Prevalence and factors associated with re-laparotomy among patients operated in Debre-Markos Referral Hospital, North West Ethiopia: Retrospective cross-sectional study

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Abstract

Background Re-laparotomy is one of the causes of morbidity and mortality among patients with abdominal surgery; unless efforts are made to prevent in advance by identifying the potential risk factors.

Methods Retrospective cross-sectional study was conducted at Debre-Markos Referral Hospital from three hundred and ninety charts (390) from January 1, 2015, to January 30, 2017. Data were analyzed using Statistical Package for Social Science (SPSS) version 22. The associated factors for re-laparotomy were identified using multivariable logistic regression. P-value < 0.05 was considered to be statistically significant.

Results We studied 390 patients based on charts. Two hundred seventy-four patients (70.3%) were males. Forty-eight patients (12.3%) performed re-laparotomy. Patients with the duration of operating on initial surgery >60 hrs, AOR=3.30(95%CI [1.40-7.41, p=0.05]), diabetes mellitus, AOR=4.79(95%CI [1.55-14.80, p=0.007]), elective surgery, AOR=0.17(95%CI [0.05-0.56, p= 0.004])

Conclusion Even re-laparotomy is preventive; it is found to be in-patients underwent abdominal surgery. Therefore, appropriate preventive intervention to be taken to change those factors of the first surgery.

Background

Re-laparotomy defined as a re-abdominal operation performed within 60 days relate to the first surgery (1). Re-laparotomy reported in different parts of the world, which accounts about 1.5-27% of patients with abdominal surgery (1-7).

Re-laparotomy occurs once or more than once related to complications (8). It is one of the causes of morbidity and mortality among patients with abdominal surgery (1, 9); unless efforts are made to prevent in advance by identifying the potential risk factors. The most common indications for re-laparotomy are peritonitis, infection, bleeding, abscess, anastomotic leakage, wound dehiscence, necrotizing pancreatitis, bowel necrosis, bowel obstruction and evisceration (10, 11). This study concluded that patients with re-laparotomy had high in mortality as well as exposed to the disease (10, 11). Research, however, lacks in examining the effect of re-laparotomy on abdominal surgical patients. It suggested that patients with re-laparotomy are at higher risk of morbidity and mortality (2). This higher often attributed to treatment of complications take a long time, which creates a psychological and economic burden of those who are undergoing repeated abdominal surgery related to the first abdominal surgery of mortality (12). Repeated abdominal surgery can induce the patient a poorer immunity resistance (13), which may influence postoperative outcomes. Even Preoperative and postoperative antibiotic, counting of the instruments, instrumental processing and wound care (14) used as a preventive approach; problems of health system service, patient factors (15), and comorbidity (9) may be underlying factors leading to poorer outcomes after first surgery. Although it is preventable, it is still one of the problems after first surgery. Most of the problems occur to individual particularly general surgery (16).

Re-laparotomy is one of the conditions associated with providing inappropriate health services at first surgery for which prevention is possible with proper intervention (3,13, 17-19). In an individual with abdominal surgery, the presence of re-laparotomy may affect in many ways. It contributes to lengthening the hospital stay, then to the high chance of mortality (12, 13). Most individuals with re-

abdominal opening worldwide are urgently or latently develop complications, mortality rate considerably high (2).

The management of people with re-laparotomy is challenging because of more complications leads the client to multi-organ failure (1,9,13,18). I think patients and health workers need positive outcome of first surgery. However, re-laparotomy occurred in the different part of the world. Information on the magnitude and associated factors of re-laparotomy is necessary to focus attention on minimizing the problem. Although the re-laparotomy expected in abdominal surgery, there is lack of evidence showing the magnitude of the problem and associated factors in Ethiopia.

Therefore, to offer baseline information and highlight magnitude of the problem, the current study was proposed to assess the prevalence and factors associated with re-laparotomy in Debre-Markos Referral Hospital.

Methods

The study design and setup

A retrospective cross-sectional study conducted at Debre-Markos Referral Hospital. Debre-Markos is 300 km from the capital city Addis Ababa. The hospital established was in 1964 and provide outpatient and inpatient services for more than 3.5 million peoples living in its catchment area.

Source population

All patients treated with laparotomy surgery in Debre-Markos Referral Hospital were source population.

Study population

Records of all patients that undergo laparotomy in Debre-Markos Referral Hospital from January 1, 2015, to January 30, 2017, were study population.

Sample size determination

The sample size determined by using single population proportion formula for the assumption of 50 % proportions, 95 % confidence level, and 5 % margin of error. The total sample size was 384 charts. By assuming a 10% non-response rate, the last sample size determined as 422.

Sampling technique

Simple random sampling methods were applied for the choice of charts from 875 abdominal surgeries in general surgery by using the patient's medical registration number (MRN) following open EPI version 3.

Data collection and rules

After pretest was conducted 5% of charts from University of Gondar Referral Hospital, then real data was collected from Debre-Markos Referral Hospital. Primarily total two years laparotomy from January 2015 to January 2017 was counted. The list of patients with laparotomy procedure selected from the record books in the operating room. Followed by, medical registration numbered (MRN) of everyone recorded and then open EPI version 3 applied to 422 charts. By using card numbers, charts of the patient retrieved from the card room for collect variables.

Variables of the study

Dependent variable

Re-laparotomy

Independent variables

Age, Sex, operating room (OR) latency, type of procedure, urgency of surgery, Site of surgery, hypertension (HTN) , diabetes mellitus (DM) , hepatic malignancy, Chronic Obstructive Pulmonary Disease (COPD), Ischemia, peripheral vascular disease, jaundice >3 months, end stage of renal disease, Stricture behavior at diagnosis were independent variables.

Operational definitions

Operating room latency

Delays onset of the symptom of surgery >60hr

Re-laparotomy

It is re-operation of the abdominal surgery site associated with the first surgery within 60 days.

Stricture behavior at diagnosis

It is inflammatory bowel diseases, which involves small bowel stricture, colonic stricture and lead to significant complications.

Index surgery

It is the first time for the abdominal surgery.

Urgency

Elective or emergency conditions condition of the surgery.

Surgery site

It is the site the surgical procedure.

Data processing and analysis

Data were coded and cleaned using EPI INFO version 7 statistical software and exported to SPSS version 22 for analysis. Descriptive statistics were used to present socio-demographic, surgical interventions and co-morbidities. Percentages, frequencies, and cross tabulation were used to describe patient characteristics and surgical characteristics. Bi-variable and multivariable logistic regression model was used to identify associated factors of re-laparotomy. The finding was presented using unadjusted and adjusted odds ratios and their 95 % Confidence Intervals. The p-Value of less than 0.05 considered as statistically significant in multivariable analysis.

Ethical considerations

Ethical clearance obtained from the University of Gondar, College of Medicine and Health Science Ethical review board. A formal letter of cooperation was written to Debre-Markos Referral Hospital and obtained permission from Hospital management before starting data collection. After the purpose and aim of the study had informed, verbal consent obtained from the chart room workers. Data were kept anonymously in the distributed data extraction format to keep confidentiality.

Results

Socio-demographic characteristics of participants

A total of 422 charts retrieved for study. Among these, 116 (29.7%) were females, and 274(70.3%) were males with the age range of 7years to 75 years. Of the 422 charts, 390(92%) charts were found complete. Among 390 charts, re-laparotomy identified from 48 patients with the prevalence of 12.3%. Thirty-one (64.6%) men and seventeen (35.4%) women were undergoing re-laparotomy (table 1). About 48/390 (12.3%) of the total re-laparotomy 14(3.6%), 13(3.3%), 11(2.8%), 9(2.3%), 1(0.3%) were belonged in age group of 46-60, 31-45, above 60, 16-30, and less than 16 years old respectively (Table 1).

Prevalence of re-laparotomy relation to features surgical intervention on patients operated in general surgery.

Lower gastrointestinal system surgeries such as colon 25(6.4%), and appendix 14(3.6%) was leading procedure followed by gallbladder 2(0.5%) (Table 2).

More than half of re-laparotomy performed following Operative Room latency > 60 hrs 39(10.0%) and emergency surgery 44(11.3%) (Table 2).

Co-morbidities

Thirty-four patients (70.8%) had one or more co-morbidities namely DM 13(3.3%), hypertension 10(2.6%) and Chronic obstructive pulmonary disease 11(2.8%) (Table 3).

Factors associated with re-laparotomy

On bi-variable logistic regression model, six variables; such as latency of first surgery >60 hr, elective surgery, IEOS professionals, DM, HTN, and COPD were associated with re-laparotomy at $p < 0.25$.

The latency of surgery greater than 60hr, elective surgery and DM were independently associated factors of re-laparotomy in multi-variable regression analysis.

Multivariable logistic regression analysis revealed patients with the duration of operating on initial surgery >60 hrs were 3.3 times more likely to develop re-laparotomy compared with patients underwent first abdominal surgery within <60 hrs of the illness, $AOR=3.30(95\%CI [1.40-7.41])$. Moreover, patients with diabetes mellitus were 4.8 times more likely to develop re-laparotomy compared patients who have no diabetes mellitus, $AOR=4.79(95\%CI [1.55-14.80])$. But patients with elective surgery were about 83% times less likely to undergo re-laparotomy compared those patients that had emergency abdominal surgery, $AOR=0.17(95\%CI [0.05-0.56])$ (Table 4).

Discussion

Out of 390 patients who underwent laparotomy procedure, 48 patients performed re-laparotomy which gives the overall prevalence of 12.3%. The finding was similar to studies done in USA 15% (3). The finding also supported by a study conducted in India 18.5% (21). But, our finding was higher than compared to the study done in Zambia 3.3% (5). The discrepancy might be due to the inclusion of gynecological and obstetric surgery in those studies while only general surgery included in our study. Another discrepancy might be due to less study period, one year study period only conducted in those study while two year's study period in our study. But the finding was lower compared with the study conducted at Netherlands 27 % (22). The studies done in the Netherlands included only emergency surgery but in our study, both emergency and elective surgeries included, this might be due to the reason why those studies find out high prevalence of re-laparotomy compared to our study.

The present study revealed that patients OR latency in >60hrs were 3.3 times more likely develop re-laparotomy compared with patients operated in <60hrs with AOR=3.30(95%CI [1.40-7.41, P-value=0.05]). The study was in agreement with other studies (17) confirming that as the duration of illness goes up the risk occurrence of re-laparotomy increases. Authors revealed that severity of illness increases to develop re-laparotomy due to perforation or generalized peritonitis (23).

We found that patients with elective surgery about 83% times less likely to develop re-abdominal operation compared with patients who conducted emergency surgery with AOR=0.17(95%CI [0.05-0.56, P-value=0.004]). This finding was in line with other studies done in Korea (6).

Authors revealed that, in elective surgery, there is time to plan and optimize the patient before the operation but in the emergency, it is striking (7).

In the present study, patients who had the history of DM were 4.8 times more likely to develop re-laparotomy, AOR=4.79 (95%CI [1.55-14.80, P-value=0.007]) compared with patients who had no history of DM which is in line with another study (24), this might be due to the high level of blood sugar which makes a comfortable condition for the multiplication of micro-organisms and makes reopen of abdominal surgery.

Conclusions

The overall prevalence of re-laparotomy was 12.3% which was higher compared with the report from some developing countries like Tanzania and lower compared to developed countries. OR latency in >60hrs, emergency surgery and DM were associated factors for re-laparotomy. Examining and identifying high-risk patients and accordingly taking all appropriate care should be done to decrease the risk of re-laparotomy. Shortening the preoperative hospital stay and duration operation further decrease the prevalence of re-laparotomy. Further researches with long study period and with large sample size should be done to get overall associated factors of re-laparotomy.

Abbreviations

COPD	Chronic Obstructive Pulmonary Disease
DM	Diabetic Mellitus
GIS	Gastro-Intestinal System
HPB	Hepatic-Pancreatic-Biliary
HTN	Hypertension
IEOS	Integrated Emergency obstetrics and Surgery
MRN	Medical Registration Number
OR	Operating Room

Declarations

Ethical considerations

The ethical clearance was obtained from the ethical review committee of the department of surgical nursing on behalf of the Institutional Review Board of the University of Gondar. Permission letter was obtained from debermarkos town healthy office administration. Furthermore, after a thorough discussion and explanations of the purpose, benefit and the possible risks of the study, oral informed consent was obtained from each study participants. Women aged below 18 years would have allowed participating in the study considering that they are emancipated minors. The study participant's confidentiality was maintained by avoiding possible identifiers, such as the name of the client, and using only numerical identification.

Authors' contributions

WW conceived the research idea and prepared the proposal, participated in the data collection process, analyze data and draft the paper. NN and AD approved the proposal with some revisions, participated in the data analysis and reviewed the manuscript. All authors approved the final draft of the manuscript.

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Competing Interests

The authors have declared that they have no competing interests.

Availability of Data and Materials

All necessary data are available in the manuscript if electronics data are requested to submit, it will be done through the corresponding author.

Funding Organization

The University of Gondar which funded the project has no role in the process of the research work.

Authors' detail

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Declaration

This declaration statement is to verify that all authors have agreed on the manuscript to being submitted and no any disagreement of concern to declaring. We confirm that; the article is the original work of authors, and the data that support the findings of this study are available from the corresponding author. We affirm that the article has not received earlier publication and is not under consideration for publication elsewhere. We have ensured that the submission made here, including the main paper, database entries, and software code, does not contain any plagiarized material. We attest to the fact that all authors listed here have contributed notably to the effort, have read the manuscript, attest to the validity and legitimacy of the data and its interpretation, and agree to its submission of the BioMed central nursing journal.

All authors agree that author list is correct in its content and order and that no revision of the author listed made without the official approval of the Managing Editor. No other authors will be added post submission unless editors receive the agreement to all authors and detailed information supplied about to why the author list should be amended. We agree to follow the formalities as given on the website of the journal.

As the corresponding author, I also declare that this work supported by the University of Gondar, Ethiopia.

I am submitting this on behalf of all authors.

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Tables

Table1: Socio-demographic characteristics of surgical patients with laparotomy at Debre-Markos referral hospital, Northwest Ethiopia, from January 1, 2015, to January 30, 2017.

Variables	Re-laparotomy	
	Yes	No
Age in year		
<16yrs old	1(0.3%)	29(7.4%)
16-30yrs old	11(2.8%)	133(34.1%)
31-45yrs old	13(3.3%)	72(18.5%)
46-60yrs old	14(3.6%)	74(19.0%)
Above 60yrs	9(2.3%)	34(8.7%)
Sex		
Female	17(4.4%)	99(25.4%)
Male	31(7.9%)	243(62.3%)
Residence		
Urban	19(4.9%)	134(34.4%)
Rural	29(7.4%)	208(53.3%)

Table2. Frequency distribution of re-laparotomy in relation to features on surgical interventions in surgical patients at Debre-Markos Referral Hospital from January 1, 2015, to January 30, 2017.

Surgical intervention features		Re-laparotomy	
Lower GIS		Yes	No
Colon	Yes	25(6.4%)	91(23.3%)
	No	23(5.9%)	251(64.4%)
Small intestine	Yes	4(1.0%)	55(14.1%)s
	No	44(11.3%)	287(73.6%)
Appendix	Yes	14(3.6%)	146(37.4%)
	No	34(8.7%)	196(50.3%)
Upper GIS			
Stomach	Yes	1(0.3%)	6(1.5%)
	No	47(12.3%)	336(86.2%)
HPB system			
Gall bladder	Yes	2(0.5%)	12(3.1%)s
	No	46(11.8%)	330(84.6%)
Abdominal wall	Yes	1(0.3%)	22(5.7%)
	No	47(12.0%)	320(82.0%)
Initial surgery site other	Yes	1(0.3%)	10(2.6%)
	No	47(12.0%)	332(85.1%)
Other initial surgery procedure	Yes	1(0.3%)	12(3.0%)
	No	47(12.0%)	330(84.7%)
The latency of initial surgery	>60hrs	39(10.0%)	182(46.7%)
	<60hrs	9(2.3%)	160(41.0%)
The urgency of initial surgery	Emergency	44(11.3%)	261(66.9%)
	Elective	4(1.0%)	81(20.8%)
Professional who perform the initial surgery	Surgeon	12(3.0%)	141(36.2%)
	IEOS	16(4.1%)	115(29.5%)
	Both	20(5.2%)	86(22.0%)s

Another surgery site* prostate gland

Table3. Re-laparotomy following co-morbidities in surgical patients at Debre-Markos Referral Hospital from January 1, 2015, to January 30, 2017.

Comorbidities	Re-laparotomy		
		Yes	No
Diabetes mellitus	Yes	13(3.3%)	10(2.6%)s
	No	35(9.0%)	332(85.1%)
Hypertension	Yes	10(2.6%)	6(1.5%)
	No	38(9.7%)	336(86.2%)
Chronic obstructive pulmonary disease	Yes	11(2.8%)	13(3.3%)s
	No	37(9.5%)	329(84.4%)
>3months jaundice	Yes	1(0.3%)	6(1.5%)
	No	47(12.0%)	336(86.2%)
Hepatic malignancy	Yes	1(0.3%)	2(0.5%)
	No	47(12.0%)	340(87.2%)
Peripheral vascular diseases	Yes	3(0.8%)	5(1.3%)s
	No	45(11.5%)	337(86.4%)

Table4. Bivariable and Multivariable regression analysis of factors associated with re-laparotomy among patients operated at Debre-Markos referral hospital, Debre-Markos, Northwest Ethiopia, January 01-2015 to January 30-2017

Variables		Re-laparotomy		COR(95%CI)	AOR(95%CI)	P-value
		Yes	No			
The latency of initial surgery	>60hrs	39(10.0%)	182(46.7%)	3.81(1.80,8.10)	3.3(1.40,7.41)	0.05*
	<60hrs	9(2.3%)	160(41.0%)	1		
Urgency	Elective	4(1.0%)	81(20.8%)	0.29(0.10,0.84)	0.17(0.05,0.56)	0.004*
	Emergency	44(11.3%)	261(66.9%)	1		
Professional who perform the initial surgery	Surgeon	141(36.5%)	12(3.08%)	1		
	IEOS	115(29.5%)	16(4.1%)	1.64(0.75,3.60)	1.05(0.43, 2.55)	0.9
	Both	86(22.05%)	20(5.13%)	2.73(1.28,5.89)	1.80(0.85, 4.27)	0.20
DM	Yes	13(3.3%)	10(2.6%)	12.33(5.03,30.18)	4.79(1.55,14.80)	0.007*
	No	35(9.0%)	332(85.1%)	1		
HTN	Yes	10(2.6%)	6(1.5%)	14.73(5.07,42.80)	4.74(0.95,23.69)	0.06
	No	38(9.7%)	336(86.2%)	1		
COPD	Yes	11(2.8%)	13(3.3%)	7.52(3.16,17.99)	2.30(0.73,7.30)	0.16
	No	37(9.5%)	329(84.4%)	1		

P-value $\leq 0.05^*$