

# The Role of Peritoneal Toileting and Abdominal Drainage during Exploratory Laparotomy for Hemoperitoneum due to Gynecological and Obstetrical Etiology

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## ABSTRACT

**Aims and objectives:** The role of abdominal drainage and peritoneal toileting/irrigation as beneficial or harmful, to compare between two groups, the evidence-based usefulness, and to evaluate the effect of postoperative morbidity.

**Type of study:** Prospective randomized control study, clinical trial, comparative study, research journal publication.

**Materials and methods:** After getting ethical approval, this research work was carried out in the Department of Obstetrics and Gynaecology in the Institute of Post-Graduate Medical Education and Research—Seth Sukhlal Karnani Memorial (SSKM) Hospital, Kolkata, West Bengal, India, with proper diagnosis, selection, and allocation of total 66 cases for exploratory laparotomy for hemoperitoneum in different gynecological and obstetrics indications was categorized into two cohorts of Gr-DI-n-33 (abdominal drainage and peritoneal toileting/irrigation) and Gr-Non-DI-n-33 (no abdominal drainage drain and peritoneal toileting/irrigation). As per the standard data collecting procedure, we had collected data from two groups [Gr-DI ( $n = 33$ ) and Gr-NDI ( $n = 33$ )], the results of each group in the form of primary and secondary outcomes elaborated and the statistical significance analyzed and calculated with the help of GraphPad Software and expressed in Tables 1 to 3.

**Result:** The peritoneal irrigation and abdominal drainage in this operation (exploratory laparotomy for hemoperitoneum in different gynecological and obstetrics indications) are not required, and in fact, these procedures cause increased adverse events. In our study, it had been established that placement of such drain is not only beneficial but also unnecessary. At the same time, it had been revealed that it was time-consuming, prolongation of hospital time, and increased wound infection rate.

**Conclusion:** In this research study, there were minimal complications with the help of broad spectrum antibiotics and primary wound closure without peritoneal irrigation and abdominal drainage. With coverage of potent, high-level antimicrobial in such complicating operations, there was no need of such procedures.

**Keywords:** Abdominal toileting and drain, Beneficial/harmful, Exploratory laparotomy, Hemoperitoneum.

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## INTRODUCTION

The peritoneal toileting and abdominal drainage are generally used for evacuation of collection via dependent part with gravity and washed-out materials which act as nidus for microbial growth cause impaired wound healing. By applying these procedures (as demonstration by Sim's<sup>1</sup>), intra-abdominal complications can be identified early and can save lives, that is why surgeons even nowadays routinely practice these. Many randomized controlled trials (RCT) were carried out, but the benefits were inconclusive and useless,<sup>2-4</sup> but institutions and surgeons even nowadays routine the use of prophylactic abdominal irrigation and drainage on the faith of concept by Lawson Tait—when doubt drain. The abdominal drainage causes discomfort, ambulatory obstacle, and sometimes becomes blocked and acts as a source of infection.

The aims of the current study directing not only primary and secondary outcomes but also as below:

- Identification of alarm on developing intra-abdominal events.
- Effects on hospital stay.
- The long-term and late effects—morbidity.

## MATERIALS AND METHODS

### Case Selection

A total of 66 cases of exploratory laparotomy for hemoperitoneum in different gynecological and obstetrics indications stated below

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**Conflict of interest:** None

are selected, randomized, and allocated into two cohorts as follows: in the first group of patients of exploratory laparotomy as indicated with extensive peritoneal irrigation and placement of abdominal drainage called group DI and the second group without peritoneal toilet and drainage called group NDI.

### Place of Study

The Department of Gynaecology and Obstetrics, IPGMR and SSKM Hospital, West Bengal, India.

### Setting

Academic, Research.

**Duration and Time**

One year (February 19, 2015–February 18, 2016)

**Type of Study**

Prospective Randomized Controlled Trial (RCT), Interventional Clinical Trial, and Comparative Study.

**Sampling Method**

*Sample Size*

A total of 66 (sixty-six) cases of exploratory laparotomy for hemoperitoneum in different gynecological and obstetrics indications are allocated into two cohorts in Gr-DI-n-33 (abdominal drainage and peritoneal toileting/irrigation) and Gr-Non-DI-n-33 (no abdominal drainage drain and peritoneal toileting/irrigation).

**Inclusion Criteria**

Gynecological operation—abdominal, vaginal, laparoscopic procedures; obstetrical operation—during cesarean delivery and postoperations.

- Exploration for hemoperitoneum (postoperation)—18
- Rupture ectopic pregnancy—15
- Rupture uterus—12
- Rupture and or hemorrhagic cysts—12
- Postlaparoscopy operative hemoperitoneum—03
- Posttraumatic pregnancy—01
- Negative G and O causes but surgical (Appendix pathology)—05

**Exclusion Criteria**

- Defects in bleeding, clotting, anticoagulation therapy, and low hemoglobin (less than 10.5%)

- Surgically unfit from medically and anesthetic point of view
- Immunodeficient and connective tissues diseases
- Medical and surgical complications
- Rectus sheath hematoma leading to pelvic hemorrhage

**Ethical Application for Permission and Approved**

This study was duly approved by Institution Ethics Committee.

**Health Score System**

The used score system here is health-related quality of life (HRQOL).

**RESULTS AND ANALYSIS**

**Data Collection Procedure**

The data were collected from both the groups—Group DI (33) and Group Non-DI (33)—as per standard collection procedure. The parameters from individual groups were retrieved and analyzed accordingly.

**Data Analysis**

The collected data analysis was done with the outcomes of individual groups of two cohorts in Gr-DI-n-33 (abdominal drainage and peritoneal toileting/irrigation) and Gr-Non-DI-n-33 (no abdominal drainage drain and peritoneal toileting/irrigation) in the forms of \*primary outcomes and \*secondary outcomes are tabulated, analyzed, and the statistical significance calculated by GraphPad Software described: Table 1 [the primary outcomes better in non-drain and irrigation group compared to drain and irrigation group with statistical significance documented in the form of organ damage/failure [Ureter ( $p = 0.0268$ ), Bladder ( $p = 0.0169$ ), G.I.T ( $p = 0.0129$ ), Vessels ( $p = 0.0326$ ), Blood loss, Volume drain

**Table 1:** Primary outcomes

Indicators	Gr-Non-DI (n = 33)	Gr-DI (n = 33)	Conclusion
Impair/Loss of			
Ureters	1/32	8/25	$p = 0.0268$
Bladder	3/30 (stained urine)	12/21 (stained urine)	$p = 0.0169$
G.I.T	1/32	9/24	$p = 0.0129$
Vessels	3/30	11/22	$p = 0.0326$
Blood loss			
Drain (mL) (operation)	*20, *5, *28.72.	*50, *8, *45.96.	$p < 0.0001$
Drain (48 hours)	*150, *50, 287.23	*300, *50, *287.23.	$p = 0.0378$
Decreased Hb%	1, 0.05, 0.28	2, 0.05, 0.28.	$p < 0.0001$
Mops (wet-dry) (mg)	400, 50, 287.23	800, 50, 287.23	$p < 0.0001$
Drop-PCV	1.8, 0.01, 0.0574	2.7, 0.05, 0.28727	$p < 0.0001$
Transfusion needed			
Blood	03/30 (01 unit)	12/21 (03 units)	$p = 0.0169$
FFP	00/33	33/0 ( $\geq 1$ unit)	$p < 0.0001$
Platelets	00/33	33/00 ( $\geq 1$ unit)	$p < 0.0001$
Volume expanders	03/30	27/05	$p < 0.0001$
Altered BP (decrease/no change)	05/28	25/08	$p < 0.0001$
Resp. ailments 2/31 15/18	2/31	15/18	$p = 0.0005$
Critical care 00/33 08/25	00/33	08/25	$p = 0-0048$
Death 00, 01	Nil	01	NA

FET, Fisher’s exact test; UTT, unpaired-t-test. MEAN.SEM.SD



**Table 2:** Secondary outcomes

Parameters	Gr-DI (n = 33)	Gr-NDI (n = 33)	p value and test
Complications	20/13	5/28	
Operation time	76.3 ± 9.4 minutes	50.5 ± 8.7 minutes	p < 0.0001 (utt)
Mobilization time	18, 4, 22.98	8, 2, 11.49	p = 0.0288 (utt-ttp)
Oral intake	20, 4, 22.98	10, 2, 11.49	p = 0.0288 (utt-ttp)
Postsurgical pain (more and not satisfactory/less and satisfactory)	33/00	03/30	p = 0.0093 (utt-ttp)
Analgesic needs and satisfaction	24, 4, 22.49	12, 2, 11.49	p = 0.0093 (utt-ttp)
Pyrexia	20	5	p = 0.0022 (fet)
Antibiotic use (weeks)	6	3.5	
Hospital stay	14, 2, 11.49	7, 1, 5.74	p = 0.0026 (utt-ttp)
Re-admission	05	00	Not applicable

FET, Fisher's exact test; UTT, unpaired-t-test; UTT-TTP, unpaired-t-test and two-tailed-p value. MEAN.SEM.SD

**Table 3:** The prophylactic drain and irrigation of peritoneal (D and I) related outcomes

Parameters	Gr-DI (n = 33)	Gr-NDI (n = 33)	p value and test
Established wound type	23/10	6/27	p = 0.0010
SSI	18/15	4/29	p = 0.0005
Healing surgical site	15/18	24/9	p = 0.0443
Wound complaints	20/13	4/29	p = 0.0001
Wound dehiscence	6/27	0/33	p = 0.0244
Secondary intervention	7/26	0/33	p = 0.0110
Abdominal collects/abscess	4/29	0/33	p = 0.1136
Intestinal ileus	9/24	1/32	p = 0.0129
Intestinal complications	6/27	0/33	p = 0.0244
Others (intestinal obstruction)	30/3	5/28	p = 0.0099
Drain complications	21/12	0/33	p = 0.0001
• Omentum pulled			
• Discharge drain			
• Site infection			
• Difficulties removal			

FET, Fisher's exact test; UTT, unpaired-t-test; UTT-TTP, unpaired-t-test and two-tailed-p value. MEAN.SEM.SD

(Operation) ( $p < 0.0001$ ), Drains (48 hours) ( $p = 0.0378$ ), Hb Drop ( $p < 0.0001$ ), Mops ( $p < 0.0001$ ), PCV Decreased ( $p < 0.0001$ ), needed transfusion [blood ( $p = 0.0169$ ), Fresh Frozen Plasma ( $p < 0.0001$ ), Platelets ( $p < 0.0001$ ), Volume expanders ( $p < 0.0001$ ), Blood Pressure ( $p < 0.0001$ ), respiratory ailments ( $p = 0.0005$ ), require critical care ( $p = 0.0048$ ), and one<sup>1</sup> death in drain and irrigation group, Table 2 [the secondary outcomes better in non-drain and irrigation group compared to drain and irrigation group with statistical significance showed that surgical time ( $p < 0.0001$ ), mobilization time ( $p = 0.0288$ ), oral intake time ( $p = 0.0288$ ), pain ( $p < 0.0001$ ), requirement of analgesic ( $p = 0.0093$ ), temperature increased ( $p = 0.0022$ ), antibiotic use (weeks), hospital stay ( $p = 0.0026$ ), and five<sup>5</sup> re-admission required in drainage and irrigation group], and Table 3 [the specific outcomes related to this procedures better in non-drain and irrigation (non-D and I) group compared to drain and irrigation (D and I) group revealed with statistical significance as follows: nature of wound ( $p = 0.0010$ ), SSI ( $p = 0.0005$ ), wound healing ( $p = 0.0443$ ), pain and hardness, complication ( $p = 0.0001$ ), wound dehiscence ( $p = 0.024$ ), secondary intervention ( $p = 0.0110$ ),

abscess rate ( $p = 0.1136$ ), prolong lie rate ( $p = 0.0129$ ), bowel obstruction, and fecal fistula ( $p = 0.0244$ ), others (Intestinal obstruction) ( $p = 0.0099$ ), drain complications ( $p = 0.0001$ )].

## DISCUSSION

### Anatomical Consideration

The peritoneal cavity is the largest surface area (2 sq m), composed of flattened polyhedral mesothelial cells with microvillus and cilia rest on network of rich plexus having fibrinolytic activity absorption of large fluid and particle were showed by experimental evidence that particulate matters were circulated through the pores of the diaphragmatic peritoneum into lymphatics within minutes.

The uses of peritoneal irrigation and abdominal drainage leading to evacuation of collections early to prevention of accumulation of fluid to find out any break of connections though there is evidence that its routine use may not be beneficial in uncomplicated surgery and controversial as leaks may occur

after removal so not useful in this way.<sup>6-8</sup> As per Lawson Tait,<sup>9</sup> the common practice during the mentioned surgical procedure (exploratory laparotomy); if there is any doubt, thorough peritoneal irrigation and put a drain into abdominal cavity, but studies revealed this system produced more hazards and complications.<sup>9-14</sup>

### Surgical Procedure

The exploratory laparotomy for hemoperitoneum due to gynecological and obstetrical etiology with or without prophylactic abdominal drainage and irrigation of peritoneal cavity started preoperatively with all routine investigations are carried out, all patients were properly examined by the treating surgeons, all patients were treated and followed up by the same surgeons, all surgeries were performed by or under the supervision of the consultant surgeons in the unit using the same protocol.

### Drain and Irrigation (D and I)

After explanation and received informed consent, following exploratory laparotomy in one series (Gr-DI), thorough peritoneal irrigation was done and placement of a drain into POD in the form of polyvinyl chloride or simple rubber drain which was fixed as usual and other series (Gr-NDI) same surgical procedure carried out as per standard guidelines without peritoneal toileting and abdominal drain.

The use of larger volume of saline (1–2 L) (0.9%) with antibiotics only effectively used in operation hoping to prevent general peritonitis and late complications. The fixation of abdominal drain was done with skin stitches to prevent drain-related complications like migration or pull out drain from abdominal cavity. The drain was removed when effluent <30 mL/day or dressing once with minimal soaked in open system and 1 day after initiation of oral solid diet. The prophylactic antimicrobial in the form of injection piperacillin and tazobactam (4.5) plus metronidazole was administered before operation and continued thrice daily for 7 days more postoperatively in all selected cases under this research study.

### Alternatives Procedures

The good clinical assessment, the intraoperative procedures, abdominal quadrants punctures with peritoneal lavage, diagnostic, and therapeutic keyhole surgery and radiological intervention had markedly reduced the number of re-laparotomies and excludes unnecessary exploratory laparotomy where peritoneal irrigation and abdominal drainage<sup>15</sup> need not require but are commonly practiced in such type of different operations for long time<sup>16</sup> (abdominal drainage and peritoneal irrigation) by many surgeons nowadays and followed their usual technique stating simply doing what I always do.<sup>17</sup>

### Effects

The causes of peritoneal inflammation and path of peritoneal infection-related late complications like adhesion are not related to blood accumulated but related to trauma, surgery, and drains (the placement of drainage with peritoneal irrigation—not only questionable in its role in diversion and eviction of abdominal collection but also involved in the transmission of external infection) and the use of larger volume of saline (1–2 L) (0.9%) with antibiotics only effective in operation for general peritonitis with prevention strategies for adhesion which generally achieved by minimal surgical trauma to peritoneal cavity or uses of membranes and gels. Some surgeons stated that drainage of peritoneal cavity (intra-abdominal postsurgical events are generally diagnosed quickly) for

early intervention leading to save the life of patients but it was not accepted by all surgeons. Therefore, it is useless. As the utilization of peritoneal irrigation and abdominal drainage and its withdrawal are still controversial and there are no specific recommendations about it, so its use after exploratory laparotomy varies. This intervention had no adverse effects on future fertility, reproductive events, and on pregnancy as this method not compromised pelvic circulation with preserving uterine and ovarian circulations. Though the rule of thumb adopted after Lawson Tait, in a state of confusion during exploratory laparotomy, placement a drain into abdomen, though there were lack of randomized controlled trial (RCT) in its beneficial effects as the value of use of these remains unclear and controversial. As many studies revealed that there were no need of peritoneal irrigation and abdominal drainage in peritonitis and sepsis in present period of antimicrobial, that had produced complications, that is why GI and others (different types of GI operations, liver surgery, etc.) nowadays have been carried out safely without it with the statement of these are no other alternatives of fine-skilled surgical skill and techniques.<sup>18-20</sup> The related study reports revealed distinctly that the introduction of drainage system into abdominal cavity with thorough irrigation of peritoneum prolong hospital time, increased operation time, increased wound complications (SSI, wound infection rate, subcutaneous infection, and wound dehiscence), higher rate of postoperative fever, chest infection, and drain-related specific complications.<sup>21</sup>

As most of the well-constructed studies along with our study also have failed to show any benefit or to identify any surgical-related events or avoidance of intra-abdominal collection with infection following exploratory laparotomy our suggestion that routine practice of the placement of abdominal drainage with peritoneal irrigation/toileting is not only unnecessary but also harmful.<sup>22-26</sup>

### In Our Study

The data from both the groups (Gr-D and I and Gr-Non D and I) were duly collected as per standard with analyzed and revealed the statistical significant findings.

The postsurgical mortality and morbidity are assessed and evaluated as per the ISGPS criteria. The specific outcomes related to this procedure better in non-drain and irrigation (Non-D and I) group compared to drain and irrigation (D and I) group revealed with statistical significance as follows:

The primary outcomes were better in non-drain group compared to drain and irrigation group with statistical significance documented in the form of less organ damage/failure, less blood loss, transfusion required, and minimal chest discomfort or pulmonary infection, ITU/CCU care but one<sup>1</sup> death in drain and irrigation group.

The secondary outcomes better in non-drain group compared to drain and irrigation group with statistical significance showed less operation time, quick ambulation, early feeding, postsurgical less pain required minimal analgesic for relief from discomfort with satisfaction, less postoperative rise of temperature, antibiotic use (weeks), hospital stay, and five<sup>5</sup> re-admission required in drainage and irrigation group. The specific outcomes related to this procedures better in non-drain and irrigation (Non-D and I) group compared to drain and irrigation (D and I) group revealed to statistical significance as less SSI, pain-hardness-complication, wound dehiscence, intra-abdominal abscess formation, paralytic

ileus and prolonged ileus, bowel obstruction and fecal fistula, others intestinal obstruction, drain complications (the adverse effects are chances of gut injury, failure to withdrawal required exploration, accidentally part of gut, and/or omentum may be expressed and persistent discharge through wound site after removal of drain predisposed to drain site infection observed in drain group), less secondary intervention required, and ultimately better wound healing outcomes.

## CONCLUSION

Many like Lund, Murphy, Schwartz and Tapper are in favor of intra-abdominal drainage and are still advocating transperitoneal drainage and irrigation with normal saline (0.9%) with antibiotics though controversies on these still exist in literature.

The results on reviewing of literatures: (1) the level of evidence (LOE) is low; (2) no conclusive results; (3) no need of abdominal drainage.

We achieved the lowest rate of serious complications and comparatively better postoperative outcomes following surgery (laparotomy) for secondary peritonitis with sepsis in established cases of peritonitis with infection arising from complicated obstetrics and gynecological in two groups (Gr-D and I vs Gr-Non-D and I) with the help of most potent antimicrobials and others. Accumulating data and this study supported and concluded that placement of drainage into abdominal cavity not produces any advantages but produces some complications/hazards that is why its routine application nowadays is debated.

## RECOMMENDATION

We propose the same treatment protocol to all study cases with starting most potent and effective antimicrobials prophylactic with continued postoperation along with layers abdominal closure without abdominal drainage placement and peritoneal irrigation. Under coverage of such broad spectrum antimicrobials, there are no beneficial effects of abdominal drainage and peritoneal irrigation but produces hazards and complications.

This study (Gr-D and I vs Gr-Non D and I) demonstrates that it is not helpful on postoperative morbidity but also in fact these procedures cause an increase in operative time.

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## Disclosure of Interest

All the authors have nothing to disclose, especially commercial point of view.

## Authors' Contribution

All authors contributed to conduct this study.

## Ethics Approval

This study was approved and certified by our Institutional Ethics Committee.

## Informed Consent (IC)

Properly explained and was obtained in written form from all participants.

## Human Participants in Research Approved by Ethics Committee

All types of recommendation were carried out.

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