

## Factors influencing Postoperative Abdominal Wound Dehiscence: A Survey among Women

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### ABSTRACT

Background: Wound Dehiscence (WD) as an important complication in abdominal surgeries, increases morbidity and mortality rates among patients. This investigation was conducted to determine several risk factors related to the development of abdominal WD among women.

Methods: This cross sectional study was performed at Alzahra educational hospital in Rasht, Iran. Patients with abdominal WD (n=44) were compared to the patients without WD as controls (N-WD) (n=88). Ten risk factors were considered and compared in the groups under study.

Results: There were 61.4% (n=27) of WD patients and 31.8% (n=28) of controls with anemia. Only two WD patients had malignancy and there weren't any history of chemotherapy or radiotherapy between patients of the two groups. 29.5% of WD patients and 21.6% of N-WD patients had steroid use. Sepsis incidence was just reported in 15.9% of WD group. 22.7% of the WD patients were diabetics compared to 4.5% of the controls. 75% of incisions were Pfannenstiel and 25% were midline. Surgery duration time in WD group was 57 minutes and in N-WD group was 45 minutes. Anemia, sepsis, diabetes, type of surgery (emergency or elective), surgeon's experience and duration time of operation were defined statistically significant (p<0.05). The number of WD patients increased by increase in the number of risk factors and WD complications enhanced by increase of more than four risk factors. Conclusion: evaluation of the risk factors related to WD, as an essential element, before and after surgery will prevent postoperative complications among women.

**KEYWORDS:** Wound dehiscence, abdominal, women, risk factors.

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### 1. INTRODUCTION

Wound Dehiscence is a mechanical failure of wound healing. Surgical abdominal WD is an urgent problem in healing of patients. There are two states for this condition: at good state the wounds usually are improved and healed after discharging the patients but sometimes urgent interventions are required when a wound dehiscence problem occurs and the fatal outcome is about 20% of cases(1). There have been a lot of advances in pre and after surgery care for wound healing over the past decades. Unfortunately despite of all the efforts this issue has remained as an important problem in healthcare with a mortality rate about 10-44 % (2-6).

There are several factors related to increase of WD rates as documented in numerous studies. In addition, WD predominantly affects women more than men [7-9]. Conditions that increase risk of wound dehiscence development are nutritional state, age and co-existing diseases (diabetes, use of steroids, anemia, hypoproteinemia, obesity, cancer, radiotherapy, chemotherapy, jaundice, malnutrition), and some factors such as surgeon-experience, type of incision, suture material, drain, and ostomy are related to surgery [10-12].

Abdominal wound dehiscence is a postoperative problem that involves the abdominal wall layers. As reported in the literature, the incidence rate in regard to this problem is from 0.4% to 3.5% with associated mortality rate of 9% to 44%. Despite the remarkable advances in perioperative care in recent years, the incidence of abdominal wound dehiscence and its associated mortality have not changed significantly [13-15]. This may be related to the increase of incidences of risk factors among patients outweighing the advantages of technical advancements. It is very important to recognize the risk factors to prevent these complications especially the wound infection and mechanical stress [15].

Regarding the lack of data related to the abdominal WD complications in Iran, this study was conducted to consider the history of woman patients suffering from this problem, to recognize several risk factors related to the development of this condition, and to compare these patients with the control group. It is hoped that this study would

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be able to decrease the incidence of WD complications and mortality rates due to this problem by identifying and controlling the related risk factors.

**METHOD**

This cross sectional study was done during a ten-year period from March 2001 to March 2011 and 9,569 major intra-abdominal operations were performed at Alzahra educational Hospital in Rasht, Iran which is one of the large centers. This study was approved by ethical committee of Guilin University of medical sciences. Forty-four patients were reported with complete wound dehiscence (WD group). During the same period, 88 non-wound dehiscence patients (N-WD group) were selected as controls. The medical records of all patients were considered in order to collect the information as follow: age, malignancy, sepsis, anemia, diabetes, radiotherapy or chemotherapy, use of steroid before operation (12 months), surgeons’ experience, surgical incisions (Pfannenstiel or midline), type of surgery (emergency or elective), and surgery duration. Each WD patient was matched with two controls by random sampling. Clinical Anemia was considered as a Hemoglobin level of less than 10 mg/dl and diabetes was defined as fasting glucose level more than 126 mg/dl .The SPSS version 20 was employed to analyze the data. Variables were reported as mean ± standard deviation (SD). Statistical analyses were done by the independent t-test, chi-squared and Fisher exact tests, and a P-value of < 0.05 was considered statistically significant.

**RESULTS**

Out of 9569 patients, there were 44 with developed WD, an incidence of 0.46%. The mean age of the WD patients was 31 years, compared with 30 years for N-WD group ( $p>0.05$ ). None of patients had any history of chemotherapy within 12 months before the operation. Twenty-seven of the 44 patients (61.4%) in WD group, and 28 of the 88 patients (31.8%) in N-WD group had anemia. There was just two report of malignancy among WD group. Thirteen patients (29.5%) in the WD group and nineteen patients (21.6%) in N-WD group had used steroids for their treatments within 12 months before operation. Anemia, Malignancy and steroid usage were not found significant factors between the groups ( $p>.05$ ) (table 1).

Seven patients (15.9%) in WD group had sepsis, while none of the patients in the control group had sepsis. Ten Patients (22.7%) in WD group and four patients (4.5%) in N-WD group had diabetes. Sepsis and diabetes factors between the two groups were significantly different (P value <0.05) (table 1).

Surgery related factors are shown in table 2. Junior Surgeons at post graduate year 2 (PGY-2) 25%, PGY-3 38.6%, senior surgeons 13.6% and teachers 22.7%, performed the operations in WD group, while 50% of operations in the N-WD group were performed by PGY-4, 20.4% by PGY-3 and 10.2% by PGY-2. Among WD and N-WD patients, 61% and 28% had emergency surgery, and 39% and 72% had elective surgery respectively.

Seventy-five percent of surgical incisions in the WD patients were Pfannenstiel and the rest (25%) were midline type. Among control patients 86% had an operation with Pfannenstiel incision and 14% had midline incision. Duration of surgery in WD patients was 54±24 and in N-WD group was 45±23 minutes. Among surgery related factors, surgeon graduation level, type, and duration of operation were found statistically significant ( $p<0.05$ ) but type of incision was not statistically significant ( $p>0.05$ ).

Table 1: comparison of the risk factors between study groups

Factors	WD n=44	N-WD n=88	P-value
Age	31.4±10.4	30.5±7.8	0.4
Anemia n (%)	27(61.4)	28(31.8)	0.001
Sepsis Nn (%)	7(15.9)	0	0.001
Malignancy n(%)	0	2(2.3)	0.55
Diabetes n(%)	10(22.7)	4(4.5)	0.002
Use of steroids n(%)	13(29.5)	19(21.6)	0.39

Table 2: comparison of surgical factors between the study groups.

Factors	WD	N-WD	p-value
<b>Surgeon teacher</b>	10(22.7%)	44(50%)	0.003
<b>PGY-4</b>	6(13.6%)	17(19.3%)	
<b>PGY-3</b>	17(38.6%)	18(20.5%)	
<b>PGY-2</b>	21(25%)	9(10.2%)	
<b>Surgical incision</b>			0.14
<b>Pfannenstiel</b>	33(75%) 11(25%)	76(86.4%) 12(3.6%)	
<b>Midline</b>			
<b>Type of surgery</b>			0.001
<b>Emergency</b>	27(61.4%)	25(28.4%)	
<b>Elective</b>	17(38.6%)	63(71.6%)	
<b>Duration time</b>	54.7±24.1	45.2± 23.2	0.003

There were only two WD patients (4.5%) who didn't have any of the risk factors considered in this study. Regarding the risk factors to develop wound dehiscence problem in WD group, 16 patients had 2, 12 patients had 3, 11 patients had 4, 2 patients had 5, and one patient had 7 risk factors. In comparison, in the patients of N-WD group, 25 patients had just one, 24 patients had 2, 13 patients had 3, and just 3 patients had 4 risk factors to develop WD complications. Statistical analysis showed significant difference between number of risk factors and developing wound dehiscence problem ( $p < 0.05$ ).

## DISCUSSION

In the current study the postoperative complications of wound dehiscence problem in women were examined. The results showed that several factors may affect the development of wound dehiscence complications. This is a mechanical problem in wound healing which can result in high rates of mortality and morbidity and it is more common in elder patients (>65 years) than younger ones, but the difference wasn't significant between WD and N-WD patients in the current research [16]. It might be because many of the women who had undergone laparotomy were in reproductive age and most of them had Caesarean operation.

The previous studies indicated that using steroid for a long time may decrease the tensile strength in wound healing process [17]. But in the current study using steroid didn't have any significant effect on wound dehiscence problem.

In the present study, a significant effect was found for diabetes factor. Diabetics had a greater risk of WD problems than non-diabetics. It might be because of collagen synthesis decreases in diabetes conditions. On the other hand changes in levels of insulin, insulin growth factor (IGF-1), growth factor and transforming growth factor-beta might partially impair wound healing [18]. It was shown that use of insulin therapy and growth factor as an exogenous medicine can increase tensile strength of wounds and collagen deposition [18].

None of the control group patients had sepsis, but 16% of WD group had sepsis and the difference for this factor was statistically significant. This finding was similar to that of the Spiliotis study [19].

In spite of previous studies in which malignancy was defined as a significant factor, in the current study malignancy was not a significant factor because there were just two patients in WD group who had malignancy history [20, 21]. It may be because majority of surgeries in this research were Caesarean operations in reproductive women and the rest were surgeries related to the cervix or ovarian masses which were without any pathological observation of cancer.

Wound dehiscence was seen more in emergency surgeries than elective surgeries because sterile conditions may be provided less in emergency cases than elective cases. The surgeon's experience was an important factor in the outcome of surgeries. The more experienced the surgeon, the lower the incidence of wound dehiscence problems. In this study, surgeon experience was defined as a significant factor similar to the previous studies [16]. Less experienced surgeons increase duration time of operation which may lead to WD problems.

In conclusion it was found that if patients have four or more risk factors, the WD complications may increase. Wound dehiscence was an important problem in surgical operations which can increase mortality rate and prolonged hospital stays. In the current study some important risk factors were considered. Some of which couldn't be changed but some were related to the surgeons. Therefore it is recommended that the patients with more risk factors, be operated by experienced surgeons in appropriate duration. In addition, patients' conditions should be assessed before surgery to check their risk factors. After surgery, patients should be taken care of precisely to prevent any possible

complications. Awareness of the risk factors for wound dehiscence and measures to prevent dehiscence are important.

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