

STUDY OF PROGNOSTIC FACTORS OF ABDOMINAL WOUND DEHISCENCE AFTER MIDLINE LAPAROTOMY

Taha Sino Ali^{*1}, Aktham Kanjarawy² and Ali Alloush³

¹Department of General Surgery, Tishreen University, Faculty of Medicine, Lattakia, Syria.

^{2,3}Department of General Surgery, Professor, Tishreen University, Faculty of Medicine, Lattakia, Syria.

Received date: 09 December 2020

Revised date: 29 December 2020

Accepted date: 19 January 2021

*Corresponding author: Taha Sino Ali

Department of General Surgery, Tishreen University, Faculty of Medicine, Lattakia, Syria.

ABSTRACT

Background: Abdominal Wound dehiscence (WD) following laparotomy is a surgical emergency with high morbidity and mortality. **Objective:** the present study aims to determine the incidence and important risk factors for WD after laparotomy. **Materials and Methods:** This is analytical study conducted in the Department of General surgery in Tishreen University Hospital –Lattakia- Syria from November 2019 to November 2020. Patients aged 18 to 85 years who underwent to laparotomy were included in the study. **Results:** 88 patients were included in the study. The median age was 66 years, 57(64.8%) were male, abdominal WD was developed in 22 patients (25%). Abdominal WD was more frequently in patients using corticosteroid, with a history of chemotherapy or radiotherapy, and in the presence of wound infection ($P < 0.05$). Independent predictors for abdominal WD were wound infection (OR=10 [2.7 – 22.9], $p:0.0001$), hypoalbuminemia (OR 4.5 [1.9 – 19.2], $P:0.006$), and prolonged use of corticosteroid (OR=3.3 [0.6 – 17.8], $p:0.01$). **Conclusion:** Abdominal WD is a serious complication which associated with worsening prognosis, so identification the risk factors for abdominal (WD) may be useful in guiding perioperative management.

KEYWORDS: Wound dehiscence, mortality, risk factors, Laparotomy.

INTRODUCTION

Abdominal WD is the separation of the margins of a closed surgical incision that has been made in skin, with or without exposure or protrusion of underlying tissue or organs.^[1,2]

The incidence of WD after laparotomy is approximately 0.4-3.8%, with mortality rates reported as high as 45%.^[3,4]

The major causes of WD can be categorized as: technical issues, mechanical stress, and disrupted healing.^[5,6]

Risk factors associated with WD include patient and non-patient related factors all of which may play a role in contributing to the occurrence of WD, either independently or in combination with the patient's surgical course.^[7,8]

There is limited research about the influence of these factors in relation to WD and how identification might be utilized in influencing clinical practice.

The aim of the current study is to evaluate possible risk factors for abdominal WD.

MATERIALS AND METHODS

Study design and data collection

We studied patients aged 18 to 85 years who underwent laparotomy in the Department of General Surgery from November 2019 to November 2020 in Tishreen University Hospital –Lattakia-Syria. The following data were recorded: demographic (age, sex), past medical history, co-morbidities, type of admission, laboratory test, and postoperative outcomes.

Definition

The Sandy Grading System for SWD: It describes a new grading system related to the incisional wound dehiscence characteristics and is determined by the visible anatomical features at the incision site.^[9]

Statistical Analysis

Statistical analysis was performed by using IBM SPSS version 20. Basic Descriptive statistics included means, standard deviations (SD), Frequency and percentages.

Differences of distribution examined using chi-square test or Fisher exact test if it need. Risk factors were evaluated in univariate analysis, and in multivariate analysis by a multiple logistic stepwise regression procedure. Variables with p less than 0.05 were included in the model. Odd ratios were estimated from b coefficients obtained, with respective 95% confidence intervals (CI 95%).

RESULTS

A total of 88 patients underwent laparotomy in the Department of General Surgery from November 2019 to November 2020, 22 patients (25%) developed WD. The

baseline characteristics of patients are as given in table(1).

As shown below, abdominal WD was more frequently in patients using Corticosteroid (13.6% vs 4.5%, p 0.04), with a history of Chemotherapy or Radiotherapy (18.2% vs 3%, p 0.01), and in the presence of wound infection (68.2% vs 9.1%, p 0.0001). Serum Albumin levels were lower in patients with abdominal WD in comparison with the other group (3.06±0.2 vs 3.71±0.2, p 0.04). There wasn't statistically significance difference between the two groups in regards to (Age, Sex, BMI, smoking, Co-morbidities, type of surgery, mortality).

Table1: Demographic characteristics of the study population by comparison of the two groups.

Variables	Group1 patients with abdominal WD n=22(25%)	Group2 patients without abdominal WD n=66(75%)	p-value
Age(year)	64.2±11.2	63.7±11.4	0.8
Sex Male Female	15(68.2%) 7(31.8%)	42(63.6%) 24(36.4%)	0.6
BMI>30	5(22.7%)	8(12.1%)	0.2
Smoking	16(72.7%)	57(86.4%)	0.1
Co-morbidities			
• Cancer	11(50%)	30(45.5%)	0.7
• Diabetes mellitus	5(22.7%)	10(15.2%)	0.4
• Chronic pulmonary disease (COPD)	3(13.6%)	7(10.6%)	0.6
Medical history			
• Previous surgery	8(36.4%)	32(48.5%)	0.3
• Use of Corticosteroid	3(13.6%)	3(4.5%)	0.04
• Chemotherapy or radiotherapy	4(18.2%)	2(3%)	0.01
Serum Albumin	3.06±0.2	3.71±0.2	0.04
Type of surgery			
• Emergency	18(81.8%)	54(81.8%)	1
• Selective	4(18.2%)	12(18.2%)	
Complications of surgery			
• Wound infection	15(68.2%)	6(9.1%)	0.0001
• Abdominal infection	2(9.1%)	1(1.5%)	0.09
Mortality rate	6(27.3%)	14(21.2%)	0.5

Significant independent risk factors for developing abdominal WD were: wound infection, hypoalbuminemia, and prolonged use of corticosteroid (Table2).

Table 2: Risk factors for developing abdominal WD in the study population by multivariate logistic regression.

Factor	OR(95% CI)	p-value
Wound infection	10 [2.7 – 22.9]	0.0001
hypoalbuminemia	4.5 [1.9 – 19.2]	0.006
Prolonged use of corticosteroid	3.3 [0.6 – 17.8]	0.01

These risk factors are represented in the Fig(1).

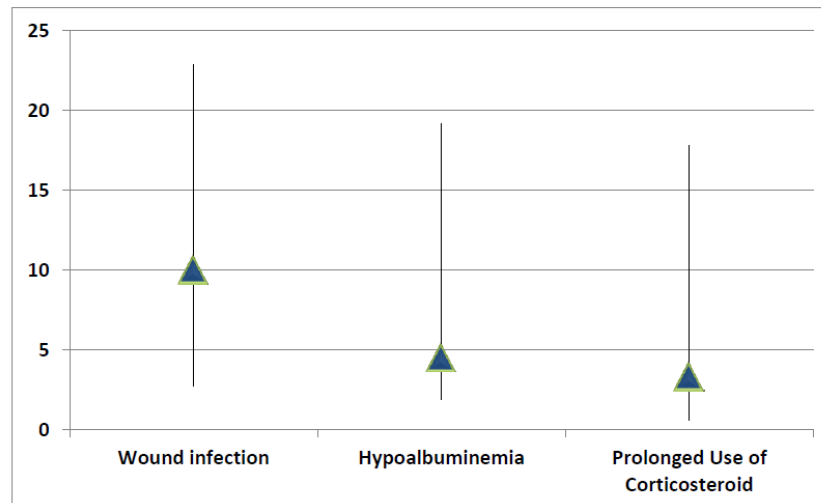


Figure 1: Risk factors for developing abdominal WD in the study population.

DISCUSSION

This analytic study demonstrated incidence, characteristics, and predictive risk factors for abdominal WD in patients who underwent laparotomy.

The overall incidence of abdominal WD in our study was (25%).

Webster et al (2003) reported that the incidence of WD was 3.4%.^[10] Kenig et al(2012) also found that incidence of WD was 2.9%.^[11] In study by John et al(2009), the incidence of WD was 0.5%,^[12] these findings are consent with the incidence reported in the literature.

The relatively higher incidence in our study might be due to the difference in the sample size, Co-morbidities present in population included in the study or due to factors related to surgery.

Abdominal WD was more frequently in patients with prolonged use of corticosteroid, a history of chemotherapy or radiotherapy ($p < 0.05$). The most important risk factors for abdominal WD in the present study were: wound infection (OR=10, $P:0.0001$), hypoalbuminemia (OR= 4.5, $P:0.006$), and prolonged use of corticosteroid (OR=3.3, $p:0.01$).

These findings may be explained a follows: Steroids inhibit primary wound healing, delay the formation of granulation tissue, and it is also well known that long term treatment with steroids induces an increase in complications during and after operation because the patient is in secondary adrenal insufficiency.^[13]

Infection causes a prolongation of the inflammatory phase and negatively affects deposition of collagen and fibroblast activity, in addition to that degradation of collagen exceeds the synthesis of it which adversely affects breaking strength.^[14]

Preoperative serum albumin concentration is closely

related to poor wound healing and pathological inflammation.^[15]

Radiation leads to microvascular obliteration leading to a gradual decrease in tissue perfusion as a result compromising wound repair.^[16]

Johan et al(2009) found that abdominal WD was more frequently in older patients, males, and those with cancer, wound infection, prolonged use of corticosteroid, and in emergency surgery.^[12] But in our study there wasn't any effect of age, sex or type of surgery on incidence of abdominal WD.

Theodoros et al(2001) also found that patients older than 65 year, with cancer, hypoalbuminaemia, prolonged use of steroid, wound infection are at risk for abdominal WD.^[17]

Mortality rate was higher in patients with abdominal WD without statistically significant difference (27.3% vs 21.2%, $p 0.5$), and this is comparable with other studies. Kenig et al(2012) found that mortality was higher in patients with WD(23.2% vs 20.2% , $p 0.6$).^[11]

CONCLUSION

Identification of risk factors associated with abdominal WD may assist in recognizing patients that may predisposed to surgical WD to initiate preventive measures and improving prognosis.

ACKNOWLEDGEMENTS

We would like to thank all doctors in the Department of General Surgery for assistance.

REFERENCES

1. G.H.van Ramshorst, J.Nieuwenhuizen, W. C. J. Hop et al. Abdominal wound dehiscence in adults: development and validation of a risk model,World Journal of Surgery, 2010; 34: 20-27.

2. N.Eke,N.Jebbin. Abdominal wound dehiscence: a review.Int Surg, 2006; 91: 276-287.
3. Webster C,Neumayer L,Smout R. National veterans affairs surgical quality improvement program. Prognostic models of abdominal wound dehiscence after laparotomy.J Surg Res., 2003; 109: 130-137.
4. G.Madsen,L.Fischer, and P.Wara.Burst abdomen-clinical features and factors influencing mortality,Danish Medical Bulletin, 1992; 39: 183-185.
5. Carlson MA. Acute wound failure. Surg Clin North Am, 77: 607-636.
6. Niggebrugge AH, Hansen BE, Trimbo JB.Mechanical factors influencing the incidence of burst abdomen.Eur J Surg, 1995; 161: 655-661.
7. J.T.Makela, H.Kiviniemi, T.Juvonen, S.Laitinen. Factors influencing wound dehiscence after midline laparotomy.Am J Surg, 1995; 170: 387-390.
8. J.Kenig,P.Richter,A.Lasek,k.Zbierska,S.Zurawska.The efficacy of risk scores for predicting abdominal wound dehiscence: a case-controlled validation study.BMC Surg, 2014; 14: 65.
9. Sandy-Hodgetts K,Carville K,Leslie GD Determining risk factors for surgical wound dehiscence: a literature review.Int Wound J., 2015; 12(3): 265-75.
10. Clinton Webster, Leigh Neumayer Randall Smout, Susan Horn. Prognostic models of abdominal wound dehiscence after laparotomy. Journal of surgical Research, 2003; 109: 130-137.
11. Jakub Kenig,Piotr Richter, Sabina Zurawska,Anna Lasek. Risk factors for wound dehiscence after laparotomy –clinical control trial.Polski Przegląd Chirurgiczny, 2012; 84(11): 565-573.
12. John Spiliotis,Konstantinos Tsiveriotis,Anastasios D Datsis, Archodoula Vaxevanidou. Wound dehiscence: is still a problem in the 21 th century: a retrospective study.World Journal of Emergency Surgery, 2009; 4: 12.
13. Wicke C,Halliday B,Allen D,Roche NS.Effects of steroids and retinoids on wound healing.Arch Surg., 2000; 135: 1265-1270.
14. Riou JPA,Cohen JR,Johnson H.Factors influencing wound dehiscence.Am J Surg., 1992; 163: 324-352.
15. Choudhury A,Deka RK,Gogoi B,Kumar N. A clinical study of abdominal wound dehiscence including its causes and management.J Evol Med Dent Sci., 2017; 6: 1519-1523.
16. Dormand E,Banwell PE,Goodcare TE.Radiotherapy and wound healing.Int Wound J., 2005; 2(2): 1-20.
17. Theodoros E.Pavlidis,Ioannis N.Galatianos,Basilios T.Papaziogas,Charalabos N.Complete Dehiscence of the abdominal wound and incriminating factors.Eur J Surg., 2001; 167: 351-354.