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A STUDY ON THE INDICATIONS AND OUTCOME OF RE-LAPAROTOMY: A CROSS SECTIONAL STUDY

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Abstract

OBJECTIVES: The aim of the study was to determine the indications, morbidity and mortality of re-laparotomy. **STUDY DESIGN AND SETTING:** This retrospective study was conducted at surgical department of MTI- Khyber Teaching Hospital. **METHODOLOGY:** This study was conducted in duration of nine months from 6th January to 31 September 2023. Patients undergone Re-laparotomies within 60 days of first laparotomy, both gender, and age greater than 18 years were included in the study. Data were collected and entered in Microsoft Excel and further analyzed through SPSS-23. **RESULTS:** Out of total 95 patients, emergency made 62.1% while elective were 37.9% of the operated cases. Most common surgeries that needed re-laparotomy were small gut perforation (13.7%), firearm injuries (12.6%) and lower GI carcinomas (10.5%), while common indications were intra-abdominal abscess (36.5%), anastomotic leak (22%) followed by haemorrhage and dehiscence (9.5% each). The time duration between primary laparotomy and re-laparotomy ranged from 1st to 60th day with 20% on the 10th postoperative day. The complications encountered were surgical site infections (41.1%), septicemia (21.1%) and hypoalbuminemia (18.9%). **CONCLUSION:** The most common indications of re-laparotomy were patients of small gut perforation, firearm injuries and lower GI Carcinomas. Peritonitis following leak, laparotomy for malignancy and advanced age were associated with mortality.

KEYWORDS: Complications, Laparotomy, Mortality, Re-laparotomy, Surgery

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INTRODUCTION

A repeat abdominal procedure carried out within 60 days of the initial procedure is known as a re-laparotomy. Around 1.5–27% of patients undergoing abdominal surgery had relaparotomies, according to reports from around the globe.[1] There are certain situations in the span of a surgeon when one has to perform a re-laparotomy in the best interest of the patients. These situations may arise due to severe intrabdominal sepsis or due to complications in the initial surgery. Re-laparotomies can be defined as procedures performed within 60 days of the index laparotomy. Re-laparotomies are categorized as early or late; radical or palliative; urgent or elective; and, planned or unplanned depending on the performed period, its purpose, urgency,

and whether or not it is scheduled, respectively.[2] It has been observed in studies that the most common cause of early re-laparotomy are complications associated with the first procedure such as peritonitis, evisceration and hemorrhage, whereas the most common cause of late re-laparotomy came out to be intestinal obstruction due to adhesions.[3]

According to the suggestion, patients who have re-laparotomies are more likely to experience morbidity and death. This is frequently linked to the lengthy treatment of complications, which puts a financial and psychological strain on individuals having multiple abdominal surgeries in relation to their initial abdominal surgery that resulted in death.[1] The question of which patients should get RL is not well agreed upon. Making a decision is often difficult, particularly when dealing with severely ill patients who exhibit vague signs and symptoms of partially treated sepsis. The necessity of doing RL and when to do it are both arbitrary. Planned Relaparotomy (PLR) and On-demand Re-laparotomy (ODRL) are the two general techniques (strategies) of RL.[4]

Studies reported an incidence of 1% and 7% for re-laparotomy but this incidence can change on type of disease, type of surgical intervention and technique.[5] Results from studies showed that the total laparotomies performed; about 1-1.6% require early re-laparotomy after initial surgery. A study conducted also suggested that re-laparotomies performed in abdominal sepsis will require peritoneal lavage to drain abscesses and fluid collections, reduce the amount of microorganisms and debride necrotic tissues.[6] According to study the mortality rate in urgent abdominal re-laparotomies is still high ranging from 15.5% to 61.5%, despite of the availability of early diagnostic methods and therapeutic advancements.[7] A study showed a mortality rate of 37.03%.[8] Whereas another on reported a mortality rate of 34.72% after urgent abdominal re-laparotomies.[9] According to a study done, revealed an early intervention reduce mortality by decreasing multi-organ failure rates.[10] Relaparotomy happens in different regions of the world, despite the fact that patients and medical professionals need good results from initial surgery. Knowledge about the scope and contributing variables of relaparotomy is required to concentrate efforts on reducing the issue. While re-laparotomy is a common outcome of abdominal procedures, little is known about its etiology or associated comorbidities. The aim of this study is to know the causative factors behind re-laparotomies and also to predict its outcome in terms of mortality and complications.

METHODS AND MATERIALS

It is a single-centered, retrospective study of patients who underwent re-laparotomy in the surgical department of Khyber Teaching Hospital, Peshawar, Pakistan in the duration of nine months from 6th January to 31 September 2023. A ninety five (n=95) sample size was calculated through World Health Organization (WHO) Calculator where confidence level was 95%, 5% margin of error, and population proportion was 6.55%.

For study purposes, any abdominal surgery in which the peritoneum was breached was labelled as laparotomy. Likewise, re-laparotomy was defined as the opening of the abdomen within 60 days of initial surgery. Inclusion criteria involved the patients undergone Re-laparotomies within 60 days of first laparotomy, both gender, and age greater than 18 years. However exclusion criteria involved patients with Planned re-laparotomy for packs removal. About 95 cases with re-laparotomies within the four years, meeting the inclusion criteria were added to the study. The study was approved by Institutional Research Ethics Board of Post Graduate Medical Institute, Peshawar (Ref No. 363 Dy.REG./PGPI). Moreover, consent form was filled before study conducting and also before surgerical procedure from patients or their guardians.

Data was collected through hospital records, and coded and analyzed in SPSS 23. Analysis of data included: the primary cause of laparotomy, duration between laparotomies, indications of re-laparotomy and mortality rate. Statistical descriptive techniques were used to characterize variables, and results were obtained in tables, figures and percentages.

RESULTS

A total of 95 cases were included in the study, out of which 60% (57) were males, whereas 40% (38) were females, with a ratio of 3:2. Age of the cases ranged from 16 years to 80 years, with the mean age of 42.4 ± 16.9 years, whereas group-wise distribution. In total cases for re-laparotomy, 62.1% (59) were emergency cases,

whereas 37.9% (36) were elective. About 17.1% (18) had co-morbidities like diabetes mellitus, hypertension, asthma, and HCV infection. The complications that occurred following re-laparotomy within the study population. The findings indicate that surgical site infections were the predominant occurrence in 41.1% of cases, followed by septicemia (21.1%) and hypoalbuminemia (18.9%). The results underscore the negative health outcomes linked to re-laparotomy and elaborate on the occurrence rates of distinct postoperative complications, The indications for re-laparotomy within the research cohort. It is worth mentioning that abscesses were the predominant indication, including 36.8% of re-laparotomy instances. The subsequent most prevalent indications were anastomotic leak (22.0%) and ruptured abdomen (9.5%). The table shown in this research provides a comprehensive breakdown of the factors leading to re-laparotomy. The analysis reveals that abscesses are the primary contributing factor, followed by anastomotic leak and ruptured abdomen (Table 1).

Table 1: Age-wise distribution of participants with comorbidities, complication, and causes of re-laparotomy.

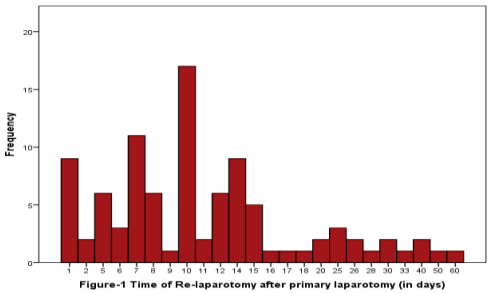
Ages (in groups)	**Total (n=95)**	**Percentages %)**
ess than 21 years	13	12.35
21-30 years	15	14.25
31-40 years	18	17.1
41-50 years	18	17.1
51-60 years	17	16.15
more than 60 years	14	13.3
Co-morbidity	**Frequency n=95)**	**Percentages %)**
Asthma	2	2.1
HCV	2	2.1
Diabetes mellitus	6	6.3
Hypertension	11	11.6
Complications	**Frequency**	**Percentages %)**
Surgical Site nfections	39	41.1
Septicemia	20	21.1
Hypoalbuminemia	18	18.9
Anemia	12	12.6
Multi-Organ Failure	12	12.6
Pulmonary Complications	10	10.5
Urinary Tract nfection	9	9.5
Enterocutaneous istula	6	6.3
Electrolyte Imbalance	6	6.3
Disseminated ntravascular coagulation (DIC)	2	2.1
Cause of Re-aparotomy	**Total (n=95)**	**Percentages %)**
Abscesses	35	36.8
Anastomotic Leak	21	22.0
Hemorrhage	9	9.5
Burst abdomen	9	9.5
Obstruction	8	8.4
Viscous perforation	6	6.3
Peritonitis	8	8.2
Enterocutaneous istulae	8	8.2
Others	2	2.1

With a total of 36 cases, the gastrointestinal surgical group dominated the major reasons, with small gut perforations (13.7%) and appendectomies (9.5%) being the most common operations. Lower GI carcinomas accounted for 10.5% of most oncological procedures. 12.6% of cases included firearm injuries, while 4.2% had hernia procedures that were complicated. These graphs demonstrate how surgical cases are distributed and their corresponding indications (Table 2).

Table 2: Shows the primary cause of laparotomy in total cases.

Type of Surgery	Details	Total	Percentages
Gastrointestinal Surgeries n=36, 37.9%)	Small gut perforation	3	3.7%
	Appendectomies		.5%
	Subacute intestinal bstruction		.3%
	Large gut perforations		.3%
	Stoma reversal		.1%
	Diverticular disease		.1%
Oncological Surgeries n=20, 20.1%)	Lower GI carcinomas	0	0.5%
	Upper GI carcinomas		.3%
	Pancreatic carcinoma		.1%
	Ovarian carcinoma		.1%
Firearm njuries	Firearm Injuries	2	2.6%
Hepato-pancreatic-biliary urgeries n=11, 11.6%)	Cholecystectomies		.3%
	Pancreaticojejunostomy		.1%
	Hydatid cyst		.1%
	Hepatic hematoma		.1%
	Necrosectomy		.1%
Others (n=6, 6.3%)	Tuberculous Abdomen		.6%
	Splenectomy		.1%
	Mesenteric Ischemia		.1%
	nflammatory Bowel Disease		.1%
Hernia Surgeries Obstructed)	Hernia Surgeries Obstructed)		.2%
Urological Surgeries (n=2, 2.1%)	Nephrectomy		.1%
	Vesicolithiasis		.1%
Trauma	Trauma		.1%

In this study, the average duration of re-laparotomy from the first laparotomy was 12.5 ± 10.3 days with the earliest one on the 1st post-operative day and latest one on the 60th post-operative day. The frequency of re-laparotomies on post-operative days, with the maximum done on the 10th day (Figure 1).



The statistical association among major causes, re-laparotomy length, and critical outcomes. The main reason exhibits a substantial association with postoperative complications (p=0.001) and a marginally significant association with relapse causes (p=0.063). However, its impact on the overall result of re-laparotomy does not reach statistical significance (p=0.317). On the other hand, a significant correlation exists between the duration of re-laparotomy and the occurrence of complications (p=0.024). Additionally, a strong association is shown between the duration of re-laparotomy and the reasons for relapse (p=0.00), indicating that the length of time required for re-laparotomy may substantially influence these outcomes. Nevertheless, it seems that the length of re-laparotomy did not significantly impact the overall result (p=0.839). The results highlight the significance of both main factors and the time of re-laparotomy in impacting postoperative complications and recurrence, offering significant perspectives for clinical decision-making (Table 3).

Table 3: Associations between primary cause, duration, and outcomes of re-laparotomy

Parameters	Complications ssociated with re-aparotomy p-Value)	The outcome of e-aparotomy p-Value)	Relapse Causes o-Value)
Primary Cause	0.001	0.317	0.063
Duration of re-aparotomy	0.024	0.839	0.00

DISCUSSION

The rate of re-laparotomy in developing countries is quite high as compared to developed countries depending on the environmental factors, hospital setups, materials used, reason of first laparotomy and study population. This study is based on the audit of re-laparotomies done over 4 years. In this study male to female ratio was 3:2, where males were 60% and females were 40%, almost consistent with studies which show male predominance depending upon the region and disease incidence.[11, 12] In contrast, a study revealed a female predominance of 60.5% due to a higher rate of biliary surgeries in females.[13] The mean age in the study was 42.4 years (SD, 16.9), where each group had nearly equal subjects, similar to studies conducted in African and South Asian countries.[4, 14] Although the western region shows high mean age,[15] due to high life expectancy and incidence of malignancy towards older ages.[11, 13]

Most of the re-laparotomies in subjects underwent in the emergency which was in line with other studies.[4] As in emergency, there is the least time to optimize the patients, which increases the risk of re-laparotomies. In spite, in elective cases reported re-laparotomies were decreased. Moreover, in our study, most of the elective cases had malignancy and other co-morbidities which was a leading factor in re-laparotomy. The rate of co-morbidities in our study was 17.1% which included diabetes mellitus, hypertension, asthma and HCV, which might have positive effects on re-laparotomy.

The most common cause of primary laparotomies was gastrointestinal surgeries. These results were consistent with other studies conducted.[16, 17] As in GI surgeries, small gut perforations and appendectomies are top of the list because small gut perforations can occur in every age group, so in early ages infections such as enteric and parasitic infestations are the most common reasons in this region. As we move towards the older age groups, obstructions, ischemia and malignancy might be the reason for this. Furthermore, appendectomies were done for acute appendicitis and abscesses, which is quite similar to the study conducted in Tanzania,[16] out of which most of them were done in the remote areas, and were referred afterwards. In subjects with subacute intestinal

obstruction, three of them were cases of sigmoid volvulus. The second on the list was malignancies, which have a high prevalence globally. It occurred more in the geriatric population, as in our study as well, which was a lead point in mortality. This part of the region also showed firearm injuries and trauma as one of the prime causes, where laparotomy is performed to decrease damage control, which is uncommon in developed countries[18] but, can occur in South African countries.[12] The subjects who underwent pancreaticojejunostomy were diagnosed with chronic pancreatitis, whereas the one with necrosectomy was a complicated case of acute pancreatitis.

Although, different surgical departments have different values of time gap between re-laparotomy. So, the mean duration of re-laparotomy was 12.5±10.3 in our study, which is accordant with the study in India[17] but is a little higher than other studies.[8, 14, 16] This time interval depends on the primary pathology, patient factors, environmental aspects and hospital facilities, and it may vary accordingly. Most of them were done over the period of 5 to 15 days, as were in India.[17] Abscesses, anastomotic leaks, and burst abdomen were the leading indications in this study and others;[11, 12] however, another study showed hemorrhage as the most common reason for repeat laparotomy.[19] As abscesses have a high prevalence for re-laparotomy it depends upon primary causes, the time interval between primary laparotomy, the associated diseases, the setup in which surgery is going on and the performing surgeon. Although, anastomotic leaks, hemorrhages and burst abdomen as such causes; this may be due to poor suturing technique and material used. A surge is seen on 1st post-operative day is due to hemorrhages, for which urgent re-laparotomies were done within hours. Furthermore, a patient with ulcerative colitis was operated on for pan-proctocolectomy with an ileoanal pouch, which was re-operated for pouchitis; another one was an iatrogenic injury to the ureter during right hemicolectomy for caecal carcinoma, which expired. Overall, the mortality rate was 21.1%, which is more consistent with studies where the mortality rate lies between 20-40%.[17, 20] A maximum of expires occurred in patients above the age of 50 years, and the chief reason was the malignancy for which laparotomy was indicated leading to abscess formation and sepsis, due to immunocompromised states. On the other hand, comorbidities and the complexity of the procedures may impose higher mortality in the western studies,[8, 11] likewise in Indian studies, the anastomotic leak caused the highest mortality after re-laparotomy.[19, 21] Our study had a morbidity rate of 76.8% which is low than studies in Ethiopia, but surgical site infections are on top consistent with it[4], whereas another study showed electrolyte imbalance and anemia as the most common complications.[16] Patients having diabetes mellitus, carcinomas and those aged above 50 were more prone to surgical site infections, hypoalbuminemia and multi-organ failure which was a crucial factor in their mortality. Although patients below 40 had surgical site infections and septicemia, nevertheless recovery was remarkable. We observed that patients having age less than 50 years had lower frequency of mortality as compared to the patients who were above the age of 50, this finding is similar to a study which reported higher frequency of mortality in patients above 50 years.[4]

The fact that this study concentrated more on patients who need a relaparotomy than on all patients who had a laparotomy is one drawback that must be considered. The primary limitations of this study were missing medical records for patients and occasionally inadequate patient records. The study's passive follow-up strategy, which required patients to show up at the emergency room, was the study's second design flaw. It's likely that this underreports the real situation because some patients may have scheduled relaparotomies at other hospitals. As it's a single-centered study, further studies are required to predict the outcomes of re-laparotomy for more generalization.

CONCLUSION

It is concluded that re-laparotomy surgery operated due to emergency. Surgical site infections were mostly seen complication after re-laparotomy. A most effective way to decrease the mortality rate after a re-laparotomy is to minimize complications and follow proper surgical protocols during primary laparotomy.

Moreover, effective post-operative care is also needed after primary surgery.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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