

Research Article

Comparative Outcomes in Endobag versus Direct Extraction of Gall Bladder Specimen in Laproscopic Cholecystectomy from a Tertiary Care Hospital

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ABSTRACT

Aims & Objectives: To evaluate and compare the incidence of spillage and contamination during endo bag extraction and direct extraction. To assess the operative time difference between the two techniques.

Materials and Methods:

SAMPLE: Patient admitted in the Institute of General Surgery, Rajiv Gandhi Government General Hospital and who underwent laparoscopic cholecystectomy during the period August 2024 to March 2025.

Sample Size: 132 **STUDY:** Prospective cohort study

Inclusion Criteria: Patient above 18 years of age Patients diagnosed with symptomatic gallbladder disease requiring laparoscopic cholecystectomy (e.g., cholelithiasis, chronic cholecystitis). Patients who provide informed consent to participate in the study

Exclusion Criteria: Complicated Gallbladder Disease: Cases with acute cholecystitis, empyema, or gangrene of the gallbladder, where emergency intervention is necessary. Previous Abdominal Surgery: Patients with a history of major abdominal surgeries leading to significant adhesions, which may impact gallbladder retrieval. Conversion to Open Surgery: Patients requiring conversion from laparoscopic to open cholecystectomy during the procedure

Results

In our study 132 cases were included who underwent laparoscopic cholecystectomy and there were 66 patients in Group A, where direct extraction of gall bladder was done and 66 cases in Group B, where endobag extraction was done. The age range of the patients were in the range 20 - 75 years. Male: female ratio was found to be 1:1 in our study. Around 85% patients in the study had comorbidities. In around, 53.79% cases the extraction was done through epigastric port while 46.21% cases it was done through umbilical port. The mean operative time in Group A was found to be 81.03 min and in group B it was 77.3 min and the p value was 0.04 which showed that direct extraction consumed more time than endobag extraction. Group B had significant decrease in stone spillage, bile spillage, port site spillage, port site infection, port site hernia when compared to Group A

Keywords: Laproscopic Cholecystectomy, Endobag.

INTRODUCTION

Laparoscopic cholecystectomy has been the preferred treatment for symptomatic gallstones for the past 15–20 years. Following laparoscopic cholecystectomy, removing the gallbladder can be time-consuming and tricky. Although various techniques have been proposed to ease specimen retrieval, issues during extraction persist, and surgeons often have to enlarge the port site. This carries

added risks—such as bleeding, hematoma, infection, and potential incisional hernia—due to the weakened abdominal wall.

Since its adoption in gallbladder surgery, various extraction tools from simple powder-free gloves to commercially made retrieval bags—have been used to remove the gallbladder from the abdomen. However, laparoscopic removal carries a higher likelihood of intra-abdominal stone spillage

and port-site contamination. Retrieval devices are recommended to reduce wound infections and prevent port-site metastasis. They also help minimize stone spillage during gallbladder extraction. On the downside, using a retrieval bag can complicate specimen removal, often requiring enlargement of the incision and raising the risk of organ injury during bag insertion or removal and may prolong retrieval time. Port-site herniation is a notable complication after laparoscopy; bowel obstruction can occur if intestine becomes trapped in the fascial defect. Richter's hernias have been reported post-laparoscopy, with rates ranging from 0.2% to 3%. Gallbladder perforation during the procedure is common, frequently leading to loss of stones and spillage of bile. Consequences include intra abdominal or subcutaneous abscesses, fistulas, liver abscess, staphylococcal bacteremia, broncholithiasis, empyema, granulomas, bowel obstruction, and hernia formation. Port-site infections—most often superficial—typically respond well to local treatment and are usually centered where the gallbladder is retrieved.

To reduce the risk of wound infection, stone spillage, or even occult malignancy, it's best to use an endobag for an infected specimen to limit contamination of both the abdominal cavity and port tract. Preventing stone scattering within the abdomen—a key benefit of bag use—may help avoid serious infections. In one remarkable case, spilled gallstones were recovered from a supraumbilical port two years after surgery, manifesting as a chronic draining sinus—underscoring that an endobag is a simple, safe, cost-effective method with fewer complications [].

In our study, we compared outcomes between two groups: Group A, where a simple polythene drain-cover endobag was used, and Group B, where the gallbladder specimen was directly extracted through the epigastric or umbilical port.

MATERIALS AND METHODS

Source of Data and Study Period: Patient admitted in the Institute of General Surgery, Rajiv Gandhi Government General Hospital and who underwent laparoscopic cholecystectomy during the period August 2024 to March 2025.

Study design and sampling: Prospective cohort study. Consecutive random sampling

Inclusion Criteria:

1. Patients aged 18 and above.

2. Patients diagnosed with symptomatic gallbladder disease requiring laparoscopic cholecystectomy (e.g., cholelithiasis, chronic cholecystitis).
3. Patients who provide informed consent to participate in the study.

Exclusion Criteria:

1. Complicated Gallbladder Disease: Cases with acute cholecystitis, empyema, or gangrene of the gallbladder, where emergency intervention is necessary.
2. Previous Abdominal Surgery: Patients with a history of major abdominal surgeries leading to significant adhesions, which may impact gallbladder retrieval.
3. Conversion to Open Surgery: Patients requiring conversion from laparoscopic to open cholecystectomy during the procedure

Method of Study: After obtaining institutional ethical committee approval and after selecting the patients based on inclusion and exclusion criteria and after obtaining consent from the patient, the following data for my study were collected by Direct interview with patient and obtaining a detailed history regarding present duration of illness, past history of surgery, personal habits, family and occupation was also taken.

1. After obtaining consent from the patient, patient was exposed to and a thorough clinical examination was performed by Inspection, Palpation of abdomen.
2. Informed consent will be obtained, explaining the purpose, procedure, potential risks, and benefits of the study.

Randomization and Group Allocation: Eligible patients will be randomly assigned to one of two groups:

Group A: Direct extraction group

Group B: Endo bag extraction group

Randomization will ensure equal distribution to control for bias and confounding variables.

Operative Procedure

All patients will undergo laparoscopic cholecystectomy following a standard technique.

Group A patients: The gallbladder specimen will be removed directly through the trocar without using an endo bag.

Group B patients: After gallbladder dissection, the specimen will be placed in an endo bag for extraction.

During the procedure, key parameters will be recorded:

Operative time: Time from incision to closure.

Spillage occurrence: Whether bile or gallstones spill into the abdominal cavity.

Ease of extraction: Subjectively rated by the surgeon on a predefined scale.

3. **Postoperative Observation and Data Collection** Patients will be monitored for any immediate Post-Operative Complications, Including Port-site infection Bile leakage Intra-abdominal abscess formation Post-operative pain levels hospital stay duration and need for additional treatments will be recorded. Data will be collected and compared between both groups.
4. **Follow-Up** Patients will be followed up at intervals (e.g., one week and one month post-surgery) to monitor for delayed

complications, such as infection or adhesion formation. Any complications, re-hospitalizations, or re interventions related to the extraction method will be documented.

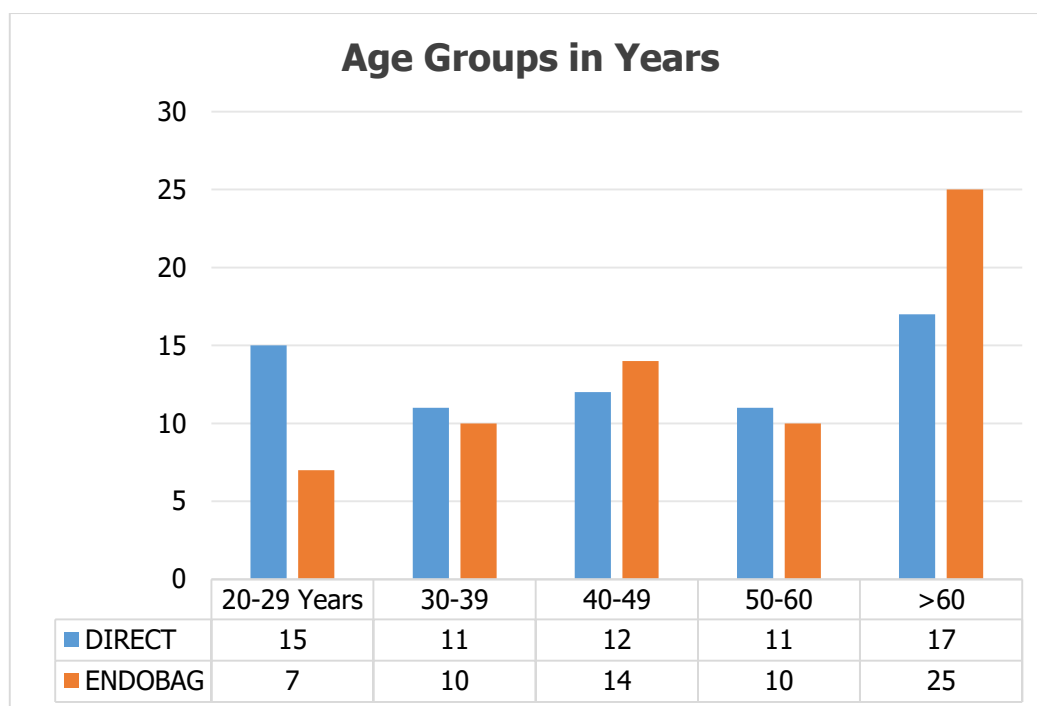
5. **Data Analysis:** Statistical analysis will be performed to compare the two groups in terms of operative time, spillage rate and complication rates.

RESULTS

Age Distribution

The study included 132 patients of various age distributions ranging from 20 years to 75 years with most of my patients who underwent laparoscopic cholecystectomy being in the age group of 60-75 years constituting around 31.82% of the total with 12.88% cases in Group A and 18.94% cases in Group B

Age Groups In Years	DIRECT		ENDOBAG		GRAND TOTAL	
	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE
20-29 Years	15	11.36%	7	5.30%	22	16.67%
30-39 Years	11	8.33%	10	7.58%	21	15.91%
40-49 Years	12	9.09%	14	10.61%	26	19.70%
50-60 Years	11	8.33%	10	7.58%	21	15.91%
>60 Years	17	12.88%	25	18.94%	42	31.82%
Grand Total	66	50.00%	66	50.00%	132	100%
Mean	46.3181		51.5606		48.9394	
SD	16.1818		16.2435		16.3636	
P=0.32151						

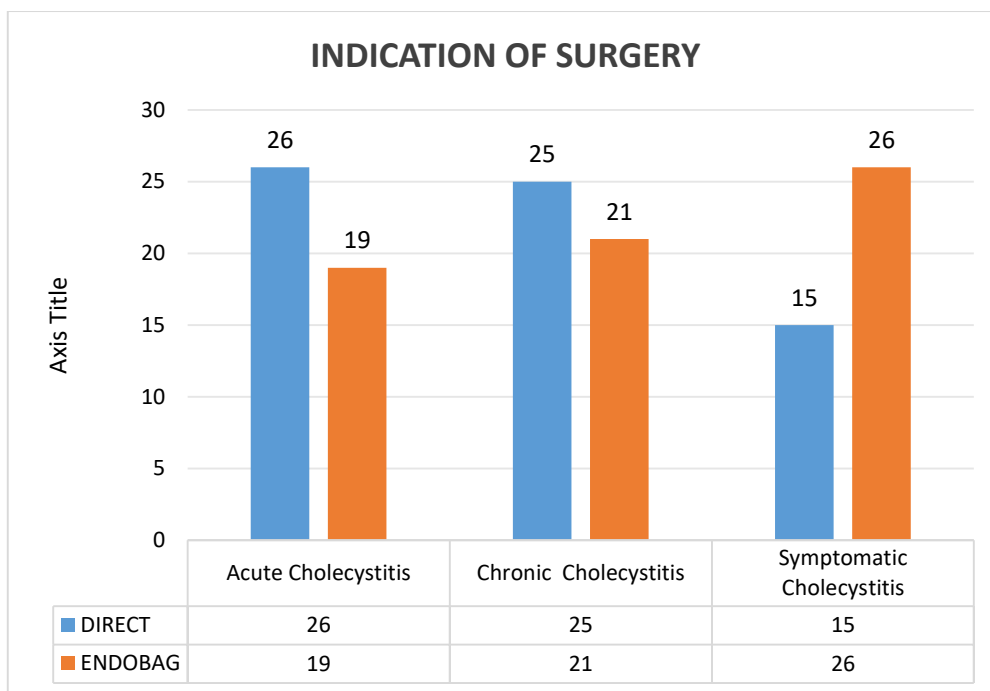


Indication for Surgery:

The most common indication for surgery was found to be chronic cholecystitis in about 34.85% in total. While, in Group A the most

common cause was acute cholecystitis with 19.07% and in Group B it was symptomatic cholelithiasis with 19.07%.

Indication For Surgery	DIRECT		ENDOBAG		GRAND TOTAL	
	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE
Acute Cholecystitis	26	19.70%	19	14.39%	45	34.09%
Chronic Cholecystitis	25	18.94%	21	15.91%	46	34.85%
Symptomatic Cholecystitis	15	11.36%	26	19.70%	41	31.06%
Grand Total	66	50.00%	66	50.00%	132	100%
P=0.036						



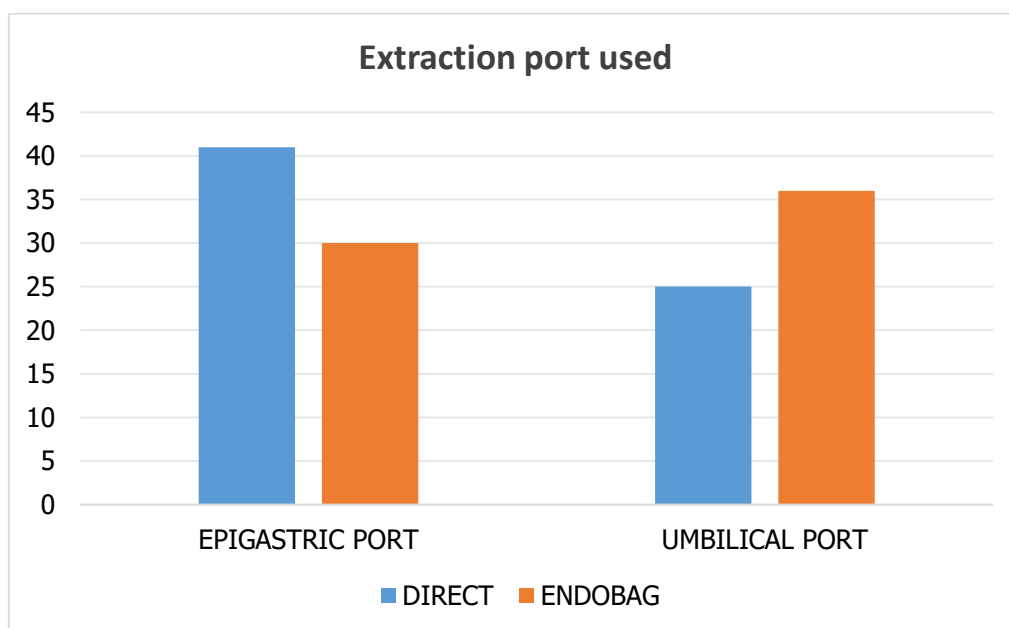
Extraction Port Used:

Out of the 132 cases, in 71 cases gall bladder was extracted through epigastric port (31.06% in Direct group and 22.73% in Endobag group)

and 61 cases through umbilical port (18.49% in Direct group and 27.27% in Endobag group).

Extraction Port Used	DIRECT		ENDOBAG		GRAND TOTAL	
	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE
Epigastric	41	31.06%	30	22.73%	71	53.79%
Umbilical	25	18.94%	36	27.27%	61	46.21%
Grand Total	66	50.00%	66	50.00%	132	100%

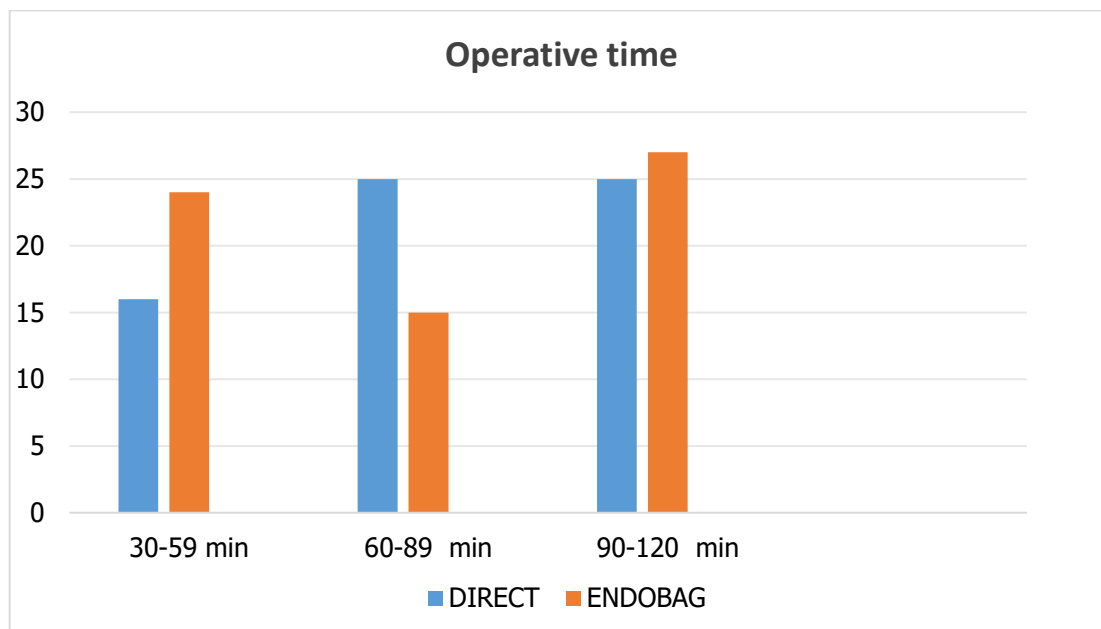
P=0.05



Operative Time:

In Direct extraction group, the mean operative time was found to be 81.03 min while in endobag group it was to be 77.3 min. Yet, 20.45% cases of endobag group had an operative time between 90-120min while in

direct extraction group it was 18.94% cases. There was no statistically significant difference noted between both the group's operative time.

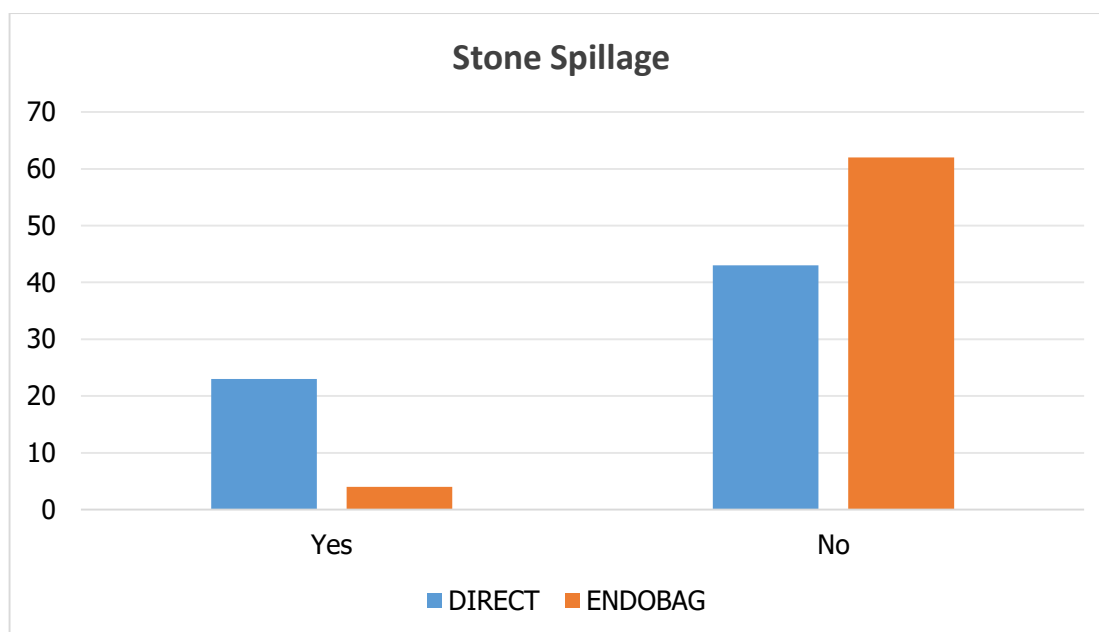


Operative Time (Min)	DIRECT		ENDO BAG		GRAND TOTAL	
	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE
30-59 Min	16	12.12%	24	18.18%	40	30.30%
60-89 Min	25	18.94%	15	11.36%	40	30.30%
90-120 Min	25	18.94%	27	20.45%	52	39.39%
Grand Total	66	50.00%	66	50.00%	132	100%
Mean	81.0303		77.3636		79.1970	
SD	25.4667		29.0367		27.2678	
P=0.041						

Stone Spillage:

Out of 132 cases with 66 cases in each group, 23 cases had stone spillage in direct extraction group (17.42%) while only 4 cases had stone spillage in endobag extraction group (3.03%).

The p value was 0.00004 showing there is a highly significant difference between the two groups with respect to stone spillage



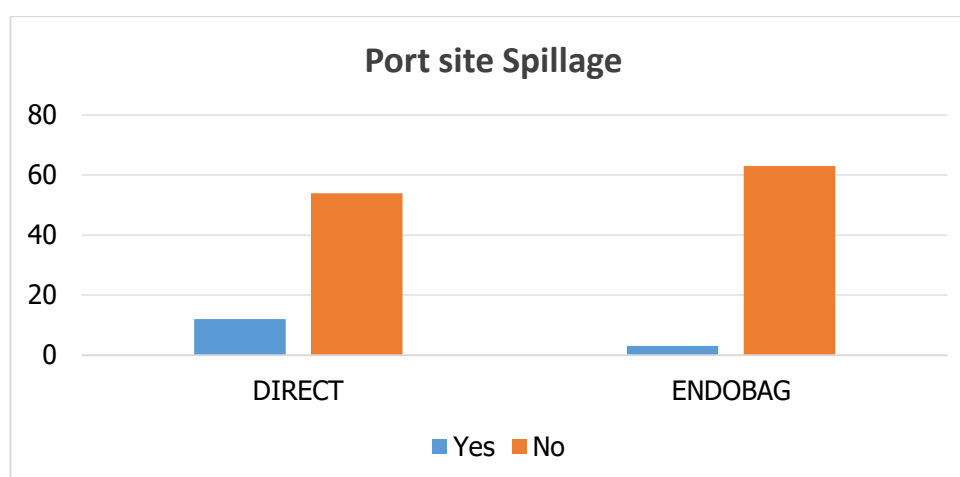
Stone Spillage	DIRECT		ENDOBAG		GRAND TOTAL	
	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE
Yes	23	17.42%	4	3.03%	27	20.45%
No	43	32.58%	62	46.97%	105	79.55%
Grand Total	66	50.00%	66	50.00%	132	100%

P=0.00004

Port Site Spillage

The port site spillage that occurred during the procedure was found to be 11.36% of which direct extraction had an incidence of 9.09%

compared to 2.27% in the endobag group. The p value is 0.013 which shows that it is statistically significant



Port Site Spillage	DIRECT		ENDOBAG		GRAND TOTAL	
	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE
Yes	12	9.09%	3	2.27%	15	11.36%
No	54	40.91%	63	47.73%	117	88.64%
Grand Total	66	50.00%	66	50.00%	132	100%

P=0.013

Portsite Infection:

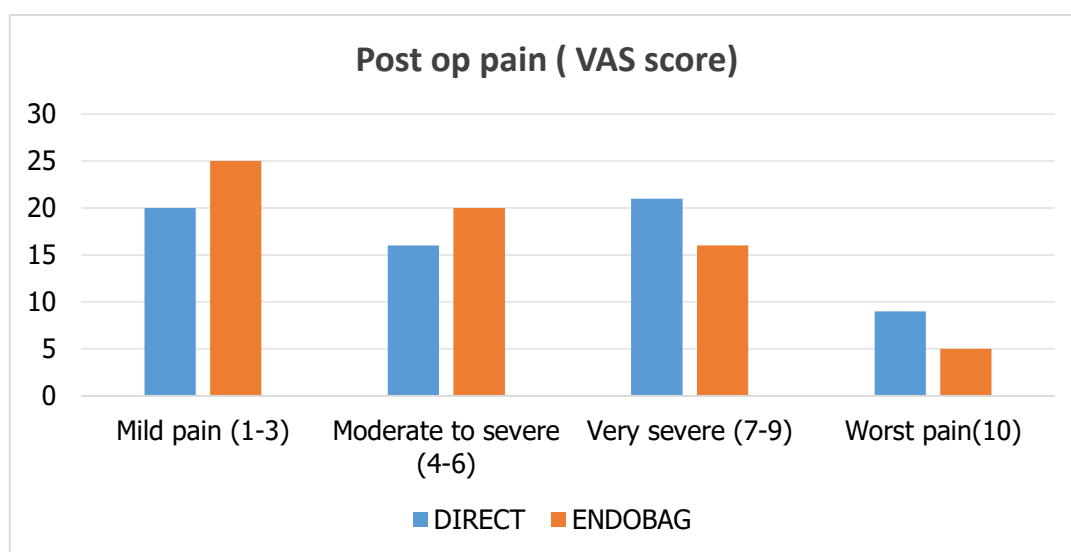
Due to port site spillage or due to various reasons port site infection can occur. In this study 12.88% of cases had reported port site infection. Group A (Direct extraction) had 13 cases (9.85%) of portsite infection while Group B (Endobag extraction) had 4 cases (3.03%) of portsite infection. The p value was 0.019 which shows that portsite infection is statistically lower in endobag group.

Portsite Hernia:

Out of 132 cases, 3 cases developed port site hernia during the followup period following direct extraction while no cases reported port site hernia in the Endobag group

Postop Pain:

Following the procedure Postop pain was evaluated and it was found out to be mild pain in around 34.09% cases while moderate to severe pain was found to be present in 27.27% cases. Around 28.03% cases had very severe pain and 10.61% of cases had worst pain.



Post Op Pain(VAS Score)	DIRECT		ENDOBAG		GRAND TOTAL	
	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE	NO OF CASE	PERCENTAGE
Mild Pain (1-3)	20	15.15%	25	18.94%	45	34.09%
Moderate To Severe (4-6)	16	12.12%	20	15.15%	36	27.27%
Very Severe (7-9)	21	15.91%	16	12.12%	37	28.03%
Worst Pain(10)	9	6.82%	5	3.79%	14	10.61
Grand Total	66	50.00%	66	50.00%	132	100%
Mean	5.6970		4.8636		5.2803	
SD	2.9870		2.8495		2.9378	
P=0.4204						

Hospital Stay: The mean hospital stay was found to be 2.9 days in both the groups.

DISCUSSION

Currently, over 80% of gallbladder surgeries are performed laparoscopically. Extracting the gallbladder during these procedures is often difficult and time-intensive. Spillage of infected bile and stones into the peritoneal cavity and

the port-site can lead to discharging sinuses or abscesses in the abdominal wall tissues. To prevent port-site contamination from bile or stones, surgeons avoid opening the gallbladder while dissecting it from the liver bed or retrieving it. Instead, many opt to use a retrieval bag to remove the gallbladder through a trocar incision. An endobag is particularly recommended if gallbladder cancer is suspected, as it minimizes tumor cell spread, and in acute cholecystitis cases to prevent the leakage of infected bile, stones, or pus. Despite higher expenses and limited strong evidence, these bags are also routinely used in elective procedures. In the current study, laparoscopic cholecystectomy was performed on a greater proportion of females (62%) compared to males (38%). Port-site infections (PSIs) are linked to longer hospital stays and increased costs.

In our study 132 cases were included who underwent laparoscopic cholecystectomy and there were 66 patients in Group A, where direct extraction of gall bladder was done and 66 cases in Group B, where endobag extraction was done.

The age range of the patients were in the range 20 – 75 years. The most common age group of presentation in our study was 60 -75 years despite middle age group but the mean age group was 48 years.

Male: female ratio was found to be 1:1 in our study. Around 85% patients in 81 the study had comorbidities. In around, 53.79% cases the extraction was done through epigastric port while 46.21% cases it was done through umbilical port. The mean operative time in Group A was found to be 81.03 min and in group B it was 77.3 min and the p value was 0.04 which showed that direct extraction consumed more time than endobag extraction. In our study, 78.79% cases had a gall bladder thickness >3mm.

Out of 132 cases with 66 cases in each group, 23 cases had stone spillage in direct extraction group (17.42%) while only 4 cases had stone spillage in endobag extraction group (3.03%). The p value was 0.00004 showing there is a highly significant difference between the two groups with respect to stone spillage and that endobag extraction is considered superior to direct extraction.

In this study 12.88% of cases had reported port site infection. Group A (Direct extraction) had 13 cases (9.85%) of portsite infection while Group B (Endobag extraction) had 4 cases (3.03%) of portsite infection. The p

value was 0.019 which shows that portsite infection is statistically lower in endobag group.

In our study, 26 cases had stone spillage in direct extraction group (39.39%) while only 13 cases had stone spillage in endobag extraction group (19.07%). The p value was 0.013 showing there is a statistically significant difference between the two groups with respect to bile spillage.

The port site spillage that occurred during the procedure was found to be 11.36% of which direct extraction had an incidence of 9.09% compared to 2.27% in the endobag group. The p value is 0.013 which shows that it is statistically significant.

In our study, out of 132 cases, 3 cases developed port site hernia during the followup period following direct extraction while no cases reported port site hernia in the Endobag group.

The mean duration of hospital stay was found to be the same in both groups in our study (2.9 days). Due to port site spillage or due to various reasons port site infection can occur. In this study 12.88% of cases had reported port site infection. Group A (Direct extraction) had 13 cases (9.85%) of portsite infection while Group B (Endobag extraction) had 4 cases (3.03%) of portsite infection. The p value was 0.019 which shows that portsite infection is statistically lower in endobag group.

CONCLUSION

In conclusion, using an endobag to remove the gallbladder is superior to direct extraction, as it minimizes leakage of stones and bile. It also lowers the rate of port-site infection without increasing operating time or hospital stay. Moreover, a simple drain bag can serve as a cost-effective alternative to commercial retrieval bags. Therefore, retrieving the gallbladder with an endobag limits port-site contamination from bile and stones compared to direct extraction. However, this technique may result in more postoperative pain due to increased handling and often requires a larger fascial incision.

Declarations

Ethical approval obtained. Informed consent secured. No conflict of interest. No funding received.

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