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NO DRAINAGE CHOLECYSTECTOMY IN UNCOMPLICATED CHOLELITHIASIS: A PROSPECTIVE STUDY OF 100 CASES

Dr. Ajay Dayma[1*], Dr. Amar Singh Gajraj[2], Dr. Nimesh Chaudhari[3]

[1*]Assistant Professor, Department Of General Surgery, Nims, Jaipur
[2]Junior Resident, Department Of General Surgery, Nims, Jaipur
[3]Junior Resident, Department Of General Surgery, Nims, Jaipur

***Corresponding Author:** Dr. Ajay Dayma
*Assistant Professor, Department Of General Surgery, Nims, Jaipur

Abstract

Background: The necessity of routine sub-hepatic drainage after cholecystectomy for uncomplicated cholelithiasis remains debated. This study evaluates outcomes following open and laparoscopic cholecystectomy without drainage.

Methods: A prospective study of 100 patients with uncomplicated cholelithiasis was conducted at a tertiary care center. Patients underwent either open or laparoscopic cholecystectomy without sub-hepatic drains. Clinical parameters included demographics, pain scores, ultrasound findings, complications, and hospital stay. Data were analyzed using chi-square and t-tests; $p<0.05$ was considered significant.

Results: 87% underwent laparoscopic cholecystectomy and 13% open surgery. Minimal postoperative collections were detected in 8% of patients on POD-VII, with intervention required in only 4%. Mean VAS scores fell from 1.39 on POD-I to 0.23 on POD-VII. The majority (89%) were discharged within 24 hours. No mortality occurred.

Conclusion: Routine drainage is unnecessary after uncomplicated cholecystectomy. It increases morbidity and hospital stay without clinical benefit. No-drain cholecystectomy should be considered safe and effective.

Keywords: Cholelithiasis; Laparoscopic cholecystectomy; Open cholecystectomy; Sub-hepatic drainage; Postoperative outcomes

Introduction

Cholelithiasis is a common condition worldwide, with prevalence ranging from 10% to 20% of the adult population. In India, the incidence is increasing due to dietary and lifestyle factors. Cholecystectomy remains the definitive treatment, with laparoscopic cholecystectomy regarded as the gold standard.

Historically, sub-hepatic drains were placed to detect bile leaks and intra-abdominal bleeding. However, drains themselves may be associated with complications such as infection, increased pain, and prolonged hospital stay. Several randomized controlled trials and meta-analyses have questioned

their routine use. Yet, despite growing evidence, some surgeons still prefer routine drainage due to perceived safety.

This prospective study was conducted to evaluate outcomes of no-drain cholecystectomy in uncomplicated cholelithiasis, aiming to provide robust evidence for clinical decision-making.

Materials and Methods

Study Design: A prospective, observational study conducted between November 2022 and November 2024 at NIMS Medical College & Hospital, Jaipur.
Sample: 100 consecutive patients with ultrasonographically confirmed uncomplicated cholelithiasis were included. Inclusion criteria: patients aged >18 years, symptomatic cholelithiasis without signs of acute cholecystitis, CBD stones, malignancy, or pancreatitis. Exclusion criteria: complicated cholelithiasis, cirrhosis, coagulation disorders, uncontrolled comorbidities.

Procedures: Patients underwent either laparoscopic or open cholecystectomy performed by experienced surgeons. No drains were placed in any case.
Outcome Measures: Postoperative pain measured using the Visual Analogue Scale (VAS), ultrasonography on POD-I and POD-VII to detect fluid collections, duration of hospital stay, and complications were recorded.

Statistical Analysis: Data were analyzed using SPSS v23. Continuous variables were expressed as mean ± SD and compared using t-tests. Categorical data were analyzed using chi-square tests. Significance was set at $p<0.05$.

Ethics: Ethical approval obtained Written informed consent was obtained from all participants in accordance with the Declaration of Helsinki.

RESULTS

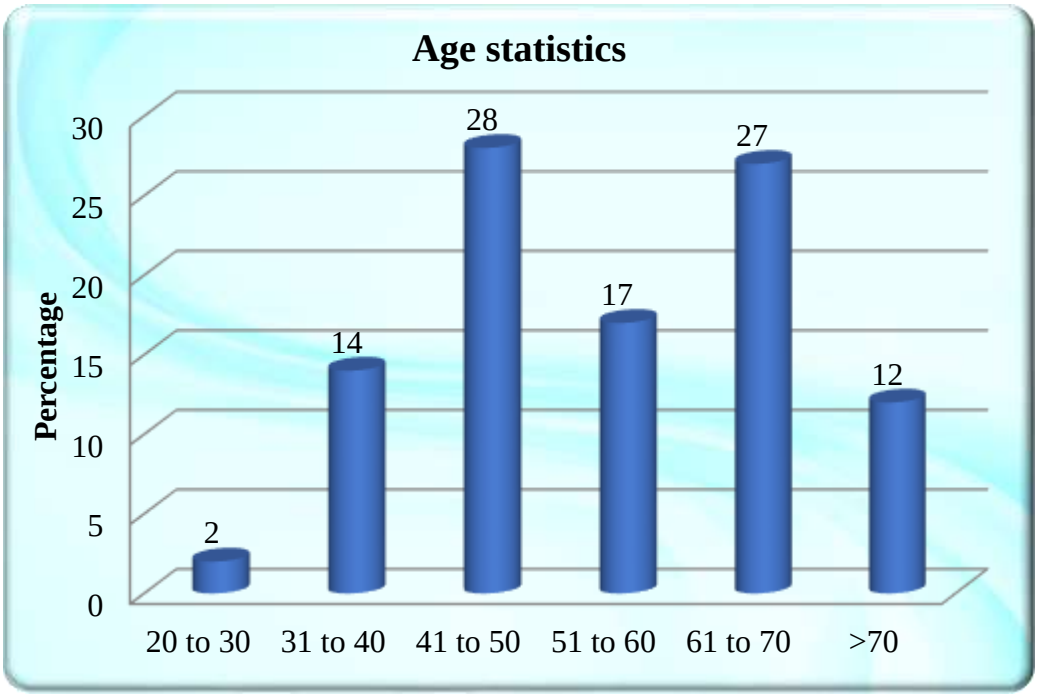
This prospective study of 100 patients was undertaken during period from November 2022 to November 2024, in surgical wards and operation theatre of Department of General Surgery, NIMS Medical College & Hospital,Jaipur, Rajasthan.
The patients were admitted for gall bladder stones (cholelithiasis) and treated by surgical method of either laparoscopic or open cholecystectomy as per fitness for surgery.
The results of the study are as follows:

1. Age distribution:

Majority of the cases (28%) were observed in 41 to 50 years of age groups followed by 27% in 61 to 70 years of age, least were in extreme of age groups. the mean age of patients was 53.95±13.23years range (29 to 82 Years).

Table 1: Age wise distribution of the cases

Age Group	Number	Percentage (%)
20 to 30	2	2
31 to 40	14	14
41 to 50	28	28
51 to 60	17	17
61 to 70	27	27
>70	12	12
	100	100
Mean ±SD	53.95±13.23	
Range	29 to 82	



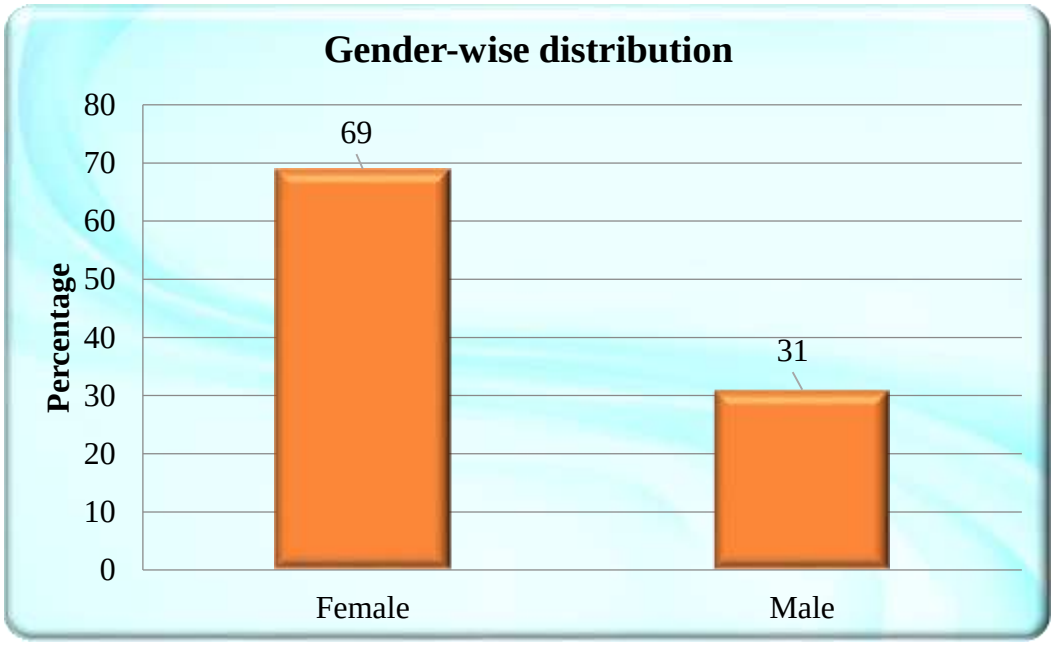
Graph 1: Graph depicting Age statistics

2. Sex wise distribution:

Out of total 100 patients the gender wise distribution is as depicted in the table and graph below. Out of total 100 patients, Male comprised of 31 % and females 69 % with male to female ratio of 1:2.25.

Table 2: Gender wise distribution of the cases

Sex	Number	Percentage (%)
Female	69	69
Male	31	31
TOTAL	100	100



Graph 2: Gender wise distribution of the cases

3. Clinical Features:

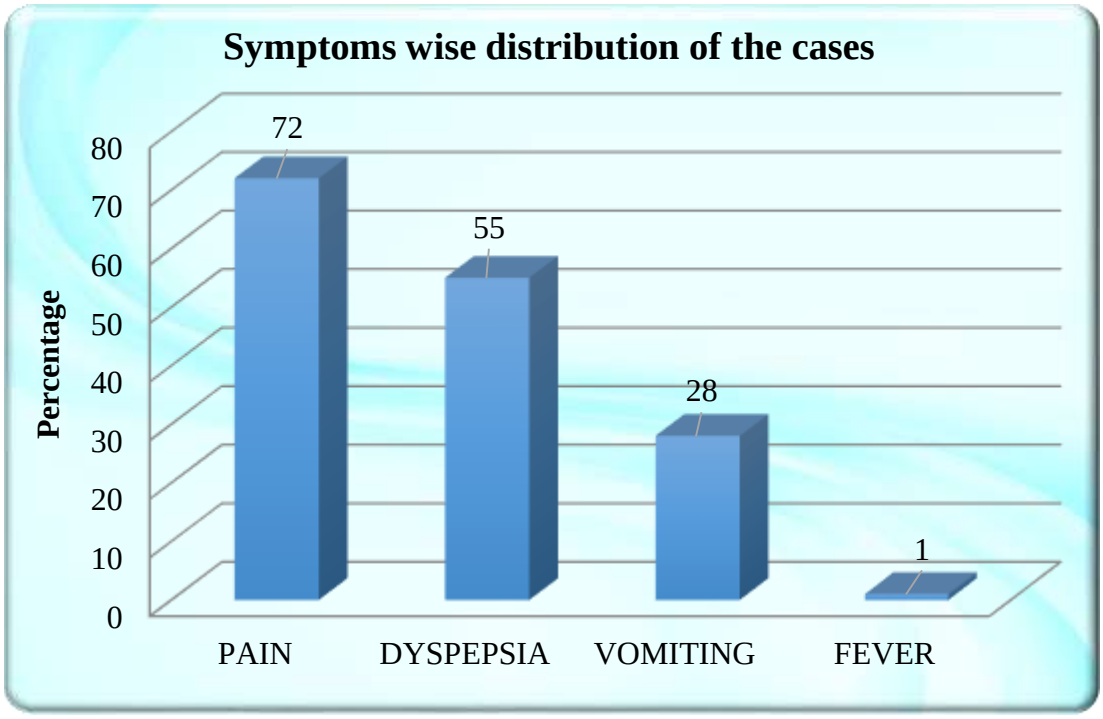
All patients presenting to outpatient department had signs and symptoms suspicious of cholelithiasis who were then sent for Ultrasonography for definitive diagnosis

3.1 Symptoms on presentation:

All patients with cholelithiasis presented with symptoms like pain, dyspepsia, vomiting, fever, etc. Incidence of various symptoms on presentation is as mentioned below. Amongst all the symptoms most common symptom was pain in the right hypochondria present in 72% of the total 100 patients, followed by 55% of patients presenting with dyspepsia. Only 1 patient had fever presenting with symptoms of acute cholecystitis. 28% had complaints of vomiting.

Table 3.1: Symptoms wise distribution of the cases

Symptoms	Number	Percentage (%)
PAIN	72	72
DYSPEPSIA	55	55
VOMITING	28	28
FEVER	1	1



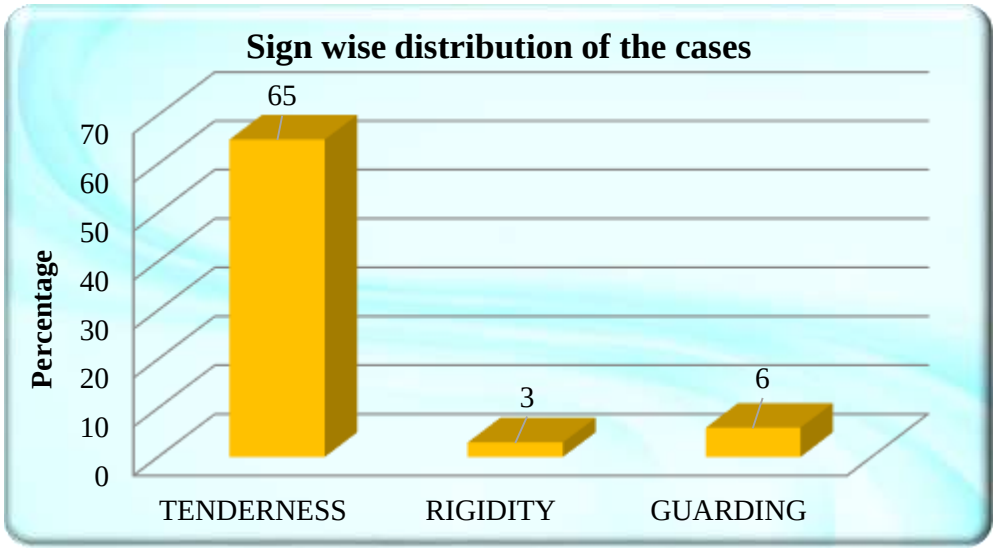
Graph 3.1: Symptoms wise distribution of the cases

3.2 Signs at presentation of the disease:

On examination patients had the following distribution. Amongst all clinical features, on examination tenderness in the right hypochondria was the most common sign noted in maximum (65%) of the total patients. Only 3 patients had rigidity and only 6 had guarding, constituting 3% and 6% of total patients respectively. Rest did not have any clinical findings on examination

Table 3.2: Sign wise distribution of the cases

Sign	Number	Percentage (%)
TENDERNESS	65	65
RIGIDITY	3	3
GUARDING	6	6



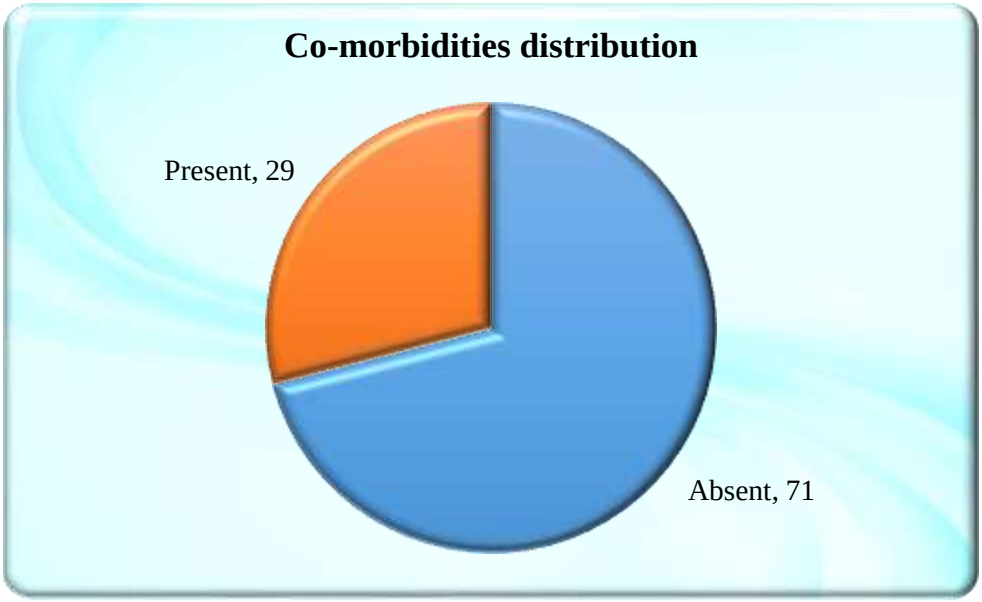
Graph 3.2: Sign wise distribution of the cases

4. Co-morbidity status:

All admitted patients were assessed for any co-morbidities if present. Out of 100 patients 71 had no co-morbidities. Only 29 (29%) patients had co-morbidities. The distribution of various co-morbidities has been depicted below. Amongst all the patients admitted for cholecystectomy, most common co-morbidity found was Diabetes mellitus present in 9 out of 100 patients (31.03). COPD was present in 6 out of 100 patients (20.68%). 2 patients had a history of coronary artery bypass surgery and 1 patient had history of myocardial infarction in the past, these patients were on antiplatelet drugs. According to modified American Society of Anaesthesiologists risk classification system, 71 patients belonged to class I, 9 patients belonged to Class II, 19 patients belonged to Class III, only one patients belonged to Class IV

Table 4.1 Co Morbidity and distribution of the cases

	Number	**Percentage (%)**
Absent	71	71
Present	29	29



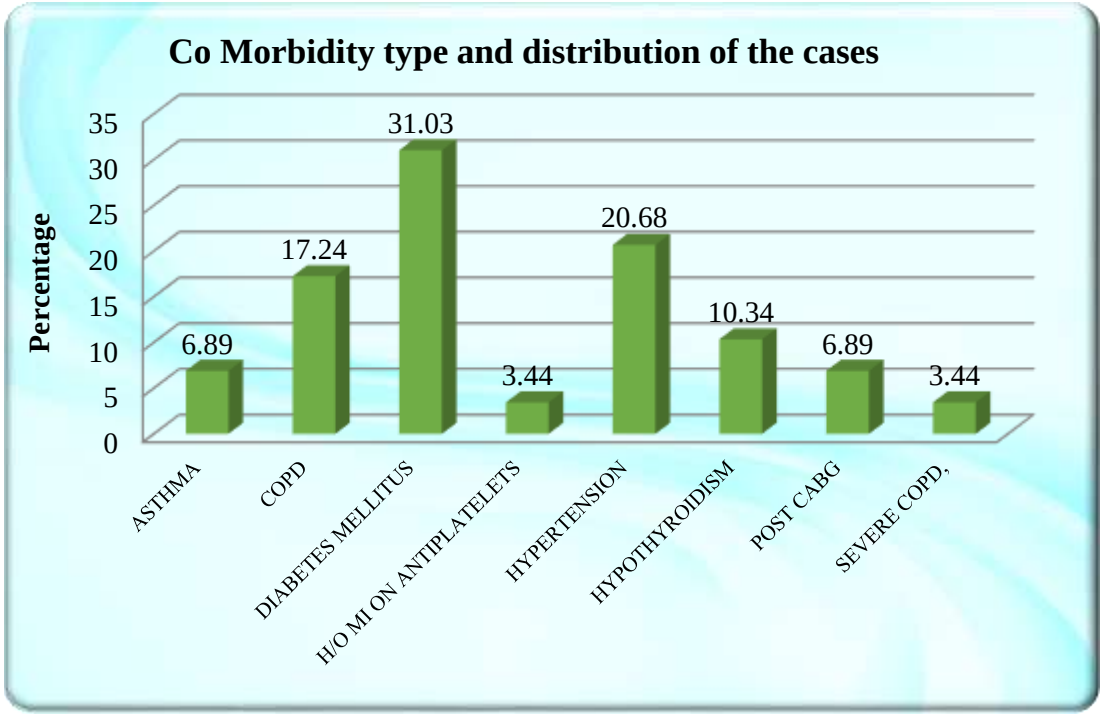
Graph 4.1 Co Morbidity and distribution of the cases

Table 4.2: **Co Morbidity type and distribution of the cases**

N=29	**Number**	**Percentage (%)**
ASTHMA	2	6.89
COPD	5	17.24
DIABETES MELLITUS	9	31.03
H/O MI ON ANTIPLATELETS	1	3.44
HYPERTENSION	6	20.68
HYPOTHYROIDISM	3	10.34
POST CABG	2	6.89
SEVERE COPD	1	3.44

Table 4.3: Distribution of co-morbidities as per ASA classification

ASA grading	**Percentage**
Class I	71
Class II	9
Class III	19
Class IV	1



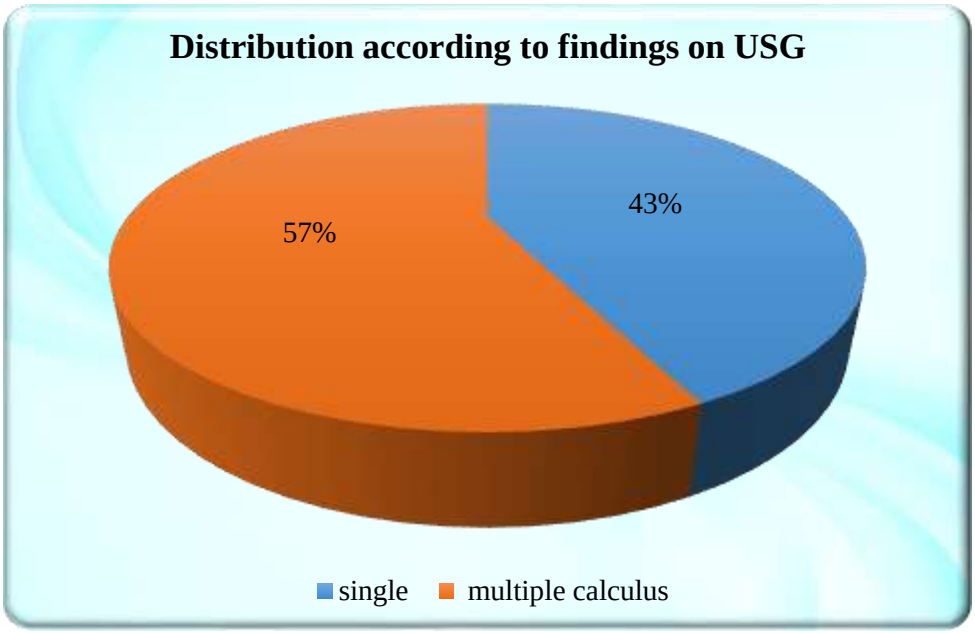
Graph 4.2: Co Morbidity type wise distribution of the cases

5. Ultrasound findings:

On ultrasound 43% of the patients had single calculus in the gall bladder lumen and 57% of the patients had multiple calculus.

Table 5: Distribution of the cases according to USG findings

USG	**Number**	**Percentage (%)**
Single	43	43
Multiple calculus	57	57
Total	100	100



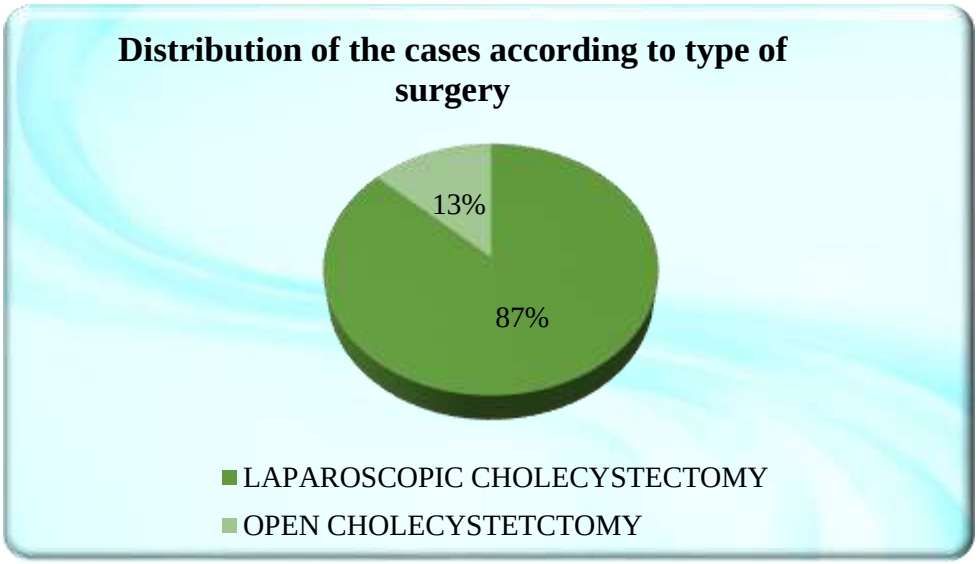
Graph 5: Distribution of the cases according to USG finding

6. Type of surgery:

Out of total 100 cases with uncomplicated cholelithiasis 87 underwent laparoscopic cholecystectomy and 13 underwent open surgery for cholelithiasis. No conversion happened during laparoscopic surgery.

Table 6: Distribution of the cases according to type of surgery

SURGERY TYPE	Number	Percentage (%)
Laparoscopic cholecystectomy	87	87
Open cholecystectomy	13	13
	100	100



Graph 6: Distribution of the cases according to type of surgery

7. Follow-Up findings:

On follow up, patients were asked for an ultrasound. Follow up ultrasound was done on post-operative day I and post-operative day VII.

7.1 Ultrasound findings day I after surgery

None of the patients had any significant collection in the Morrison's Fossa. Minimal collection was seen in all 100 patients on post-operative day I. Patients were discharged on post-operative day I until patient had any complaints or stayed far away from a medical facility.

7.2 Ultrasound findings on day VII of surgery

Patients were called on post-operative day VII. Out of 100 patients 8 patients were observed to have collection after surgery. These patients consulted the out-patient department as and when the patient started developing complaints. Intervention was required in only 4 patients. Rest 4 patients no intervention was required and patient recovered well on conservative management and vigilant watch.

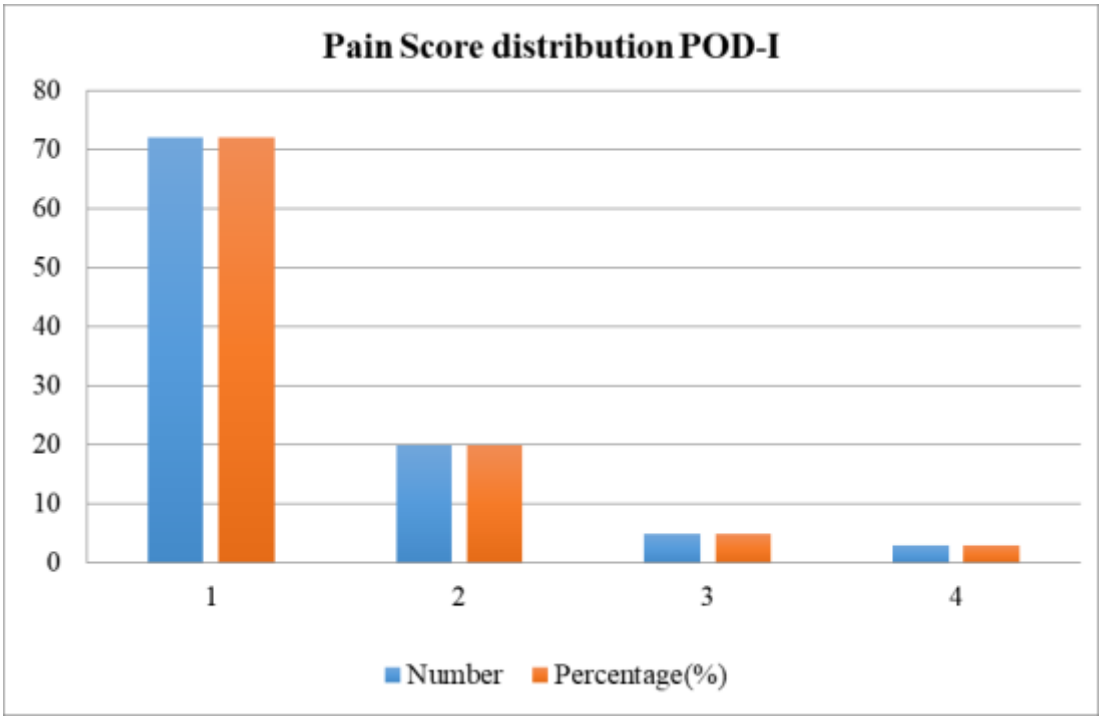
8. Pain after surgery as per VAS score:

8.1 Post-operative day I:

Maximum patients 72% had a VAS score of 1, indicating mild pain. Only 3% of the patients had severe pain. Mean pain score was 1.39±0.72.

Table 7: Pain score distribution on POD I

PAIN SCORE	Number	Percentage (%)
1	72	72
2	20	20
3	5	5
4	3	3
	100	100
Mean ±SD	1.39±0.72	
Range	1 to 10	



Graph 7: Pain score distribution on POD I

Comparative statistics of pain score day I and day VII

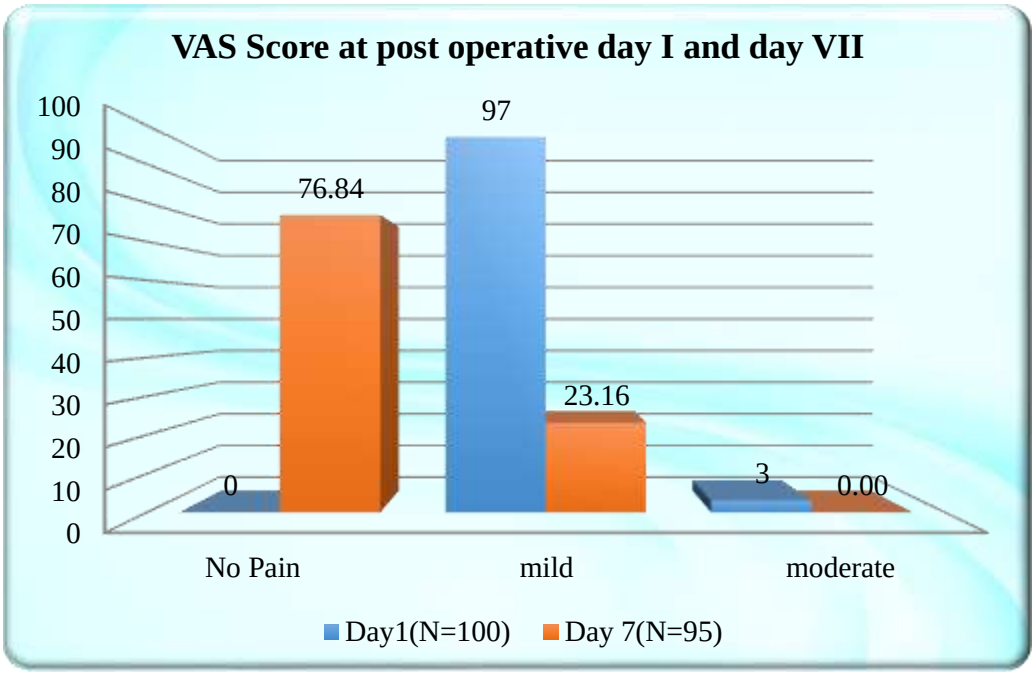
On post-operative day I the mean pain score as per VAS was 1.39±0.72. On day 7 the mean pain score was 0.23±0.42. On POD I pain score range between 1-4 with standard deviation of 0.72 and on POD VII pain score range between 0-1 with standard deviation of 0.42. On POD I, 97% had mild pain and 3 % had moderate pain, whereas, On POD 7 maximum 73% of the patients had no pain, 22% had

mild pain and none had moderate to severe pain as per VAS scoring system depicted by *Wong Baker faces.*

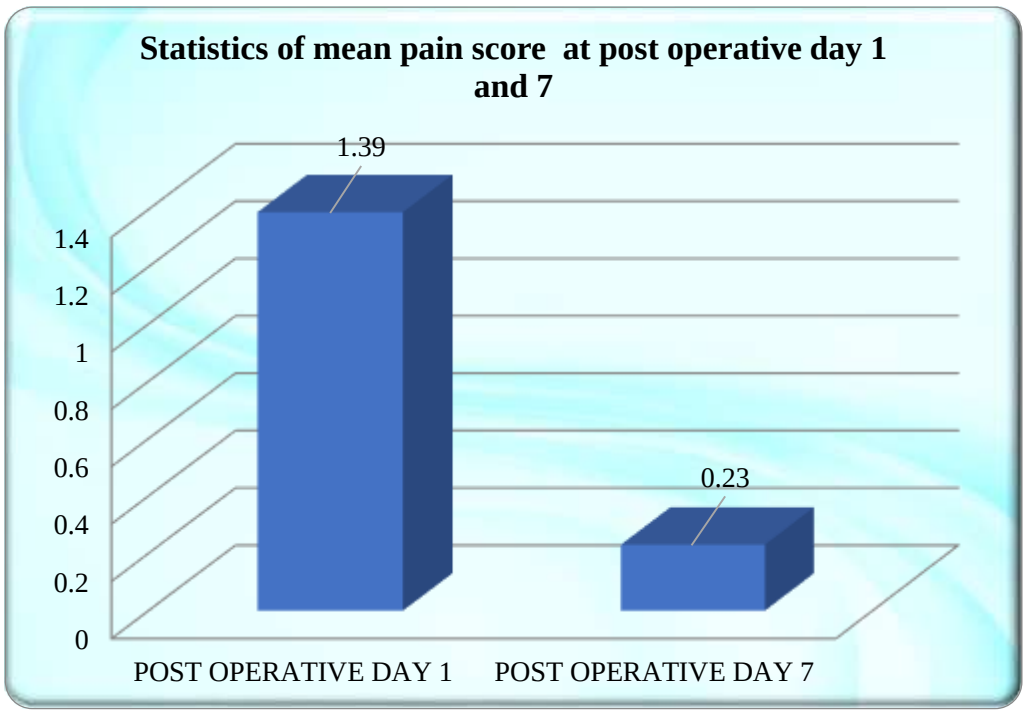
Table 8: VAS Score at post-operative day I and day VII

VAS Score	Day I (N=100)	Day VII (N=95)
No Pain	0	73
mild	97	22
moderate	3	0
Mean ± SD	1.39±0.72(1to4)	.23±0.42(to 1)

Chi-square = 123.222 with 2 degrees of freedom; P = 0.000



Graph 8: VAS Score at post-operative day I and day VII



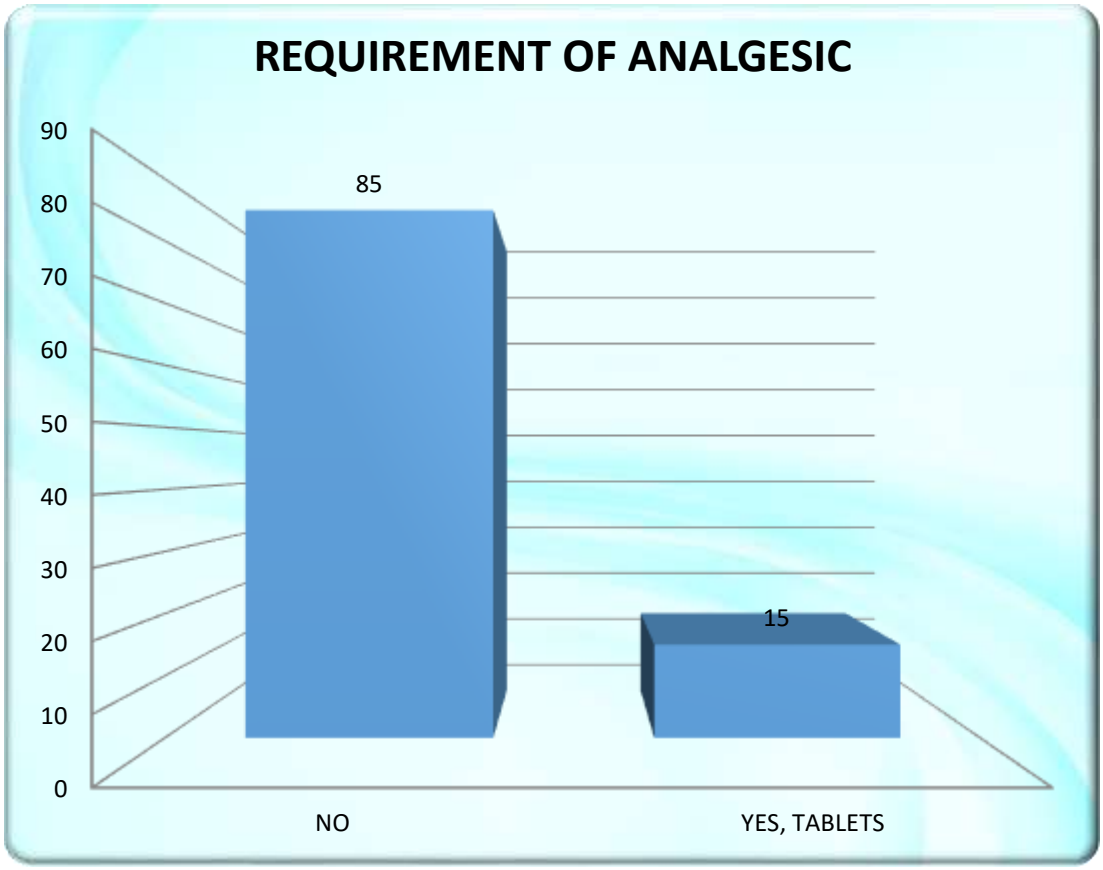
Graph 9: Statistics of mean pain score at post-operative day 1 and 7

8.2 Post-operative requirement of analgesics:

Out of 100 patients operated for open and laparoscopic cholecystectomy only 15% of the patients required an analgesic in the post-operative period. The analgesic given was Tablet Diclofenac sodium. No injectable analgesia treatment was required.

Table 9: Distribution of cases as per requirement of analgesic:

REQUIREMENT OF ANALGESIC	Number	Percentage
NO	85	85
YES, TABLETS	15	15
Total	100	100



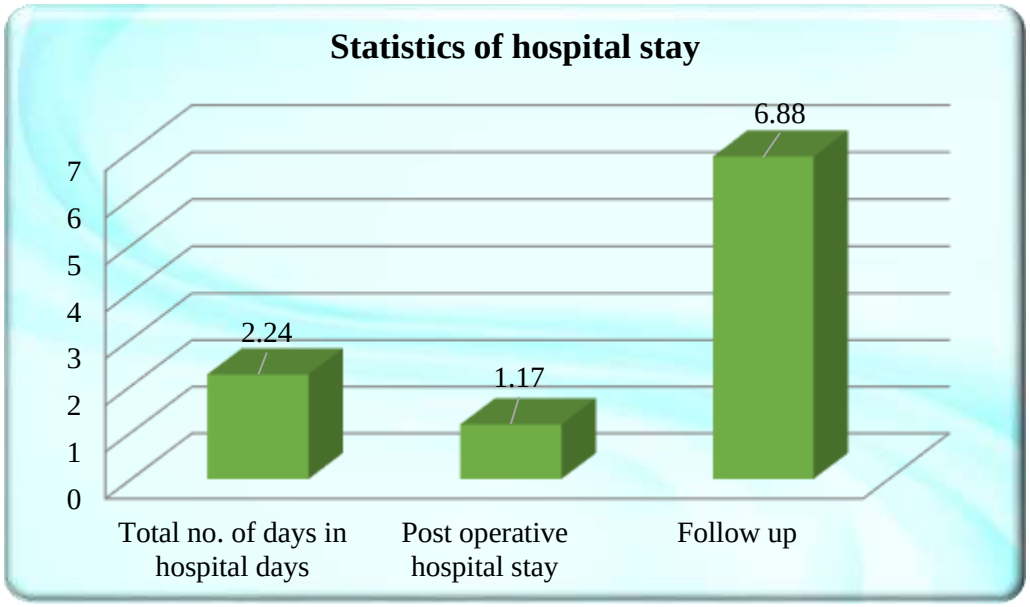
Graph 10: Distribution of cases as per requirement of analgesic

9. Hospital stay:

Total number of days in hospital of patients range between 2days to 8 days. Most of patients 89%, were discharged at 24 hours after surgery, while some were even discharged after 3-4 days. The mean total post-operative days in hospital of the patients without drain was 1.17 ±0.74 days.

Table 10: Statistics of hospital stay

	N	Minimum	Maximum	Mean	Std. Deviation
Total no. of days in hospital days	100	2	8	2.24	0.89
Post-operative hospital stay	100	1	6	1.17	0.74
Follow up	98	1	7	6.88	0.69



Graph 11: Statistics of hospital stay

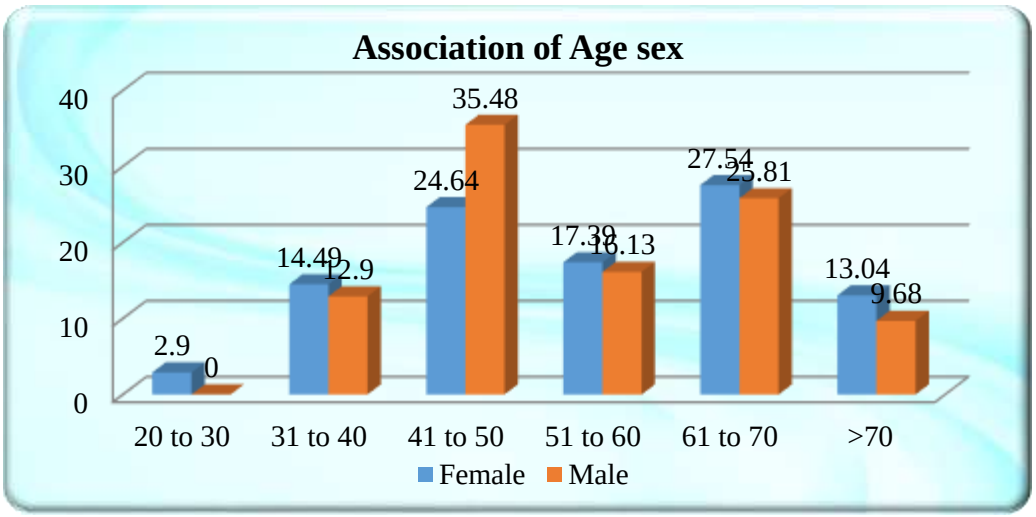
10. Cross table for association of Sex and Age.

Out of 100 patients 69 were female and 31 were males. Female to male ratio was found to be 2.22. Maximum patients i.e. 35% males and 24% females belonged to the age group of 41 to 50 years. Only 2 patients belonged to younger age group of 20 to 30 years. 9 females (13.04%) and 3 males (9.68%) were of the age >70 years.

Table 11: Association between sex and age

	Female		**Male**		**Grand Total**
	No	**%**	**No**	**%**	
20 to 30	2	2.90	0	0.00	2
31 to 40	10	14.49	4	12.90	14
41 to 50	17	24.64	11	35.48	28
51 to 60	12	17.39	5	16.13	17
61 to 70	19	27.54	8	25.81	27
>70	9	13.04	3	9.68	12
	69	100.00	31	100.00	

Chi-square = 2.082 with 5 degrees of freedom; P = 1.000NS



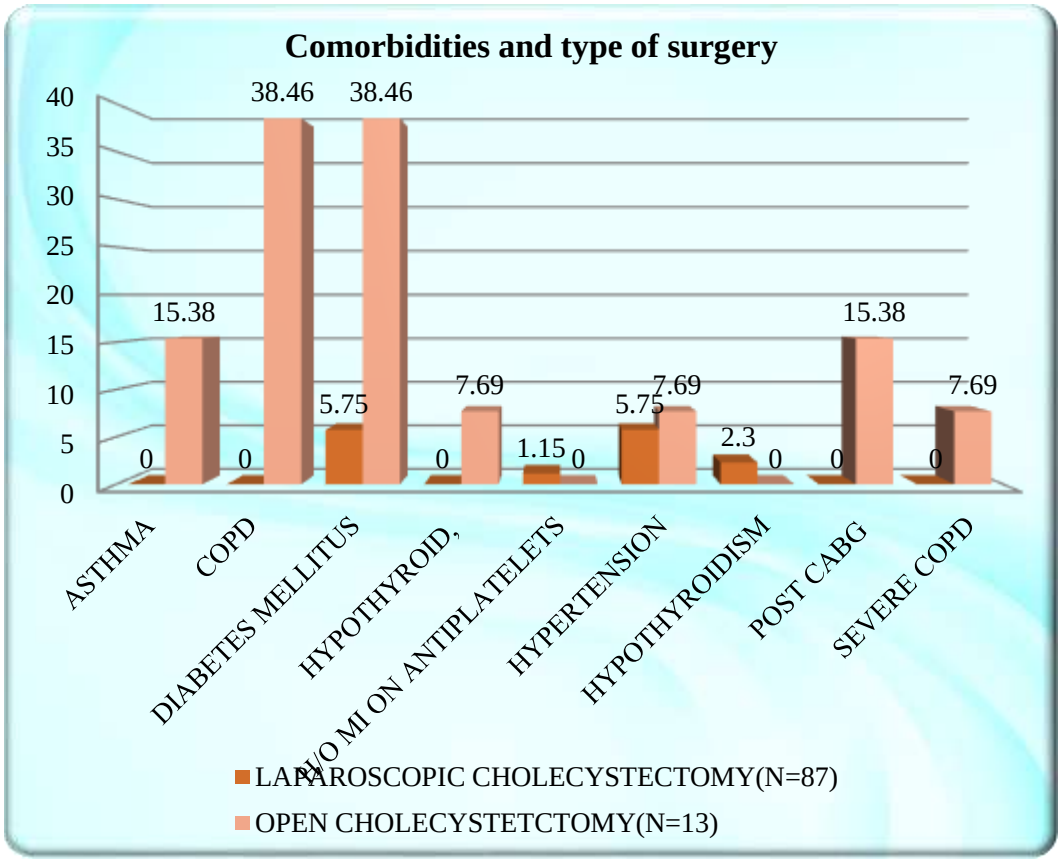
Graph 12: Association between sex and age

11. Association between comorbidities and type of surgery

Out of 87 patients who underwent laparoscopic cholecystectomy, 5 (5.75%) had diabetes mellitus, whereas out of 13 patients who underwent open cholecystectomy 5 had diabetes mellitus (38.46%). Out of 13 open cholecystectomy, 5 patients (38.46%) were known case of COPD, 2 patients (15.38%) were suffering from asthma. Statistically significant association is present between the type of surgery and co morbidity

Table 12: Association between co-morbidities and type of surgery:

	LAPAROSCOPIC CHOLECYSTECTOMY(N=87)		OPEN CHOLECYSTETCTOMY (N=13)		P Value LS
ASTHMA	0	0.00	2	15.38	0.008S
COPD	0	0.00	5	38.46	<0.001S
DIABETES MELLITUS	5	5.75	5	38.46	0.002S
HYPOTHYROID,	0	0.00	1	7.69	0.27NS
H/O MI ON ANTIPLATELETS	1	1.15	0	0.00	0.27NS
HYPERTENSION	5	5.75	1	7.69	0.72NS
HYPOTHYROIDISM	2	2.30	0	0.00	0.61NS
POST CABG	0	0.00	2	15.38	0.008S
SEVERE COPD	0	0.00	1	7.69	0.27NS



Graph 13: Association between co-morbidities and type of surgery:

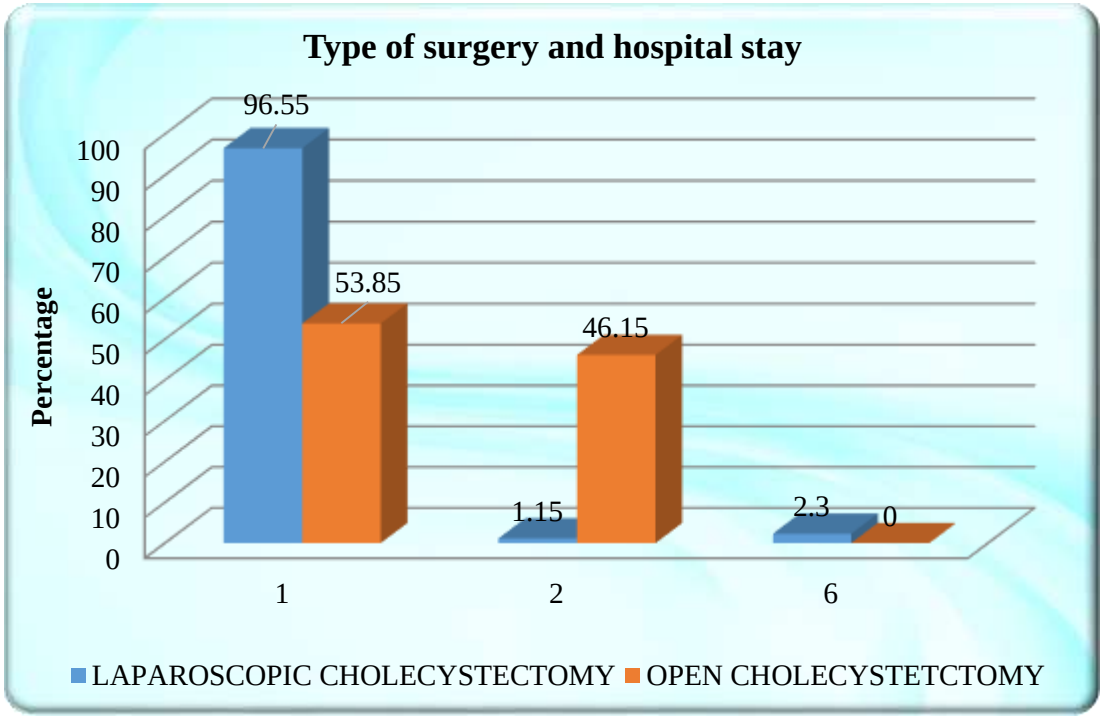
12. Type of surgery and hospital stay:

In laparoscopic cholecystectomy most of patient accounting for 96.55% were discharged on day 1. In open cholecystectomy 53.85% of the patients were discharged on day 1 and 46.15% were discharged on day 2. Significant association was observed between the type of surgery and hospital stay (P<0.001S).

Table 13: Association between type of surgery and hospital stay:

NO. OF DAYS IN HOSPITAL AFTER SURGERY	LAPAROSCOPIC CHOLECYSTECTOMY		OPEN CHOLECYSTETCTOMY	
	Number	%	Number	%
1 day	84	96.55	7	53.85
2 days	1	1.15	6	46.15
6 days	2	2.30	0	0.00
	87	100.00	13	100.00

Chi-square = 35.290 with 2 degrees of freedom; P < 0.001S



Graph 14: Association between type of surgery and hospital stay:

13. Type of surgery, collection on USG and management

Out of 87 laparoscopic cholecystectomy and 13 open cholecystectomy. 8 patients developed post-operative collection on USG. Out of 8, 2 had undergone open cholecystectomy and 6 had undergone laparoscopic cholecystectomy. Intervention was required in 4 patients. Amongst these 4, 2 belonged to open cholecystectomy group and 2 to laparoscopic group. ERCP guided stenting indicative of biliary tract injury, was required in 2 patient, 1 open and 1 laparoscopic cholecystectomy. Other 2 patients, USG guided drain was placed and localized collection was drained. Rest 4 patients recovered by conservative management and strict watch.

Table 14: Association between type of surgery and post-operative collection on USG

	LAPAROSCOPIC CHOLECYSTECTOMY(N=87)		OPEN CHOLECYSTETCTOMY(N=13)	
	Total number	%	Total	%
Post-operative collection on USG	6	6.90	2	15.38

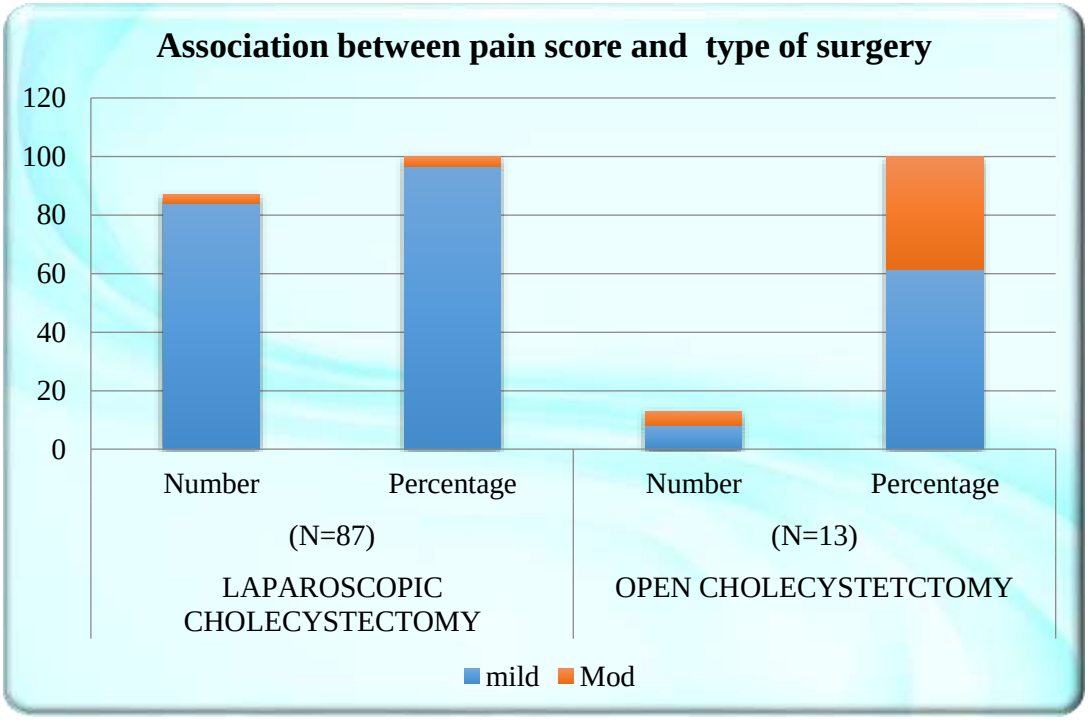
14. Association between pain score and type of surgery:

Significant difference was observed according to association between pain score and type of surgery. Proportion of the cases with mild pain were significantly more in laparoscopic cholecystectomy (96.55%) as compared to 61.54% in open cholecystectomy. Whereas patient with moderate pain were significantly more in open cholecystectomy (38.46%) as compared to laparoscopic cholecystectomy (3.45%).

Table 15: Association between pain score and type of surgery

	LAPAROSCOPIC CHOLECYSTECTOMY(N=87)		OPEN CHOLECYSTETCTOMY(N=13)	
	No	**%**	**No**	**%**
Mild	84	96.55	8	61.54
Mod	3	3.45	5	38.46
Total	87	100	13	100

Chi-square = 14.382 with 1 degree of freedom; P < 0.001S



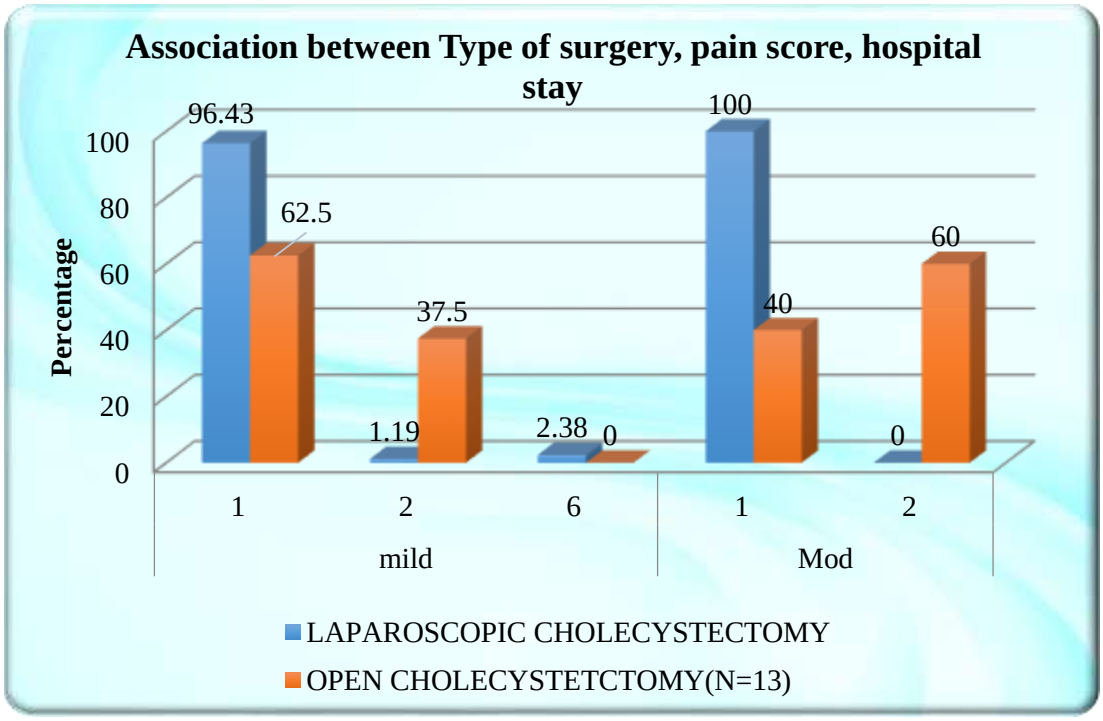
Graph 15: Association between pain score and type of surgery

15. Association between Type of surgery, pain score, hospital stay:

Significant difference was observed according to association between mild pain score and type of surgery. Proportion of the cases were significantly more in laparoscopic cholecystectomy (96.43%) as compared to (62.5%) in open cholecystectomy at day 1 discharge(P<0.001S). But no significant difference was observed according to association between moderate pain score and type of surgery. (P=0.34NS). Patients operated for either type of the surgery with moderate pain were discharged between 2 to 6 days after surgery.

Table 16: Association between Type of surgery, pain score, hospital stay

	LAPAROSCOPIC CHOLECYSTECTOMY(N=87)		OPEN CHOLECYSTETCTOMY(N=13)		P Value LS
	Number	**%**	**Number**	**%**	
MILD	**84**		**8**		
1 day	81	96.43	5	62.5	<0.001S
2 days	1	1.19	3	37.5	
6 days	2	2.38	0	0	
Mod	**3**		**5**		
1 day	3	100	2	40	0.34NS
2 days	0	0	3	60	



Graph 16: Association between Type of surgery, pain score and hospital stay

Discussion

This prospective study confirms that omission of sub-hepatic drainage in uncomplicated cholecystectomy is safe and effective. Routine drainage, once considered essential, appears to prolong hospital stay and increase patient discomfort without providing significant safety benefits.

Our findings are consistent with several international studies. Tzovaras et al. reported that routine drainage in laparoscopic cholecystectomy is unnecessary and contributes to increased morbidity. Rathi et al. and Gurusamy et al. similarly concluded that routine drains do not prevent postoperative collections or complications. Our study aligns with these findings, showing lower pain scores, shorter hospital stays, and no adverse outcomes without drains.

Strengths of this study include its prospective design and sample size of 100 patients. Limitations include its single-center design, lack of long-term follow-up, and absence of randomization. Nevertheless, the consistency of our findings with global evidence strengthens the conclusion that no-drain cholecystectomy is safe in uncomplicated cases.

Conclusion

Routine drainage after uncomplicated open or laparoscopic cholecystectomy confers no benefit. It increases postoperative pain, risk of infection, and hospital stay without improving safety. No-drain cholecystectomy should be considered the standard of care in uncomplicated gallstone disease.

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SUMMARY AND CONCLUSION

SUMMARY:

- Gallstone disease or cholelithiasis is one of the most common diseases which need surgical intervention. The management of cholelithiasis is surgical removal of the gall bladder or cholecystectomy
- After cholecystectomy a routine use of sub-hepatic drainage, i.e., placement of a drain tube (Robinson drain or Ryle's Tube) in the sub-hepatic region, is a general practice by many surgeons.
- The results of recent systematic reviews showed that there is no benefit with the routine use of intra-abdominal drains, after both open as well as laparoscopic cholecystectomy, instead the use of drain is found to be associated with increased rate of wound infection and associated chest infections and hence further increases the morbidity of the patient.
- Significant difference was observed according to association between pain score and type of surgery. Proportion of the cases with mild pain were significantly more in laparoscopic cholecystectomy (96.55%) as compared to 61.54% in open cholecystectomy. Whereas patient with moderate pain were significantly more in open cholecystectomy (38.46%) as compared to laparoscopic cholecystectomy (3.45%).
- Statistically significant association was present between the type of surgery and co morbidity.
- Although laparoscopic cholecystectomy is the *gold standard* treatment of choice for cholelithiasis. In patients with high risk and added co-morbidities open cholecystectomy can also be the procedure of choice keeping in mind the risk and benefit associated with laparoscopic surgery
- Open cholecystectomy should not be taken as inexperience of the surgeon, rather should be the procedure of choice in high risk cases.
- In our study, we had a failure of 4% of the patients. Rest 96% patients had non-significant or minimal collection on ultrasound after surgery. Such collection is present as a normal finding after surgery.
- As per previous studies drained groups had more collections as compared to non-drained group which can be attributed to the fact that drain acts as a foreign body causing irritation in the abdominal cavity thereby, causing more fluid secretion.
- Drain which is generally placed to alarm the surgeon for a post-operative complication and prompt treatment, is rather being harmful than beneficial.
- As compared to other studies pain score as per VAS scoring system using *Wong Baker faces*, we found that maximum of our patients operated by either laparoscopic or open technique had mild pain. Pain in laparoscopically operated patients were at the shoulder tip and was relieved by oral analgesic medications. Pain in open surgery was at the incision site. Open cholecystectomy patients had more incidence of moderate pain.
- The mean total post-operative days in hospital of the patients without drain was 1.17 ±0.74 days. In open cholecystectomy 53.85% of the patients were discharged on day 1 and 46.15% were discharged on day 2.In laparoscopic cholecystectomy most of patient accounting for 96.55% were discharged on day 1, only 2 patients stayed for 6 days after surgery. Significant association was observed between the type of surgery and hospital stay ($P<0.001S$).
- Hence the study proves, that no drainage after uncomplicated cholecystectomy leads to less post-operative pain to the patients and hence early mobilization.
- No drainage after uncomplicated Cholelithiasis reduces the post-operative hospital stay and early discharge of the patient. Thereby, reducing the hospital burden and early return to work for patients.

CONCLUSION

We can conclude that no drainage after cholecystectomy (laparoscopic/open) leads to less post-operative pain, early discharge and early return to work, thereby, reducing the hospital burden.

After this study we can also conclude that no drainage cholecystectomy can be done as a day care procedure, wherein the patient can be admitted, investigated, operated and then discharged within 24 hours. Day care surgery is the latest upcoming concept in field of surgery to reduce patient burden to the hospital and support home care and early return to work