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ORIGINAL ARTICLE

Causes of wound dehiscence in trauma patients with penetrating and non-penetrating abdominal wound in Rasool Akram Hospital within 2017-2020

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Abstract

Introduction: Wound dehiscence is one of the serious complications of surgery that is associated with mortality and morbidity (about 45%); moreover, it increases medical costs. The present study assessed the incidence and predictors of wound dehiscence in trauma patients referred to Hazrat Rasool Akram Hospital.

Methods: This cross-sectional study was conducted on all trauma patients with penetrating or non-penetrating abdominal wounds referred to Hazrat Rasool Akram Hospital within April 2017-March 2020. Patients were evaluated in two stages, three days after the surgery and one month later. The data were analyzed in SPSS software (version 19) using Fisher's exact tests, independent t-test, Pearson's correlation coefficient, and chi-square test. A p-value less than 0.05 was considered statistically significant.

Results: The present study included 154 patients with a mean age of 43.53±16.81(age range:16-91 years). Moreover, the majority of the cases were female (n=86; 55.8%). The wound of 20 (13%) patients did not heal. There was a significant relationship between male gender and wound dehiscence (P=0.013). The two groups did not differ in age, smoking, alcohol or opioid use, and the type of surgery. Nevertheless, wound dehiscence was significantly correlated with chemotherapy and the number of sessions. The number of hospitalization days was significantly higher in the group with wound dehiscence (P=0.001). Furthermore, wound dehiscence was closely correlated with low albumin, low hemoglobin, low hematocrit (leading to anemia), and high bilirubin (leading to jaundice).

Conclusions: As evidenced by the obtained results, wound dehiscence was significantly correlated with gender, low albumin, low hemoglobin, low hematocrit, bilirubin elevation, steroid usage, and chemotherapy history.

Key words: Penetrating wound, Surgical wound dehiscence, Wound healing

Introduction

Wound dehiscence refers to the reopening of is a surgical incision occurring 2-7 weeks after the surgery. This complication increases the risk of infection, reduces skin wound healing, and leads to atrophic scars (1-3). Wound dehiscence is one of the serious complications of surgery that is

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associated with mortality and morbidity (about 45%); moreover, it imposes a heavy economic burden on patients and medical centers. The incidence reported in the studies ranges from 0.3%-3.5%; nonetheless, it has been reported as 10% in some other studies (4-6). The influential factors affecting wound dehiscence are assigned to three categories: preoperative, intraoperative, and postoperative (7-10). Among these factors, we can refer to chronic obstructive pulmonary disease, male gender, age> 40 years, smoking, Body mass index> 30, anemia, low albumin, high bilirubin, ascites, infection, long operative time, postoperative trauma, inexperienced surgeon, peripheral vascular disorders, and strain (10, 11-15). Moreover, chemotherapy and the number of sessions has been reported to affect wound dehiscence (15-19).

Wound dehiscence can lead to prolonged hospitalization and put the patient at risk of such infections as osteomyelitis, meningitis, and abscesses. Therefore, it reduces patients' quality of life due to the appearance of skin defects (14, 20). In light of the aforementioned issues, the present study aimed to assess the incidence and predictors of wound dehiscence in trauma patients referring to “Hazrat Rasool Akram Hospital”.

Methods

This cross-sectional study was conducted on all trauma patients (n=154) with penetrating or non-penetrating abdominal wounds referred to the Rasool Akram hospital and have laparotomy between April 2017 and March 2020. Regarding the ethical consideration, the study protocol was approved by the Ethical Committee at Iran University of Medical Sciences, Tehran, Iran (IR.IUMS.FMD.REC.1398.400).

Checklist data included demographic data, history of the disease, history of wound dehiscence, smoking, alcohol or opium uses, anemia, jaundice, cancer, history of chemotherapy and number of sessions, blood pressure, nausea and vomiting, mechanism of trauma, type of surgery, and the number of hospitalization days. The laboratory tests were bilirubin, albumin, complete blood count (CBC), blood urea nitrogen (BUN), creatinine (Cr), prothrombin time (PT), Partial thromboplastin time (PTT), and C-reactive protein (CRP). The patients were evaluated in two stages, three days after surgery and one month later. If patients were referred or treated for wound dehiscence, their information was also recorded. The variables were analyzed and compared between patients with and without wound dehiscence in SPSS software (version 19) concerning descriptive indices (mean, standard deviation, frequency, and percentage). The relationship between variables was examined using Fisher's exact tests, independent t-test, Pearson's correlation coefficient, and chi-square test. A p-value less than 0.05 was considered statistically significant.

Results

The present study included 154 patients with a mean age of 43.53±16.81(age range:16-91 years). Moreover, the majority of the cases were female (n=86; 55.8%). The wound of 20 (13%) patients did not heal. There was a significant relationship between male gender and wound dehiscence (P=0.013). The two groups did not differ in age, smoking, alcohol or opioid use, and the type of surgery. The mean number of hospitalization days in wound dehiscence patients was 5.52±4.30, while it was reported as 12.65±7.27 in the other group. The number of hospitalization days was significantly higher in the group with wound dehiscence (P<0.001).

Table 1 displays the association between wound dehiscence and the laboratory tests, including bilirubin, albumin, CBC, Bun, Cr, PT, PTT, and protein c, based on the results of Chi-Square and t-test results. It was observed that wound dehiscence was associated with low hemoglobin, low hematocrit, low albumin, and high bilirubin (P<0.001).

In the current study, a significant association was

Table 1: Association between wound dehiscence and laboratory tests based on Chi-Square and Fisher's Exact Test

		Wound Dehiscence				P-value*
		No		Yes		
		N	%	N	%	
Bilirubin	Insufficient	7	87.5	1	12.5	0.03
	Normal	1	25.0	3	75.0	
	High	28	82.4	6	17.6	
Albumin	Insufficient	24	66.6	12	33.3	0.04
	Normal	28	93.3	2	6.66	
	High	0	0.0	0	0.0	

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Table 1. Continued

	Insufficient	2	66.7	1	33.3	0.13
WBC	Normal	50	79.4	13	20.6	
	High	44	91.7	4	8.3	
	Insufficient	74	84.1	14	15.9	1.00
RBC	Normal	21	84.0	4	16.0	
	High	2	100.0	0	0.0	
	Insufficient	73	81.0	17	18.0	0.05
Hematocrit	Normal	24	96.0	1	4.0	
	High	0	0.0	0	0.0	
	Insufficient	7	87.5	1	12.5	0.73
Platelets	Normal	84	84.8	15	15.2	
	High	5	71.4	2	28.6	
	Insufficient	0	0.0	0	0.0	0.5
PT	Normal	52	86.7	8	13.3	
	High	41	82.0	9	18.0	
	Insufficient	42	87.5	6	12.5	0.32
PTT	Normal	50	83.3	10	16.7	
	High	1	50.0	1	50.0	
	Insufficient	75	82.4	16	17.6	0.03
Hemoglobin	Normal	17	89.5	2	10.5	
	High	0	0.0	0	0.0	
	Insufficient	18	90.0	2	10.0	0.231
BUN	Normal	67	85.9	11	14.1	
	High	9	69.2	4	30.8	
	Insufficient	6	85.7	1	14.3	1.00
Creatinine	Normal	68	84.0	13	16.0	
	High	21	84.0	4	16.0	

WBC=White blood cells, RBC=Red blood cells, PT=prothrombin time, PTT=partial thromboplastin time, BUN=blood urea nitrogen

also detected between wound dehiscence and anemia P<0.001) and also jaundice (P=0.007). Nonetheless, wound dehiscence was not correlated with systolic blood pressure (P=0.34) and diastolic blood pressure(P=0.23). In the drug history of patients, a significant relationship was observed between wound dehiscence and steroids (P<0.001). No significant differences were found in past medical histories; however, the association of wound dehiscence with chemotherapy and the number of sessions was significant. Further symptoms of nausea and vomiting were significantly correlated with wound dehiscence. The correlation values of wound dehiscence with nausea and vomiting were obtained at P=0.014 (R=0) and P=0.048(R=0.16), respectively.

Discussion

The present study included 154 patients with a mean age of 43.53±16.81(age range:16-91 years); moreover, the majority of the cases were female (n=86; 55.8%). Out of these patients, 20 (13%) cases were afflicted with wound dehiscence, and the rate of wound dehiscence was higher in males (P=0.013) as reported in most studies (9-12). There was no significant relationship between the age of patients and wound dehiscence in the present study; nonetheless, a study by Ramneesh et al. (2014)indicated that old age, particularly the fourth decade of life, contributed to the development of wound dehiscence. Moreover, in their study, Gabrielle et al. (2010) referred to age as one of the risk factors for wound dehiscence. Furthermore, wound dehiscence was correlated with low albumin, hemoglobin, hematocrit, anemia, high bilirubin, and jaundice (P<0.001). in their study, Ramneesh et al. (2014) stated that 26% of anemia patients, 24% of patients with low serum albumin, and 16% of cases with high bilirubin levels developed wound dehiscence. Moreover, Gabrielle et al. (2010) referred to anemia and jaundice as risk factors for wound dehiscence. The results of the current study also pointed to a

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significant relationship between wound dehiscence and steroid usage (P<0.001). Tobacco usage was considered a risk factor for wound dehiscence in most studies; however, in the current study, no significant relationship was found in this regard. Every study has some limitations which should be addressed in the paper. The limitations of the current study are as follows: small sample size, absence of information about the effects of wound care on wound dehiscence, and incomplete laboratory data for some patients.

Conclusions

As evidenced by the obtained results, wound dehiscence was significantly correlated with gender, low albumin, low hemoglobin, low hematocrit, bilirubin elevation, steroid usage, and chemotherapy history.

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Conflict of Interest

The authors declare that they have no conflict of interest regarding the publication of this article.

References

1. Chin GA, Diegelmann RF, Schultz GS. Cellular and molecular regulation of wound healing. Basic Clin Dermatol. 2005; 33:17.
2. Waldrop J, Doughty D. Wound healing physiology. Acute and chronic wounds: nursing management. 2nd ed. St Louis, MO: Mosby/Elsevier; 2000. P. 17-80
3. West J, Gimbel M. Acute surgical and traumatic wound healing. Acute and chronic wounds: nursing management. St Louis, MO: Mosby/Elsevier; 2000. P. 189-96.
4. Afzal S, Bashir MM. Determinants of wound dehiscence in abdominal surgery in public sector hospital. Ann King Edward Med Univ. 2010; 14(3):119. DOI: 10.21649/akemu.v14i3.46
5. Hodgson NC, Malthaner RA, Ostbye T. The search for an ideal method of abdominal fascial closure: a meta-analysis. Ann Surg. 2000; 231(3):436-42. PMID: 10714638 DOI: 10.1097/00000658-200003000-00018
6. Richards PC, Balch CM, Aldrete JS. Abdominal wound closure. A randomized prospective study of 571 patients comparing continuous vs. interrupted suture techniques. Ann Surg. 1983; 197(2):238-43. PMID: 6297417 DOI: 10.1097/00000658-198302000-00018
7. Ramneesh G, Sheerin S, Surinder S, Bir S. A prospective study of predictors for post laparotomy abdominal wound dehiscence. J Clin Diagn Res. 2014; 8(1):80-3. PMID: 24596730 DOI: 10.7860/JCDR/2014/7348.3921
8. Rencuzogullari A, Gorgun E, Binboga S, Ozuner G, Kessler H, Abbas MA. Predictors of wound dehiscence and its impact on mortality after abdominoperineal resection: data from the National Surgical Quality Improvement Program. Tech Coloproctol. 2016; 20(7):475-82. PMID: 27189443 DOI: 10.1007/s10151-016-1486-7
9. Walming S, Angenete E, Block M, Bock D, Gessler B, Haglind E. Retrospective review of risk factors for surgical wound dehiscence and incisional hernia. BMC Surg. 2017; 17(1):19. PMID: 28222776 DOI: 10.1186/s12893-017-0207-0
10. Elliott S. A clinically effective primary wound dressing that supports self-care for chronic and acute wounds. Br J Community Nurs. 2019; 24(Sup6):S30-7. PMID: 31166798 DOI: 10.12968/bjcn.2019.24.Sup6.S30
11. Kenig J, Richter P, Lasek A, Zbierska K, Zurawska S. The efficacy of risk scores for predicting abdominal wound dehiscence: a case-controlled validation study. BMC Surg. 2014; 14:65. PMID: 25182865 DOI: 10.1186/1471-2482-14-65
12. Hede P, Sorensson MA, Polleryd P, Persson K, Hallgren T. Influence of BMI on short-term surgical outcome after colorectal cancer surgery: a study based on the Swedish national quality registry. Int J Colorectal Dis. 2015; 30(9):1201-7. PMID: 26077669 DOI: 10.1007/s00384-015-2280-0
13. Tolstrup MB, Watt SK, Gögenur I. Reduced rate of dehiscence after implementation of a standardized fascial closure technique in patients undergoing emergency laparotomy. Ann Surg. 2017; 265(4):821-6. PMID: 28267697 DOI: 10.1097/SLA.0000000000001762
14. Aksamija G, Mulabdic A, Rasic I, Aksamija L. Evaluation of risk factors of surgical wound dehiscence in adults after laparotomy. Med Arch. 2016; 70(5):369-72. PMID: 27994299 DOI: 10.5455/medarh.2016.70.369-372
15. Di Stadio A, Gambacorta V, Cristi MC, Ralli M, Pindozzi S, Tassi L, et al. The use of povidone-iodine and sugar solution in surgical wound dehiscence in the head and neck following radio-chemotherapy. Int Wound J. 2019; 16(4):909-15. PMID: 30972904 DOI: 10.1111/iwj.13118

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[DOI: 10.32592/jsurgery.2020.8.4.105]

16. Tolstrup MB, Watt SK, Gögenur I. Reduced rate of dehiscence after implementation of a standardized fascial closure technique in patients undergoing emergency laparotomy. Ann Surg. 2017; 265(4):821-6. PMID: 28267697 DOI: 10.1097/SLA.0000000000001762

17. van Ramshorst GH, Nieuwenhuizen J, Hop WC, Arends P, Boom J, Jeekel J, et al. Abdominal wound dehiscence in adults: development and validation of a risk model. World J Surg. 2010; 34(1):20-7. PMID: 19898894 DOI: 10.1007/s00268-009-0277-y

18. Meyer CP, Rios Diaz AJ, Dalela D, Hanske J, Pucheril D, Schmid M, et al. Wound dehiscence in a sample of 1776 cystectomies: identification of predictors and implications for outcomes. BJU Int. 2016; 117(6B): E95-101. PMID: 26118393 DOI: 10.1111/bju.13213

19. Kantar RS, Alfonso AR, Rifkin WJ, Ramly EP, Sharma S, Diaz-Siso JR, et al. Risk factors for wound complications following transmetatarsal amputation in patients with diabetes. J Surg Res. 2019; 243:509-14. PMID: 31377491 DOI: 10.1016/j.jss.2019.07.003

20. Shariq OA, Hanson KT, McKenna NP, Kelley SR, Dozois EJ, Lightner AL, et al. Does metabolic syndrome increase the risk of postoperative complications in patients undergoing colorectal cancer surgery? Dis Colon Rectum. 2019; 62(7):849-58. PMID: 31188186 DOI: 10.1097/DCR.0000000000001334

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