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Enhanced recovery after surgery programs versus traditional perioperative care in laparoscopic and open cholecystectomy

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Abstract

Target: In this research, the Multimodal Pathway designed for Elective Laparoscopic Docystectomy through collaboration between the Departments of General Surgery and Anesthesiology and the patient was investigated for functional healing, duration and protection. Patients and procedures The research included 80 patients who were candidates for abdominal or laparoscopic cholecystectomy, with a gallbladder infection, and Randomly, patients were divided into four equivalent categories according to the allocated management method utilising sealed envelopes: two laparoscopic and open-scopic ERAS categories, and two normal, laparoscopic and openness categories. The patients were evaluated by a multidisciplinary team and observed throughout the peri-operative phase. The data collected contained demographic and general clinical data, compliance data, surgical data, post-operative injuries, rehabilitation, ICU and hospital stays. When we have a strong adherence rate to the ERAS protocol, the rates vary greatly across various parameters. We find that ERAS has been correlated with a substantial decrease of the average overall patient residence. This was 1.2 days for laparscopic and 2.65 days for open group compared to 1.55 days for traditional laparoscopic and 3.8 days for conventional open group. Our ERAS portion leads to less discomfort and no danger of excessive narcotic problems and further reduces tension and postoperative nausea and vomiting (PONV) as well as other complications. Conclusion: In addition to optimising patient's functional rehabilitation and his quality of life, ERAS route for elective patients with open or laparoscopic cholecystectomy is secure. AS is correlated with an important decrease in average postoperative hospitalisation and overall hospitalisation with lower complications and little chance of readmission.

Keywords: cholecystectomy, total hospital stay, enhanced recovery after surgery, perioperative**.**

1. Introduction

Enhanced post-operative restoration protocols (ERAS) have been more popular during the past decade and helped develop postoperative management techniques. [20] It has been shown that a multidisciplinary method to treat surgical patients with early nutrition and ambulation can accelerate recovery and contribute to premature disposal of the hospital and, while preserving patient protection, limit opioids and vigorous prevention of postoperative nausea and vomiting (PONV). [3]

Multimodal treatment pathways intended to achieve quick recovery after surgery by the preservation of preoperative organ function and the reduction of the depth of stress reaction during surgery. [1]

Preoperative advice, optimization of diet, systematic analgesic and anaesthetic regimes and early mobilisation are core elements of ERAS protocols. Despite the significant evidence that ERAS procedures contribute to better results, they contradict conventional doctrine for surgery and are thus slow to enforce. [1,3]

The approach to laparoscopic cholecystectomy was first carried out in the 1980s, replacing the open technique clearly in the standard approach to cholecystectomy. [3]

The laparoscopic procedure has less incision and reduces post-operative discomfort. [16] There are no variations in death, adverse events or readmission rates among many studies contrasting the same-day discharge (SDD) versus the overnight hospital stay (OHS) after LC.

2. Methodology

2.1 strategy

From October 2018 to October 2020, our research was performed at Department of General Surgery, Banha University Hospital and Agoza Police Hospital. Following acceptance by the Local Ethical Committee of the trial procedure and informed permission from patients or family members, the research consisted of 80 patients who were candidated for cholecystectomy with a gallbladder problem, by means of accessible abdominal or laparoscopic methods. Prior to participation in this analysis for each participant, there was a full debate on the essence of the ERAS and specifics of the preoperative, intra-operational and post-operative elements of the treatment package. The patients were randomised into four equivalent categories using the enclosed envelope according to the allocated management technique: the group with ERAS by laparoscopy, group with ERAS by open surgery, group with conventional laparoscopy software and group with the traditional open operation programme. An additional permission was obtained for the operation. A multidisciplinary team evaluated the patients. Preoperative anaesthesia visit and ERAS education, Clinical history, biochemical and radiological research have been carried out. Controlled anaemia and any medical complications. Patients admitted to the hospital for surgical care, 200 ml of carbohydrate-rich fluids preoperatively and 2 hours for liquids and 6 hours for solids quickly. Prophylactic IV and thromboembolism antibiotics. Ketorolac IV, lidocain 2 percent, without epinephrine in the epidural catheter, performed preoperatively inserting the epidural catheter, induction by short acting anaesthetic, multimodal analgesia. Normo-thermia was maintained and antiemetic prophylaxis was administered, Perioperative fluid

management strategies including 500 ml of colloid routinely provided before local anaesthesia epidural, Crystalloid for extracellular loses intraoperatively (0,5 ml/kg/h for laboratory,1 ml/kg/h for opening), Lost blood was substituted 1:1 with colloids and Red blood cells were administered based on the desired hematocrit.

Continuous, local anaesthetic epidurally low-dose epidural (0.125% bupivacain), patient-controlled analgesia is performed during the surgery. If nausea or vomiting actually happened, metoclopramide hydrochloride was received. Immediate intravenous fluid postoperative termination Early outpatient ambulation as patients were forced to leave their bed on surgery day. Treatment following discharge via phone call of an anestheticist 1 day after discharge and after surgery on the seventh day after surgery.

2.2. Statistical methods

Data were coded and entered using the statistical package for the Social Sciences (SPSS) version 26 (IBM Corp., Armonk, NY, USA). Data was summarized using mean, standard deviation, median, minimum and maximum for quantitative variables and frequencies (number of cases) and relative frequencies (percentages) for categorical variables. Comparisons between groups were done using analysis of variance (ANOVA) with multiple comparisons post hoc test in normally distributed quantitative variables while non-parametric Kruskal-Wallis test and Mann-Whitney test were used for non-normally distributed quantitative variables (Chan, 2003a). For comparing categorical data, Chi square ($\chi 2$) test was performed. Exact test was used instead when the expected frequency is less than 5 (Chan, 2003b). P-values less than 0.05 were considered as statistically significant.

2.3. Inclusion and exclusion criteria

The inclusion criteria included all male or female patient undergoing for cholecystectomy either open or laparoscopic with the following criteria: (a) age between 18 and 85 years; (b) the American Society of Anesthesiologists grade I or II; (c) patients who are able to understand and follow the necessities of the program and to offer a consent; and (d) having some social criteria for early discharge, for example, a home sited within 1 h from the hospital. And the exclusion criteria were (a) emergency surgery; (b) abdominal surgery other than cholecystectomy; (c) American Society of Anesthesiologists grade III or IV; (d) the need for inpatient postoperative rehabilitation; (e) age less than 18 or more than 85years; and (f) low socioeconomic status.

3. Result

There was a non-significant (P>0.05) difference between the four study groups regarding demographic and general clinical data, except in patient with cardiac disease that were significant increase in group (OC) open cholecystectomy with conventional protocol than other three groups. Operation was shown take more time in (OC) open conventional groups than (OE) open group with ERAS protocol. And the operative time was more in (LC) laparoscopic conventional group than (LE) group of laparoscopic cholecystectomy with ERAS protocol , fig. (1).

The group of laparoscopic cholecystectomy with ERAS protocol (LE) show the least intraoperative bleeding while the group (OC) open cholecystectomy with conventional technique show the most bleeding during operation. (Table 4-2). Postoperative complications are significant increase in group (OC) open cholecystectomy with conventional technique . while postoperative ICU admission was non-significant (P>0.05) difference between the four study groups. Postoperative hospital stay show significant (P<0.001) difference between four groups as the most decrease in group (LE) and the most increased in group (OC) Open cholecystectomy with Conventional technique, (table4-2).

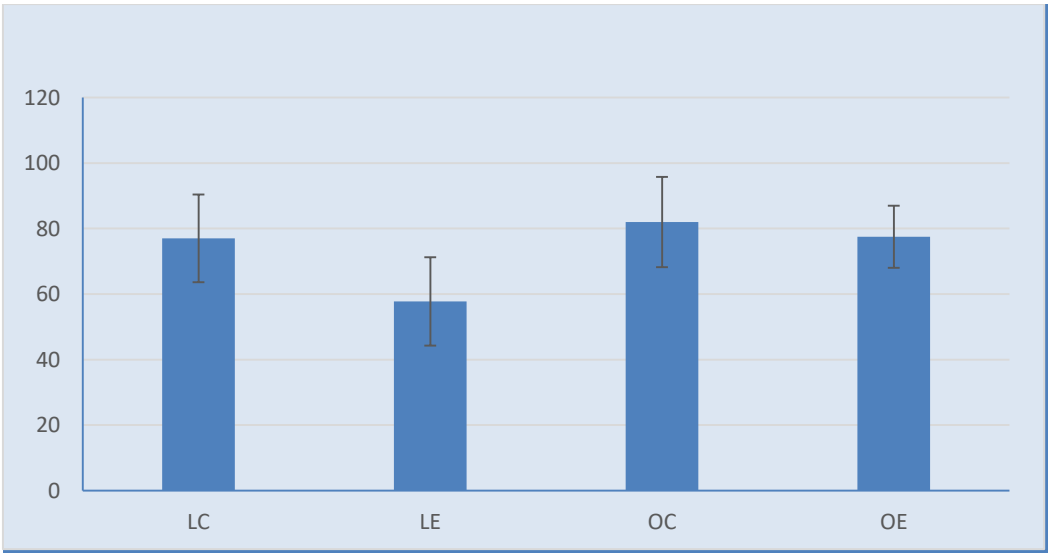

Fig. (1) Intraoperative time compareson study

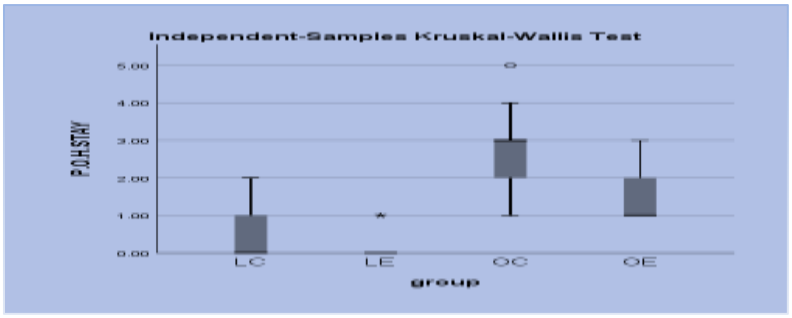

Fig 2: postoperative hospital stay comparison

Table (1) Comparative groups for postoperative hospital stay.

	P value
LE-LC	1.000
LE-OE	< 0.001
LC-OC	< 0.001
OE-OC	0.218

As shown in (fig 2) .regarding to postoperative hospital stay there was non-significant difference (P>0.05) between group (LE) laparoscopic cholecystectomy with ERAS protocol and group (LC) laparoscopic cholecystectomy with conventional, Also there was non-significant difference (P>0.05) between group (OE) open cholecystectomy with ERAS protocol and group (OC) Open cholecystectomy with Conventional protocol. Regarding to two groups of operation with ERAS protocol, laparoscopic cholecystectomy technique (LE) group show less postoperative days to stay than those with open technique (OE) .And regarding to two groups done with conventional technique, also laparoscopic cholecystectomy technique (LC) group show less postoperative days to stay than those with open technique (OC).

Outcome comparison between four groups show significant difference regarding to postoperative pain score, Passage of first flatus, postoperative nausea and vomiting, and total hospital stay. In all groups study, there was no case reported for readmission to hospital or reoperation occurred within 30 days postoperatively and all patients in all groups study was done successfully without any mortality. (table 4-4).

Pain scores from 0(no pain) to 10 (most horrible pain) was least in patient in laparoscopic ERAS (LE) group and worst in open conventional group (OC). In spite of the mean of pain score was less in group laparoscopic ERAS (LE) than laparoscopic conventional group (LC) , there was non-significant difference between both group fig. (3) .

On other hand there was significant increase in pain score in group open conventional (OC) than open ERAS (OE).And also there was significant difference in pain score between couple of groups with conventional technique as pain score increased in open technique with conventional protocol (OC) than laparoscopic surgical technique with the same conventional protocol (LC) group.

Regarding to post-operative Passage of first flatus, there was no significant difference between ERAS protocol and NON ERAS (conventional) protocol while there was significant difference between open technique and laparoscopic technique in our study as (fig 3) show in both ERAS group there was more delay in passage of first flatus in group with open surgical technique (OE) than group with laparoscopic technique (LE). And also in both conventional group there was more delay in passage of first flatus in group with open surgical technique(OC)than group with laparoscopic technique(LC).

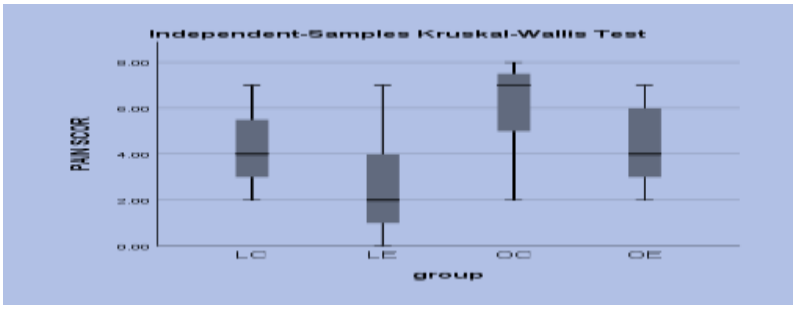

Fig (3) postoperative pain score comparison study

Table 2: Comparative groups for postoperative pain score.

	P value
LE-OE	0.230
LE-LC	0.221
LE-OC	< 0.001
OE-LC	1.000
OE-OC	0.008
LC-OC	0.009

Postoperative nausea and vomiting (PONV) in all four groups show non-significant difference (P>0.05) between all four study.

Total hospital stay (THS) show the least days to stay in hospital with group (LE) laparoscopic ERAS than other three groups while patients with open cholecystectomy under conventional protocol show more total hospital stay days than other three groups study. Both ERAS group there was less (THS) in in group with laparoscopic technique (LE) than open surgical technique (OE) group . And in both conventional group there was less (THS) in in group with laparoscopic technique (LC) than open surgical technique (OC) group,(fig 4-7).There was non-significant difference regarding to (THS) total hospital stay between ERAS and conventional groups study either cholecystectomy technique was open or laparoscopy.

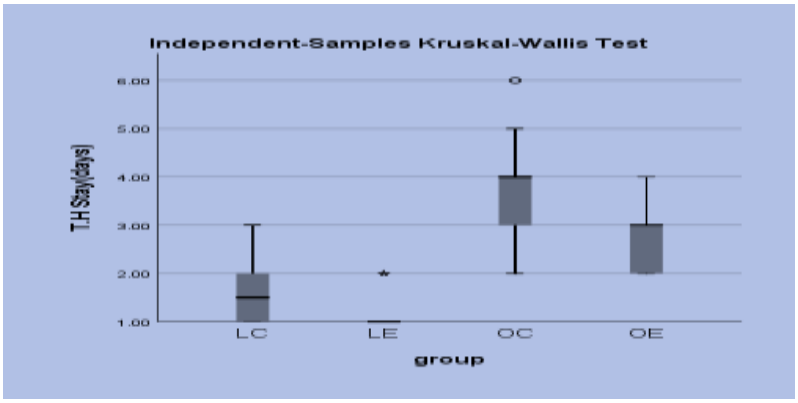

Fig (4) Total hospital stay comparison study between all four groups

Table (3) Comparative groups for total hospital stay

	P value
LE-LC	1.000
LE-OE	< 0.001
LE-OC	< 0.001
LC-OE	0.005
LC-OC	< 0.001
OE-OC	0.272

Table (4) Operative and post-operative data

		LC	LE	OC	OE	Pvalue
Operative time (min)	**Mean**	77.00	57.75	82.00	77.50	
	Standard Deviation	13.42	13.52	13.80	9.53	
	Median	77.50	55.00	80.00	80.00	< 0.001
	Minimum	60.00	40.00	60.00	65.00	
	Maximum	110.00	90.00	110.00	90.00	
Intraoperative bleeding (ml)	**Mean**	382.50	207.50	960.00	787.50	
	Standard Deviation	144.44	61.29	294.51	150.33	
	Median	350.00	200.00	900.00	800.00	< 0.001
	Minimum	100.00	100.00	600.00	600.00	
	Maximum	600.00	300.00	1600.00	1100.00	
p.o complication		20%(4)	15%(3)	70%(14)	55%(11)	< 0.001

p.o ICU admission(days)	**Mean**	0.05	0.00	0.20	0.00	
	Standard Deviation	0.22	0.00	0.52	0.00	
	Median	0.00	0.00	0.00	0.00	0.098
	Minimum	0.00	0.00	0.00	0.00	
	Maximum	1.00	0.00	2.00	0.00	
Post-operative hospital Stay(days)	**Mean**	0.50	0.15	2.70	1.65	< 0.001

Table (5) Outcome comparison between four group

		LC	**LE**	**OC**	**OE**	**Pvalue**
Pain scores :from 0(no pain) to 10 (most horrible pain)	**Mean**	4.10	2.55	6.25	4.10	
	Standard Deviation	1.52	2.11	1.65	1.59	
	Median	4.00	2.00	7.00	4.00	< 0.001
	Minimum	2.00	0.00	2.00	2.00	
	Maximum	7.00	7.00	8.00	7.00	
Passage of first flatus	**Mean**	0.30	0.05	2.20	1.25	
	Standard Deviation	0.57	0.22	0.52	0.64	
	Median	0.00	0.00	2.00	1.00	< 0.001
	Minimum	0.00	0.00	1.00	1.00	
	Maximum	2.00	1.00	3.00	3.00	
(THS)Total hospital stay (days)	**Mean**	1.55	1.20	3.80	2.65	
	Standard Deviation	0.69	0.41	1.06	0.81	
	Median	1.00	1.00	4.00	2.00	< 0.001
	Minimum	1.00	1.00	2.00	2.00	
	Maximum	3.00	2.00	6.00	4.00	
p.o nusia and vomiting		15%(3)	5%(1)	25%(5)	15%(3)	0.416
Readmission (within 30 days P.O)		0%(0)	0%(0)	0%(0)	0%(0)	--------
Reoperation (within 30 days P.O)		0%(0)	0%(0)	0%(0)	0%(0)	--------
Mortality		0%(0)	0%(0)	0%(0)	0%(0)	--------

4. Discussion

All ERAS programme measures focused on empirical facts, certain enforcement deficiencies (compliance) found sufficient. We have a high adherence to the ERAS protocol in this sample, the rates vary greatly between various criteria, and the explanations must be studied. Anne et al. stated that, where certain protocols have to be fixed, the aim is to ensure full conformity with all the outlined method, but that the goal is normally unlikely. 2 In the other hand, Mateusz.R and Magdalena.P et.al concluded that their gastric cancer research could not increase the average survival of three years of observation through high conformity to the ERAS procedure. Only the stage of the disease was defined as the risk factor for poor prognosis, as described by the American Joint Committee on Cancer (AJCC). [19]

In the background of western multimodal perioperative protocol, Jose' E. and Fernando S. et.al is the first randomised study to examine the importance of preoperative education to the recovery. In elective cases, morbidity and mortality are moderate and hospital stay varies from 1 to 2 days, the high well-being of the aware patients has been felt more often 24 hours after open cholecystectomy. Lower level of pain has substantially associated the positive benefit of pre-operative education, comprehensive verbal and written pre-operative material. [12] Zhao etal. and Charles et al. have reported that patient counselling is effective in patient reaction to surgery and that it reduces patient worries before surgery and contributes to fewer postoperative analgesia needed as patients with considerably less discomfort. [7,37] Sjo¨ling M, Nordahl G et.tal noticed that preoperative education would ease postoperative pain sensation and length. [26]

These correlated to our results as ERAS-pathway patients with 100 percent open-cholecystectomy preoperative education and psychotherapy reported slightly (P < 0,001) less discomfort than traditional open cholecystectomy community patients, respectively, through a median postoperative pain score 4.1 versus 6.25. Moreover, a substantial drop was observed in the mean postoperative hospital stays of 2,65 days compared with 3,8 days in the traditional open community and the mean was 1,2 days compared to 1,55 days in the conventional laparoscopic group. In his review Susanne V.L, et.al discerned this finding that evidence on ERAS is also scarce in preoperative education and medical counselling, and the most challenging aspect to incorporate is the preoperative optimisation of the patient, such as change in lifestyle. Most nursing techniques in the recovery phase after RC continue to be practised. [30] One of the main components of our ERAS pathway research was carbohydrate preparation, resulting in lower stress and postoperative rest periods. No effects on post-operative nausea and vomiting (PONV) or other complication as compared to ordinary pathway classes. Robert.S et.al, commit to this,

Preoperative loading with carbohydrates contributes significantly to the ERAS programmes. There are little barriers to the implementation of the perioperative carbohydrate loading, however they involve overcoming the inertia to amend older and more stringent fast recommendations and gaining the requisite multidisciplinary agreement to introduce such improvements. [22] Timothy et al., who demonstrated that non-opioid or opioid-reduced analgesia would speed the healing, supported our practise for intraoperative epidural and non-opioid anaesthesia. [32] The most benefits from neuro-axial techniques with additional multimodal analgesia are helping us use non-opioid treatment practise and reduce drug requirements to destroy pain. We find that Pain ratings from 0(no pain) to 10 (most terrible pain) were significantly higher than ERAS with the same accessible procedure for cholecystectomy in the traditional route. Smith et al. was opposed to our result, which omits the usage of epidural catheters because it increases the likelihood of urinary retention, retarded ambulations and some delays in postoperative hospital release. [27] Thais Reif and Samantha.K et.al, have also noticed that a procedure ERAS is possible in the context of ambulatory ano-rectal surgery and reduces the usage of opium and healthcare without any discomfort or patient satisfaction. This questions the concept of the successful post-operative pain relief whereby prolonged opioids are essential. [31] A major benefit from a less aggressive laparoscopic treatment was one of the most relevant discharge conditions relative to an open technique for intraoperative overall bleeding, postoperative discomfort score and first flatus passages. In this analysis, the overall volume of bleeding and total hospital stay decreased and the postoperative first flatus passage was previously reported. The laparoscopic technique was less invasive than the open technique in a comparable peri-operative anaesthetic treatment procedure, while pain score declined dramatically in the laparoscopic technique than the open technique in the traditional protocol. In his research Wan-Joon Kim et.al observed that laparoscopic extended cholecystectomy (LEC) has a big benefit in obtaining shorter aftercare and comparable effects in opening up extended OEC cholecystectomy for overall problems and pathological outcomes. [34] In the previous research by Won Jong Kim and Hyeong Y. J. et.al on more less intrusive single-cut laparoscopic appendectomy techniques, it has been observed that single-cut laparoscopic appendectomy (SILA) reduced hospitalisation time without raising complications or readmission rates in comparison with three port appendectomy (CLA) per ERAS procedure. [36] 80% of cholecystectomies are conducted laparoscopically in the United States. [28]

Although laparoscopic cholecystectomy is the gold standard in developing countries, open cholecystectomy is still performed. A new large-scale Brazilian cohort study showed that open cholecystectomy has been done in around 40% of cases. [5]

Many GI procedures without prophylactic drainage may be done safely. [21] In our ERAS path, avoidance of intraoperative nasogastric pipe (NGT) insertion and in addition, intra-abdominal drain insertion has been avoided. D. Kleive et.al, who failed to use NGT routinely after pancreato- duodenectomy (PD) is not justified in an ERAS environment. The immediate removal of NGT may be carried out in a secure way during the treatment and reinsertion on demand in uncomplicated courses is rarely mandatory. [8] And Liang et al. who confirmed that drainage in extreme patients could be prevented or limited to a short duration, helping to quickly relocate. [15] Frances J et.al concluded that intra-peritoneal colonic operation, usage of prophylactic drains is not accompanied by evidence of improving results linked to anastomotic leak or other common surgical complications. [10]

Postoperative early enteral feeding was carried out within 6 hours postoperatively on the ERAS route for laparoscopic cholecystectomy without any complication and with a conformity rate of 95% and 75%, respectively compared to late oral feeding of up to 72 hours for patients from the two classic classes. In Roulin et.al, early oral feeding retains the bowel's absorbent role which results in a higher level of collagen, a positive nitrogen balance, accelerates wound healing and reduces postoperative sepsis. 24 And the finding was in line with Massimiliano et.al, who claimed that, even with colorectal anastomosis, postoperative enteral feeding is harmless. [18]

Early postoperative ambulation included our ERAS protocol By adherence, the laparoscopic and transparent solution means 1.1 days and 1.2 days respectively. This clearly reduces the duration of postoperative stay. In laparoscopic cholecstectomy, there was a substantial decrease in the duration of stay in post-operative hospital for the ERAS population by 0.15 days vs 0.5 days for traditional groups. And the duration of the postoperative hospital stay for the ERAS population in open cholecystectomy was significantly lower by 1,6 days than 2,7 days for traditional groups. Gregg et.al said that rapid mobilisation is crucial to speeding the postoperative healing process since it facilitates a return to the daily operation of the gastrointestinal tract and prevents thromboembolic complications. And he said that early ambulances are closely related to the risk mitigation of chest complications, DVT and motor power safety. [11]

All of this was in agreement with the research E.P.M de Almeida et.al that concluded that early-mobilization patients had a 22.2 percent absolute decrease in risk for incapacity to traverse the space without human assistance (95 percent CI 5.9–38.6) and 5 (95 percent CI 3-17) compared to the normal sample. And again, in the population of early mobilisation patients, exhaustion was lower in post-operative day 5 (POD 5) than the regular group. [9]

Pain ratings for patients with laparoscopic cholecystectomy with mean 2.55 were lower in this study from 0(no pain) to 10 (the most awful pain) and worst in

traditional protocol, with transparent approach patients of mean 6.25. And pain with traditional route than ERAS with the same open procedure in cholecystectomy was significantly higher. However, we observed that with minimally invasive laparscopic techniques for cholecystectomy, there was a reduction in the ERAS pathways post-operative pain score compared with other traditional methods. The VAS score is sufficient for proper evaluation of both nausea and discomfort. It was also included in a variety of clinical trials. Six,29 Pain is a multidimensional phenomenon that calls for a multidimensional solution including both medication and behavioural preparedness. [14] One of the conditions for discharging hospital patients was a part of the First Flatus passage, although some authors showed that no risk from discharged patients to home was present prior to the resume of regular bowel function. Ahmed et.al who demonstrated that patients should not experience more morbidity after they are released until a typical bowel function is resumed. In our traditional groups as well as in those in related randomised controlled trials the reported rates of postoperative injuries, readmission and reoperation among ERAS patients were roughly similar. (2) The mean post-operative hospital stay was linked to a substantial decrease of 1.2 days for the laparoscopic community and 2.65 days for the open group compared to 1.55 days for the traditional laparoscopic and 3.8 days for the conventional open group. This is consistent with S.P.Bisch et.al, who said that the LOS, complexities and expense of the ERAS protocols decrease without raising readmission or death rates. [25]

Robert Young et al. have accepted and said that several writers agreed to create and adopt a complete ERAS protocol to minimise postoperative opioid use and the duration of hospital stay. [23] This follows on from Karen.P and Paul.R et.al, which showed that implementation of ERAS has resulted in a 3.5-day decrease in the duration of hospital stay (LOS). Compliance with the ERAS "A-recommendations" procedure and § 5 "early factors" may be predictive of reduced LOS. [13] Further analysis is required on the outcome of ERAS," said Martin.T and Riddhi.J etal, who are discreet about the findings of their study and stated that, while there is enough proof that ERAS is helpful in minimising problems and hospital stays during major gastrointestinal surgeries, it is still possible to further investigate the effect of ERAS in patient-reported outcomes. [17] Wataru.N et.al did not show in its trial the increased effectiveness of the LOHS ERAS procedure following open hepatectomy. The ERAS Procedure, however, was linked to a stronger recovery from gastrointestinal postoperative paresis that is beneficial for open hepatectomy patients. [35]

Our research had significant constraints. We did not evaluate the postoperative nausea and vomiting preoperative values (PONV). Therefore, control patients may be more susceptible to PONV, In all, for different causes, 28 patients initially qualifying were omitted from the sample. Theoretically, the findings might have been different if these patients had been present.

5. Conclusion

In addition to optimising patient functional rehabilitation and quality of life, the ERAS route for electives experiencing open or laparoscopic cholestectomy is healthy. As a result, mean postoperative hospitalisation and complete hospital stay with lower complication and little chance of rehabilitation have declined significantly.

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