ABSTRACT

BACKGROUND
Abdominal wound dehiscence is a preventable complication, but is still seen. When present, it poses problem in the management of the case, increases the morbidity and mortality of the patient. The present study is a prospective study done from January 2010-May 2016 with an objective to find out the incidence of wound dehiscence, the most common pathologies associated with dehiscence and to find out the statistical significance of the difference risk factors causing wound dehiscence and to evaluate the role of tension sutures in prevention of wound dehiscence.

MATERIALS AND METHODS
291 major laparotomies were followed from January 2010-September 2016. There were 21 cases of dehiscence and from the remaining 270 cases, 58 patients were chosen as controls who underwent the same procedure, but without dehiscence. 15 factors were analysed and compared between the dehiscence and control groups.

RESULTS
The incidence was found to be 7.2%. Peritonitis was the most common pathology. The significant factors were age more than 50, wound infection. Tension suture application has shown to reduce the incidence of wound dehiscence.

CONCLUSIONS
- Intra-abdominal sepsis (peritonitis) increases the incidence of wound dehiscence.
- Age >50, Uræmic, Jaundiced, Obesity, Malnutrition increases the incidence of wound dehiscence.
- Wound infection was a highly significant factor having 8 times more risk of dehiscence.

KEYWORDS
Wound Infection, Abdominal Wound, Dehiscence, Laparotomy.

2. To study the significance of age, sex and wound infections risk factors in the development of wound dehiscence.

Incidence and Mortality

Incidence
Estimates of the incidence varies between 0% to 10%. Most surgeons would regard an incidence of 10% as being unduly high.\(^2\)

In recent years, there has been a considerable drop in the incidence of burst abdomens in many reports, a result of the spread in popularity of the use of mass closure of abdominal wall.\(^3\)

Mortality
The death rate in reported series varies considerably and maybe as high as 44%. Although, the average operative mortality in a collective review is 18.1% (range 9.4% to 43.8%),\(^4\) much depends on the group of patients under study. Because burst abdomens occurred particularly among elderly patients who had wound infection, pneumonia, obstruction or who were undergoing emergency operation for haematemesis, this mortality well might have been expected on the basis of these other factors. It is seen that many patients eventually would have died from the primary disease for which the operation was performed, the disruption merely precipitated the fatal outcome.

MATERIALS AND METHODS

Study Type and Background
This is a prospective case-control study conducted on patients admitted in the Department of Surgery, Chennai Medical College Hospital and Research Centre. Irungalur, Trichy, Tamilnadu.

Materials
This study included all those patients who underwent major laparotomy from January 2010 to May 2016. 291 major laparotomies were followed of this 21 patients developed wound dehiscence (cases). From the remaining 270 patients, 58 patients were chosen as controls (patients who underwent abdominal operation for the same reason, but without any wound dehiscence). Thus, a case-control study type was set up.

Exclusion Criteria
Patients undergoing appendectomy through the gridiron incision, herniorrhaphy and minor abdominal procedures were excluded from the study. Although, dehiscence and herniation of such incisions may occur, they are extremely rare. Their inclusion would dilute the incidence and make comparisons less accurate.

Factors under Study
Of the different factors causing wound dehiscence, 3 factors were selected. The factors are:
1. Age.
2. Sex.
3. Wound infection.

In each group (cases and controls), the number of patients having the particular factor in question was calculated. Each factor was analysed for its test of significance using chi-square or Fisher's test. A factor was considered significant if \(P < 0.05\).

METHODS

History and Clinical Examination
Particulars regarding the diseases like diabetes, hypertension, jaundice, tuberculosis and other chest infections were made note of. Particular attention was given to note the anaemia, nutritional status, jaundice and respiratory tract infection.

Investigations
A thorough preoperative search was made to exclude Anaemia, Jaundice, Uraemia, Diabetes, Malnutrition or Obesity.

The Following Investigations were done as a Routine
1. Blood: Hb%, TC, DC, ESR, BT, CT and Blood grouping and Rh typing.
2. Blood: Random blood sugar, FBS and PPBS.
4. Blood: For HbsAg, HIV, HbsAg, HCV.
5. Urine: For albumin, sugar and microscopy.
7. X-ray: Chest PA view was done routinely in all cases preoperatively.
8. Height and weight of the patient: To calculate the BMI = Weight (Height).\(^2\)

Special Investigations Like
1. Erect x-ray abdomen was used in all acute abdominal conditions.
2. Contrast x-rays like barium meal follow through were used wherever necessary.
3. Abdominal ultrasound scanning was used wherever necessary.

RESULTS
Of the different factors causing wound dehiscence, 'five' factors were analysed for their role in the development of wound dehiscence. The results have been discussed under the following headings:
- Incidence of wound dehiscence.
- Primary aetiology.
- Age.
- Sex.
- Wound infections.

Incidence
Out of the 291 major laparotomies, which were followed, 21 patients developed wound dehiscence. An incidence of 7.2% of the remaining 270 patients, 58 patients were chosen as controls who underwent the similar procedure, but without dehiscence.
Primary Aetiology

Primary diagnosis of dehiscence and control group is as follows:

<table>
<thead>
<tr>
<th>Diagnosis*</th>
<th>Dehiscence Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=21)</td>
<td>(n=58)</td>
</tr>
<tr>
<td>Peritonitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duodenal Perforation</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Gastric Perforation</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Ileal Perforation</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Appendicular Perforation</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Malignancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colorectal Carcinoma</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

*NOTE: The diagnosis of cases developing dehiscence was recorded and then from the remaining patients controls were chosen who underwent the same procedure, but did not develop dehiscence.

It is seen from the above table that we see a large number of cases of peritonitis (n=42), which have intra-abdominal sepsis and have a higher incidence of dehiscence. Ileal perforation due to enteric fever presents with faecal contamination and has a higher mortality and higher incidence of dehiscence.

Age

Fifty years was taken as cut off. The number of patients >50 years in the dehiscence and control groups was determined. Then, a 2x2 contingency table was drawn and using chi-square p-value was calculated. The number of patients more than 50 years in dehiscence group was 10 and in the control group was 14 by drawing up a 2x2 contingency table, p-value was 0.044.

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Dehiscence Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;50 years</td>
<td>10 (48%)</td>
<td>14 (24%)</td>
</tr>
<tr>
<td>Age &lt;50 years</td>
<td>11 (52%)</td>
<td>44 (76%)</td>
</tr>
</tbody>
</table>

Using chi-square p= 0.044. (p<0.05) Significant.

Sex

There were 16 males (76%) and 5 females (24%) in the dehiscence group (Ratio of 3.2:1) compared with 42 males (72%) and 16 females (28%) in the control group (ratio of 2.6:1). Using chi-square, 'p' was not found to be significant. There is a higher incidence of wound dehiscence in males.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Dehiscence Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>16 (76%)</td>
<td>42 (72%)</td>
</tr>
<tr>
<td>Females</td>
<td>5 (24%)</td>
<td>16 (28%)</td>
</tr>
</tbody>
</table>

Treatment of Patients with Burst Abdomen

Of the 21 patients having wound dehiscence, 10 patients underwent immediate resuturing of the burst abdomen. The condition of 3 patients was too hazardous for any secondary operative procedure, 1 patient had shock (who died) and 2 patients were in critical state (1 of them died). These patients were treated by packing of the wound and strapping using an adhesive plaster.
In the remaining 8 patients, the disrupted wound was foul and freely suppurating, 3 of them died in the postoperative period. In the remaining 5 patients, the wound dried up and once there was no evidence of any infection, they were treated, 3 by secondary suturing and 2 had skin grafting (because the wound edges were too far and could not be re-approximated without tension.)

DISCUSSION
Wound dehiscence carries a high morbidity and mortality, but with due care, it is a preventable complication. This study has been discussed under the following headings:
- Incidence of wound dehiscence.
- Primary aetiology.
- Age.
- Sex.
- Wound infection.

Incidence of Wound Dehiscence
Incidence in this series (CMCHRC 2016) is 7.2%. The dehiscence in different studies is as follows. Reported to vary from 0.2% to 10%.

<table>
<thead>
<tr>
<th>Studies</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riou et al</td>
<td>1%</td>
</tr>
<tr>
<td>G. V. Poole</td>
<td>3%</td>
</tr>
<tr>
<td>S. K. Mathur</td>
<td>5% and 7%</td>
</tr>
<tr>
<td>CMCH and RC</td>
<td>7.2%</td>
</tr>
</tbody>
</table>

Some would consider a rate of 7.2% to be unduly high. But, we see a large number of patients who are >50 yrs. and have intra-abdominal sepsis who usually present to us late. Most of these patients are malnourished, anaemic, diabetics, may have uraemia. They are operated upon on emergency basis and have a higher incidence of postoperative wound infection. Due to these large numbers of factors acting in unison, we have a higher incidence of wound dehiscence. These factors make the problem of dehiscence more common and graver in our setting as compared to the West. Riou et al\(^3\) had a incidence of only 1%, but there patient profiles are different with only 2 cases of peritonitis being operated and one patient developed wound dehiscence. Whereas, in our series, we had 42 cases of peritonitis of which 12 patients developed wound dehiscence. S. K. Mathur\(^4\) has reported a dehiscence rate of 5% in Delhi and 7% in Surat.

Age
The data from this study (henceforth referred to as, CMCH and RC 2016) indicates that age >50 years is a risk factor for wound dehiscence in patients undergoing major abdominal surgery. This has been a consistent finding in the literature through no age is an exemption. Riou\(^3\) found age more than 65 years significant and Irvin\(^5\) found age of >50 significant. Other studies showing in the higher age as risk factors are:

![Age](chart.png)

Sex
Patients with wound dehiscence were nearly three times more likely to be males than females. But, gender was not significant as an individual risk factor. Male predominance is a consistent finding. Mayo and Lee attributed the male predominance to abdominal breathing, greater physical activity and less elasticity of the abdominal wall. Nonetheless, the sex of the patient as an independent risk factor cannot be controlled by surgeon. Different series showing male predominance are:
Wound Infection

Wound infection was found to be a very important variable for wound dehiscence in our series. This factor occurred about 8 times more frequency in the dehiscence group than in the control group.

Suppurative wounds cause violent local inflammation and tissue destruction. Bucknall et al\(^8\) showed in a clinical and experimental study that infection causes decreases in tensile strength and fibroblast concentration. Irvin et al recommended the importance of decreasing the incidence of wound infection thereby decreasing the incidence of dehiscence. The work of Banerjee SR, Johnson, Ellis H has shown that the rate of wound infection can be decreased by minimising contamination and by leaving the skin subcutaneous tissue open to heal by secondary intention or delayed primary closure when contamination is unavoidable.

CONCLUSION

Abdominal wound dehiscence is a preventable complication. The care to prevent dehiscence starts in the preoperative period itself. The surgeon and the surgical techniques play a very important role in prevention. The prevention strategy continues into the postoperative period also.

1. The incidence of wound dehiscence was found to be 7.2%.
2. Peritonitis or any other cause associated with intra-abdominal sepsis increases the incidence of wound dehiscence.
3. Malignancy is associated with higher incidence of wound dehiscence.
4. Age of the patient more than 50 years was a significant risk factor for the development of dehiscence.
5. Wound infection was a highly significant factor for wound dehiscence occurrence. Patients with wound infection were 8 times at more risk of developing dehiscence.
6. A significantly higher incidence of postoperative wound dehiscence in emergency than in elective cases.\(^9,10\)

SUMMARY

This study is a prospective study conducted from January 2010 to May 2016. 291 major laparotomies were followed up. Every laparotomy was followed till the patient's sutures were removed and patient classified as having wound dehiscence or not having dehiscence.

There were 21 cases of dehiscence, an incidence of 7.2%. From the remaining 270 patients, 58 patients were chosen as controls who underwent the similar procedure, but without dehiscence. Fifteen important factors causing
wound dehiscence were studied. The number of patients having the particular factor in concern was calculated and a 2x2 contingency table drawn and the 'p' value calculated to test where the factor plays a significant role or not in the development of dehiscence.

The Following is the List of Significant and Nonsignificant Factors

<table>
<thead>
<tr>
<th>Factors Found to be Significant</th>
<th>Factors Found Not to be Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;50 years</td>
<td>Sex</td>
</tr>
<tr>
<td>Wound, Infection</td>
<td></td>
</tr>
</tbody>
</table>

Patients with peritonitis (intra-abdominal sepsis) were the most common cause for dehiscence.

REFERENCES