Laparotomy Wound Dehiscence - Risk Factors and Management – Experience in a District Hospital of Bangladesh

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This study was carried out during the period from the April, 2012 to August, 2015 in 250 Bed District Hospital, Kishoreganj. Total 52 cases of laparotomy wound dehiscence occurring among 615 laparotomies, were studied. All possible measures were taken during operations to prevent wound dehiscence along with standard method of fascial closure. In this study, the most common age group that dehisced were ≥ 50 year (n=17, 32.69%). Peritonitis was the most frequent preoperative factor in the dehisced cases, 41 (78.84%). Wound infection was the major factor (n=36, 69.23%) in the postoperative period. Most of dehiscences (78.86%) occurred in operations by trainee doctors. 24 patients had ≥ 4 risk factors comprising 46.15 % of total dehisced cases. Most of the cases were managed by dressing, antibiotics, and secondary closure. Laparotomy of patients having multiple risk factors of Wound dehiscence should be performed by skilled surgeon whenever possible.

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Key words: Laparotomy wound dehiscence, Faulty surgical technique, Expert surgeon

Introduction

Wound dehiscence (WD) is defined as complete or partial disruption of some or all the layers of a wound.[1] Wound dehiscence has been noted to occur when a wound fails to gain sufficient strength to withstand stresses placed upon it. The separation may occur when overwhelming forces break sutures, when absorbable sutures dissolve too quickly or when tight sutures cut through tissues.[2] It is also called acute wound failure. Abdominal wall disruption may be partial or complete. Partial disruption is when one or more layers have separated but the underlying sheath and peritoneum is intact. Complete disruption is when all layers have disrupted leading to viscous evisceration.[3]

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Laparotomy wound dehiscence (LWD) has remained a puzzle that hasn't been solved by any surgical unit (i.e. no unit has reported 0% failure rate). However, most hospitals globally have achieved and maintained failure rates well below 1%. This however has not deterred continuing research in attempts to eliminate the problem.[4] The reported incidence continues to be 0.2% to 6 % with associated mortality of 9-44%.[5] It is of greatest concern because of risk of evisceration along with subsequent hemodynamic compromise, and needs immediate intervention, with the risk of repeat dehiscence and incisional hernia formation. It causes a break in the pride of a surgeon. It prolongs hospital stay as well as economic burden to the patient and the hospital. According to Farquharson M, Brendon M it is now almost exclusively an indication of faulty technique.[6] But Theodoros E et al. described several risk factors for WD. The possibility and mortality of dehiscence correlates directly with the numbers of risk factors responsible for this condition.[7] The risk factors of wound dehiscence can be predicted early and their number can be decreased before and after surgery by an experienced surgeon, leading to a lowered incidence of wound failure.[8] A surgeon can perform a technically perfect operation in a patient, who is severely compromised by the disease process and still have a complication. [9] The management of wound dehiscence ranges from simple dressing to further surgery for abdominal wash and subsequent closure of burst abdomen followed by a period of intensive care.[10] 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.

Methods

This cross-sectional study was carried out during the period from the April, 2012 to August, 2015. Total 52 cases of abdominal WD occurring among 615 laparotomies done in the 250 Bed District Hospital, Kishoreganj were studied after taking informed written consent to undergo the study. The objectives were to find out the risk factors of abdominal wound dehiscence in a district level hospital, to reduce the rate of wound dehiscence. Both Complete and partial wound dehiscence were taken into account. Routine and emergency cases were included. Data was collected regarding age, sex, present and past history, physical examination findings to diagnose the disease, to find out any co-morbidity and correct them if possible. Relevant investigations were carried out before and after operation and clinical diagnosis and indication for laparotomy were noted. Antibiotics were started pre-operatively in all patients presenting with acute abdomen and course was continued accordingly in each case after operation. A prophylactic dose of antibiotic was given in all cases. Skin preparation before operation, site and type of incision were recorded. At laparotomy, important findings, any evidence of peritonitis, techniques of closure, duration of operation were recorded. Standard of wound closure technique was maintained as far as possible. Presence of any discharge and the postoperative day on which the dehiscence took place was noted. Any postoperative complication like cough, abdominal distension, vomiting, postoperative prolonged ileus, and wound infection were recorded. Wound infection was considered if there was clear evidence of pus in the wound. Bacteriological study of the wound discharge could not be carried out as there was no facility to do that in this district. After detection of wound dehiscence the patients were grouped in two. The first group was patients with partial wound dehiscence. These patients were managed by regular dressing abdominal binder and subsequent secondary closure after second to third week. The next

group was complete wound dehiscence. This group was managed by resuscitation, relaparotomy and closure of abdominal wound by tension suture keeping a drain in the peritoneal cavity.

Results

A total of 52 cases of various types of wound dehiscence occured among the 615 cases of laparotomies during 41 months period accounting for 8.45% incidence of wound dehiscence in this hospital. The study showed that the incidence of wound dehiscence increases with the increasing age of the patients (Table I)

Table I: Age distribution (n=52)

Age (years)	Number of Patients
0-10	01 (01.92%)
11-20	03 (05.76%)
21-30	05 (09.61%)
31-40	13 (25.00%)
41-50	13 (25.00%)
>50	17 (32.69%)

Among the dehisced cases emergency laparotomies were 45 cases (86.53%) and routine operation were only 7 (13.46%). (Table-II)

Table II: Nature of Operation (n=52) in dehisced cases

Operation	Number	%
Routine	07	13.46%
Emergency	45	86.53%

Peritonitis was the most frequent preoperative factor which was present in 41 (78.84%) patients. Anaemia was the next important co-morbid factor. It was present in 9 cases(17.30%) of wound dehiscence.

Table III: Pre-operative co-morbidity in dehisced cases (n=52)

Preoperative co-morbidity	Number (%)
Anaemia	9 (17.30%)
Malnutrition	6 (11.53%)
Diabetes	5 (9.61%)
COPD	7 (13.46%)
Malignancy	2 (3.84%)
Jaundice	3 (5.76%)
Uraemia	2 (3.84%)
Steroid use	4 (7.69%)
Obesity	3 (5.76%)
Peritonitis	41 (78.84%)
Tuberculosis	2 (3.84%)

In 52 cases 31 cases were partial wound dehiscence with disruption of superficial layers of the wound. 13 cases were complete wound dehiscence and 8 cases were complete wound dehiscence with evisceration (burst abdomen). (Table IV)

Table IV: Types of wound dehiscence (n=82)

Type	Number of cases
Partial	44 (84.61%)
Complete	08 (15.38%)

Wound infection was the most frequent factor in the postoperative period and was present in 70.73 % cases. Abdominal distension and postoperative vomiting was present in 15.38% cases of wound dehiscence. (Table V)

Table V: Factors in post-operative period (n=52)

Factors	Number (%)
Wound infection	36 (69.23%)
Abdominal Distension	8 (15.38%)
Postoperative cough	7 (13.46%)
Vomiting	8 (15.38%)
Bowel leakage	04 (07.69%)

The rate of wound dehiscence was more when the number of the risk factors in a patient is ≥4. There were 46.15 % of cases in the

dehisced group where the numbers of risk factors (both preoperative and postoperative) were more than 4.(Table-VI)

Table VI: Number of risk factors in a patient (n=82)

Number of risk factors	Number (%)
<2	13 (25.00 %)
3	15 (28.84 %)
>4	24 (46.15 %)

Wound dehiscence was revealed by serosanguinous discharge in 50% (26 cases), Purulent discharge in 46.15 % (24 cases). Abdominal pain and distension was present in 18.29% of cases. Shock was present only in 13.46% cases. In our study most of the wound dehiscence (78.84 %), occurred in operations done by trainee doctors. (41 cases done by trainee out of 52 cases of WD).

Table VII: Management of wound dehiscence (n=46)*

Management	Number (%)
Dressing, binder & secondary closure	40(76.92%)
Closure by tension suture	06 (11.53%)

* Total 6 deaths are excluded.

84.61% cases of wound dehiscence were managed conservatively with regular dressing, abdominal binder and antibiotics. Out of these 44 cases 4 died before reoperation by secondary closure. Out of 8 cases wound dehiscence with evisceration 2 cases died immediately of evisceration and the remaining 6 cases was managed by resuscitation and relaparotomy under general anaesthesia with thorough peritoneal toileting and closure by tension suture putting a drain in the peritoneal cavity. One patient of this group died in the immediate postoperative period following relaparotomy. Thus, the mortality rate in the wound dehiscence cases was 13.46 %. Sepsis and hemodynamic instability were major factors in these cases. Enterocutaneous fistula and subsequent malnutrition was the next. Most of the LWD occurred between the 6^{th} – 8^{th} postoperative day.

Discussion

There are 4 complications involved in comparison of the different techniques of fascial closure apparent on review of the literature:[11]

Early complications

1. Fascial dehiscence
2. Infection

Late complications

3. Hernia formation
4. Suture sinus/ Incisional pain

Laparotomy wound dehiscence (LWD) still play an important role in postoperative morbidity and mortality. It occurs in 1-3% of abdominal surgical procedures. In this study, the incidence is 8.45 %. In a study by Waqar SH et al its incidence is higher, up to 6%.[12] Incidence varies with underlying general condition, the type of operation and the presenting pathology.

LWD can occur in any age group. The peak incidence was in patients at or above 50 years (32.69%). Aziz A found 28% cases with age more than 50 years.[13] Abdominal wound dehiscence is more in old age group because of atherosclerotic change of blood vessels wall results in less tissue perfusion and also, they are more prone to infection due to decreased immunity. Next higher incidence was in the 31-40 and 41-50 years age group (each group comprising 25%). This may be due to higher rate of admission for acute abdomen from this age group in the surgical unit of this hospital.

Of 52 dehisced cases, 45 (86.53%) cases underwent emergency laparotomy and 7 patients (13.47 % cases) underwent routine operation. In a study by Arunabha et al 40 patients (70.17%) of 57 patient who underwent emergency surgery developed abdominal wound dehiscence.[14] Study by Soni *et al* Emergency laparotomies cases showed a higher number (15/102, i.e., 14.7%) while only one patient developed burst abdomen treated with elective laparotomy (1/60, i.e., 1.7%).[15] Our study showed LWD occurring in 45 of 428 cases of total emergency surgery with the rate 10.51% in emergency surgeries. Laparotomy wound dehiscence occurs more frequently in emergency operation due to peritonitis with suboptimal general condition and subsequent wound sepsis.

Peritonitis during admission in the hospital was present in 78.8 % cases of wound dehiscence. Amini A.K. et al found majority of cases were dirty having gut perforations and a fecal peritonitis (73.3%).[16] It causes bacteraemia and leads to bone marrow suppression and even renal failure, respiratory failure and multisystem failure. All these complications may lead to postoperative wound infection and poor wound healing leading to wound dehiscence. We found other common risk factors as wound infection (69.23%), anemia (17.3. %), abdominal distension (15.38%), obesity (5.76%), postoperative vomiting (15.38%), postoperative cough (13.46%), malnutrition (11.53%), diabetes mellitus (9.61%), bowel leakage (7.69%), tuberculosis (3.84%). Col and Soran also reported wound infection as an important risk factor for wound dehiscence.[17] These may represent poor patient preparation and management in the perioperative period.

Most of the wound dehiscence occurred in the hand of trainee doctors, 41of 52 WD cases (78.86 % cases. Total 397 operations among 615 cases done by trainee. Lesser percentage WD occurred in operations done by Expert surgeons 11 of 52 WD cases (21.15 % , total 218 cases done from 615 cases). Cameron AP *et al* found in their series wound dehiscence in the hand of trainee doctors 54% cases and in experienced surgeons 11% cases.[18] It may be concluded that wound dehiscence occurs less in the hand of experienced surgeons. This may be due to faulty surgical techniques on the part of trainee surgeons who may not follow the best abdominal closure technique. But it should be mentioned here that most of the emergency laparotomies are performed most of the time by the surgical trainee doctors where poor general condition of the patient, poor patient preparation interplay with faulty surgical techniques. WD often reflects an error of judgment on the part of surgeon, and the elimination of postoperative wound dehiscence may be within the jurisdiction of the operating surgeon.[19] The best abdominal closure technique should be fast, easy and cost effective while preventing both early and late complications. The most effective method of midline abdominal fascial closure involves mass closure, incorporating all the layers of abdominal wall (except skin) as 1 structure, in a simple running technique, with #1 or #2 absorbable monofilament suture material with a suture length to wound length ration of 4 to 1.[20]

We observed that in 46.15 % of wound dehiscence cases had 4 or more risk factors. Jyrki TM *et al* found 75% of patients had four or more risk factors.[21] Thus wound dehiscence seems to be a multi-factorial problem. No single factor can said to be responsible in causing wound dehiscence.

In our study, most of the wound dehiscence occurred at sixth to ninth postoperative day and most of were in the 6th post- operative day (34%).Wound dehiscence most commonly occurs from the fifth to eight post-operative

day when the strength of the wound is at its weakest.[22]

Most of the cases of WD were managed by regular dressing, abdominal binder, antibiotics and secondary closure at 2nd to 3rd week. 6 cases of burst abdomen were closed by deep tension suture. All the cases were followed up for at least 6 months. Total 6 cases (11.53%) developed incisional hernia. 9 cases (17.30%) readmitted within 6 months for intestinal obstruction. Simek and Danek described a technique to prevent laparotomy wound dehiscence by using intraperitoneal resorbable mesh in prevention of postoperative wound dehiscence for any patient they consider at risk.[23] This could not be practiced here as the mesh are costly and most of the patient had intra-abdominal sepsis. Bogota bag closure techniques is also tried elsewhere. Deep tension suture is an effective way of managing patients with burst abdomen and is associated with shorter hospital stay, lesser development of incisional hernia as compared to Bogota bag. In those patients where deep tension suture may not be feasible due to non-approximation of wound edges, Bogota bag may be offered as an alternative.[24]

Conclusion

Our observation is that the rate of wound dehiscence is high in this hospital. The rate increases with increasing number of risk factors in a patient concluding that it may be multifactorial. Most of the cases can be managed by regular dressing and secondary closure. We recommend the following steps in operation to prevent wound dehiscence:

1. Management of infection with appropriate antibiotics.
2. A thorough peritoneal toileting when there is peritonitis.
3. Strict adherence to standard method of fascial closure. A simple mass closure technique should be used.
4. A more complicated case should be done, after adequate resuscitation, by a trained or expert surgeon.
5. High index of suspicion needed to detect WD.

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