

A Nested Case Control Study of the Abdominal Wound Dehiscence in a Rural Hospital in South India

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Abstract: The abdominal wound dehiscence is defined as partial or complete separation of the fascial layers of the abdomen. Also been described as fascial dehiscence, postoperative eventration, abdominal wound disruption, broken-down abdominal wounds and burst abdomen. The incidence rate mentioned in the international literature ranges from 0.4-3.5%. The reported mortality rates of the complication are as high as 45% associated with the severity.

In our teaching hospital which is a Secondary level hospital in a rural area, an overall incidence of 6% of abdominal wound dehiscence is observed in comparison to others.

In this study, many risk factors were observed to be the cause for the development of abdominal wound dehiscence. Many of the patient related risk factors were proved to be the cause for the development of dehiscence. Hypoproteinemia, Anaemia, Renal failure, uremia, presence of malignancy, associated diseases like Diabetes, hypertension, COPD and immunocompromised state of the patient, factors which increase intra abdominal pressure like post operative cough, vomiting, abdominal distension and urine retention, development of the wound infection plays a role in the development of wound dehiscence.

Keywords: Dehiscence, eventration, factors

I. Introduction

The abdominal wound dehiscence is one of the most important complications faced by a surgeon. It is defined as partial or complete separation of the fascial layers of the abdomen. Also been described as fascial dehiscence, postoperative eventration, abdominal wound disruption, broken-down abdominal wounds and burst abdomen. The incidence rate mentioned in the international literature ranges from 0.4-3.5%. The reported mortality rates of the complication are as high as 45% associated with the severity^{1,2}.

The management of wound dehiscence cases creates difficulties for both a surgeon as well as for a patient too. It ranges from a simple separation of fascial layers to complete evisceration.

Abdominal dehiscence can be categorized into partial and complete types. Partial dehiscence is separation of one or more fascial layers while the skin or peritoneum either of them is intact. Complete dehiscence is described as separation of whole of all layers of abdominal wall but it may or may not be associated with evisceration. Wound dehiscence is of greatest concern when it is associated with evisceration which is protrusion of bowel out through the abdominal incision.

There are several risk factors which are responsible for the development of wound dehiscence and they can be classified into patient factors and surgeon related factors. Emergency surgery, faulty abdominal wall closure, malnutrition, obesity, anemia, jaundice, uremia, malignancy, use of steroids, diabetes, wound infection, post operative cough, vomiting, paralytic ileus, abdominal distension are important among the proposed risk factors.

Death is not caused by the dehiscence per se but this complication contributes to an excessive mortality in these patients, who are usually elderly having wound infection, chest diseases, malignancy and other associated medical problems. So identifying the risk factors which contribute to the development of abdominal wound dehiscence is a responsibility of surgeon to help early recovery of the patient.

Most of the data available is urban based and there are fewer amounts of data regarding the wound dehiscence in a rural level hospital. Patients who are residents in rural India are more prone for nutritional impairment due to the pertaining poverty and illiteracy.

This study was conducted in a secondary level hospital situated in a rural area in southern India, where poverty and malnourishment are more common, and access to the health care in emergency conditions is not readily available. This study helps in assessing the extent of the problem and identifying the risk factors associated with abdominal wound dehiscence in our hospital. It helps in identifying the patients who are at risk

of developing wound dehiscence, so that they can be given better care and subsequently can reduce the incidence, morbidity and mortality associated with the wound dehiscence.

This study helps in undertaking various prophylactic measures that will help in preventing the development of the wound disruption.

II. Aim And Objectives

1. To identify risk factors in patients developing abdominal wound dehiscence.
2. To calculate the incidence of abdominal wound dehiscence and to estimate the extent of problem in our hospital.

III. Materials And Methods

3.1 Study site:

Rural Development Trust hospital, a 330 bedded secondary level hospital

3.2 Study duration:

December 2013 to May 2015

3.3 Study design:

A Nested Case control study

3.4 Study criteria:

i. Inclusion criteria

All patients who underwent elective and emergency surgeries during the period of two years were included in the study.

ii. Exclusion criteria

- ✓ Patients below the age of 3 years were excluded from the study.
- ✓ Patients who died during the study period were also excluded from the study.

3.5 Sample size:

Sample size was calculated using following formula. Calculated sample size was 36, but during the study period only 30 subjects developed burst abdomen.

$$n = 2 \frac{(p')(q')(Z_{\alpha} + Z_{\beta})}{(p_1 - p_0)^2}$$

3.6 Study procedure:

a. Cases:

All the patients who developed wound dehiscence were taken as cases.

b. Controls:

To increase the power of study, 3 controls were selected for each case from the study subjects who were at risk at the time of occurrence of wound dehiscence in a case. Cases and controls were selected and matched based on baseline characteristic variables. A control that subsequently developed dehiscence was also considered as a case. A cohort subject may be selected as a control for more than one case.

c. Pre operative data

A detailed clinical history was taken regarding the disease. The clinical findings were noted. All necessary laboratory investigations underwent preoperatively were also collected.

d. Intra operative and post operative findings

- ✓ Intra operative data and post operative data was collected. Detailed description of the format is discussed below.
- ✓ Patients were observed for wound site infections and subsequently followed up with the culture and sensitivity reports.
- ✓ Post operatively the biopsy reports were followed and accordingly the final diagnosis was noted.
- ✓ The day of dehiscence, day of discharge and condition of the patient during discharge were also recorded.

e. End points:

Risk factors contributing to the development of wound dehiscence were the end points.

3.7 Statistical analysis:

- ✓ Baseline characteristics were analyzed and calculated by descriptive statistical analysis using MS-Excel 2007
- ✓ Association between risk factors and development of wound dehiscence in cases were analyzed using Instat Graph Pad version 3.01, 32bit
- ✓ P value less than 0.05 was considered as statistically significant
- ✓ Incidence rate of abdominal wound dehiscence was calculated by

$$\text{Incidence Rate} = \frac{\text{No. of new cases}}{\text{Population at risk}}$$

- ✓ Chi-square test was calculated further with Yate’s continuity correction
- ✓ 95% CI was calculated using the approximation of Woolf

IV. Results

Table 1: Overview of results with respect to the variables included in proforma

Variable	Cases	Controls
Age		
03-20 years	04	06
20-40 years	09	26
40-60years	16	52
>60 years	01	06
Gender		
Males	12	36
Females	18	54
BMI		
Under weight	07	23
Normal	13	54
Over weight	03	09
Obese	07	04
X-ray changes	13	10
Emergency	25	70
Elective	05	20
Type of Incision		
Midline	30	85
Transverse	--	05
Wound class		
Clean	--	08
Clean contaminated	05	40
Contaminated	10	32
Dirty	15	10
Presence of Tension sutures	15	21
Post Op binder	10	11
Presence of stoma	10	08
Comorbidities		
Diabetic	10	06
Hypertensive	--	04
Malignant	10	08
HIV	03	04
TB	--	02
Personal history		
Smoking	15	21
Alcohol	10	21

Results of individual risk factors are calculated and mentioned below.

Incidence : Approximately 500 laparotomies were done in Rural Development trust Hospital during our study period. Out of them, 30 cases developed abdominal wound dehiscence.

Table 2: Table showing incidence of our hospital

Total laparotomies	Wound dehiscence cases	Incidence
500	30	6%

An incidence of 6% was recorded in our study. According to literature, the incidence of wound dehiscence ranges from 0.4% to 3.5%⁷⁶.

Age

A total of 120 subjects were taken into the study from the selected cohort. Of them, 30 subjects developed wound dehiscence and were considered as cases. And remaining subjects who did not develop the dehiscence but has the risk factors for its development were considered as controls. There were 12 males and 18 females in Cases. 36 males and 54 females were there in Controls.

Table 3: Showing different age groups of the study population

Age group	Cases	Percent
03-20 yrs	04	13.3%
20-40 yrs	09	30%
40-60 yrs	16	53.4%
>60 yrs	01	3.3%

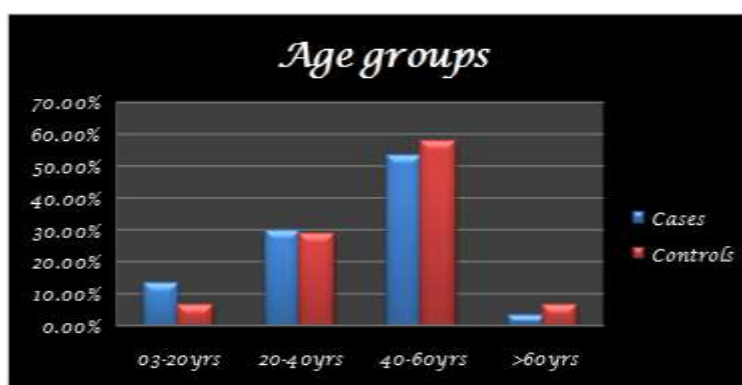


Fig 1: Graph showing the percentage of various age groups

The highest incidence of abdominal wound dehiscence was found to be in age group of 40-60 years, with mean age of 41.2 years.

Table 4: Gender-wise Distribution of study subjects

Subjects	Males	Females
Cases	12	18
Controls	36	54

In our study, we observed that female subjects developed wound dehiscence more compared to male subjects.

Table 5: Obesity as a risk factor

Variable	Cases	Controls
Under weight	07 (23.3%)	23(25.5%)
Normal	13(43.3%)	54(60%)
Over weight	03(10%)	09(10%)
Obese	07(23.3%)	04(4.4%)

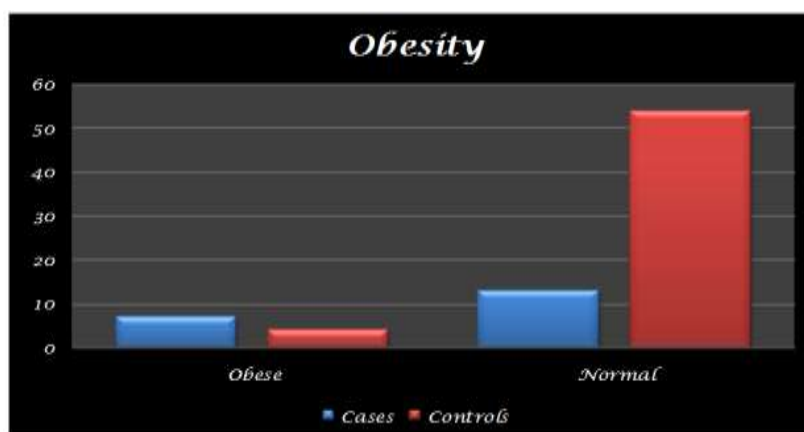


Fig 2: Graph showing the risk of obesity on AWD

Chi square statistic	p value	Odds ratio	95% CI
7.515	0.0061	7.269	1.847 to 28.605
Degree of freedom = 1			

Obesity is said to be one of the risk factor for the development of burst abdomen. p value was found to be <0.05 and is considered as statistically significant. The odds ratio obtained also shows positive association between obesity and burst abdomen.

Table 6: Haemoglobin

Variable	Cases	Controls
Anemia	25(83.3%)	33(36.6%)
Normal	5(16.7%)	57(63.4%)

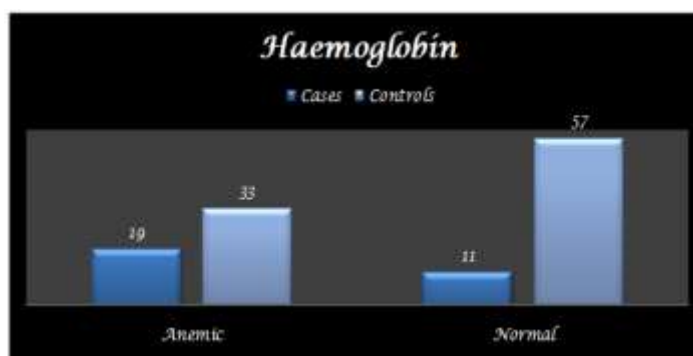


Fig 3: Graph showing the risk of anemia to develop dehiscence

The process of wound healing is dependent upon the status of anemia in patients. Decreased Hb further leads to reduced tissue oxygenation and leads to delay in wound healing process.

WHO classification of anemia

Hb level	Mild	Moderate	Severe
Males	11-13g/dl	8-11g/dl	<8g/dl
Females	11-12g/dl	8-11g/dl	<8g/dl

Cases that have the risk factor of anemia were calculated for chi-square statistic, odds ratio and 95% confidence interval. And they are as follows,

Chi square statistic	p value	Odds ratio	95% CI
5.475	0.0193	2.983	1.265 to 7.034

Above values shows statistical significance and positive association between anemia and development of dehiscence.

Table 7: Serum albumin

Malnutrition has significant impact on wound healing. Protein catabolism can result in delay in wound healing process. One of the parameters which can be used for measuring the nutritional status is serum albumin, which plays significant role in wound healing process.

Variable	Cases	Controls
Hypoalbuminaemia	16(53.3%)	24(26.7%)
Normal	14(46.7%)	66(73.3%)



Fig 4: Graph showing the risk of hypoalbuminaemia

Chi square statistic	p value	Odds ratio	95% CI
6.050	0.0139	3.143	1.335 to 7.399
Degree of freedom = 1			

The odds ratio obtained shows that the association between hypoalbuminemia and wound dehiscence is positive.

Table 8: Serum Proteins

Since malnutrition has significant impact on wound healing, one of the parameter that can be used for measuring the nutritional status is total proteins.

Variable	Cases	Controls
Hypoproteinemia	21(70.0%)	35(38.9%)
Normal	9(30.0%)	55(61.1%)

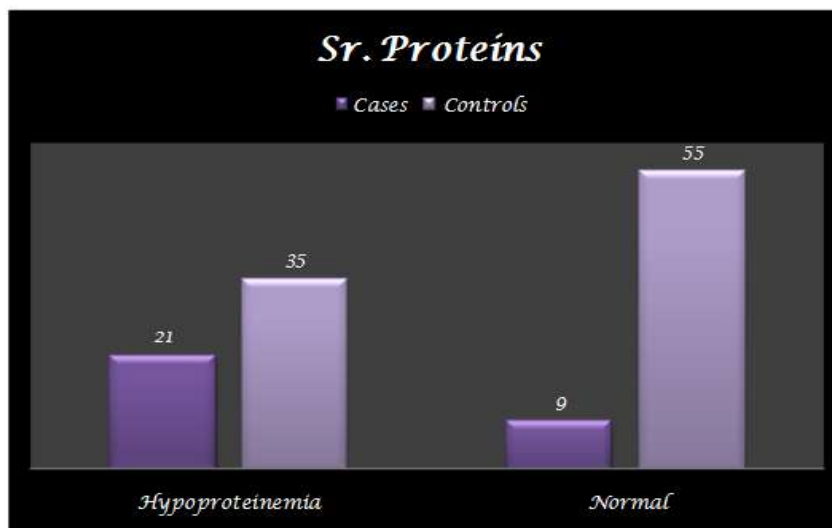


Fig 5: Graph showing the risk of hypoproteinemia

Chi square statistic	p value	Odds ratio	95% CI
7.545	0.0060	3.667	1.508 to 8.917
Degree of freedom = 1			

Calculated value is <0.05 and is considered statistically significant. Even the odds ratio shows positive association between hypoproteinemia and wound dehiscence.

Table 9: Urea

Variable	Cases	Controls
Uremia	16(53.3%)	26(28.9%)
Normal	14(46.7%)	64(71.1%)



Fig 6: Graph showing the risk of uremia in AWD study population

Chi square statistic	p value	Odds ratio	95% CI
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4.884	0.0271	2.813	1.202 to 6.582
Degree of freedom = 1			

Obtained p value shows statistical significance. Value of odd ratio obtained was also >1, that shows positive association between risk factor and dehiscence.

Table 10: Renal Failure

Variable	Cases	Controls
Renal failure	19(63.3%)	36(40.0%)
Normal	11(36.7%)	54(60.0%)

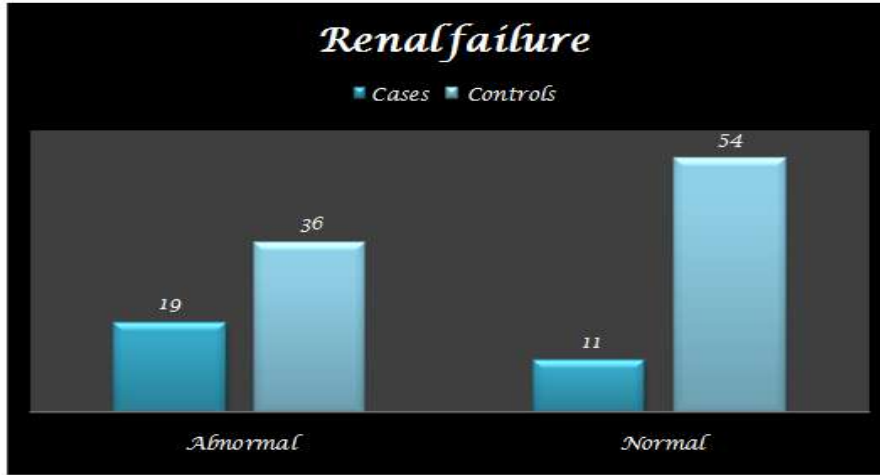


Fig 7: Graph showing the risk of AWD development in renal failure subjects

Chi square statistic	p value	Odds ratio	95% CI
4.039	0.0445	2.591	1.103 to 6.087
Degree of freedom = 1			

The p value seems statistically significant. Odds ratio is also >1, i.e., positive association between high levels of serum creatinine and wound dehiscence development.

Table 11: Lactate

Variable	Cases	Controls
Abnormal	24(80.0%)	42(46.7%)
Normal	6(20.0%)	48(53.3%)

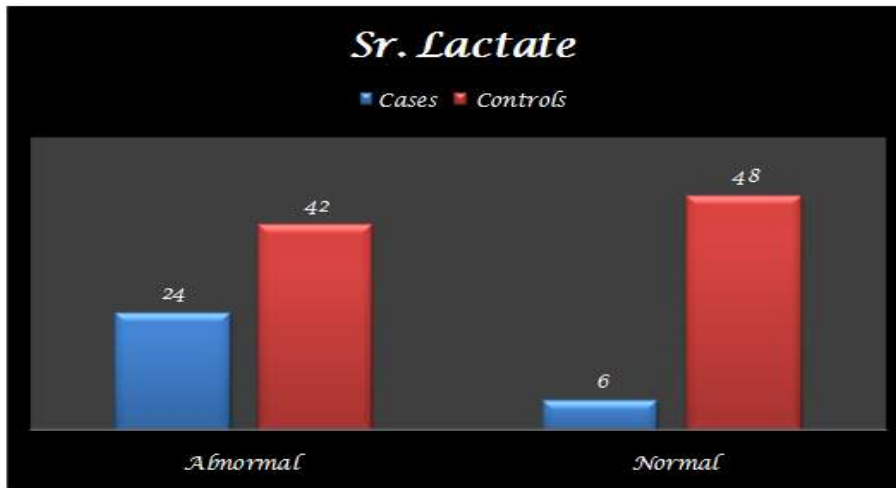


Fig 8: Graph showing the elevated lactate levels as risk factor in AWD

Chi square statistic	p value	Odds ratio	95% CI
8.799	0.0030	4.571	1.705 to 12.254
Degree of freedom = 1			

p value obtained is considered statistically significant.

V. Electrolytes

Table 12: Sodium

Variable	Cases	Controls
hyponatremia	12(40.0%)	40(44.4%)
Normal	18(60.0%)	50(55.6%)

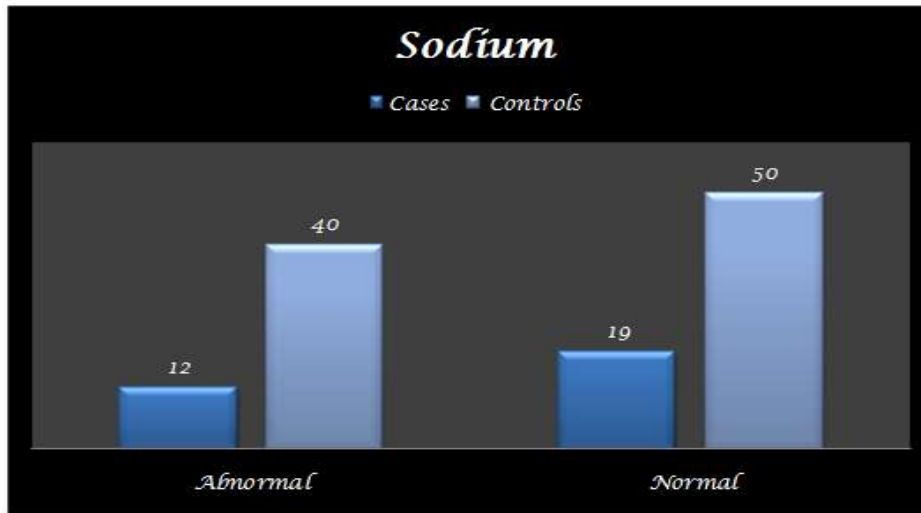


Fig 9: Graph showing the hyponatremia as risk factor in AWD

Chi square statistic	p value	Odds ratio	95% CI
0.04525	0.8315	0.8333	0.3595 to 1.932
Degree of freedom = 1			

Table 13: Potassium

Variable	Cases	Controls
Hypokalemia	22(73.3%)	44(48.9%)
Normal	8(26.7%)	46(51.1%)

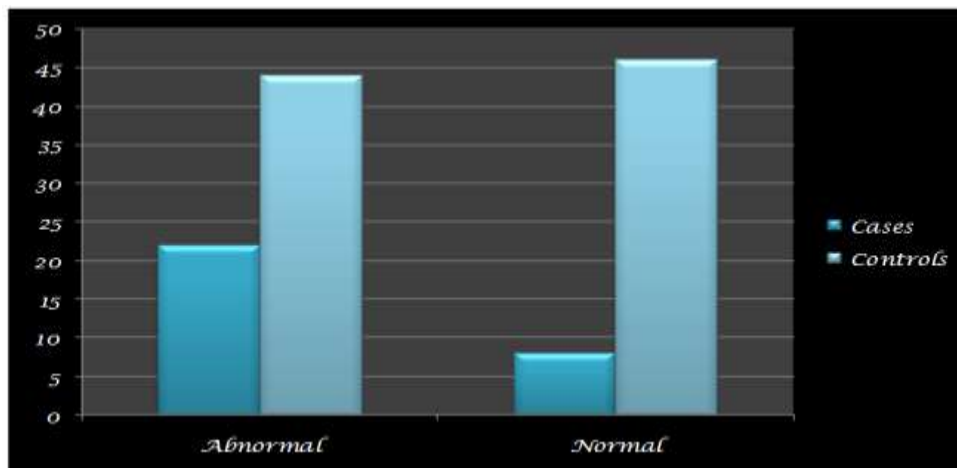


Fig 10: Graph showing the hypokalemia as risk factor in AWD

Chi square statistic	p value	Odds ratio	95% CI
4.489	0.0341	2.875	1.159 to 7.134
Degree of freedom = 1			

Obtained p value is considered statistically significant

Table 14: Malignancy

Variable	Cases	Controls
Malignant	10(33.3%)	8(8.9%)
Non malignant	20(66.7%)	82(91.1%)

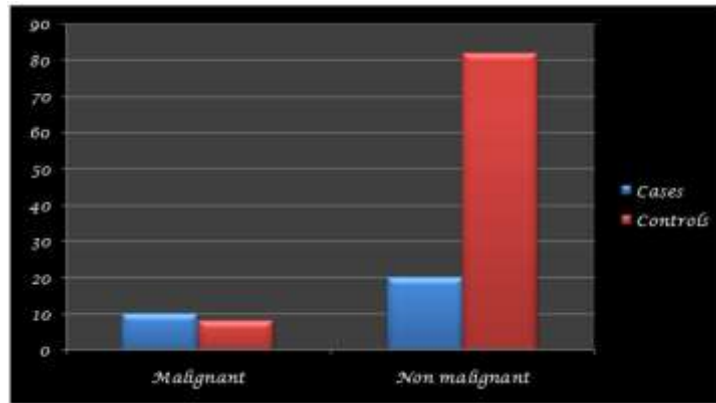


Fig 11: Impact of malignancy in AWD

Chi square statistic	p value	Odds ratio	95% CI
8.715	0.0032	5.125	1.792 to 14.654
Degree of freedom = 1			

Obtained p value is considered to be statistically significant. Odds ratio shows positive association.

Table 15: Diabetes

Variable	Cases	Controls
Diabetic	10(33.3%)	6(6.7%)
Non-diabetic	20(66.7%)	84(93.3%)

Diabetes mellitus has been said to have effect on all stages of wound healing. It causes atherosclerosis of the vessels and leads to tissue hypoxia. Diabetics are further more susceptible to infections because of decreased inflammatory response and inefficient bacterial killing. There will also be the impairment in the collagen synthesis in diabetes. All these factors leads to bursting of the abdomen.

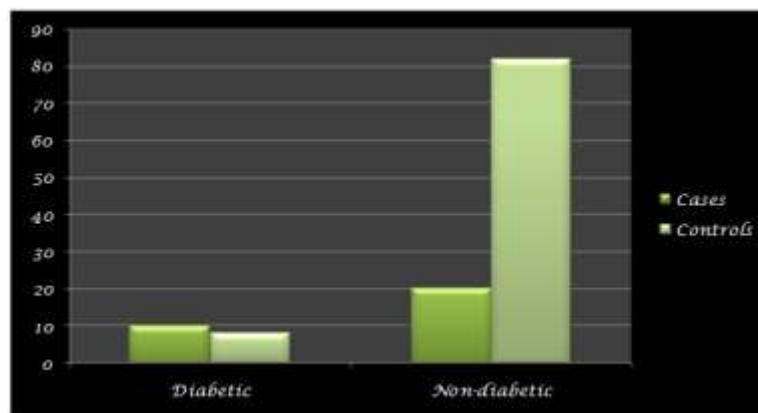


Fig 12: Impact of diabetes on AWD

Chi square statistic	p value	Odds ratio	95% CI
11.635	0.0006	7.000	2.275 to 21.535
Degree of freedom = 1			

p value obtained seems significant and odds ratio shows positive association.

Table 16: Elective Vs Emergency Procedures

Variable	Cases	Controls
Emergency	25(83.3%)	70(77.8%)
Elective	5(16.7%)	20(22.2%)

Emergency surgery is considered as a risk factor for the development of abdominal wound dehiscence since many factors contributes to this, such as presence of intra-abdominal sepsis, presence of uremia, presence of renal failure, presence of malnourishment, anemia, requirement of intestinal stomas, increased intra-abdominal tension, suboptimal management of the abdominal layers, greater risk of surgical field contamination, improper maintenance of sterility etc. All these mentioned factors were found to be less in elective procedures. So, less risk of dehiscence.

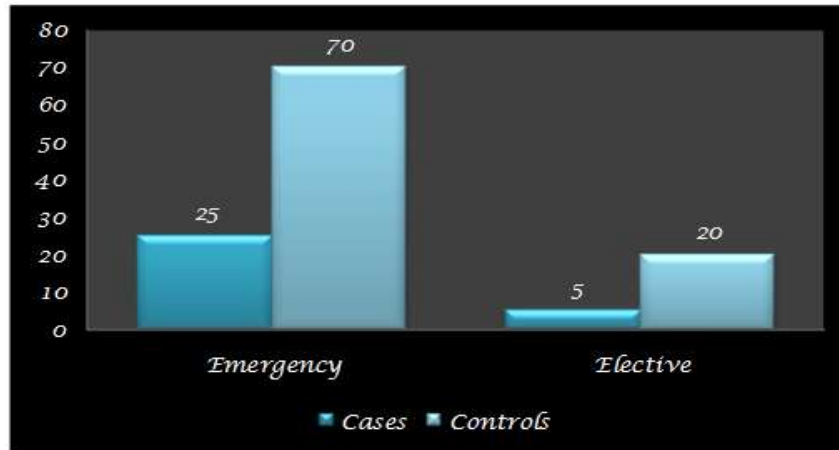


Fig 13: Elective/emergency procedures as risk factor in AWD

Chi square statistic	p value	Odds ratio	95% CI
0.1516	0.6970	1.429	0.4844 to 4.213
Degree of freedom = 1			

The p value obtained from our data seems insignificant but the odds ratio obtained is >1, which can be interpreted that there is positive association of emergency procedures and dehiscence.

Table 17: Contamination

Variable	Cases	Controls
Abnormal	23(76.7%)	39(43.3%)
Normal	7(23.3%)	51(56.7%)

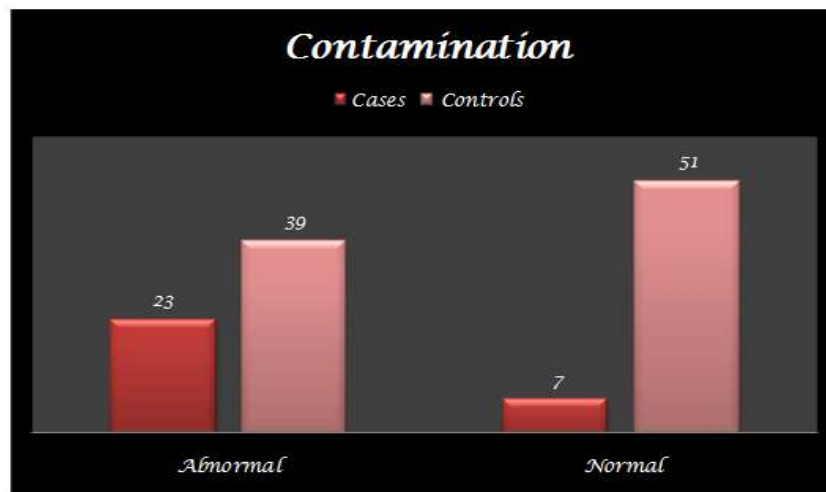


Fig 14: Presence of contamination as risk factor in AWD

Chi square statistic	p value	Odds ratio	95% CI
8.721	0.0031	4.297	1.673 to 11.037
Degree of freedom = 1			

Obtained p value shows statistical significance. Odds ratio also shows positive association between the contamination, so called risk factor and development of burst abdomen.

Table 18: Stoma

Variable	Cases	Controls
Stoma present	10(33.3%)	8(8.9%)
Stoma absent	20(66.7%)	82(91.1%)

Most of the lower gastrointestinal cases which were presented in emergency conditions have been operated with the placement of intestinal stomas. The presence of a stoma in the post-operative period has been demonstrated to play a significant role in the development of wound infections, further leading to delayed healing process.

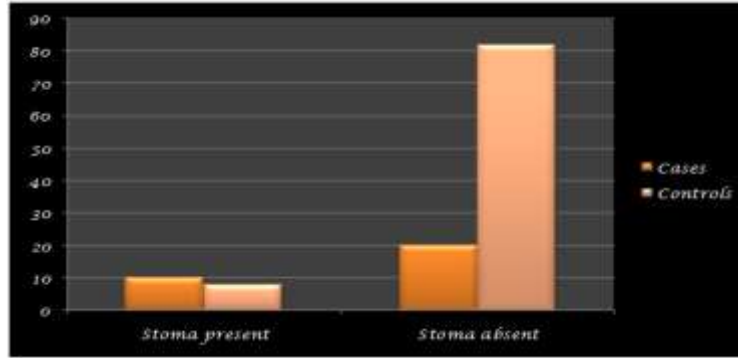


Fig 15: Risk of presence of stoma

Chi square statistic	p value	Odds ratio	95% CI
8.715	0.0032	5.125	1.792 to 14.654
Degree of freedom = 1			

p value is considered as statistically significant.

Table 19: Tension sutures

Variable	Cases	Controls
Tension sutures present	8 (26.7%)	25(27.8%)
Tension sutures absent	22(73.3%)	65(72.2%)

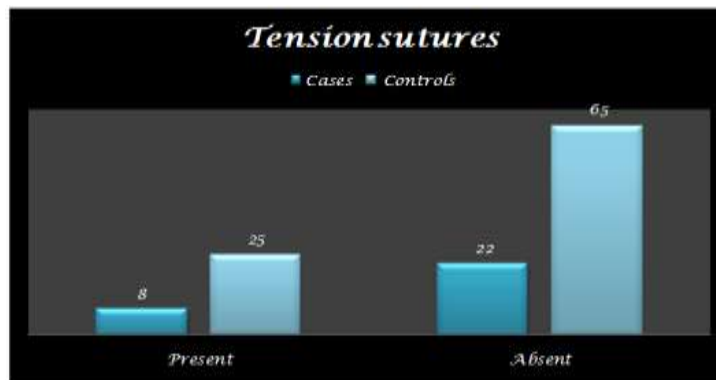


Fig 16: Presence of tension sutures-protective factor in AWD

Chi square statistic	p value	Odds ratio	95% CI
0.01393	0.9060	0.9455	0.3724 to 2.400
Degree of freedom = 1			

Table 20: Cough (Elevated intra-abdominal pressure)

Variable	Cases	Controls
Cough present	13(43.3%)	10(11.1%)
No cough	17(56.7%)	80(88.9%)

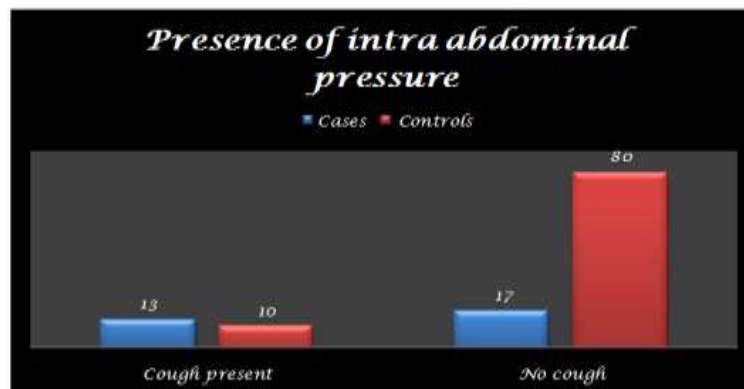


Fig 17: Risk of raise in IAP on AWD

Chi square statistic	p value	Odds ratio	95% CI
13.070	0.0003	6.118	2.303 to 16.248
Degree of freedom = 1			

Obtained p-value is considered as statistically significant.

Table 21: Smoking/Tobacco

Variable	Cases	Controls
Exposed	15(50.0%)	21(23.3%)
Unexposed	15(50.0%)	69(76.7%)

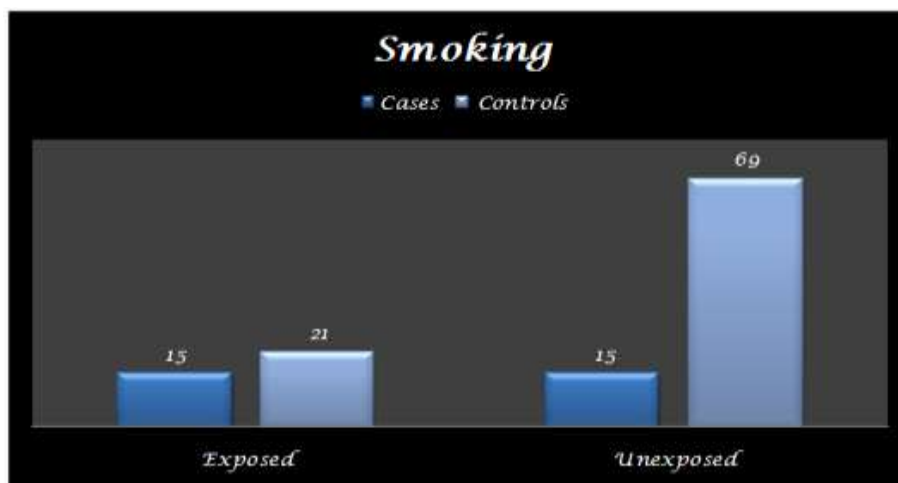


Fig 18: Impact of smoking on AWD

Chi square statistic	p value	Odds ratio	95% CI
6.042	0.0114	3.286	1.381 to 7.81
Degree of freedom = 1			

p value obtained is statistically significant and the odds ratio shows positive association between the risk factor and dehiscence.

Table 22: Alcohol

Variable	Cases	Controls
Alcoholics	10(33.3%)	21(23.3%)
Non-alcoholics	20(66.7%)	69(76.7%)

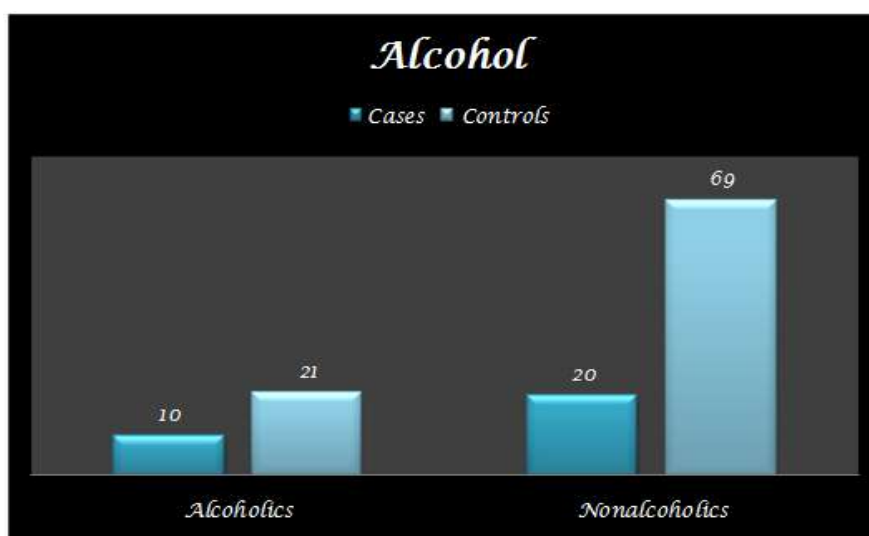


Fig 19: Impact of alcohol on AWD

Chi square statistic	p value	Odds ratio	95% CI
0.7104	0.3993	1.643	0.6660 to 4.052
Degree of freedom = 1			

Day of Dehiscence

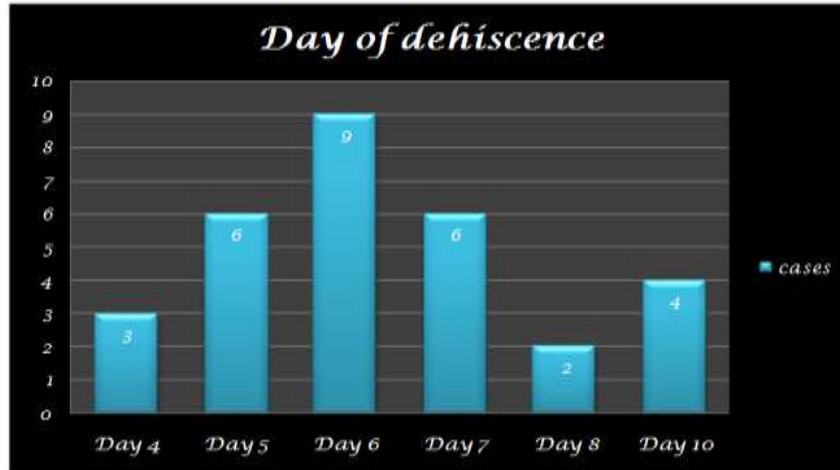


Fig 20: Graph showing the day of dehiscence

From the available data, most of the cases developed dehiscence by day 6; the calculated mean value for day of dehiscence is 6.46days.

Wound infection

The most common cause of delay in wound healing is the presence of infection. Presence of bacteria prolongs the inflammatory phase and interferes with the epithelialisation, wound contraction and collagen deposition.

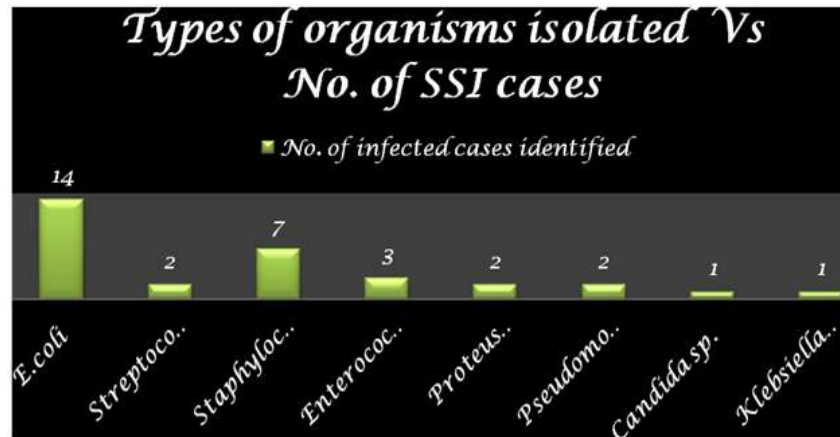


Fig 21: Graph showing the type of organisms isolated



Fig 22: Graph showing the combination of organisms isolated

VI. Discussion

Abdominal wound dehiscence is still a significant cause of morbidity after major abdominal operations with incidence ranging from 0.4% to 3.5%⁷⁶. The incidence for Abdominal Wound Dehiscence was found to be 6% in our hospital. There are various reasons for this higher incidence. The cause of the tearing may be secondary, to both patient and surgeon related factors. The precise contribution of any one factor toward increasing the dehiscence risk is difficult to know, but certainly a patient with many putative risk factors is at a higher risk than a patient with none. Even though the surgeon has no control over patient related factors like - advanced age, male sex, malignancy etc which increase the risk of wound disruption, but still surgeon can play a major role in prevention of this complication. Majority of the cases operated in our hospital were presented in emergency. The delay in presentation to the hospital also effects the outcome of the patient in terms of the presence of septic shock and infective foci. The more the delay in presentation the worse is the outcome. Hence we ascertain the delayed presentation of the patients to the hospital in emergency situation as one of the important cause for the increased incidence rate of abdominal wound dehiscence in our hospital. Coming to individual risk factors, odds ratio, 95% confidence interval and p value are calculated for each and every risk factor. Most of the values are significant. Since the sample size is very small, some insignificant values are also obtained.

Advanced age is identified as a risk factor in wound disruption in a study conducted by Riou JP et al (1992)⁶⁷. According to the study by Lenhardt R. et al (2000)⁷⁹, collagen deposition after surgery decreases significantly with advancing age. Younger men and women deposited similar amounts of collagen. In our study, we found higher incidence of abdominal wound dehiscence in age group of 40-60years, with mean age of 41.2 years.

Obesity is said to be the risk factor for abdominal wound dehiscence. The presence of excessive adipose tissue in the subcutaneous layers makes obliteration of the dead space more difficult and because of increased difficulties with hemostasis encompass the formation of hematoma and wound infection.⁸⁰ Similarly it is proved to be one of the risk factor for AWD ($p < 0.05$). The OR (7.269) and 95% CI (1.847 to 28.605) also shows positive association between obesity and AWD. 10 out of 30 patients were overweight in our study. These results are similar to those with the study conducted by Israelsson LA et al(1997), concluded that overweight is an independent risk factor for the development of wound dehiscence

In a study conducted by Arunabha Sinha et al(2015) out of 57 patients about 43.8% of patients showed hemoglobin $< 10\text{gm}\%$. The effect of anaemia on wound healing often is compounded by the associated hypovolemia or hypoxia. anaemia and hypovolemia cause decreased tissue oxygenation causing impairment of wound healing by decrease in wound tensile strength. In our study, anemia ($p < 0.05$) was found to be significant risk factor. OR (2.983), 95% CI (1.265 to 7.034) also shows the positive association among anemia, the so called risk factor and burst abdomen.

Serum albumin plays a key role in process of wound healing as discussed above in results. Hypoalbuminaemia ($p < 0.05$) is also considered as one of the risk factor for development of dehiscence. OR (3.143) and 95% CI (1.335 to 7.399) values show the positive association between hypoalbuminaemia and AWD. In a study carried out at Oula University Hospital⁸¹, among 48 patients who developed wound dehiscence, there were 31 (65%) patients with pre-operative hypoalbuminemia, other risk factors included anemia, malnutrition, chronic lung disease and emergency procedure. Hypoproteinemia ($p < 0.05$) is also considered as one of the significant risk factor in our study. Positive association was found between hypoproteinemia and burst abdomen with OR (3.667) and 95% CI(1.508 to 8.917).

There is remarkably little objective clinical evidence regarding the effect of uremia on wound healing although the clinical impressions of experimental surgeons have suggested that it does affect wound repair. However, hyperalimentation properly adjusted for the renal failure patient may counter the putative defect of healing associated with uremia²⁴.

In our study uraemia is also found to be a significant risk factor ($p < 0.05$). Positive association is seen between uremia and AWD with OR (2.813) and 95% CI (1.202 to 6.582). similar results were observed in a clinical study conducted by M.Khan et al (2004)⁸⁵ and a.Aziz et al (2009)⁸⁶. Renal failure can be predicted by higher levels of serum creatinine. Patients with higher levels of serum creatinine developed AWD ($p < 0.05$) OR (2.591) and 95% CI (1.103 to 6.087) also shows positive significant association between the mentioned risk factor renal failure and AWD.

Serum lactate is said to be one among the list of risk factors of AWD by many authors. Obtained p value ($p < 0.05$) OR (4.571) 95% CI (1.705 to 12.254) shows that serum lactate is significant independent risk factor for abdominal wound dehiscence.

Hyponatremia is considered as an independent risk factor for AWD. But unfortunately, in our study we got an insignificant value ($p > 0.05$). Also the OR and 95% CI reveal negative association. However, hypokalemia was considered as significant risk factor ($p < 0.05$), OR (2.875) and 95% CI (1.159 to 7.134). In the study done by Riou JP et al (1992)⁶⁷ identified malignancy as a risk factor in wound disruptions. Malignancy

per se might not predispose to wound disruption but associated general debility and hypoproteinemia certainly cause increase in the incidence. In our study, 10 out of 30 cases were having a malignant disease. Malignancy is an independent risk factor for the development of abdominal dehiscence with a strong positive association ($p < 0.05$) OR (5.125) 95% CI (1.792 to 14.654)

Diabetes has significant impact on all stages of wound healing. Moreover, diabetics are furthermore susceptible to infections. Diabetes is often associated with poor wound healing. Granulocytes from diabetic patients demonstrate decreased phagocytic activity and poor chemotaxis. These granulocyte defects and local ischemia secondary to accelerated atherosclerosis and small vessel disease result in increased susceptibility to infection⁵⁸. This may increase the risk of developing dehiscence. In our study, diabetes is considered as one of the significant risk factor ($p < 0.05$), also OR (7.000) and 95% CI (2.275 to 21.535). This result is compared with the similar results obtained in a study carried out by Pradeep soni et al (2015) in Chattisgarh institute of medical sciences, Bilaspur, India⁸⁴.

Emergency surgical procedures have higher risk of dehiscence than elective procedures. As the patients undergoing surgery in emergency are in suboptimal condition, hemodynamically unstable, and the risk of contamination of surgical field is high. The concert of the surgeon can be affected leading to the inappropriate closure of the abdomen at the end of surgical procedure. The results in our study are similar to the study conducted by Pradeep soni et al(2015)⁸⁴. But unfortunately, we found it insignificant ($p < 0.05$). But OR (1.429) suggests positive association i.e., there is risk of development of burst abdomen having emergency procedure as risk factor when compared with the elective procedures.

Contamination is also considered as one of the significant risk factor in AWD ($p < 0.05$) OR (4.297) and 95% CI (1.673 to 11.037). In a prospective clinical study by T.T. Irvin et al (1977)⁷⁷ showed wound infection is associated with a tenfold increase in the incidence of wound disruption. The incidence of postoperative wound infection can be reduced by usage of prophylactic antimicrobials. In established cases of wound infection, pus should be drained and appropriate antibiotics to be started based on culture sensitivity reports. In our study most of the surgical site infections grown *E.coli* on the cultural medium.

Tension sutures acts as protective factor from preventing the dehiscence. In a study conducted by Khorgami Z et al(2013) prophylactic retention sutures reduce the occurrence of WD following midline laparotomy in high-risk patients with multiple risk factors for impaired wound healing without imposing remarkable postoperative complications⁸². But in our study we got statistical insignificance for this ($p < 0.05$). OR (0.945) suggests negative association i.e., the application of tension sutures offers no protection from the development of wound dehiscence.

The triad of abdominal distention, vomiting and cough increase the intra abdominal pressure and wound disruption⁶⁷. It was found to be statistically significant in our study ($p < 0.05$) OR (6.11) 95% CI (2.303 to 16.248). 13 patients in this study had post operative cough which is a risk factor for causing increasing intra abdominal pressure and further leading to wound disruption. Chest physiotherapy, tracheobronchial toilet will reduce the frequency of wound failure. Therefore post operative cough is considered as an independent risk factor.

The day of wound dehiscence ranges from 4th postoperative day to 12th postoperative day and average of 6.9 days. Keill et al (1973)⁷⁸ reported similar findings, with average postoperative day of dehiscence of 7 days.

VII. Conclusion

Wound dehiscence is a complication that haunts every abdominal surgeon. The incidence of abdominal wound dehiscence ranges from 0-3%. Numerous risk factors, including the patient related and surgeon related risk factors were known to cause abdominal wound dehiscence.

In our teaching hospital which is a Secondary level hospital in a rural area, an overall incidence of 6% of abdominal wound dehiscence is observed in comparison to others.

In this study, many risk factors were observed to be the cause for the development of abdominal wound dehiscence. Majority of the cases operated in our hospital were presented in emergency. The delay in presentation to the hospital also effects the outcome of the patient in terms of the presence of septic shock and infective foci. The more the delay in presentation the worse is the outcome. Hence we ascertain the delayed presentation of the patients to the hospital in emergency situation as one of the important causes for the increased incidence rate of abdominal wound dehiscence in our hospital.

Many of the patient related risk factors were proved to be the cause for the development of dehiscence. Hypoproteinemia, Anaemia, Renal failure, uremia, presence of malignancy, associated diseases like Diabetes, hypertension, COPD and immunocompromised state of the patient, factors which increase intra abdominal pressure like post operative cough, vomiting, abdominal distension and urine retention, development of the wound infection plays a role in the development of wound dehiscence.

Surgeons can aim to reduce the development of abdominal wound dehiscence by

1. Prevention of surgical site infections by using appropriate antimicrobial prophylaxis and during the post operative period.
2. Improving the nutritional status of the patients by providing high protein diet and maintain the hemoglobin in near normal limits.
3. Prevention of the development of increased abdominal tension by suppressing the cough, avoiding hiccups, to avoid urinary retention by continuous drainage of the bladder.
4. Maintaining proper antiseptic precautions while handling the patient in the wards while changing the dressings and during surgical procedures.
5. Employing good surgical techniques during the closure of the abdominal wounds by taking equal and adequate thickness of the rectus sheath on either sides of the surgical wound.
6. Proper peritoneal toileting with warm saline before the abdominal closure particularly in contaminated and dirty cases.
7. Providing tension sutures to the patient is of doubtful benefit in preventing the development of wound dehiscence. Hence we advice careful patient selection for the application of retention sutures.

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