

## To Study the Aetiological Factors and Outcomes of Urgent Re-Laparotomy in Himalayan Hospital

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### Rezumat

#### *Studierea factorilor etiologici și rezultatele re-laparotomiei de urgență într-un spital din Himalaya*

**Context:** Tratarea unor complicații care apar după intervenții chirurgicale abdominale pot necesita re-laparotomii de urgență, operații obligatorii care pot salva viața pacientului. Obiectivele acestui studiu au fost evaluarea motivelor pentru efectuarea re-laparotomiilor de urgență, rezultatele acestora și factorii care influențează mortalitatea.

**Metode:** Studiu observațional, prospectiv studiul a inclus toți pacienții care au fost supuși re-laparotomiei de urgență după o laparotomie (electivă, sau de urgență) într-un spital din Himalaya în perioada 01.01.2013 - 01.06.2014, și a exclus pacienții care au fost supuși unei intervenții de laparotomie în afara spitalului.

**Rezultate:** Re-laparotomia de urgență a fost efectuată în cazul a 40 de pacienți din 1050 (4.2%), din care 25 au fost bărbați și 15 femei. Intervalul de timp mediu între laparotomie și re-laparotomia de urgență a fost de 6,4 zile. Cea mai des întâlnită cauză a decesului a fost șocul septic și cedarea mai multor organe. Cel mai întâlnit criteriu pentru re-explorare a fost fistula anastomotică (13 cazuri), urmat de pioperitoneu (11 cazuri) și peritonită persistentă (6 cazuri). În comparație cu numărul intervențiilor chirurgicale, au mai fost efectuate

proceduri gastro-intestinale inferioare (21 cazuri, 47.7%), urmate de intervenții chirurgicale hepato-biliare și pancreatice (8 cazuri, 18.2%) Au fost 6 cazuri de proceduri gastro-intestinale superioare (13.6%).

**Concluzie:** Re-laparotomia de urgență efectuată după intervenții chirurgicale abdominale cu complicații au rata de mortalitate mai mare. Rata mortalității este mai mare în special după intervenții chirurgicale gastro-intestinale sau atunci când apar complicații și infecții.

**Key words:** re-laparotomia de urgență, indicele de laparotomie, fistulă anastomotică, pioperitoneum, peritonită, morbiditate, mortalitate

### Abstract

**Background:** Treatment of a number of complications that occur after abdominal surgeries may require that Urgent Re-laparotomy (UR), the life-saving and obligatory operations, are performed. The objectives of this study were to evaluate the reasons for performing URs, their outcomes and factors that affect mortality.

**Methods:** Observational, Prospective Study. The study included all the patients who underwent urgent re-laparotomy following laparotomy (emergency, elective) in Himalayan Hospital from 01.01.2013 to 01.06.2014 and excluded those who underwent laparotomy outside.

**Results:** UR was performed for 40 out of 1050 patients (4.2%), of which males were 25 and females 15. The average time interval between the index laparotomy and urgent re-exploration was 6.4 days. The most common reason for mortality was multi organ failure with septic shock. The most common

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criteria for re-exploration were anastomotic leak (n=13), followed by pyoperitoneum (n=11) and persistent peritonitis (n=6). Comparing the index surgery, lower gastro-intestinal procedures were most usually involved (n=21, 47.7%), followed by hepato-pancreato-biliary surgeries (n=8, 18.2%). There were 6 cases of upper gastro-intestinal surgeries that re-explored (13.6%).

**Conclusion:** UR that is performed following complicated abdominal surgeries has high mortality rates. In particular, they have higher mortality rates following GIS surgeries or when infectious complications occur.

**Key words:** Urgent Re-laparotomy, index laparotomy, anastomotic leak, pyoperitoneum, peritonitis, morbidity, mortality

## Introduction

The term "Re-laparotomy" (RL) refers to operations performed within 60 days in association with the initial surgery. Re-laparotomy can be of various types such as – Planned, Urgent, Early, Late, Diagnostic, Radical or Palliative. Urgent Re-laparotomy (UR) is defined as emergency re-exploration done only when clinical condition of the patient deteriorated or failed to improve or if there was sonological or CT evidence of intra abdominal collection (1).

Currently there are have been no studies in Indian institutes on emergency re-exploration and all available data is on the basis of western studies. This study is being conducted so as to determine the incidence of Urgent Abdominal Re-exploration (UAR) in Himalayan Hospital and evaluate the different aetiological factors and outcomes.

## Materials & Methods

This is an observational prospective study conducted in the Himalayan Hospital, Jolly Grant, Dehradun, India between 01.01.13 to 01.06.14 which included all the patients who underwent urgent re-laparotomy following laparotomy (emergency, elective) in our institute and excluded those who underwent primary laparotomy outside. Their age, sex and initial diagnoses; pre- and per-operative findings; surgical procedures and postoperative complications that occurred following the first operation; and for UR intervals and outcomes. Mortality rates and reasons following URs were also investigated.

The following parameters were considered as urgent laparotomy decision criteria: i) existence of hemorrhage resistant to medical treatment, ii) existence of progressive peritonitis, iii) existence of abscess where percutaneous drainage is either impossible or ineffective, iv) continuous contamination of abdominal cavity with fecal content, v) existence of necrosis, vi) existence of ileus resistant to decompression or medical treatment, vii) worsening of patient's clinical condition despite medical treatment.

UR-requiring complications can be categorized into 5 groups:

- (i) hemorrhage into intestinal canal or abdominal cavity;
- (ii) peritonitis that occurs in the absence or presence of a perforation;
- (iii) mechanical or paralytic post-operative ileus;
- (iv) eventration or evisceration;
- (v) miscellaneous complications, tumors.

Statistical analyses were done using Fisher exact tests by independent comparisons among groups by a statistician who was blinded to the study. A p value of < 0.05 was considered as significant.

## Results

A total number of 2520 patients underwent laparotomies (Index Laparotomy) were done and a total of 44 UR were conducted for 40 patients (incidence 1.7%), where 1 patient underwent UR thrice and two patients twice. Out of the 40 patients who underwent emergency re-exploration, 15 were of elective index laparotomies and 25 of emergency index surgeries (37.5% and 62.5% respectively). The average age of a patient was 36 years, which was comparable in both males and females (36 and 37 years respectively).

The average time interval between the index laparotomy and UR was 6.4 days, which was longer in females who underwent an elective index laparotomy that of 7.6 days.

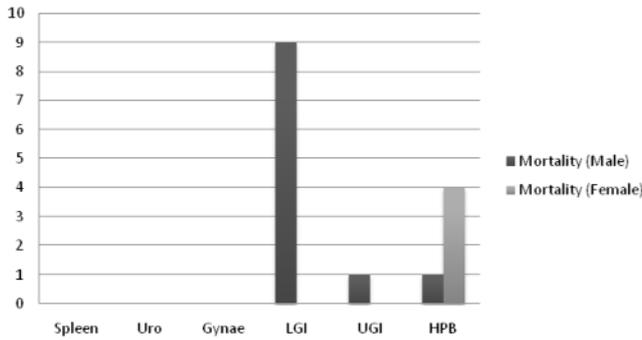
A total of 15 (37.5%) patients we admitted to the ICU. The incidence was higher in emergency cases i.e. 66% (n=10). Of these 10 patients, 7 male and 3 female patients. The maximum number of male patients were admitted in the ICU were those who had initial lower gastro-intestinal surgery (LGI) (n=8). Where as in the females, there were total 7 admissions in the ICU with 1 following upper gastro-intestinal (UGI) surgery and 6 for hepato-pancreato-biliary surgery (HPB).

Maximum mortalities were seen in the males following LGI surgeries (n=9), while in the females the most common cause of mortality was following HPB surgery (n=4). Maximum mortalities were seen in the males following LGI surgeries (n=9), while in the females the most common cause of mortality was following HPB surgery (n=4). (Fig. 1, Fig. 2, Tables 1, 2, 3, 4, 5, 6, 7, Fig. 3, Fig. 4)

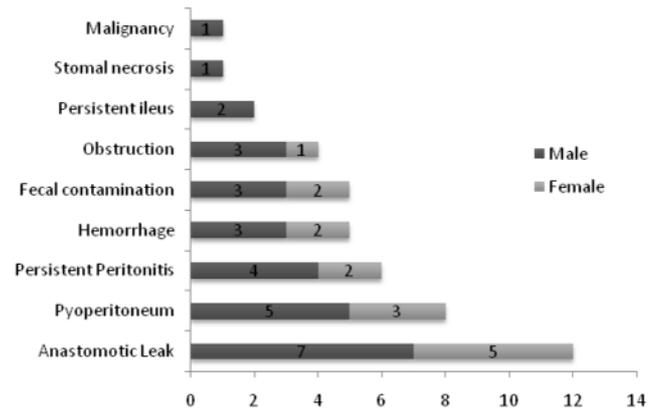
This is a Fisher's exact test contingency table with a significant P-value of 0.02. It signifies that re-exploration more than once carries a high mortality rate in comparison with that done once. (Table 8)

## Discussion

In our study 40 patients undergoing urgent abdominal re-exploration 44 times out of 2520 patients. The incidence being 1.7% in our study. The incidence of males being 62.5% (n=25) and females 37.5% (n=15). Out of the 2520 index laparotomies, 1512 were elective surgeries and 1008 being emergency laparotomies. The incidence of UAR in elective cases being 1.48% and in emergency cases being 1.65%. In our study the mean age of patients undergoing emergency re-



**Figure 1.** Diagram showing the expired male and female patients as opposed to the site of index laparotomy



**Figure 2.** The various indications for UAR amongst male and female patients

**Table 1.** Different criteria for UR against the different sites of index laparotomy

Criteria / Site	UGI	LGI	HPB	Uro	Spleen	Gynae
Anastomotic leak	1	7	4	-	-	-
Pyoperitoneum	3	2	3	-	-	-
Peritonitis	-	4	2	-	-	-
Hemorrhage	2	-	1	-	1	1
Fecal contamination	-	3	-	1	-	1
Obstruction	-	3	-	-	-	1
Persistent ileus	-	2	-	-	-	-
Tumor	-	1	-	-	-	-
Stomal necrosis	1	-	-	-	-	-

**Table 2.** Various intra-operative findings during UAR as opposed to the different sites of index laparotomy

Findings / Site	UGI	LGI	HPB	Uro	Spleen	Gynae
Anastomotic leak	3	9	8	-	-	-
Pyoperitoneum	5	16	5	-	-	-
Peritonitis	-	4	2	-	-	-
Hemorrhage	2	-	1	-	1	1
Fecal contamination	1	4	-	1	-	1
Obstruction	1	6	-	-	-	1
Persistent ileus	-	2	-	-	-	-
Tumor	-	1	-	-	-	-
Stomal necrosis	1	-	-	-	-	-

**Table 3.** Table showing the different HPB surgeries and the criteria for UAR, Intra-op findings and subsequent procedure done

Sr. No	Diagnosis	Criteria for UAR	Intra-op findings (UAR)	Procedure done (UAR)
1	CBD stone	Leak	Leak + Pyoperitoneum	HJ + FJ + re-anastomosis
2	Pancreatic trauma	Leak	Leak + Pyoperitoneum	HJ + re-anastomosis
3	Empyema GB	Leak	Leak + Pyoperitoneum	Roux en Y HJ
4	CBD stone	Leak	Leak + Pyoperitoneum	Omental patch repair of CBD
5	Acute cholecystitis	Peritonitis	Leak + Pyoperitoneum	Lavage
6	Empyema GB	Peritonitis	Pyoperitoneum	Lavage
7	Liver Laceration	Hemorrhage	Hemorrhage	Lavage
8	Pancreatic trauma	Pyoperitoneum	Pyoperitoneum	Lavage
9	Acute cholecystitis	Pyoperitoneum	Leak + Pyoperitoneum	Ligation of cystic duct stump
10	Pancreatic trauma	Pyoperitoneum	Pyoperitoneum + Hemorrhage	Lavage + ligation of bleeding vessel

**Table 4.** Different upper gastro-intestinal surgeries, the criteria for UAR, Intra-op findings and subsequent procedure done

Sr. No	Diagnosis	Criteria for UAR	Intra-op findings (UAR)	Procedure done (UAR)
1	Pre-pyloric perforation	Pyoperitoneum	Pyoperitoneum	Lavage
2	Pre-pyloric perforation	Pyoperitoneum	Pyoperitoneum	Lavage
3	Distal CA stomach	Pyoperitoneum	Pyoperitoneum + Obstruction + fecal contamination	Transverse colostomy
4	Distal CA stomach	Stomal necrosis	Stomal necrosis + pyoperitoneum	Revision of transverse colostomy
5	Proximal CA stomach	Leak	Leak + pyoperitoneum	Re-anastomosis
6	Bleeding antral ulcer	Hemorrhage	Hemorrhage + Leak	Distal gastrectomy
7	Bleeding D1 ulcer	Hemorrhage	Hemorrhage + Leak	Distal gastrectomy

**Table 5.** Different lower gastro-intestinal surgeries, the criteria for UAR, Intra-op findings and subsequent procedure done

Sr. No	Diagnosis	Criteria for UAR	Intra-op findings (UAR)	Procedure done (UAR)
1	Ileal perforation	Leak	Leak + Pyoperitoneum	R/A ileum
2	FJ	Persistent ileus	Volvulus + gangrene	R/A jejunum
3	Colonic transection	Leak	Leak + Pyoperitoneum	Loop ileostomy
4	Ileal gangrene	Pyoperitoneum	Pyoperitoneum	Lavage
5	Appendicitis	Obstruction	Adhesive obstruction	Adhesiolysis
6	Colonic perforation	Fecal contamination	Fecal contamination + Pyoperitoneum	Colostomy
7	FJ	Obstruction	Pyoperitoneum	End ileostomy
8	Ileostomy closure	Obstruction	Gangrene	End ileostomy
9	Sigmoid volvulus	Leak	Leak + Obstruction	Colostomy
10	Ileal perforation	Pyoperitoneum	Pyoperitoneum	Lavage
11	Colonic gangrene	Persistent peritonitis	Pyoperitoneum + obstruction	Lavage + ileostomy
12	Ileocaecal TB	Leak	Leak + obstruction	Lavage + ileostomy
13	Ileal perforation	Peritonitis	Leak + Pyoperitoneum	Re-anastomosis
14	Ileal perforation	Peritonitis	Gangrene + Pyoperitoneum	Lavage + ileostomy
15	Ileal gangrene	Peritonitis	Gangrene + Pyoperitoneum	R/A ileum
16	Hirschsprungs' disease	Peritonitis	Leak + Pyoperitoneum	Re-anastomosis + lavage
17	Colostomy closure	Obstruction	Obstruction	Re-anastomosis
18	CA caecum	Malignancy	Growth at ICJ	Right Hemicolectomy
19	Ileal perforation	Leak	Leak + Pyoperitoneum	R/A ileum
20	Jejunal perforations	Leak	Leak + Pyoperitoneum	Ileostomy
21	Jejunal perforations	Leak	Leak + Pyoperitoneum	Re-anastomosis
22	Strangulated ventral hernia	Fecal contamination	Pyoperitoneum	Lavage + R/A ileum
23	Obstructed ventral hernia	Leak	Leak + Pyoperitoneum	Lavage + ileostomy

**Table 6.** Different gynaecological surgeries, the criteria for UAR, intra-op findings and subsequent procedure done

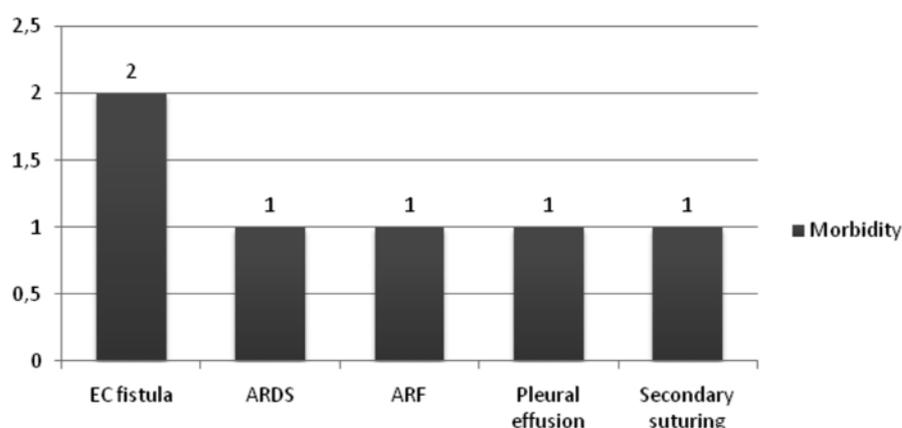
Sr. No	Diagnosis	Criteria for UAR	Procedure done	Intra-op findings (UAR)
1	Left ovarian mass	Hemorrhage	Ligation of bleeder	Hemorrhage from pedicle
2	Frozen pelvis + pyometra	Fecal contamination		Ileostomy Ileal perforation
3	CA cervix (Grade III)	Obstruction	Adhesiolysis	Adhesive obstruction

**Table 7.** Various miscellaneous surgeries, the criteria for UAR, intra-op findings and subsequent procedure done

Sr. No	Diagnosis	Criteria for UAR	Procedure done	Intra-op findings (UAR)
1	CA urinary bladder	Fecal contamination	Colostomy	Fecal contamination + rectal perforations
2	Splenic trauma (Grade V)	Hemorrhage	Ligation of bleeder	Bleeding from pedicle

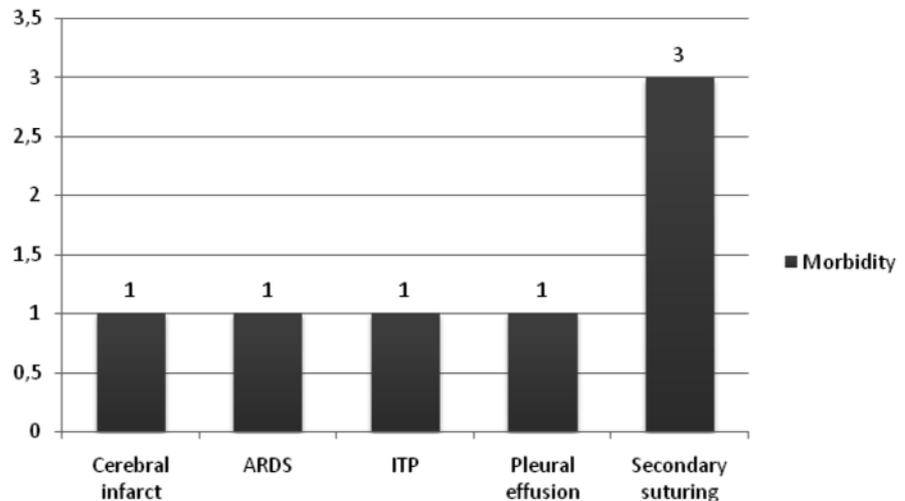
laparotomy was 36 years, which was comparable between males and females being 36 and 37 years respectively. In studies by Lamme had a mean age of 54 years with a sex ratio of 1:1.06 and by Halukthe mean age was 50.46 years. And in studies by Doekson the mean age was 67 years, ranging from 26 to 87 years Koirala had an average age of 32 years with a sex ratio of 4:3 and in Mark o'Wain's study the average age was 60 years for males and 61 years for females. In the study by James G Hindalethe mean age was 60 years and by RabiaUrooj the mean age was 31.37 years with a sex ratio of 1:1.13 (2, 3, 4, 5, 6, 7, 9).

In our study the most common criteria for re-exploration was anastomotic leak (n=12), followed by pyoperitoneum (n=8). There were 6 patients with persistent peritonitis and 5 patients with hemorrhage into the bowel or peritoneum. Of the 5 patients with bleeding, two patients were re-explored due to persistent UGI bleed rest had hemoperitoneum. In the study by Halukmost common cause for UAR was anastomotic leak (42%), followed by hemorrhage (18.5%) and intra-abdominal abscess formation (9.87%). Stomal complications and persistent ileus contributed to 6.17% and 4.93% respectively



**Figure 3.** Different types of morbidity in the Male patients following UAR

**Figure 4.** Different types of morbidity in the Female patients following UR



(2). While in Koirala's study the most common cause was evisceration or eventration (22.5%), followed by abscess formation (17.5%) and fecal contamination (15%) (6). Mark o'Wain's study showed persistent sepsis as the most common cause of UR with 18% cases, followed by obstruction and bleeding with 12% and 7 % respectively (5). In James G. Hindale's study the most common cause of re-laparotomy was abscess formation with 47 out of 87 patients, followed by anastomotic leak in 14 patients, bowel necrosis in 10 patients and abscess formation in 6 patients (3). RabiaUrooj study had results of abscess formation as the most common cause of UR with 63%, persistent sepsis in 14% cases and anastomotic leak in 9% cases (9).

In our study if we compare the site of index laparotomy, LGI procedures were most usually involved in 21 patients (52.5%), followed by 9 cases of UGI surgeries (22.5%) and HPB surgeries (n=7, 17.5%). There was 1 case each of UR after radical cystectomy and splenectomy (2.5% each). There were 3 patients who were explored more than once, of which 2 were twice and one was operated thrice. In the study by Koirala the most common site of primary laparotomy was lower GI in 23 patients (57.5%), followed by upper GI in 12 patients (30%) and gynecological in 2 cases (5%). The mortality of patients in whom primary laparotomy was of LGI origin was lower in comparison with that of UGI (22% and 50% respectively) (6). Haluk study had 28 patients of LGI surgeries

(34.5%), 23 patients of UGI surgeries (28.4%), 8 cases of HPB surgery (9.8%) and 4 cases each of vascular and gynecological surgeries (4.94% each) (2). In the study conducted by Oddeke of the 114 patients undergoing on-demand surgery, 71 were of lower GI tract, 30 of upper GI tract, 5 patients of pancreatic surgery and 2 cases of gynecological surgery (10). Marko'Wain's study had 15 patients of upper GI laparotomies, 9 patients following biliary surgery and 25 cases of lower GI surgeries (5).

In our study the patients undergoing UR the most common morbidity were of respiratory origin and secondary suturing being done in 4 patients in patients not admitted in the ICU. Out of the 18 patients admitted in the ICU 9 patients required hemodialysis for renal failure, while in 3 patients tracheostomies were made in view of persistent ventilatory support. In one patient an intercostal chest tube insertion for pleural effusion and in one patient ERCP was done. The major issues in the surgical patients were the low levels of albumin and protein, which delayed their wound healing and predisposed them to other illnesses. In the study by Doekson the most common co-morbidity was cardiovascular in origin, in 17 out of the 36 patients, followed by COPD in 8 patients (4). In Koirala's study the most common morbidity was of pulmonary origin in 25% cases, followed by wound dehiscence (17.5%) and cardiovascular complications (15%) (6). In RabiaUrooj's study the most common complications were entero-cutaneous fistula formation and recurrent sepsis (26.6% each), followed by sepsis and hemorrhage (23.3% and 10% respectively) (9).

It is clearly evident that in patients who undergo UAR, there is always a high probability of findings other hidden pathological entities, which endanger the life of the patients. Even though all surgeries carry a risk, probably more so in laparotomies, a surgeon should not hesitate to re-explore the patient if he clinically or radiologically suspects an on-going pathology, which can endanger the patient. Urgent abdominal re-exploration saves lives if undertaken at a timely moment and with proper vigilance. We must also note that repeated UAR carry a worse prognosis with high mortality rates, Thence the first re-exploration if needed should be the best and final one.

**Table 8.** Comparison of mortality and remaining patients with against those underwent UAR once or more

	Mortality	Rest	
UAR (once)	12 13.88 (0.25)	25 23.12 (0.15)	37
UAR (>1)	3 1.12 (3.12)	0 1.88 (1.88)	3
	15	25	40

$$\chi^2 = 5.405, df = 1, \chi^2/df = 5.41, P(\chi^2 > 5.405) = 0.0201$$

## Conclusion

Urgent re-laparotomy is an emergency life saving procedure for patients who have had unexpected outcomes in early post-operative period. At present the data pertaining to the aetiological factors leading up to it and the eventual outcomes of UAR are from western institutes. UARs that are performed following complicated abdominal surgeries have high mortality rates. In particular, UARs have higher mortality rates following LGI surgeries or when infectious complications occur. The possibility of efficiently lowering these high rates depends on the success of the first operations that the patient had received. There have not been much of similar studies conducted in Indian institutes on emergency abdominal re-exploration.

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