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**ABSTRACT... Objectives:** To evaluate relative frequency, reasons, avoidable responsible factors and outcomes of relaparotomy. **Study Design:** Observational case series study **Setting:** Department of Surgery Unit III BVH Bahawalpur **Duration:** From 01-9-2009 to 31-8-2010 **Patients and Methods:** All the patients who presented in surgical outdoor, indoor and casualty department with severe intra-abdominal pathologies after primary laparotomies referred from low level, secondary care and tertiary care hospital and underwent relaparotomy electively or on demand were included in the study. Retrospectively their demographic characteristics, initial diagnosis with surgical information of primary laparotomy, factors and outcomes after relaparotomies were analyzed statistically. **Results:** A total 54 patients were included in the study with male to female ratio of 1:2. Mean age of the study group was  $30.91 \pm 12.5$  years. Relative frequency of relaparotomy was 5.6%. Common center of referral was low level hospital 66.7%. Most common indication of relaparotomy was peritonitis in 52%. Most common complication of relaparotomy was wound infection 74%. Avoidable factors responsible for relaparotomies were found to be surgery at low level hospitals (77.3%) and by nonqualified surgeons (72.1%). **Conclusions:** The rate of relaparotomy is very high because of unsupervised primary surgery in institutions and surgery by unqualified operators in private sector. Many of these are avoidable. In addition to decreasing the complication rate, primary surgery performed at tertiary care hospitals would decrease need for patients to undergo re-exploration.

**Key words:** Primary laparotomy, complications, relaparotomy, avoidable factors

## INTRODUCTION

Laparotomy is a common procedure globally encountered by surgeons either elective or in emergency. A common indication include trauma, intestinal obstruction, tumors, gut ischemia and peritonitis<sup>1,2</sup>. Intra-abdominal infections both primarily due to loss of integrity of a viscus or postoperatively remains exclusively the chief cause and mainstay of treatment is its excision demanding abdominal exploration<sup>1,2,3</sup>.

The term relaparotomy refers to operations performed within 60 days in association with the initial surgery. Relaparotomy is categorized early or late, urgent or elective and planned or on demand<sup>4</sup>. Urgent abdominal re-explorations following abdominal surgeries are generally referred as final choice operations with high mortality and morbidity<sup>3,5</sup>.

The incidence of urgent relaparotomy has been reported as 1- 4.4% in previous studies with variable

complications rate. Initial attempts to explore abdomen for intra-abdominal pathologies at low volume and secondary hospitals resulted in significant morbidity and mortality. In addition to organizational factors reasoning relaparotomy some qualificational and individual mistakes are considerable like diagnostic error, technical, tactile and medical errors which may be avoided at the time of primary laparotomy<sup>6-9</sup>. Improvements in the understanding of relevant anatomy and pathophysiology as well as advances in operative and anesthetic techniques have allowed laparotomies much more safely at tertiary care hospitals and many relaparotomies are avoidable. Several published reports have documented a direct correlation between the hospital/ clinician level and the outcomes of the laparotomies<sup>10,11,12</sup>.

The present study of 54 cases carried out at the department of surgery BVH Bahawalpur was aimed to evaluate the relative frequency, reasons, indications and the outcomes of relaparotomies at one side while to find out the avoidable factors responsible for relaparotomies

at the other end.

## PATIENTS AND METHODS

This was a randomized descriptive study conducted at the Department of Surgery Unit III Bahawal Victoria Hospital Bahawalpur. The study was carried out for a period of one year from 1<sup>st</sup> September 2009 to 31<sup>st</sup> August 2010. It included 54 postoperative referred patients of either gender who presented in the surgical casualty, indoor or outdoor departments with severe intra-abdominal pathologies and underwent relaparotomy in our unit. These patients underwent operations for abdominal pathologies primarily either in private sector or secondary and tertiary care hospitals but developed postoperative complications or the preoperative status of the disease existed. All the patients were clinically assessed thoroughly resuscitated in casualty or in the ward and investigated serologically and radiologically including abdominal ultrasonography before undergoing relaparotomy. The following criteria were considered as a decision parameter for relaparotomy:

- I. Existence of hemorrhage not responding to medical treatment.
- II. Existence of progressive peritonitis.
- III. Existence of abscess where percutaneous drainage was either impossible or ineffective.
- IV. Continuous contamination of abdominal cavity with faecal or biliary contents.
- V. Existence of obstruction or ileus resistant to medical treatment or decompression.
- VI. Existence of preoperative symptoms or worsening of clinical condition.

The following patients though underwent laparotomy were excluded from the study:

- The patients' undergone laparotomy after trauma and only haemostasis was carried out per policy as damage control surgery.
- The patients with advanced generalized peritonitis and sepsis after previous surgery with very high APACHE II score not fit for anesthesia.
- The patient of mesenteric vein thrombosis and gut ischemia undergone planned staged laparotomy.

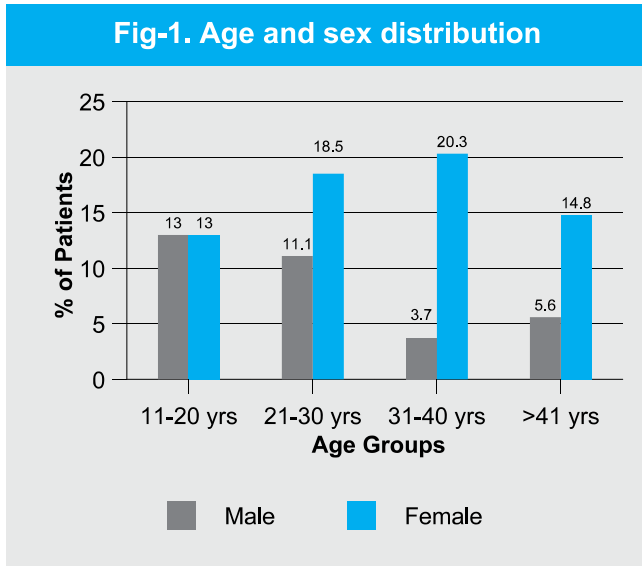
However the patients' undergone laparotomy in our unit and fulfilling inclusion criteria were also enrolled in the study. Relaparotomies were carried out either electively or on demand after vigilant observation and monitoring. All relaparotomies were carried out by the senior consultants among the authors or supervised by the authors.

The demographic details of the patients, information about the primary disease for which the operation was carried out, the primary surgeon or operator with qualifications, the level of hospital and available facilities, postoperative duration till referral, available operation notes, findings of the relaparotomies and its outcomes were noted on the prescribed Performa.

After relaparotomy the variables like iatrogenic injury, missed pathology, technical wrong decision, retained sponge / instrument and overt intra-abdominal infection were considered as avoidable factors while postoperative adhesions in cases of peritonitis were taken as inevitable factors. The postgraduate surgeons were considered to be qualified. The descriptive statistics of the study were analyzed by SPSS 16.0 version. For the qualitative variables the frequencies and the percentages were taken to assess the strength of association. Means  $\pm$  SD and 95% CI were used for the quantitative variables as descriptive statistics and the Fisher's exact test was applied to calculate the p-values of all the avoidable factors responsible for relaparotomy. Ap-value of  $< 0.05$  was considered to be significant.

## RESULTS

Abdominal exploration was carried out 965 times at the Department of surgery BVH Bahawalpur from 1<sup>st</sup> September 2009 to 31<sup>st</sup> August 2010 for abdominal pathologies out of these 54 cases enrolled for study were of relaparotomies which account for 5.6% of total cases. Eight cases of relaparotomy not fulfilling the criteria were excluded from the study. The mean age of the patients was  $30.91 \pm 12.51$  years (CI = 27.4- 34.32). Eighty percent of the patients were below 40 years with a female predominance exclusively. Male to female ratio was 1:2 (FIG 1).



Primary surgery in more than 2/3rd of the patients was done at low level private hospitals and the 28(51.9%) patients were operated by simple graduates having low surgical experience (Table I). More than half 29 (53.7%) of the patients underwent primary surgery for gastrointestinal symptoms followed by gynecological and obstetrician cases 22(40.8%) and hepatobiliary pathologies 03(5.5%). Surgical notes and information about primary disease and surgery were not provided in 8 cases (14.8%). The mean duration of delay in referral to our center from the day of primary surgery was 14.93±1.55 days (CI= 10.69-19.16).

Relaparotomy of 45 (83.4%) cases was carried out electively and the remaining 9(16.6%) cases were

observed and monitored strictly for 12-36 hours with conservative management and then relaparotomy was carried out on demand. Six (11%) patients underwent repeated relaparotomies. Although there was a considerable overlap between the complications of primary surgery but the common indications for relaparotomy were peritonitis in 28 (52.9%) cases followed by intestinal obstruction in 15(27.8%) cases. Fourteen patients died during study period with overall mortality rate of 25.92% (Table II). The higher mortality rate was noted in patients undergone repeated relaparotomies and having relatively higher APACHE II score. Mean hospital stay was 21.74 ± 1.29 days (CI = 18.22-25.26). Five patients required ICU care with a mean ICU stay of 3.20 ± 1.3 days (CI = 1.58-4.81). All of ICU patients required mechanical ventilation.

The ultimate features of the primary surgery after relaparotomy were assessed and postoperative infective element was noted to be the major 40 (74.07%) cause of relaparotomies. The summative professional surgical incompetence was found in 44(81.5%) cases (Table. III).

The complication rate of primary surgery responsible for relaparotomies was noted higher 42(77.78%) at low level private hospitals and more in cases operated by the nonqualified surgeons 39 (72.22 %) as compared to BVH and qualified surgeons with a p value of 0.0001 (Table IV).

Table-I. Levels of Hospitals & Surgeons of Primary Surgery

Hospital	n (%)	Surgeon			
		Qualified	MBBS	PGR	Non doctor
LPH	36(66.7)	7	26	0	3
BVH	12(22.3)	4	0	8	0
THQ/DHQ	6(11)	4	2	0	0
Total (%)	54(100)	15(27.8)	28(51.9)	8(14.8)	3(5.6)

*LPH=Low level private Hospital THQ/DHQ= Tehsil /District Headquarter Hospital*  
*BVH= Bahawal Victoria Hospital n= no. of patients underwent relaparotomy*

Indication	n(5) Total n=54	Mortality(%) total n=14	Cause of mortality
Anastomotic /repair leak	6 (11.1)	1(1.9)	Sepsis & MOFS
Visceral perforation	10 (18.5)	3 (5.6)	Septicemia
Obstruction/ileus. /mass	15 (27.8)	4 (7.4)	Sepsis %MOFS
Hemorrhage	3 (5.5)	1 (1.9)	ARF & MOFS
Enterocutaneous fistula	5 (9.3)	2 (3.7)	MOFS
Visceral gangrene	6 (11.1)	1 (1.9)	sepsis
Intra-abdominal abscess	9 (16.7)	2 (1.9)	sepsis & MOFS

*n = no of patients*  
*MOFS-multiple organ failure syndrome*  
*ARF-acute renal failure*

Feature	n	%
Primary surgery		
Urgent	50	92.6
Elective	04	7.4
Infection after 1 <sup>st</sup>		
Yes	40	74
No	14	26
Missed pathology		
Yes	13	24
No	41	76
Iatrogenic injury		
Yes	13	24
No	41	76
Technical error		
Yes	16	29.6
No	38	70.4
Retained sponge/Instrument		
Yes	6	11.1
No	48	88.9
Total professional Incompetence		
Yes	44	81.5
No	10	18.5

*n-number of patients*

**DISCUSSION**

The incidence of relaparotomy for intra-abdominal pathologies consequent upon the complications of primary surgery has been reported as 1-4.4%<sup>1, 4, 13</sup>. We here report a relative frequency of relaparotomy as 5.6 %

Factor	n (%)	Hospital		p Value	Surgeon		p Value
		BVH n (%)	Others n (%)		Qualified n (%)	Others n (%)	
JE	9 (20.5)	1 (2.3)	8 (18.2)	0.030	0	9 (20.5)	0.0024
TE	16 (36.4)	4 (9)	12 (27.4)	0.050	3 (6.8)	13 (29.5)	0.0111
NE	6 (13.6)	1 (2.3)	5 (11.3)	0.202	0	6 (13.6)	0.026
IE	13 (29.5)	4 (9)	9 (20.5)	0.228	3 (6.8)	10 (22.7)	0.0685
Total	44 (100)	10 (22.7)	34 (77.3)	0.0001	6 (13.6)	38 (86.4)	0.0001

*n-no of patients JE-judgment error TE- technical error NE- negligence error IE-iatrogenic error*  
*Note: In remaining 10 cases out of 54 the infective factor was inevitable & unavoidable*  
*Fisher's exact test was applied to calculate p-values in this table*

in the similar type of patients which is a significant higher than the previous studies. Most of the previous studies were done in the western block having low incidence of relaparotomy which is because of their standardized surgical conditions of the primary surgery. In an Eastern study Sanjay et al has reported higher incidence of 4.4% which is even low than the present study. Although no large national study has been reported so far but a study of mortality and morbidity after relaparotomy carried out by Rabia Urooj et al has reported a high female preponderance of relaparotomies which is consistent with our study (Fig 1) with male to female ratio of 1:2 in relaparotomy<sup>9</sup>. The reasons of high incidence of relaparotomy in our region could be multi-factorial. The increasing rate of primary surgery at low level hospitals and by non-qualified persons (Table I), are main avoidable factors responsible for relaparotomies which is in consistent with the opinion of M.O, Wain et al that the decision of laparotomy for any pathology should normally be undertaken by experienced surgical staff<sup>4</sup>.

The incidence of relaparotomy also varies depending on the disease characteristics of the hospitalized patients and the type of surgeries they have received. As is of the opinion of Myshkin KI et al the incidence of relaparotomies is high in (51.31%)<sup>15</sup> patients who got primary surgery for gastrointestinal pathologies which is in consistent with our study (52%) and Haluk Recai Unalp et al (51.85%)<sup>8</sup>.

It has been noted a common consensus in the literature regarding the most common cause of re-exploration of abdomen as infective complications which is also in consistent with our study (52%). Early diagnosis and surgical intervention to neutralize the intra-abdominal septic focus has been shown to reduce the mortality by ameliorating septic and metabolic problems from the body<sup>13,16,17</sup>. However determining the focus of sepsis may not be possible in all cases as has been reported by Hutchins et al to be only 17%<sup>16</sup>. Secondly removal of all the determined septic foci by surgical intervention may not always be possible as has been reported by Mulier et al the existence of residual peritonitis in 9% and 41% in purulent or biliary and fecal peritonitis cases respectively who underwent urgent laparotomies<sup>18</sup>. On these facts we

have not taken this inevitable infective factor to be avoidable variable in our studies.

In spite of immediate diagnosis of complications of primary surgery and therapeutical proceedings mortality rates following relaparotomies are still high ranging from 15.5% to 61.5% depending upon the severity of the complications<sup>9, 10,12,13</sup>. We here report a cumulative mortality rate of 40% which was noted to be 78% in patients undergone repeated relaparotomies and having high APACHE II score which is in consistent to the previous studies<sup>14,19,20</sup>. Sepsis and multiple organ failure was noted to be the most common cause of mortality in our study which is in consistent to the previous studies<sup>15,19,20</sup>.

Delayed surgical intervention for the treatment of an intra-abdominal septic focus might cause sepsis and MOF and, hence high mortality. In this study we have noticed a mean delay of 12.5 days after the primary surgery till the referral to our tertiary care hospital which is higher than the previous studies so far<sup>9-14</sup>. It was also noted in our study that the mortality in cases of relaparotomy carried out within 48 hours after primary surgery was much lower (12%) than those who were re-explored after 48 hours (78%). The same has been reported by Koperna T et al and Maldin et al and Doeksen et al with variable mortality rate<sup>22,23,27</sup>. The reasons of this delayed referral after primary surgery especially in private low level hospitals may be multifactorial still to be searched out but it is a fact that this avoidable factor for relaparotomies if considered seriously and the re-exploration done in right timings, may save many lives as suggested by Desiaterik et al, Zaverly et al, Hyman et al<sup>23, 24, 28</sup>.

Another important factor in reducing the rate of relaparotomies and mortality is of course the experience of the surgeon performing the surgery and the level of the hospital with its mandatory preoperative and postoperative measures as discussed by Desiaterik et al and Karen Brasel et al<sup>23,29,30</sup>. In our study 77.3% cases undergone relaparotomy were primarily operated at low level / volume private hospitals and it is strange that 92% of these cases were operated urgently without proper

preoperative measures (Table I & III). Interestingly 72.3% of the cases were operated by simple graduates having insufficient surgical experience and it is alarming that three victims (5.6%) were even operated by non doctor quacks.

Lack of surgical experience may lead to avoidable re-operations by several mechanisms. One is diminished or poorly developed technical skills and another is lack of familiarity with current standards of care and decision for more specialized diseases. It may be more challenging for those with a generalized practice to stay current with a particular surgery, which might contribute to errors in technique or judgments, leading to re-operations.

The factors expressing the surgical competence are judged with different variables including postoperative hemorrhage, iatrogenic injuries, missing pathologies and immature technical decision. The postoperative hemorrhage after primary surgery was noted in 5.5% cases which is much higher than the 0.1% rate reported by Kononov AG et al. Secondly in our study 100% of these cases were because of technical mistakes like inadequate haemostasis in the first surgery as compared to 72.2% technical mistakes reported by Kononov et al<sup>25</sup>. A mortality rate of 18.4% to 33.3% has been reported in postoperative hemorrhages in previous studies which is consistent to our rate of 33.3%<sup>8,26</sup>. These are ground facts responsible for ever rising rate of re-explorations, complications and higher mortality as compared to the global literature and need a sensible concentration by reliable authorities in regard to standardization and legislations of the hospitals and professional competence of surgeons.

A cumulative professional incompetence of primary surgery was evident in 81.5% cases after relaparotomy (Table IV) with low standard surgery at private sector hospitals and unsupervised surgery at public institutions leading to complications and unnecessary hospital stay. It is evident by the fact that 22.3% cases of relaparotomies were primarily operated in our institution and more than 2/3<sup>rd</sup> cases were operated by postgraduate residents. The mean hospital stay of 21.74 ± 1.29 days with an additional ICU stay of more than three days in 10% of our cases is really alarming.

We have not calculated the specific costs to the patients of relaparotomies but one can appreciate the impact of potentially avoidable surgery on many areas. These include financial costs, the emotional impact of reoperation and additional risk exposure to significant complications impacting quality of life. Such avoidable re-operations impose a significant economic burden on both the patient and society in general and the public resources in special<sup>31</sup>.

This study provides objective data which speak to where patients needing surgical care for intra-abdominal pathologies will best be served. No doubt a competent surgery is influenced proportionately by the standardization gages like "to whom, when, under what conditions, where, why and how the surgery should be conducted". So any means to minimize present surgical trend would be of great benefit. The implications for future surgical practice patterns with respect to surgeons, referrals and hospitals are enormous. We strongly suggest that the most efficient way of reducing the relaparotomy and mortality rate is actually avoiding the possible complications during the first surgery.

## CONCLUSIONS

The rate of relaparotomies for intra-abdominal pathologies is very high. Most of these originate from low standard private hospitals or unsupervised surgery at institutions and many of these are avoidable. Timely carried out relaparotomy at tertiary care hospitals for managing persistent or recurrent pathologies is a useful procedure with reasonable morbidity and mortality. In addition to decreasing complication ratio, primary laparotomy for intra-abdominal pathologies performed at tertiary care hospitals would decrease need for patients to undergo re-explorations.

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It's not the having,  
it's the getting.

*Taylor, Elizabeth*

