abdominal wound dehiscence. 3. To study incidence of wound dehiscence in elective and emergency operations and also incidence based on type of operation. 4. To suggest preventive measures for wound dehiscence.*
Methods: *All cases which developed wound dehiscence after operation and all cases with wound dehiscence in S.V.R.R. Government general Hospital. After taking proper consent a detailed clinical history was taken regarding the significant risk factors and whether they have undergone elective or emergency operation, the type of disease involved. A total of 36 cases are included in the study.*
Results: *The incidence of abdominal wound dehiscence is more common in male patients around the age group of 45 years. Patients with peritonitis due to duodenal and appendicular perforation carried higher risk of abdominal wound dehiscence Patients with surgical sounds classified as contaminated and dirty wound has higher incidence of abdominal wound dehiscence. Post operative abdominal wound dehiscence is more common in patients operated in emergency. Patients with anemia (Hb% < 10g%) and BMI more than 22 had higher incidence of abdominal wound dehiscence.*
Conclusion: *Postoperative abdominal wound dehiscence can be prevented by improving the nutritional status of the patient, strict aseptic precautions, improving patients respiratory pathology to avoid postoperative cough and by proper surgical technique.*
Key words: *Wound dehiscence; midline incision; emergency operation; contaminated wounds.*

I. Introduction

Wound dehiscence is described as partial or complete disruption of an abdominal wound closure with or without protrusion and evisceration of abdominal contents. Dehiscence of wound occurs before cutaneous healing.[1] It is among the most dreaded complications faced by surgeons and of greatest concern because of risk of evisceration, the need for immediate intervention, and the possibility of repeat dehiscence, surgical wound infection, and incisional hernia formation. Abdominal wound dehiscence (burst abdomen, fascial dehiscence) is a severe postoperative complication, with mortality rates reported as high as 20%. Incidence as described in literature ranges from 0.4% to 3.5%. Various risk factors are responsible for development of wound dehiscence such as emergency surgery, intraabdominal infection, malnutrition (hypoalbuminemia, anaemia), advanced age, systemicdiseases, etc. Good knowledge of these risk factors is mandatory for prophylaxis. Patients identified as high risk benefit from close observation and early intervention. The need for this study is to highlight the risk factors for wound dehiscence, the incidence rate in this hospital and remedial measures to prevent or reduce the incidence of wound dehiscence and to predict the outcome of the management of abdominal wound dehiscence. This will certainly reduce mortality and morbidity in the form of prolonged hospital stay, increased economic burden on health care resources and long term complications of incisional hernia.

II. Aims And Objectives

1. To identify the risk factors involved in causing abdominal wound dehiscence.
2. To identify the disease involved in causing abdominal wound dehiscence.
3. To study incidence of wound dehiscence in elective and emergency operations and also incidence based on type of operation.
4. To suggest preventive measures for wound dehiscence.

III. Methodology

The clinical study of post operative abdominal wound dehiscence was conducted in Department of General Surgery at Sri Venkateswara Ramnarain Ruia Government General Hospital, Tirupati during the period from the I.E.C approval to September 2014.

3.1 Inclusion criteria:

1. Patients of age > 14 years and of either sex who have developed abdominal wound dehiscence.
2. Patients who have developed abdominal evisceration
3. Patients who have undergone either emergency or elective abdominal operations and developed wound dehiscence.
4. Patients with abdominal wound dehiscence who are willing for investigation and treatment.

3.2 Exclusion criteria:

1. All patients with wound dehiscence who are less than 14 years of age.
2. All patients with incisional Hernia.
3. All patients with wound dehiscence on sites other than the abdomen.
4. Female patients who developed wound dehiscence after any gynecological procedures.
5. All patients who refuse investigations and treatment.
6. All patients who have developed wound dehiscence after second surgery.

This is a Prospective and observational study involving all those who have developed abdomen wound dehiscence after initial surgery in Sri Venkateswara Ramnarain Ruia Government General Hospital, attached to Sri Venkateswara Medical College, Tirupati. An elaborative study of these cases with regard to date of admission, clinical history regarding the mode of presentation, significant risk factors, investigations, time of surgery and type of surgery and postoperatively, study of diagnosis and day of diagnosis of wound dehiscence is done till the patient is discharged from the hospital. In history, details regarding presenting complaints, duration, associated diseases, significant risk factors like, anaemia, malnutrition, obesity, chronic cough, smoking, alcoholism were noted. Details regarding the clinical diagnosis, whether the operation was conducted in emergency or electively, was noted. Intraoperative findings noted and classification of surgical wounds done accordingly. The type of surgical procedure done was recorded. Postoperatively the wound dehiscence was diagnosed according to the definitions given in oxford text book of surgery 2nd edition.[1] The day of diagnosis of wound dehiscence is noted. The collected data is analysed and statistics were made according to need.

Software: Statistical software mainly SPSS 11.0 and Systat 8.00 was used for the analysis of the data and Microsoft word and excel have been used to generate graphs, tables etc.

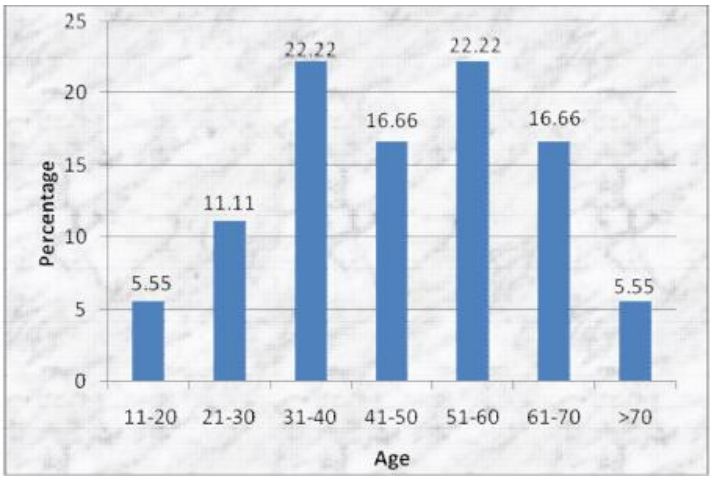
IV. Results

Age wise distribution of study subjects:

Table – 1: Incidence Of Abdominal Wound Dehiscence In Different Age Groups

Age	No.of cases	Percentage
11-20	2	5.55
21-30	4	11.11
31-40	8	22.22
41-50	6	16.66
51-60	8	22.22
61-70	6	16.66
>70	2	5.55
	36	100

In this study majority of patients belonged to the age group between 31 – 40 years, youngest patient was 18 year old and oldest patient was 75 years. The mean age of patients affected was 45.55.



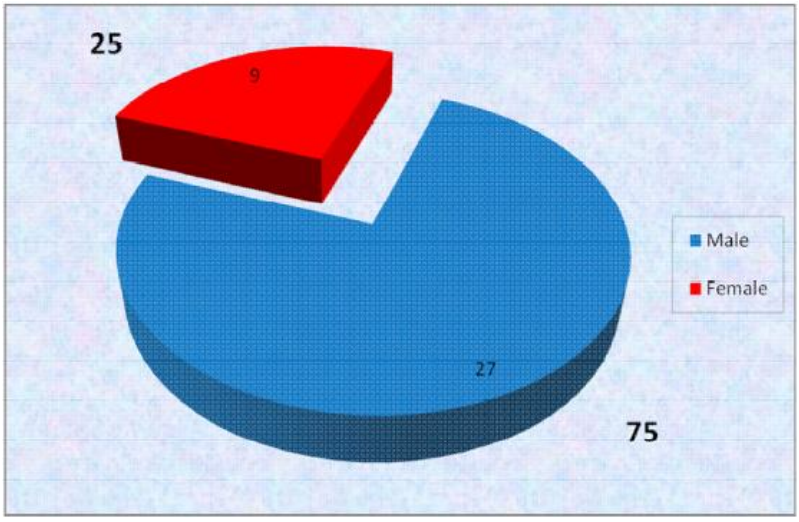
Graph – 1 : Incidence Of Abdominal Wound Dehiscence In Different Agegroups

Gender wise distribution:

Table – 2: Incidence of Abdominal Wound Dehiscence in Different Gender

Gender	No. of Cases	Percentage
Male	27	75
Female	9	25

Out of 36 cases 27 were male and 9 were female.



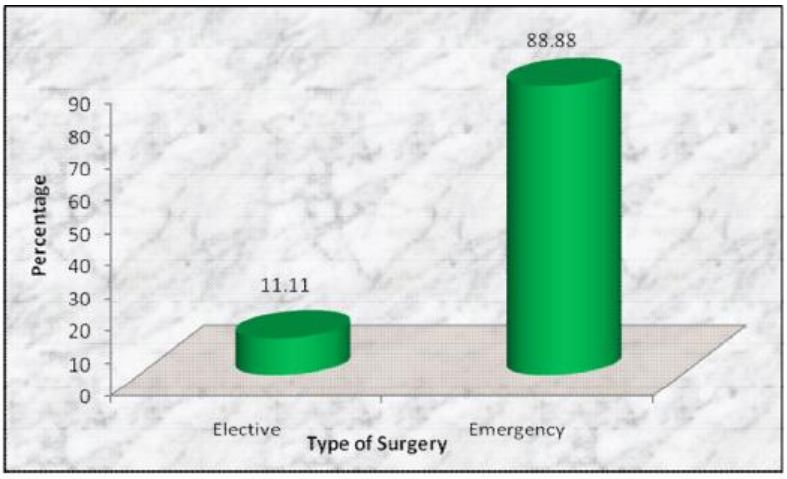
Graph – 2: Incidence Of Abdominal Wound Dehiscence In

Different Gender

Table – 3 : Effect Of Emergency Surgery In Development Of abdominal Wound Dehiscence

		No.of cases	percentage
surgery	elective	4	11.11
	emergency	32	88.88

In the present study, out of 36 cases, 32 cases (88.88%) were operated as emergency surgery and 4 cases (11.11%) as elective surgery ($P < 0.001$, S).

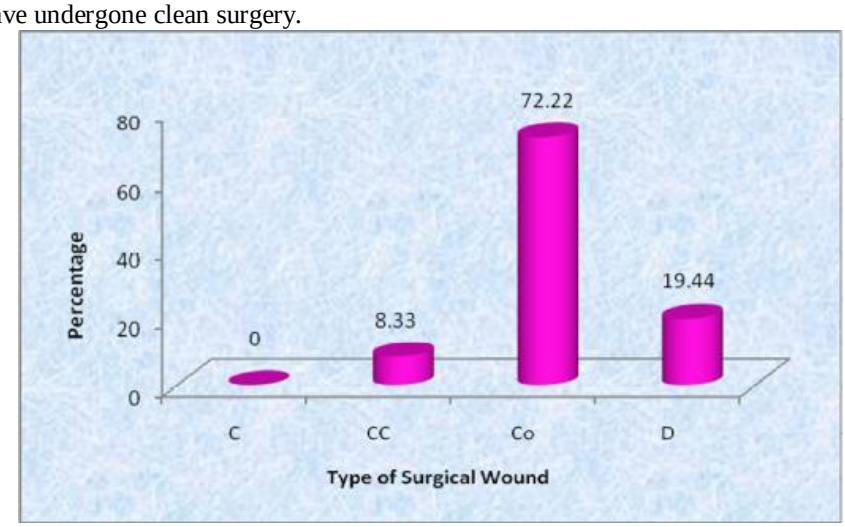


Graph – 3: Effect Of Emergency Surgery In Development Of Abdominal Wound Dehiscence

Table – 4 : Type Of Surgical Wound Developing Abdominalwound Dehiscence

Type of surgical wound	No.of cases	percentage
Clean	**0**	**0**
Clean contaminated	**3**	**8.33**
Contaminated	**26**	**72.22**
Dirty	**7**	**19.44**

26 cases i.e. (72.22%) in the study have undergone surgery which is classified as contaminated and none of them have undergone clean surgery.

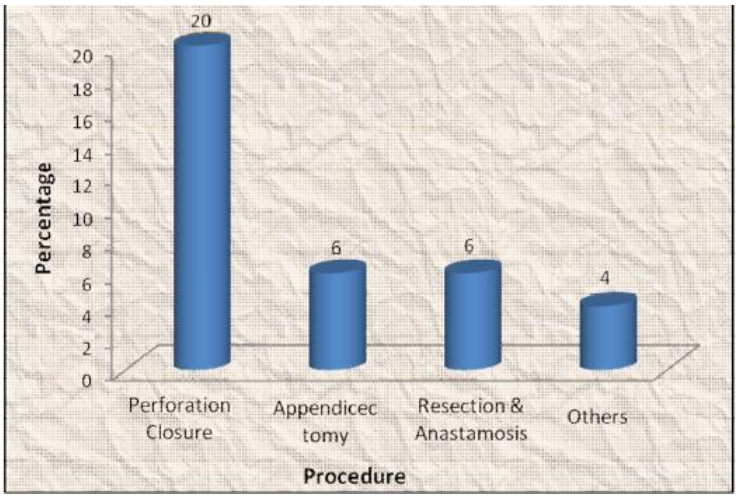


Graph – 4: Type Of Surgical Wound Developing Abdominal Wound Dehiscence

Table – 5 : Various Abdominal Procedures Leading To Abdominal Wound Dehiscence

Procedure	No.of cases
Perforation closure	20
Appendicectomy	6
Resection and anastomosis	6
Others	4
Total	36

Out of 36 cases performed, 20 cases included procedure of perforation closure, 6 cases included resection and anastamosis and 6 cases of Appendicectomy for appendicular pathology.

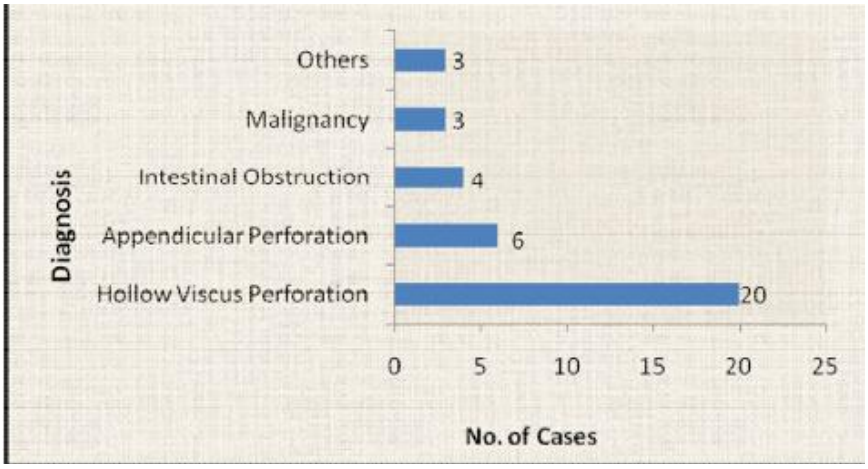


Graph – 5: Various Abdominal Procedures Leading To Abdominal Wound Dehiscence

Table – 6 : Distribution Of Patients With Abdominal Wound Dehiscence According To Underlying Intraabdominal Pathology

Diagnosis		No.of cases
Hollow viscus perforation		20
Duodenal ulcer	12	
Others[p,jp,gp]	8	
Appendicular perforaton		6
Intestinal obstruction		4
Malignancy		3
Others		3
Total		36

Out of 36 cases studied, 20 patients were diagnosed to have peritonitis secondary to hollow viscus perforation, 6 patients had appendicular pathology, 4 patients with intestinal obstruction and 3 patients were having malignancy.

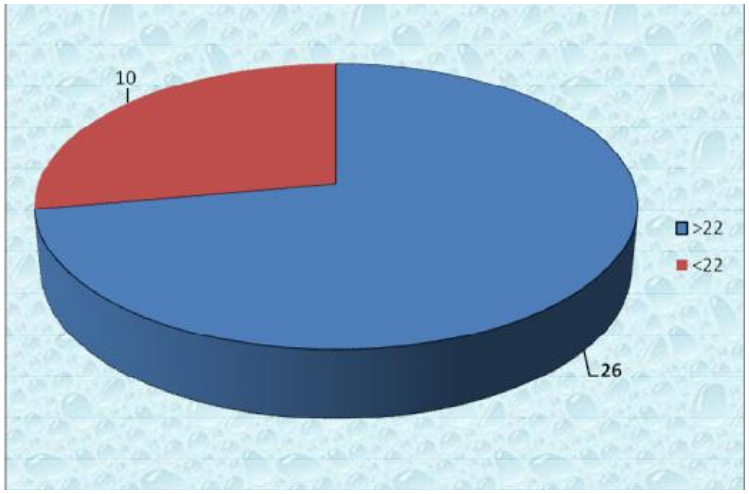


Graph – 6: Distribution Of Patients With Abdominal Wound Dehiscence According To Underlying Intraabdominal Pathology

Table–7 : Frequency Of Abdominal Wound Dehiscence According To Body Mass Index

BMI	No.of cases
>22	26
<22	10

Out of 36 cases studies, 26 patients were having their BMI above 22 and 10 patients were having their BMI 22 and below ($p < 0.001$, S).

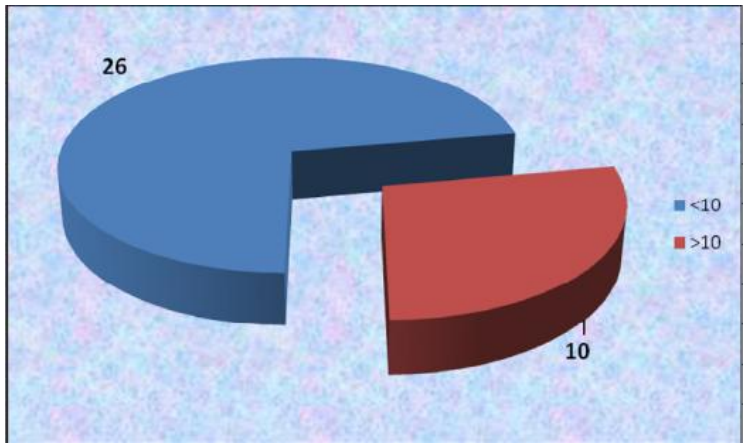


Graph – 7: Frequency Of Abdominal Wound Dehiscence According To Body Mass Index

Table – 8 : Prevalence Of Abdominal Wound Dehiscence In Relation To Anemia

Hb%	No.of cases
<10	26
>10	10

Out of 36 cases studied, 26 patients were having Hb% < 10 gm% and 10 patients were having 10gm% and more than 10gm% ($p < 0.001$, S).



Graph – 8: Prevalence Of Abdominal Wound Dehiscence In Relation To Anemia

V. Discussion

In this clinical study of abdominal wound dehiscence, all patients who developed abdominal wound dehiscence after operation in Sri Venkateswara Ramnarain Ruia Government General Hospital, Tirupati were studied. A total of 36 cases were included. In a study conducted in 2007, 3500 abdominal laparotomies were performed in department of surgery of Mesologgi General Hospital and Urban Community Teaching Hospital of 150 beds, showed the incidence of abdominal wound dehiscence occurs more commonly in male gender 60%. [2] In a study conducted on 50 patients admitted to the general surgery department of Rajindra Hospital, Patiala, India, who developed wound disruption following laparotomy showed wound dehiscence occurs more commonly in male gender of 74%.[3] In the present study males predominated the picture with the ratio of 3:1. This male predominance may be due to the higher incidence of peptic ulcer perforation and intestinal obstruction in male sex (78%).

Table 9 : Comparison of Male Gender Predominance of various studies

Garg Ramaneesh, et al35	Spiliotis J et al30	Present Study
74%	60%	75

A study conducted in the hospital of Dr. Joseph, Trueta, Spain on 12,622 patients who underwent laparotomy showed the mean age of patients with wound dehiscence was 70 years.[4] In a study conducted in 2007, 3500 abdominal laparotomies were performed in department of surgery of Mesologgi General Hospital and Urban Community Teaching Hospital of 150 beds, showed the mean age of 69.5 years. In a study conducted on 50 patients admitted to the general surgery department of Rajindra Hospital, Patiala, India, who developed wound disruption following laparotomy the mean age for wound dehiscence was 41.6 years. In the present study the mean age of patients shown to be 45.5 years as the incidence of appendicular perforation and duodenal ulcer perforation is more common in this age group.

Table 10 : Comparison of Mean Age Presentation of various studies

Rodriguez-Hermosa JI et al[4]	70 Years
Spiliotis J et al[2]	69.5 Years
Garg Ramaneesh, et al[3]	41.6 Years
Present Study	45.5 Years

Study conducted on 107 patients with abdominal wound dehiscence over a period of 7 years in Department of Surgery, Case Western, Reserve University, Cleveland Veterans Affairs Medical Centre USA showed that patients with intra abdominal infection were more likely to have undergone an emergency operations 74% ($p < 0.02$), an operation on colon 55% ($p < 0.005$), or an operation with higher wound classification ($p < 0.02$) and wound dehiscence is more common emergency operation and operations with higher wound classification.[5]

In a study conducted on 50 patients admitted to the general surgery department of Rajindra Hospital, Patiala, India, who developed wound disruption following laparotomy 44 patients (88%) had either contaminated or dirty wounds. In the present study showed that abdominal wound dehiscence is more common in patients operated for peritonitis due to hollow viscus perforation and in which wounds with higher classification such as contaminated and dirty (91%), 55% of the patients studied were operated for hollow viscus perforation among which 12 patients had Duodenal ulcer perforation, and 22% of patients had either gastric perforation, ileal perforation, jejunal perforation, 6 patients had appendicular pathology either perforation or appendicitis and 11% of the patients had small bowel obstruction and 8% of the patients had underlying malignancy.

Table 11 : Comparison of Type of Surgical Wound Developing Abdominalwound Dehiscence (Wounds With Higher Classification) of Various Studies

Garg Ramaneesh, et al[3]	88%
Present Study	91%

For the patients with bowel perforation which were classified mostly into contaminated surgical wounds, the procedure performed was peritoneal lavage with perforation closure. Patients with appendicular perforation underwent Appendicectomy with peritoneal toilet. Most patients diagnosed with small bowel obstruction underwent resection and anastamosis and few underwent adhesiolysis and colostomy. Study conducted at Pakistan institute of medical science showed that 71.4% of the patients who developed abdominal wound dehiscence had undergone surgery in emergency.[6] In a study conducted in 2007, 3500 abdominal laparotomies where performed in department of surgery of Mesologgi General Hospital and Urban Community Teaching Hospital of 150 beds showed that 60% of the patients operated who developed wound dehiscence were operated in emergency.In the present study 88.88% of patients who underwent emergency surgery developed abdominal wound dehiscence ($p < 0.001$).

Table 12 : Comparison of Effect of Emergency Surgery In Development of abdominal Wound Dehiscence of Various Studies

Wagar SH et al[6]	71.4%
Spiliotis J et al[2]	60%
Present Study	88%

In a study carried out at Oula university Hospital, among 48 patients who developed wound dehiscence, 2 patients (4%) died. The mean hospital stay was 25 ±15 days. There were 31 (65%) patients with pre-operative hypoalbuminemia, other risk factors included anaemia, malnutrition, chronic lung disease and emergency procedure.[7] In a study conducted on 50 patients admitted to the general surgery department of Rajindra Hospital, Patiala, India, who developed wound disruption following laparotomy 13(26%) patients were anaemic, 12(24%) patients had hypoalbuminemia, other risk factors include renal failure, jaundice, emergency procedure.

In the present study out of 36 patients, the mean hospital stay was 20± 5 days. About 72% of patients showed haemoglobin < 10gm%. Other risk factors in the study included, hypoalbuminemia, malnutrition, chroniclung diseases, old age, malignancy, obesity, emergency procedure and peritonitis with dirty surgical wounds. 1 patient (i.e. 2.77%) died due to septicshock.

A study at Department of Surgery Sundsvall County Hospital, Sweden concluded overweight (BMI > 25) as a risk factor for wound infection but these effects may be eliminated if patients are sutured with a suture length to wound length ratio of 4 – 4.9.[8] In a study conducted on 50 patients admitted to the general surgery department of Rajindra Hospital, Patiala, India, who developed wound disruption following laparotomy of the total of 50 patients, 16 were found to be obese (BMI>35). In the present study, 26 patients were having their BMI above 22 and 10 patients were having their BMI 22 and below. Study conducted at long Island Jewish Medical Centre showed the average post-operative day of abdominal wound dehiscence to be 11.1 postoperatively.[9] In our study, patients developed wound dehiscence on an average 8.6 days post-operatively

Table 13 : Comparison of Average Postoperative Day of Wound Dehiscence of Various Studies

Riou JPA et al[9]	11.1 Days
Present Study	8.6 Days

Other risk factors for the development of abdominal wound dehiscence include chronic cough, wound infection, poor surgical technique.

VI. Summary

 Males outnumbered females with ratio of 3:1.
 Patients in the age group of 31-40 years and 50-60 years found to have highest incidence of abdominal wound dehiscence. Mean age of the patients affected was 45.5 years.
 Incidence of abdominal wound dehiscence is more common in patients with peritonitis due to duodenal and appendicular perforation than in case of intestinal obstruction.
 Patients with surgical wounds classified as contaminated developed wound dehiscence more commonly.
 Incidence of abdominal wound dehiscence is more common in patients who are operated in emergency than elective (8:1).
 Surgical procedures which included perforation closure carried higher incidence of wound dehiscence.
 Incidence of abdominal wound dehiscence is more common in patients having their BMI>22 than those having their BMI<22
 Incidence of abdominal wound dehiscence is more common in patients with anemia (Hb% < 10g%).

VII. Conclusion

Significant risk factors for the development of post operative abdominal wound dehiscence are: Patient factors like older age group, male sex, anaemia, malnutrition, obesity, patients with peritonitis due to bowel perforation, intestinal obstruction, those who have undergone operation in emergency and those who have undergone perforation closure, resection and anastamosis.

Surgeon factors like midline incisions, improper suture technique and improper aseptic precautions which may lead to wound infection and then wound dehiscence.

Postoperative abdominal wound dehiscence can be prevented by improving the nutritional status of the patient, strict aseptic precautions, improving patients respiratory pathology to avoid postoperative cough and by proper surgical technique.

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