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Risk Factors of Abdominal Wound Dehiscence: Evaluation and Outcome

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Abstract

Background Wound Dehiscence is the premature opening of a wound along surgical suture. It is a surgical complication that results from poor wound healing that can increase significantly the risk of morbidity and mortality. Risk factors in general are age, diabetes, obesity, cancers, emergency surgery, pulmonary diseases, malnutrition, weight loss, anemia, chemotherapy and radiotherapy.

Objective To identify the most important risk factors for wound dehiscence in an attempt to decrease the incidence, morbidity and mortality of wound dehiscence.

Methods This is a cross sectional study with convenient sample of 66 patients 48 males and 18 females with wound dehiscence after laparotomy in Al-Kindy Teaching Hospital, Baghdad, Iraq from February 2008 to May 2011. The medical records for all patients regarding risk factors responsible for delayed wound healing and burst abdomen of all patients were reviewed. Laparotomy done for all patients under general anesthesia. Retention through and through sutures inserted on both sides of the abdominal wall were used in all cases.

Results The commonest time for the wound to burst was on the 10th postoperative day. The average duration of hospital staying was 26 days. The most common primary diagnosis of those patients was intestinal obstruction (30.3%), and adhesolysis was the most common operative procedure (18.2%). Emergency laparotomy was the most frequent factor found (92.4%). The mortality rate in patients with wound dehiscence increased with an increment of the number of risk factors, it was 15.6% in Patients who had 2-4 risk factors and reached 100% for patients with 8 risk factors.

Conclusion The identification of the avoidable factors and their correction could reduce the risk of development postoperative burst abdomen and in turn decrease the mortality and morbidity rate.

Keywords Wound dehiscence, risk factors, laparotomy

Introduction

Surgical wound dehiscence after laparotomy remains a serious complication. It presents a mechanical failure of wound healing of surgical incisions. Surgical incisions stimulate the healing process which in reality is a complex and continuous process with four different stages: Hemostasis, inflammation, proliferation, and maturation [(1)].

During hemostasis, platelets aggregate, degranulate and activate blood clotting. The clot is degrading, the capillaries dilate and fluids flow to the wound site, activating the complement cascade. Macrophages, lysis of cells and neutrophils are a source of cytokines and growth factors that are essential for normal wound healing [(2)].

The proliferation phase, which is the phase of granulation tissue forms in, the wound space begins in the 3rd postoperative day and lasts for several weeks. The most important factor in this phase is fibroblasts which move to the wound

and are responsible for the collagen synthesis. The maturation phase begins in the 7 postoperative day and lasts for 1 year or more, continued collagen deposition and remodeling contribute to the increased tensile strength of wounds [3].

It is important for the surgeon to know that wound healing demands oxygen consumption, normoglycemia and absence of toxic or septic factors, which reduce collagen synthesis and oxidative killing mechanisms of neutrophils [4]. Abdominal wound dehiscence (burst abdomen, fascial dehiscence) is a severe postoperative complication; with mortality rates as high as 45% [5]. The incidence, as described in the literatures, ranges from 0.4% to 3.5% [6-7].

Conditions associated with increased risk of wound dehiscence are anemia, hypoalbuminemia, malnutrition, malignancy, jaundice, obesity and diabetes, male gender, elderly patients and specific surgical procedures as colon surgery or emergency laparotomy which are associated with wound disruption [8]. Not all factors could be prevented, but the factors that could be prevented include pneumonia, wound infection, anemia, improper incisions and bad surgical technique [6]. Abdominal wound dehiscence can result in evisceration, requiring immediate treatment, prolonged hospital stay, high incidence of incisional hernia, and subsequent reoperations underline the severity of this complication [9].

Pre-operative conditions especially in elective operations should be recommended to reduce or eliminate the risk. No tobacco use, no steroid use prior to surgery, carefully controls of the patients comorbidity as anemia, malnutrition, obesity and cardiovascular or lung diseases. During the surgical procedures, measure to reduce the risk of infection and hypoxia in the tissue are the two most important factors for the postoperative wound healing process. The type of abdominal closure may play an important role. The tension free closure is recommended and a continuous closure is preferable [9].

Careful monitoring of patients with a predisposition to delayed healing is essential for prevention or mitigation of wound separation, especially between the fifth and twelfth postoperative days, when dehiscence most often occurs [9]. In about half the cases of dehiscence there is a noticeable increase in serosanguineous drainage on the wound dressing before separation of the outer layers becomes apparent. Patients also may report the feeling that something has “given way” in the wound [10].

The patient should be instructed to lie quietly and, if it is an abdominal wound, to try to avoid increasing intra-abdominal pressure by coughing or straining in any way. Should splinting an abdominal wound fails to prevent further separation and a spilling of the viscera through the opening, emergency surgery is imperative [10].

The intension of the current study is to identify the most important risk factors for wound dehiscence in an attempt to decrease the incidence, morbidity and mortality of wound dehiscence

Methods

This is a cross sectional study of 66 patients with wound dehiscence after laparotomy at Al-Kindy Teaching Hospital in Baghdad from February 2008 to May 2011. The medical records for all patients regarding risk factors responsible for delayed wound healing and burst abdomen were reported age over 75 years, diagnosis of cancer, chronic obstructive pulmonary disease (medical history of COPD), malnutrition (total serum protein less than 3 mg/dl), postoperative coughing, distension and vomiting, emergency laparotomy, body weight loss more than 10 kg in the last 10 months, sepsis (intraoperative, postoperative and wound infection), obesity(BMI is more than 35), anemia (Hb less than 10 mg/dl), diabetes, use of steroids in the last 12 months, tobacco, use and previous administration of chemotherapy or radiotherapy, all were identified as risk factors.

The diagnosis of burst abdomen was made when all the abdominal layers gave way i.e. complete disruption of all layers of an abdominal wound.

Cases in which only the superficial layers gaped, are usually due to hematoma or sepsis, and cases in which it has recognized that the deep layers had parted but the skin remained intact, were excluded.

Wound disruption was more often observed on the 10th postoperative day (range from 1-18 days).

Laparotomy was done for all patients under general anesthesia. Washing of the peritoneal contents with warm saline was done, and retention through and through sutures inserted on both sides of the abdominal wall were used in all cases. The parietal peritoneum, posterior rectus sheath, and the anterior rectus sheath were all approximated (after refreshing the edges) by a single layer of continuous sutures of No. 1 monofilament nylon, mounted on a large half circle, rounded tip needle. Each suture was placed 1.5-2 cm away from the wound edge on either side, at an interval of about 1cm from each other. The skin was closed as a separate layer with silk or nylon and patients were followed postoperatively for one year.

Results

The study included 66 patients with wound dehiscence; there were 48 (72.7%) males and 18 (27.3%) female. The mean age was 58 years (range from 32 to 85 yrs) SD (±8.45).

Table 1. The age group of patients

Age group (years)	Number	%
20-40	14	21.21
41-50	12	18.18
51-60	15	22.72
61-70	19	28.8
>70	6	9.1
Total	66	100

The most commonly affected age group was between 61 to 70 years (28.8%). The commonest time for the wound to burst was on the tenth postoperative day (range from 5 to 18 days). The average duration of hospital stay 26 days (range from 20 to 35 days) SD (±4.18).

Table 2. The primary diagnosis and initial operative procedures that caused wound dehiscence

Primary diagnosis	No.	%	Operative procedures	No.	%
Perforated peptic ulcer	16	24.2	Simple closure (Grahams patch)	7	24.2
Perforated typhoid ulcer	10	15.6	Simple closure	7	10.6
			Resection and anastomosis	2	3.1
			Ileostomy	1	1.5
Colon cancer	10	15.15	Rt. Hemicolectomy	2	3.1
			Resection and anastomosis	6	9.1
			Colostomy	2	3.1
Intestinal obstruction	20	30.3	Adhesolysis	12	18.2
			Resection and colostomy	3	4.6
			Colostomy	5	7.8
Acute cholecystitis (empyema)	1	0.02	Cholecystectomy	1	1.5
Acute perforated appendicitis	1	0.02	Appendicectomy	1	1.5
Colonic injury	8	12.12	Direct repair	3	4.6
			Colostomy	55	7.8
Total	66	100		66	100

The most common primary diagnosis was intestinal obstruction 30.3%of which adhesolysis was the most common operative procedure done in 12 patients (18.2%).

Table 3. The types of incisions of primary operations

Type of incisions of primary operations	No.	%
Upper midline	5	7.8
Lower midline	14	21.21
Upper and lower midline	32	48.5
Upper paramedian	8	12.12
Lower paramedian	6	9.1
Kocher	1	1.5
Total	66	100

The most frequent incision to bust was upper and lower midline 48.5%.

Table 4. The proportion of risk factors

Risk factors	No.	%
Emergency laparotomy	61	92.4
Postoperative cough, vomiting, distension	44	66.7
Sepsis	36	54.5
Age over 65	28	42.4
Malignancy	19	28.8
COPD, cardiopulmonary disease	17	25.7
Malnutrition, anemia	15	22.7
Obesity	11	16.7
Diabetes mellitus	10	15.2
Chronic diseases	9	13.6
Radiotherapy, chemotherapy	3	4.5
Prolong steroid therapy	3	4.5

The emergency laparotomy was the most frequent factors found in 92.4% of the cases, the next was the postoperative cough, vomiting, and distension in 66.7%.

Table 5. The number of risk factor for all patients and its relation to the final outcome (mortality and morbidity)

Patients and No. of risk factors	No.	%	Mortality No.	%	Morbidity No.	%
Patients with 2-4risk factors	32	48.5	5	15.6	-	
Patients with5-6 risk factors	23	34.8	9	39.1	1	
Patients with 7-8 risk factors	8	12.1	5	62.5	1	
Patients with > 8 risk factors	3	4.6	3	100	-	
Total	**66**	**100**	**22**	**33.3**	**2**	**3**

All patients were re-operated after the wound dehiscence diagnosis and 22 of them (33.3 %) died due to postoperative complications of reoperation mostly due to respiratory, cardiovascular complications and septicemia. In 2 (3%) of them recurrence of wound dehiscence was observed.

The number of patients with wound dehiscence increased with an increase in the number of risk factors, reaching 100% for patients with 8 risk factors.

Discussion

This study included 66 patients with wound dehiscence; there was higher rate of wound dehiscence in males 48 (72.7%) than females 18 (27.3%) and this is comparable to the study done by Gürleyik who found that males have a higher risk of developing abdominal wound dehiscence (76%) and this may be explained by the fact that men build up higher abdominal wall tension than females [(12)].

The most commonly affected age group in this study was in the 7th decade (28.8 %) and this goes with the study of Rodríguez-Hermosa who established that the mean age was 70 years [(13)]. This may be due to deterioration of the tissue repair mechanisms in the elderly especially during the first few days of wound healing process.

The commonest time for the wound to burst was on the tenth postoperative day (range from 5 to 18 days) when the dehiscence became apparent shortly after the skin sutures were removed and

this coincide with a study by John Spiliotis *et al* [11] who found that the wound dehiscence was more often observed on the 9th postoperative day (ranging from the 6th to 15th).

The average duration of hospital stay was 26 days (ranging from 20 to 35 days) in our study and this is similar to a study by Mazilu *et al* [14] who found that the wound dehiscence is associated with a high mortality and morbidity rates, and increased the costs and hospitalization period.

On the subject of the primary diagnosis this study showed that the most common primary diagnosis was emergency surgery (intestinal obstruction 30.3%, perforated peptic ulcer 24.2%) whereas Khan MN *et al* found that Malignant intestinal obstruction was the leading cause of wound dehiscence[15] and Col *et al* and Niggebrugge *et al* demonstrated a significantly higher incidence of postoperative wound dehiscence in emergency operations for perforated peptic ulcer and intestinal obstruction [16,17]. This may be due to fact that the patients are under bad nutritional state due to vomiting in these cases in addition to low immunity state because of underlying disease especially malignant tumor as a cause of intestinal obstruction.

As regards to the incisions of primary operations the present study showed that the most common incision was upper and lower midline incision 48.5% and the second one was lower midline incision 21.21% and this agrees with the study done by Mokela *et al* who established that vertical incision was reported as a risk factor compared with transverse incision [18].

Emergency laparotomy was the most frequent risk factor (92.4%) followed by postoperative cough, vomiting, and distension (66.7%) and sepsis (54.5%). This goes with the study of Heller *et al* who demonstrated a significantly higher incidence of postoperative wound dehiscence in emergency than in elective surgery [19]. This may be due to that the patients who undergo emergency surgery are generally not well prepared and in bad general condition and nutritional state and the chance of contamination of the surgical field is higher than in elective surgery. Moreover, 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.

Regarding the mortality rate of this study was 33.3 %.in a study by Waqer *et al*, the mortality rate was 45% [20] and was 28% in the study of Rodríguez-Hermosa *et al* [21].

Concerning the number of the risk factors and its relation to the mortality and morbidity rate we found that the mortality rate increased with the increment of the number of risk factors, it was 15.6% in Patients who had 2-4 risk factors and reached 100% in patients with 8 risk factors, while Spiliotis *et al* found mortality of 75% in patients with 7 or more risk factors [11].

In conclusion, the identification of the avoidable factors like pneumonia, wound infection, anemia, improper incisions and bad surgical technique and their correction could reduce the risk of development postoperative burst abdomen and in turn decrease the mortality and morbidity rate.

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