



ORIGINAL ARTICLE

Sociodemographic and operative factors associated with abdominal wound dehiscence in midline laparotomia.

Fazli Junaid¹, Muhammad Usama², Fahad Anwar³, Sana Khan⁴, Faiz ur Rahman⁵, Shawana Asad⁶

Article Citation: Junaid F, Usama M, Anwar F, Khan S, Faiz ur Rahman, Asad S. Sociodemographic and operative factors associated with abdominal wound dehiscence in midline laparotomia. Professional Med J 2022; 29(10):1448-1453.
<https://doi.org/10.29309/TPMJ/2022.29.09.6710>

ABSTRACT... Objective: To calculate the frequency of wound dehiscence after midline laparotomies; as well as look into the factors associated with the grave complication. **Study Design:** Cross Sectional Design. **Setting:** Department of Surgery, Ayub Teaching Hospital, Abbottabad. **Period:** May 2019 to Nov 2019. **Material & Methods:** Data including factors studied and diagnosis of abdominal wound dehiscence were noted on prepared pro forma. Patients were followed and final outcome was assessed. **Results:** Of these 134 cases, 94 (70.1 %) were male whereas 40 (29.9 %) were female. Mean age was 31.57 ± 11.38 years. Significant association of wound dehiscence with age ($p=0.007$), residential status ($p=0.001$), preoperative use of antibiotics ($p=0.001$), obesity ($p=0.002$), suture material used ($p=0.011$) and use of drain ($p=0.001$) was determined. Wound dehiscence was noted in 23 patients (17.2%). **Conclusion:** High frequency of wound dehiscence was observed in patients undergoing midline laparotomies during the study. Wound dehiscence was significantly associated with age, residential status, preoperative antibiotics usage, obesity, suture material preferences and drain placement. These complications must be anticipated for early diagnosis and proper management to decrease the burden of related morbidities and mortalities.

Key words: Laparotomy, Midline Incision, Wound Dehiscence.

INTRODUCTION

Partial or complete disruption of a surgically closed abdominal wound with or without protrusion and evisceration of abdominal contents is abdominal wound dehiscence.¹ Divided into two subtypes: partial or complete; on basis of the extent of separation of the layers. Separation of only the superficial layers or only part of the tissue layers is considered as partial wound dehiscence. Whereas when all the layers of the surgically closed wound get separated: revealing the underlying tissue and organs; it is termed as complete wound dehiscence.¹

Several factors are thought to result in wound dehiscence: categorized as patient related and operation related.² Age, gender, nutritional disorders including obesity, post-operative cough, systemic diseases and BMI <20 or

>25 are among the patient related factors that have been associated with wound dehiscence. Surgery related causes include indication of surgery - elective/emergency, suture type, incision used, technique of abdominal closure and underlying abdominal pathology have been found to be associated with development of the complication.^{2,3} Wound dehiscence is a severe postoperative complication in abdominal surgeries; with high morbidity, and as high as 50% mortality.⁴ The complication results in financial, mental and physical trauma to the patients and has an equivalent negative effect on the surgeon as well.⁵⁻⁹

Many studies have been published in Pakistan regarding frequency of abdominal wound dehiscence.

1. MBBS, FCPS (General Surgery), Senior Registrar Surgery, Ayub Teaching Hospital, Abbottabad.
2. MBBS, MRCS (ENG), FCPS, Resident Orthopedic, Ayub Teaching Hospital, Abbottabad.
3. MBBS, FCPS, Resident General Surgery, Ayub Teaching Hospital, Abbottabad.
4. MBBS, MPH, Medical Officer Peads, Ayub Teaching Hospital, Abbottabad.
5. MBBS, FCPS (General Surgery), Associate Professor Surgery, Ayub Teaching Hospital, Abbottabad.
6. MBBS, FCPS (General Surgery), Assistant Professor Surgery, Ayub Teaching Hospital, Abbottabad.

Correspondence Address:

Dr. Muhammad Usama
House No 1, Street No 5,
Civil Officers Colony, Abbottabad, Pakistan.
muhammadusama137@gmail.com

Article received on: 19/07/2021
Accepted for publication: 30/05/2022

A study reported it to be 9.60%.¹⁰⁻¹² This study aimed at determination of frequency of wound dehiscence after midline laparotomy and considered days postoperative day, patient's BMI, pre-operative antibiotics usage, suture materials, abdominal closure method, expertise of the operating surgeon, use of drains and underlying cause of laparotomy.

Midline incision is a longitudinally placed incision that transects only the terminal branches of abdominal wall vasculature and nerves that are located at the linea alba; thereby preserving the abovementioned structures. It is one of the most commonly used abdominal incision as it provides most rapid entry: especially important in hypotensive patients. It also provides greatest abdominal exposure which may be required in a seriously ill patient, in whom the diagnosis or location of bleeding is uncertain. Furthermore, it can be extended superiorly to the xiphoid (or to median sternotomy), inferiorly to the pubic tubercle, or transversely or obliquely if lateral exposure is needed. Comparable rates of abdominal wound dehiscence have been reported for both the midline and transverse abdominal incisions by various randomized trials.^{13,14}

Aim of this study is to calculate the frequency of wound dehiscence after midline laparotomies; as well as determine the factors associated with this grave complication. This will not only depict how well are midline laparotomy cases are managed and what factors are causing the grave complication in our setup.

MATERIAL & METHODS

The study was conducted at surgery department of Ayub Teaching Hospital Abbottabad: a tertiary care hospital with three established general surgical units. After approval by Institutional Review Board on 16/05/2019, cross-sectional study design was followed to study a total of 134 patients that presented in the aforementioned institute over a period of six months, from 25-05-2019 to 24-11-2019. The sample size was calculated by WHO software for sample size with the assumptions of 95% confidence interval, 9.60% anticipated proportion and 5% absolute

precision. Non-probability sampling was done to include all fresh midline laparotomy cases, irrespective of gender. Wound examination was done starting from third post-operative day. Patients of age from 15 to 75 years were studied. Patients who had previous history of wound dehiscence and those who were being reoperated were excluded. So were the patients developing dehiscence after gynecological procedures or those developing dehiscence at sites other than abdominal midline.

All patients presenting to the aforementioned departments, and subsequently undergoing midline laparotomy whilst fulfilling the criteria of inclusion were studied. Detailed history and physical examination were conducted, and clinical data was mentioned on structured pro forma. The diagnosis of abdominal wound dehiscence was made by each units' consultant surgeons. An informed consent was obtained from patient/guardian after explaining the study protocol, use of data for research and risk benefit ratio. Demographic data of the patients such as age and gender, duration of symptoms, time of arrival to hospital, co-morbidities, etc. were also recorded. All these patients were followed till the final outcome. Wound dehiscence was defined as separation of the layers of a surgical wound; partial (separation of only superficial layers) and complete (separation of all layers and total disruption) subtypes were considered. The final outcome was assessed in terms of morbidity, mortality (death) or discharge from hospital. The authors themselves collected all the data on a predesigned pro forma.

Collected data was entered into SPSS version 20 for statistical analysis. Quantitative variables like age were presented in terms of mean +/- standard deviation. Whereas categorical variables were described in terms of frequencies and percentages. Data was stratified in terms of variables such as age, gender, BMI, suture material used, pre-operative use of antibiotics, abdominal closure method, drain used and post-stratified data. Finally Chi-square test was used with 5% level of significance to determine significant results.

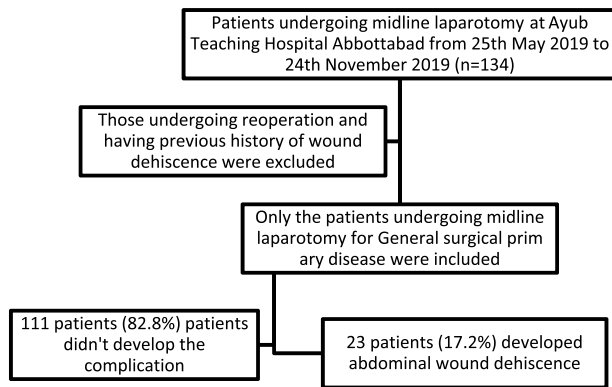


Figure-1. Recruitment algorithm

RESULTS

A total of 134 patients who met inclusion criteria were included in the study. Of these, 94 (70.1 %) were males while 40 (29.9 %) were females. Mean age of the sample was 31.57 ± 11.38 years (where minimum recorded age was 19 years and maximum was 64 years). Mean age of the males was 32.77 ± 12.08 years while that of females was 28.75 ± 9.06 years (p=0.061). Mean of body mass index was 25.43 ± 2.17 kg/m². These descriptive statistics are summarized in Table-I. Statistics indicated that majority of the cases i.e. 108 (80.6 %) aged less than 35 years. Of these 134 study cases, 94 (70.1 %) were from rural areas whereas 40 (29.9 %) belonged to urban regions. Whereas obesity was present in 22 (16.4 %) of our cases. Preoperative antibiotics usage was noted in 46 (34.3%) and drain was placed in 40 (29.9%). Abdominal wall closure was accomplished polypropylene in 95 (70.9%) and polydioxanone in 39 (29.1%). Mass closure for abdominal was employed in 35 (26.1%) and layered closure in 99 (73.9%). Whereas frequency of wound dehiscence was noted to be 17.2% (23 out of 134 cases). Categorical data is summarized in Table-III.

Variable	Mean±SD	P-Value
Age (years)	31.57±11.38	0.061
Age of Male patients (years)	32.77±12.08	
Age of Female patients (years)	28.75±9.06	
Body Mass Index (Kg/m ²)	25.43±2.17	

Table-I. Descriptive statistics of the quantitative variables: (n=134)

Variable	Subgroups	Frequency (%)
Gender	Male	94 (70.1%)
	Female	40 (29.9%)
Age group	Up to 35 years	108 (80.6%)
	Above 35 years	26 (19.6%)
Residential Status	Rural	94 (70.1%)
	Urban	40 (29.9%)
Obese	Yes	22 (16.4%)
	No	112 (83.6%)
Antibiotic Usage	Yes	46 (34.3%)
	No	88 (65.7%)
Drain	Used	40 (29.9%)
	Not used	94 (70.1%)
Suture Material	Polypropylene	95 (70.9%)
	Polydioxanone	39 (29.1%)
Closure Method	Mass Closure	35 (26.1%)
	Layered Closure	99 (73.9%)
Wound Dehiscence	Observed	23 (17.2%)
	Not Observed	111 (82.8%)

Table-II. Descriptive statistics of the categorical variables: (n=134)

Cases of wound dehiscence were stratified with regards to gender, age, residential status, preoperative antibiotics usage, obesity, drain placement, type of suture material and abdominal closure technique applied. Chi square test was applied to look for statistically significant results. Analysis is summarized in Table-III. As depicted by the table, burst abdomen was significantly associated with age (p=0.007), residential status (p=0.001), preoperative use of antibiotics (p=0.001), obesity (p=0.002), suture material used (p=0.011) and use of drain (p=0.001). Whereas no significant association of wound dehiscence was observed with gender (p=0.804) and abdominal closure technique (p=0.605).

Variable	Subgroups	Wound Dehiscence		P-Value
		Yes	No	
Gender	Male	17	77	0.804
	Female	06	34	
Age group	Up to 35yrs	23	85	0.007
	Above 35yrs	00	26	
Residential Status	Rural	23	71	0.001
	Urban	00	40	
Obese	Yes	10	12	0.002
	No	13	99	
Antibiotic Usage	Yes	00	46	0.001
	No	23	65	
Drain	Used	00	40	0.001
	Not used	23	71	
Suture Material	Polypropylene	11	84	0.011
	Polydioxanone	12	27	
Closure Method	Mass Closure	12	25	0.065
	Layered Closure	13	86	

Table-III. Chi-square test results for categorical variables w.r.t wound dehiscence

DISCUSSION

Midline approach for laparotomy is most commonly devised method in colorectal procedures as it provides maximum exposure with minimal chances of neurovascular and muscular insult. Whereas complications that are related to incision wound itself are apparent in clinical environment. Wound dehiscence and incisional hernia are among common causes of hospital admissions after midline laparotomy. Previously published data shows that surgical technique devised for closure plays a significant role in avoiding the aforementioned complication; that lead to approval of Jenkins approach of 4:1 between length of suture and the wound. Similarly other factors including obesity, diabetes, use of glucocorticoids, anemia, infection and hypoalbuminemia etc have been reported as risk factors or these wound complications.¹⁵

Our study comprised of a total of 134 patients. Of these 134 cases, 94 (70.1 %) were males while 40 (29.9 %) were females. Similar research conducted by Khan et al.¹⁶ from Panno Aqil has also reported 52 % male gender preponderance. Soomro et al¹⁷ has reported 64.2 % male gender predominance: the figure backs our study results. Similarly, Khan et al¹⁸ has reported 69 % male gender predominance. Siraj et al¹⁹ has also reported 56 % male gender predominance which is also in compliance with our results.

Mean age of the study group was 31.57 ± 11.38 years (youngest 19 years old and oldest 64 years of age). Age of males was 32.77 ± 12.08 years while that of females was 28.75 ± 9.06 years. This difference was not statistically significant ($p=0.061$). majority of our cases aged up 35 years i.e. 108 (80.6 %). Similarly, Khan et al¹⁶ has also reported majority of patients undergoing midline laparotomies belonged to third decade of life; which are similar to our results. Soomro et al¹⁷ has also reported 33 years mean age which is close to our inferences. Khan et al¹⁸ has reported similar results. Whereas Siraj et al¹⁹ has reported 44.92 ± 15.87 years as mean age which is slightly higher than that of our study results.

Of our 134 cases, 94 (70.1 %) were from rural

areas and 40 (29.9 %) were urban populations. Mean body mass index was 25.43 ± 2.17 kg/m² and obesity was noted in 22 (16.4 %). Siraj et al¹⁹ has also reported similar results in his article. Preoperative use of antibiotics was noted in 46 (34.3%) and drain was placed in 40 (29.9%). Polypropylene was used for abdominal wall closure in 95 (70.9%) and Polydioxanone in 39 (29.1%). Mass closure for abdominal cavity was employed in 35 (26.1%) and layered closure in 99 (73.9%). Soomro et al¹⁷ has also reported similar results.

Wound dehiscence was noted in 23 (17.2%). Shabbir et al²⁰ conducted a project in Faisalabad and documented 16.66% wound dehiscence which is close to our study results. Whereas study conducted by Naeem et al¹² has reported 9.60% wound dehiscence which is quite low in comparison to our results. This higher score can be attributed to the patient related factors like poor nutritional status or inadequacy of healthcare system. Thus, further work is needed to pinpoint the causative factors so that these can be avoided to curb this rise in incidence of the grave outcome.

CONCLUSION

Relatively high frequency of wound dehiscence was noted in midline laparotomies. Wound dehiscence was significantly associated with age, residential status, preoperative antibiotics usage, obesity, suture material preferences and drain placement choices. Hence all surgeons treating this group of patients should anticipate such complications for early diagnosis and proper management to decrease the burden of related morbidities and mortalities.

LIMITATIONS OF THE STUDY



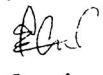


The study was conducted at only a single tertiary care facility, whose catchment area overlaps with other institutions in the same province. Thus a larger scale study should be conducted to uniformly study the population and healthcare services. That will help surgeons develop and follow guidelines leading to interventions lowering the complication rate.

Copyright© 30 May, 2022.

REFERENCES

1. Ramanachalam C, Rani PVD, Rao KA. **Clinical study of post laparotomy wound dehiscence.** J. Evid. Based Med. Healthc. 2017; 4(32), 1896-1900.
2. Muneiah NS, Kumar NM, Sabitha P, Prakash DGV. **Abdominal wound dehiscence-A look into the risk factors.** IOSR Journal of Dental and Medical Sciences. 2015; 14(10):47-54.
3. Sandy-Hodgetts K, Carville K, Leslie GD. **Determining risk factors for surgical wound dehiscence: A literature review.** Int Wound J 2015; 12:265-75.
4. Singla B, Singh K, Chawla I. **Factors predicting the risk of intra-abdominal sepsis and burst abdomen in patients with abdominal trauma undergoing laparotomy.** Int J Health Allied Sci 2017; 6:5-10.
5. Amini AQ, Khan NA, Ahmad J, Memon AS. **Management of abdominal wound dehiscence: Still a challenge.** Pak J Surg. 2013; 29(2):84-7.
6. Naeem M, Khattak IA, Samad A, Waheed R. **Burst abdomen: A common surgical problem.** J Med Sci 2017; 25: (2) 213-217. Correia MM, Thuler LCS, Velasco E, Vidal EM, Schanaider A. Peritonitis Index in oncologic patients. Rev Bras Cancerol 2001; 47(1):63-8.
7. Jung PJ, Merrell RC. **Acute abdomen.** Gastroenterol Clin North Am. 1988; 17:227-44.
8. Obuz F, Terzi C, Sökmen S, Yilmaz E, Yildiz D, Füzün M. **The efficacy of helical CT in the diagnosis of small bowel obstruction.** Eur J Radiol. 2003; 48:299-304.
9. Schermer CR, Hanosh JJ, Davis M, Pitcher DE. **Ogilvie's syndrome in the surgical patient: A new therapeutic modality.** J Gastrointest Surg. 1999; 3:173-7.
10. Laméris W, van Randen A, van Es HW, van Heesewijk JP, van Ramshorst B, Bouma WH, et al. **Imaging strategies for detection of urgent conditions in patients with acute abdominal pain: Diagnostic accuracy study.** BMJ. 2009; 338:b2431.
11. Cappell MS, Friedel D. **Abdominal pain during pregnancy.** Gastroenterol Clin North Am. 2003; 32:1-58.
12. Morino M, Pellegrino L, Castagna E, Farinella E, Mao P. **Acute nonspecific abdominal pain: A randomized, controlled trial comparing early laparoscopy versus clinical observation.** Ann Surg. 2006; 244:881-6.
13. Tenner S, Dubner H, Steinberg W. **Predicting gallstone pancreatitis with laboratory parameters: A meta-analysis.** Am J Gastroenterol. 1994; 89:1863-6.
14. Talley NJ, Vakil NB, Moayyedi P. **American gastroenterological association technical review on the evaluation of dyspepsia.** Gastroenterology. 2005; 129:1756-80.
15. Walming S, Angenete E, Block M, Bock D, Gessler B, Haglund E. **Retrospective review of risk factors for surgical wound dehiscence and incisional hernia.** BMC Surg. 2017 Feb 22; 17(1):19. doi: 10.1186/s12893-017-0207-0.
16. Khan TA, Awan SH, Khan SA, Amin S. **An audit of laparotomies; carried out in combined military hospital Panno Aqil over three years period.** Professional Med J. 2013; 20(2):279-83.
17. Soomro AG, Siddiqui FG, Agha AH, Memon AS, Shaikh NA. **Selective nasogastric decompression after elective laparotomy.** J Liaquat Uni Med Health Sci. 2008; 7(3):177-9.
18. Khan N, Bangash A, Sadiq M, Khan M, Imran M. **Frequency of adhesion obstruction following prior laparotomy: An experience at Lady Reading Hospital.** J Med Sci Jan 2009; 17(1):7-11.
19. Siraj A, Gilani AAS, Dar MF. **Elective midline laparotomy comparison of diathermy and scalpel incisions.** Professional Med J. 2011; 18(1):106-11.
20. Shabbir G, Rashid MU, Amer S. **Skin closure in laparotomy; Delayed versus primary closure performed for generalized peritonitis.** Professional Med J Oct - Dec 2011; 18(4):552-6.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Fazli Junaid	Joinly proposed the study, analysis and data of prepared the draft.	
2	Muhammad Usama	Joinly proposed the study, analysis and data of prepared the draft.	
3	Fahad Anwar	Contributed to study design, collected and analyzed data, and prepared draft.	
4	Sana Khan	Contributed to study design, collected and analyzed data, and prepared draft.	
5	Faiz ur Rahman	Contributed to study design, data collection & draft review.	
6	Shawana Asad	Contributed to study design, data collection & draft review.	