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A Comparative Study on the Effectiveness of Eras (Enhanced Recovery after Surgery) Protocol Pathway with Conventional Protocol in Gastrointestinal Surgeries

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Abstract: ***Study Design: Randomized Control trial. Study Place: The study will be conducted in the Department of Surgery at The Raipur Institute of Medical Sciences, Raipur, Chhattisgarh. Study Duration: Eighteen Month. Sampling Technique: Block Randomization technique. Sample Size: 72. Methodology: 72 Indoor patients who will be admitted in general surgery ward for gastrointestinal surgery fulfilling inclusion criteria and willing to participate in the study after proper informed consent. Patients will be divided into two group of the study. One group which is under ERAS protocol perioperative care and another group which is conventional perioperative care. Descriptive statistics analysis, frequency analysis, percentage analysis was used to categorical variables and the mean and S.D were used for continuous variables. There will be two groups of the study; 1. Test Group - ERAS care, 2. Control Group - Conventional care. Result: From the study ERAS is beneficial in reducing the length of hospital stay, cost effective with very few complications when compared with conventional management of patient undergoing gastrointestinal surgeries. Conclusion: In the present study ERAS protocol found to be beneficial as compared with conventional care of management.***

Keywords: ERAS Protocol, Gastrointestinal surgeries, complications, early recovery

1. Introduction

"Enhanced recovery after surgery" (ERAS) is also known as "fast track" surgery or Enhanced Recovery Protocol (ERP). The concept of enhanced recovery after surgery (ERAS) is almost three decades old. Conceptualized in the 90s, the idea originated from the fact that there are a lot of post-operative outcomes that could be controlled through interventions during the perioperative care.[1]

ERAS has been proven effective and has also been proven to be applicable across all surgical areas. A lot of work has already been conducted in the ERAS program, which spans across colorectal surgery, cardiothoracic surgery, radical cystectomy, and others [2].

These protocols have been designed to standardize the type of care that the hospital need to follow, thus improving outcomes of the surgery as well as managing healthcare costs along with patient mortality.[3]

The protocol that has been developed are focused on minimizing surgical trauma, pain, improve the performance ERAS protocols involve:

1. Preoperative
2. Intraoperative
3. Postoperative

It is estimated that around 234 million major surgical procedures are performed globally and even with advances in surgical anesthetic care, morbidity afterwards abdominal surgery is still enormous. The fast- track or enhanced recovery after surgery (ERAS) clinical pathway has been proposed to improve the quality of perioperative care with the aim of attenuating the loss of functional capacity and accelerating the recovery process.[5]

of the surgery, decrease the patient trauma and also expedite recovery. It refers to patient–centered evidence based and interdisciplinary team developed pathway for a surgical specialty and facility culture to reduce the patient's surgical stress response, optimize their physiologic function and facilitate recovery.[4]

Enhanced recovery is a new way of improving the experience of patients who need major surgeries. It helps patient recover sooner so life can return to normal as quickly as possible. It refers to patient-centered, evidence-based and interdisciplinary team developed pathways for a surgical speciality and facility culture to reduce the patient's surgical stress response, optimized their physiologic functions and facilitate recovery.

(ERAS) protocols comprise a combination of various perioperative patient care methods using a multidisciplinary team approach that integrates evidence-based interventions that reduce surgical stress maintained post operative physiological functions and accelerate recovery in patients undergoing major surgery.

The ERAS pathway reduces the delay until full recovery after major abdominal surgery by attenuating surgical stress and maintaining postoperative physiological functions [6] aimed to evaluate the efficacy and safety of ERAS protocols for patients undergoing Gastro Intestinal surgery. As mentioned in studies ERAS first re-examines practices that are traditional and then replaces them with evidence

based best practices whenever necessary.[8] Pathway has been implemented successfully in specialties like pancreatic, gynecological, ERAS The implementation of ERAS pathway has been shown to impact positively in reducing postoperative morbidity and as a consequence, length of stay in hospital (LOSH) and related costs are reduced. Use of ERAS pathway has been shown to reduce care time by more than 30 percent and postoperative complication by up to 50 percent [7] in cardiovascular, thoracic, pediatric, orthopedic, colorectal and urological surgery. To this end, this is study Second, it is comprehensive in its scope, covering all areas of the patient's journey through the surgical process. The central elements of the ERAS pathway address these key factors, helping to clarify how they interact to affect patient's recovery.[9]

In addition, the ERAS pathway provides guidance to all involved in perioperative care, helping them to work as a well –coordinated team to provide the best care.[10] Studies over the recent trend shows that ERAS programs allow patient to improve much faster after their operation and hence reducing the hospital stay by about 30% or more than 2 days after major surgery.[11] Despite earlier discharge from the hospital readmission did not increase.

Reduce complications by up to 50% - Eras reduces major complication after abdominal surgery by as much as 50 %; in particular non cardiac complication, such as those from the lungs and cardiovascular system markedly reduced. Although each component is effective in its own way, all components should be put together to achieve maximum benefit. With ERAS protocol, the length of hospital stay can be reduced to 2 to 4 days.[12]

This reduced of length of hospital stay is achieved after all discharge criteria have been meet thus ERAS is advantageous in fulfilling complete recovery of the patient compared to the conventional methods with least length of hospital stay. (13)

The basic mechanism of ERAS is reducing the stress response of organs to surgery which is evident by the early return of gut function. [14]

2. Materials and Methods

The study will be conducted in the Department of Surgery at Raipur institute of Medical Sciences Raipur, Chhattisgarh. It is a prospective RCT study, the source of the study being patients admitted in general surgery wards for gastrointestinal surgeries. The period of study is 18 Months. Inclusion and exclusion criteria were made, only those patients satisfying both those criteria were included in the study.

Study Design: Randomized Control trial

Study Area

The study will be conducted in the Department of Surgery at The Raipur Institute of Medical Sciences, Raipur, Chhattisgarh.

Study Population

Inclusion criteria

a) Patient age > 18 yrs
b) All patients undergoing gastrointestinal surgeries
c) Both gender

Exclusion criteria

a) Failure to obtain consent
b) Age < 18
c) Pregnancy
d) Emergency surgeries
e) Laproscopic GIT surgeries
f) Immunocompromised patients
g) Chronic illness like DM and HTN
h) Advanced malignancy on preoperative assessment
i) Palliative surgery
j) Day care surgeries like hemorrhoids, fistula in ANO

Recruitment of Patient: All indoor patients who will be operated for gastrointestinal surgery who fulfills the inclusion criteria, willing to participate in the study after informed consent from the participants will be recruited

Study Duration: Eighteen Months

Sampling Technique: Block Randomization technique

Sample Size: 72

Statistical Method

Statistical analysis will be performed by the SPSS programme for windows version 20.0. Continuous variables will be presented as mean ± SD and categorical variables will be presented as absolute numbers and percentage data will be checked for normality before statistical analysis. comparison of mean for normally distributed continuous variables will be compared using unpaired t test whereas the Mann whitney TEST will be used for those variables that will not be normally distributed. Categorical variables will be analysed using either the CHI square test or fisher's exact test.

Statistical Significance

P> 0.05 is not significant

P < 0.05 is insignificant

P < 0.01 is highly insignificant

Statistical software SPSS 20.0 randomization by computer generated random number

Study Groups

There will be two groups of the study-

Test Group - ERAS care

Control Group - Conventional care

Randomisation

Participants will be selected in two different arms of the study by using blockrandomization that assign participants to different study groups with equal probability Each arm will contain an equal number of individuals sequencing participants byBlock randomization.

1) Pre-Op Counselling

- In the test group of 36 patients undergoing GIT Surgeries, each patient and their attenders were counseled adequately. Clear instructions were given regarding
- The nature of disease.
- The surgical procedure to be done.
- Core components and its benefits
- What the patient should expect during the course of hospital stay Instructions regarding early mobilization, early feeding and breathing exercises after surgery.
- Counselling regarding active participation of patients themselves in therecovery after surgery
- Patients who might have stoma were explained in detail about the stoma and the patients and attenders were appropriately trained for stoma care and counseled regarding quality of life with stoma even before surgery
- Preoperative education has shown to improve patients' satisfaction and allay anxiety.

2) Optimisation of Co-Morbidities

- Patients were given adequate breathing exercises.
- Alcoholics and smokers were made to sustain from it.
- Nutritional status was improved.
- Other medical co-morbidities were corrected and made fit for surgery this has enhanced postoperatively.

3) Minimal Starvation and Carbohydrate Loading

- Patients posted for surgery were kept in nil per oral for maximum of 6 hours before surgery
- Two hours before surgery they were administered 100ml of 25% dextrose and 500ml 0.9% NACL.

4) Avoidance Of Mechanical Bowel Preparation

- Oral mechanical bowel preparation was not done.
- Surgeries involving left sided anastomosis of colon, patients were given single phosphate enema on the morning of surgery

5) Deep Vein Thrombosis Prophylaxis

- All patients in the study were started on deep vein thrombosis prophylaxis.
- They were given injection low molecular weight heparin subcutaneously, night before surgery and continued for up to one month after surgery.

Intraoperatively

6) Antibiotic Prophylaxis

- Inj ceftriaxone 1gm IV stat dose was given just prior to skin incision.
- For prolonged procedure (>4hrs) second dose was administered.

7) Avoidance Of Mechanical Bowel Preparation

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- For prolonged procedure (>4hrs) second dose was administered.

Intraoperatively

1) Epidural Analgesia

- All patients received epidural analgesia and continued it for 48 hourspostoperatively.
- Few patients were given transverse abdominis plane block when epidural catheter was not available in our centre as an alternative.

2) Surgical Approach and Incision

- In this study only open surgeries were included and length of the incision were kept to the minimum as possible
- A LOWER transverse incision was made whenever possible.

3) Avoidance of post-operative drains, nasogastric tubes and urinary catheters.

- Routine nasogastric tube, drain tube were avoided.
- When nasogastric or drain tubes were placed, they were removed just after purpose of keeping it was fulfilled.

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Post Operative Components

1) Avoidance of opiates

Post- operatively patients were on epidural analgesia for 48 hours after that it was removed, they were administered IV paracetamol infusion and diclofenac / brufen for breakthrough pain.

2) Early postoperative diet

- Patient were started on oral fluids on 1st postoperative days
- For patients with colostomy, oral diet was started within 24 hours postoperatively.
- Semisolid diet was started on 2nd POD.

3) Early postoperative mobilisation

- Patient were helped to sit in a chair on the evening of surgery, they were made ambulant from 1st pod itself.
- Patients were managed in the postoperative ward, examined daily with urine output, BP, blood investigations like CBC, RFT, S. ELECTROLYTES were done every day and assessed. Complaints by patients were attended to immediately.
- Regular wound dressings were done patients with surgical site infections were managed with wound dressings and antibiotics according to culture and sensitivity.
- The other complications like anastomotic leak with entrocutaneous fistula were managed conservatively as per the protocol with special concern to hydration, diet antibiotics and strict monitoring of vitals.
- Patients with enterocutaneous fistula were eventually healed.

All patients were followed up for a month after discharge with regular weeklyreview and complications arising after discharge were also noted.

Conventional Perioperative Care Protocol

The perioperative care is totally different as compared to ERAS. Patient educational activities and nutritional counseling is not standardized. Fasting is usually 10 to 12 hours before surgery. Antithrombotic prophylaxis is limited to limb movements. Antibiotic prophylaxis is as per routine. Bowel preparation is not standardized.

Use of drugs like Tranexamic acid is not standardized.

Standard general anesthesia protocol is not standardized. Maintenance of normothermiais not followed.

Early mobilization is not recommended. Patient remains in bed for 1-2 days. Removal of bladder catheter is only done when patient is ambulatory. Oral feeding is commenced on post-operative day1.

Blinding

It is not possible to blind this study. The discharge policies are standardized. Patientswill only discharge when they will be able to;

1. Tolerate three light meals a day,
2. Mobilize safely,
3. Taking oral medication
4. No surgical site infection like seroma, abscess, etc.

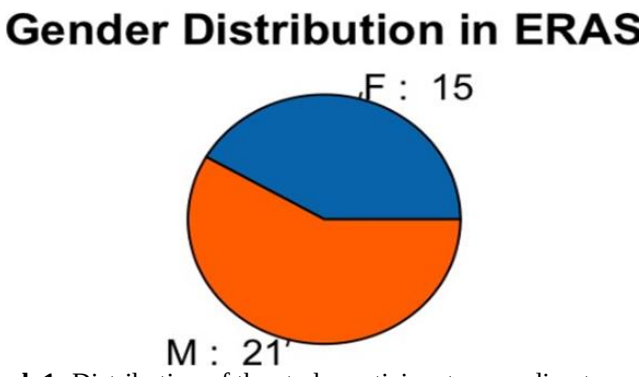
Postoperative pain will be assessed on the basis of Visual Analogue Scale:

3. Observations and Results

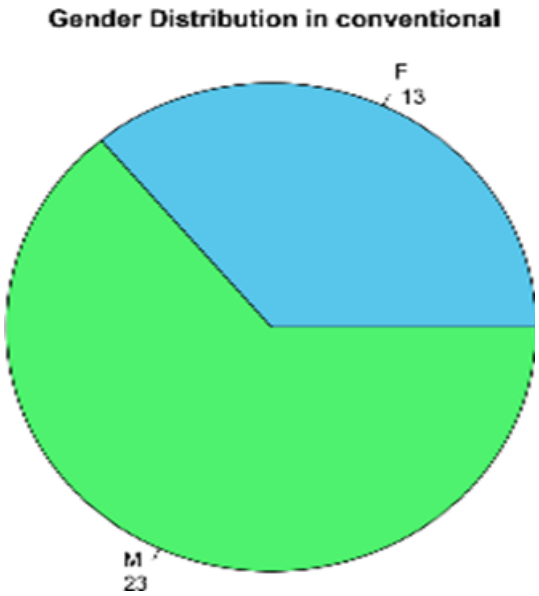
The study was conducted in the Department of Surgery at The Raipur Institute of Medical Sciences, Raipur, Chhattisgarh. Main aim of this study is „"To study the effectiveness of "Enhanced Recovery After surgery (ERAS) Protocol compared with the conventional way of management of patients undergoing gastrointestinal surgeries.

Table 1: Distribution of the study participants according to gender

Gender	Group-ERAS [N]	Percentages %	Group-conventional [N]	Percentages
Male	21	58.33	23	63.88
Female	15	41.66	13	36.11
Total	36	100	36	100



Graph 1: Distribution of the study participants according to gender

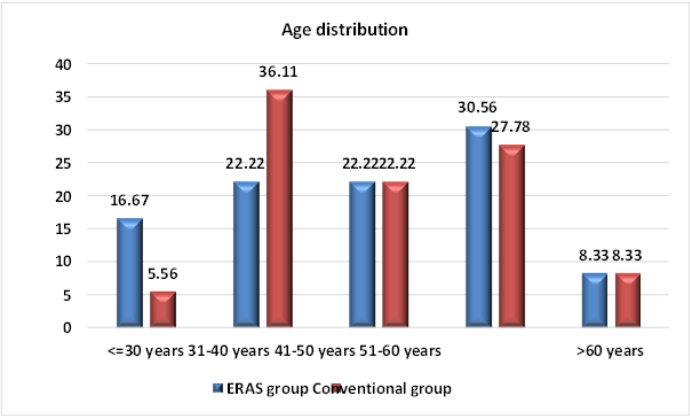


In my study there is 13 male and 23 females are included, male to female ratio is 1.8/1 while in ERAS group 21 males and 15 females are present and male to female ratio is 1.4/1 found.

Table 2: Distribution of the study participants according to age

Age group	ERAS group		Conventional group	
	N	%	N	%
<=30 years	6	16.67	2	5.56
31-40 years	8	22.22	13	36.11
41-50 years	8	22.22	8	22.22
51-60 years	11	30.56	10	27.78
>60 years	3	8.33	3	8.33
Total	36	100	36	100

Chi square value=3.24 p=0.58 NS



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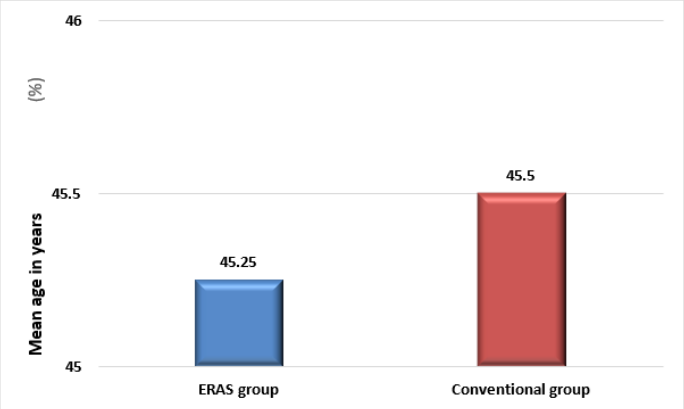
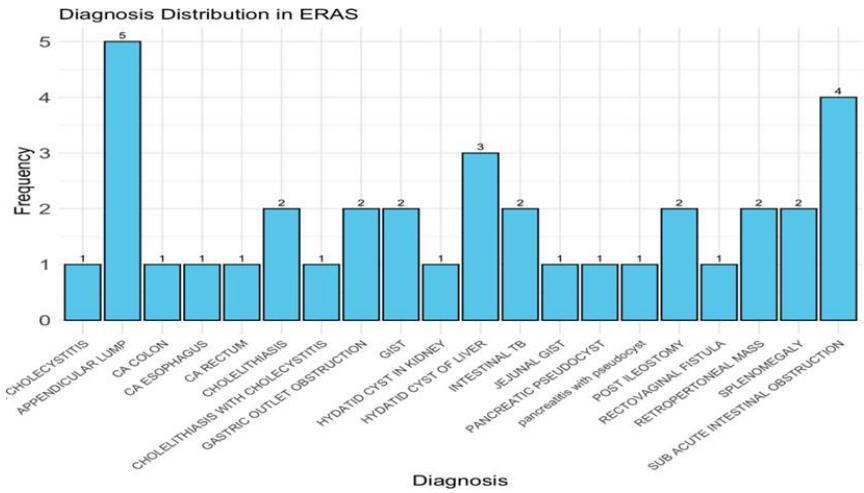
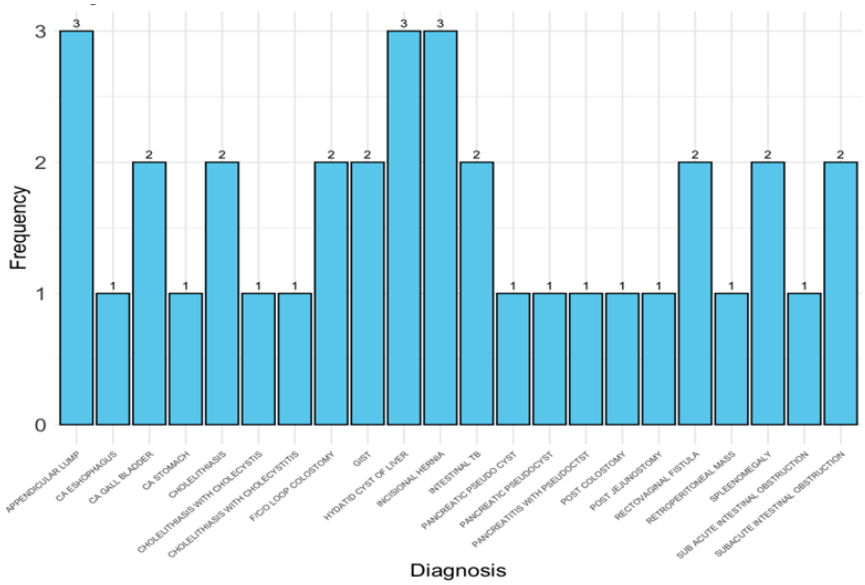


Data suggest the average age and standard deviation (S.D.) for two groups – Test Group (ERAS) and Control Group (Conventional Group). ERAS Group patients are on Average 45.25 years & Control Group 45.50 years.

Table 3: Distribution of the study participants according to diagnosis

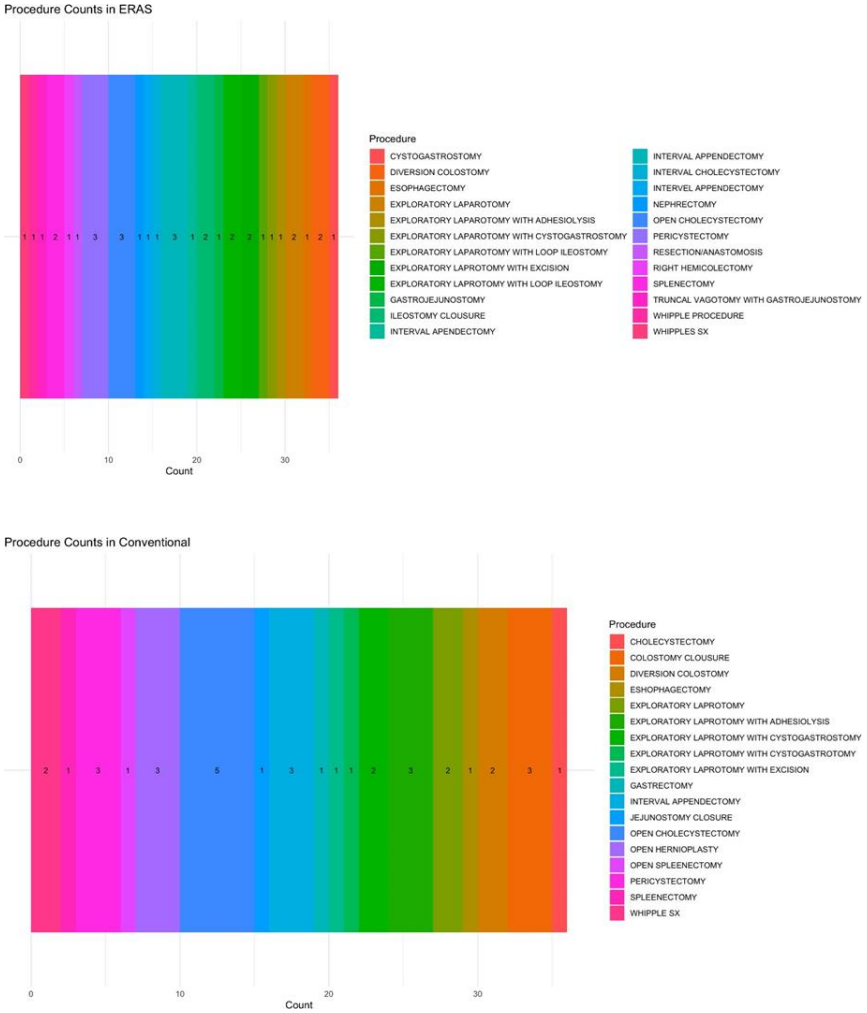
Diagnosis	ERAS group	Conventional group
Cholecystitis	1	0
Appendicular lump	5	3
Ca colon	1	0
Ca esophagus	1	1
Ca rectum	1	0
Cholelithiasis	2	2
Cholelithiasis with cholecystitis	1	2
Gastric outlet obstruction	2	0
Gist	2	2
Hydatid cyst of kidney	1	0
Intestinal tuberculosis	2	2
Jejunal gist	1	0
Pancreatic pseudocyst	1	2
Pancreatitis with pseudocyst	1	1
Post ileostomy	2	3
Recto-vaginal fistula	1	2
Retroperitoneal mass	2	1
Splenomegaly	2	2
Subacute intestinal obstruction	4	3
Hydatid cyst of liver	3	3
Ca gall bladder	0	2
Ca stomach	0	1
Incisional hernia	0	3
Post jejunostomy	0	1
Total	36	36





Graph 3: Distribution of the study participants according to diagnosis

There is appendicular lump is most common diagnosis in ERAS group, followed by subacute intestinal obstruction, while there is appendicular lump, hydatid cyst of liver and incisional hernia equally disease diagnosed in conventional group.



Graph 4: Distribution of the study participants according to surgical procedure

Mostly surgical procedure done in ERAS group is appendicectomy, cholecystectomy and exploratory laparotomy while in conventional group appendicectomy followed by exploratory laparotomy and cholecystectomy.

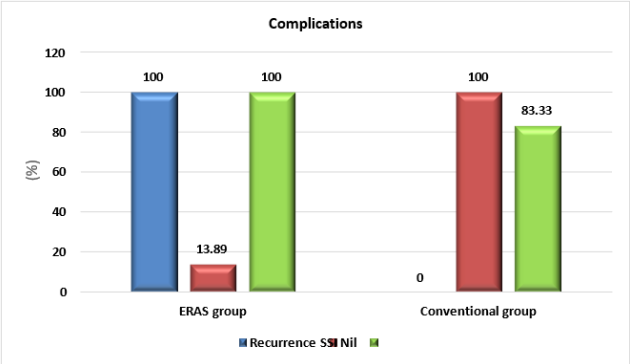
Table 4: Distribution of the study participants according to complications

Complications	ERAS group		Conventional group	
	N	%	N	%
Recurrence			1	2.78
SSI			5	13.89
Nil	36	100	30	83.33

Chi square value=6.54 p=0.03 S

The occurrence of complications differs significantly between the two groups, with the conventional group exhibiting a higher incidence of side effects. This finding underscores the potential advantages of the ERAS protocol in mitigating postoperative complications and enhancing patient recovery.

The results of Pearson's chi-squared test indicate that there is a statistically ***significant association*** between complications in the ERAS and conventional groups (chi-squared = 6.54, df = 2, p-value = 0.03S).



Graph 5: Distribution of the study participantsaccording to complications

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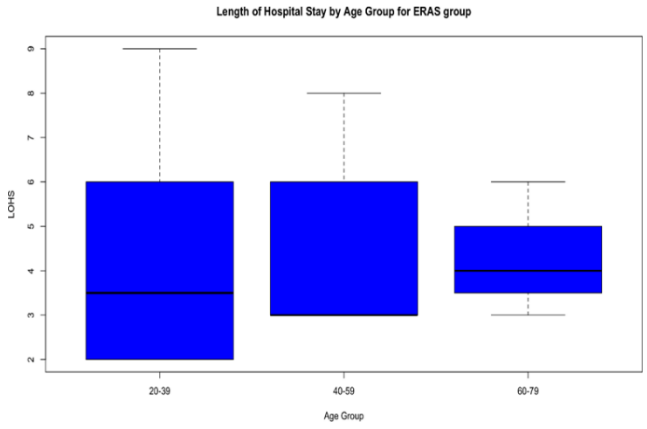

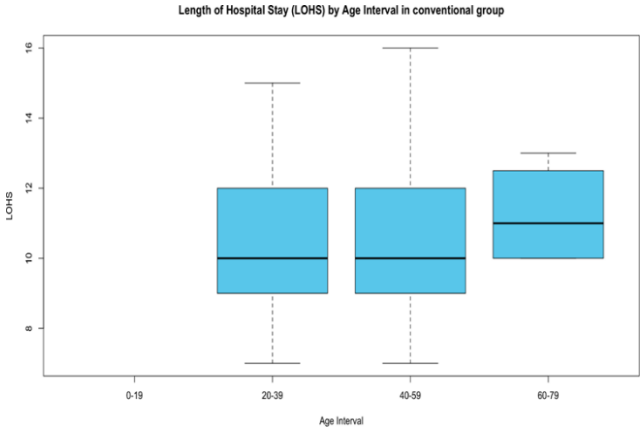

Graph 6: Distribution of the Study ParticipantsAccording to Length of Hospital Stay

The mean LOHS for the ERAS group is approximately 4.4 days, while for the conventional group, it is approximately 10.53 days. Therefore, patients in the ERAS group tend to have a significantly shorter hospital stay compared to those in theconventional group.

Preoperative Counselling

The paired t-test conducted between ERAS_COUNSELLING and CONVENTIONAL COUNSELLING yielded compelling evidence of a ***significant difference*** between the two groups. With a t-value of 40 and a p-value below $2.2\times10-162.2\times10-16$, the test indicates a substantial distinction in means. The null hypothesis, suggesting no difference between the groups, is convincingly rejected in Favor of the alternative hypothesis, implying a true difference in means. Furthermore, the 95% confidence interval for the difference in means, ranging from 0.926 to 1.025, supports this conclusion.

Specifically, the mean value for ERAS_COUNSELLING is approximately 0.976, notably higher than the mean for CONVENTIONAL_COUNSELLING, which is 0. This outcome underscores the effectiveness of ERAS_COUNSELLING over conventional methods, emphasizing its potential benefits or superiority in the context under study.

Preoperative Mechanical Bowel Preparation

When mechanical bowel preparation is prepared, the analysis between ERAS and convention groups reveals another significant contrast. The Welch Two Sample t-test indicates a pronounced discrepancy, with ERAS exhibiting a mean of approximately 0.132, considerably lower than the mean of 1.000 for conventional care. This differenceis

supported by a t-value of -15.627 and a p-value below 2.2×10^{-16}, emphasizing the superiority of the ERAS method in this aspect of preoperative preparation.

Specifically, the mean for MECHANICAL BOWEL PREPARATION ERAS stands at approximately 0.132, while for MECHANICAL BOWEL PREPARATION CONVENTION, it is notably higher at 1.000. This disparity highlights a distinct advantage or superiority of the ERAS method over the conventional approach, potentially informing clinical practice or decision-making in relevant contexts.

This suggests that the effectiveness or outcomes associated with mechanical bowel preparation differ significantly between the ERAS and conventional methods. The 95% confidence interval for the difference in means, ranging from -0.981 to -0.756, bolsters this conclusion, underscoring the substantial difference between the two groups.

Preoperative Carbohydrate Loading

The Welch Two Sample t-test conducted between the Carbohydrate Loading ERAS and Carbohydrate Loading CONVENTION groups reveals a ***significant disparity*** in their effectiveness. The test, yielding a t-value of 37 and a remarkably small p-value (< $2.2\times10-162.2\times10-16$), decisively rejects the null hypothesis in favour of the alternative, indicating that the true difference in means is not zero. This suggests a substantial difference between the two methods. The 95% confidence interval for the difference in means, ranging from 0.920 to 1.027, further reinforces this conclusion, highlighting the significant divergence in outcomes between the two groups.

Specifically, the mean for Carbohydrate Loading ERAS is approximately 0.974, whileit is 0 for Carbohydrate loading CONVENTION. This substantial gap underscores the potential superiority or advantages associated with the ERAS method of carbohydrate loading, which may have implications for clinical practice or decision-making in relevant contexts.

Preoperative Meachanical Bowel Preparation

The comparison between Enhanced Recovery After Surgery (ERAS) and conventional methods across three medical interventions revealed ***significant differences*** in Mechanical Bowel Preparation and Carbohydrate Loading. ERAS demonstrated lower means in Mechanical Bowel Preparation and higher means in Carbohydrate Loading compared to conventional methods, indicating potential advantages of the ERAS approach in terms of efficiency and effectiveness.

However, an error was encountered in the analysis of Antibiotic Prophylaxis, requiring further investigation to determine differences accurately. Overall, these findings suggest that the ERAS approach may offer superior outcomes in specific aspects of perioperative care, highlighting the importance of tailored approaches in surgical protocols.

Preoperative DVT

When ERAS and conventional care was compared concerning DVT prophylaxis, the Welch Two Sample t-test uncovers a significant difference (t (39) = 7.2639, p < 0.001), indicating that patients under the ERAS protocol are notably more likely to receive DVT prophylaxis compared to those under conventional methods. This is supported by a confidence interval for the difference in means, suggesting a higher proportion of patients receiving DVT prophylaxis in the ERAS group (mean = 1.000) compared to the conventional group (mean = 0.425). These findings suggest a more consistent application of DVT prophylaxis measures with the ERAS protocol.

The Welch Two Sample t-test results indicate a ***significant difference*** between the groups receiving DVT prophylaxis in the ERAS protocol and the conventional protocol(t (39) = 7.2639, p < 0.001). The confidence interval for the difference in means ranges from 0.414 to 0.735,

The mean proportion of patients receiving DVT prophylaxis is notably higher in the ERAS group (mean = 1.000) compared to the conventional group (mean = 0.425). This suggests that the ERAS protocol may be associated with a more consistent application of DVT prophylaxis measures compared to conventional methods.

Preoperative Standard Analgesia

Moving to the utilization of standard analgesia, another crucial aspect of preoperative management, the analysis underscores a significant difference between ERAS and conventional protocols. The Welch Two Sample t-test reveals a substantial dissimilarity(t = 39, p < 2.2e-16), with the mean usage of standard analgesia being notably higher in the ERAS protocol group (mean = 0.975) compared to the conventional protocol group (mean = 0.000). This indicates a greater tendency for the ERAS protocol to employ standard analgesia, potentially reflecting a proactive approach to pain management in the preoperative phase.

The Welch Two Sample t-test results indicate a ***significant difference*** in the usage of standard analgesia between the ERAS protocol and the conventional protocol (t = 39, df = 39, p < 2.2e-16). The 95% confidence interval for the difference in means ranges from 0.924 to 1.026.

This suggests that the mean usage of standard analgesia is substantially higher in the ERAS protocol group (mean = 0.975) compared to the conventional protocol group (mean = 0.000). Therefore, it can be interpreted that the ERAS protocol shows a significantly greater tendency to utilize standard analgesia than the conventional protocol.

Postoperative Mobilization

This indicates a significant association between treatment protocols (ERAS and conventional) and mobilization outcomes. Thus, the choice of treatment protocol likely influences the extent of mobilization achieved

postoperatively.

The Pearson's chi-squared test was conducted to assess the association between mobilization status and treatment protocols (ERAS and conventional). The analysis yielded a chi-squared statistic of 18.943 with 7 degrees of freedom, resulting in a p- value of 0.008367. This p-value indicates a ***significant association*** between the variables, suggesting that the choice of treatment protocol likely influences mobilization outcomes.

Postoperative Enteric Feed

Similarly, the assessment of enteric feeding distribution between ERAS and conventional groups using Pearson's chi-squared test results in a chi-squared statistic of 18.943 with 7 degrees of freedom, yielding a p-value of 0.008367. This p-value indicates that there is a statistically ***significant association*** between the two categorical variables (ENTERIC FEED ERAS and ENTERIC FEED CONVENTION) at the 5% significance level.

This indicates a statistically significant association between the distribution of enteric feed types and treatment protocols. In essence, there is evidence to suggest that the distribution of enteric feed types significantly differs between the ERAS and conventional groups, potentially influencing postoperative recovery and nutritional management.

Postoperative Complication

The occurrence of complications differs significantly between the two groups, with the conventional group exhibiting a higher incidence of side effects. This finding underscores the potential advantages of the ERAS protocol in mitigating postoperative complications and enhancing patient recovery.

The results of Pearson's chi-squared test indicate that there is a statistically ***significant association*** between complications in the ERAS and conventional groups (chi-squared = 6.54, df = 2, p-value = 0.03 S).

Postoperative Hospital Stay

Finally, the examination of Length of Hospital Stay (LOHS) highlights a significant difference between the ERAS and conventional groups.

Patients in the ERAS group tend to have a significantly shorter hospital stay, with a mean LOHS of approximately 4.4 days, compared to approximately 10.53 days for those in the conventional group. This underscores the potential of the ERAS protocol to expedite postoperative recovery and reduce hospitalization duration compared to conventional approaches.

The mean LOHS for the ERAS group is approximately 4.4 days, while for the conventional group, it is approximately 10.53 days. Therefore, patients in the ERAS group tend to have a significantly shorter hospital stay compared to those in theconventional group.

The unpaired t-test results show a ***significant difference*** in the Length of Hospital Stay (LOHS) between the ERAS and conventional groups (t = -12.338, df = 67.95, p-value < 2.2e-16). This indicates a substantial difference in mean LOHS between the two groups. The 95 percent confidence interval for the difference in means ranges from - 7.118864 to -5.136692.

4. Discussion

The study was conducted in the Department of Surgery at The Raipur Institute of Medical Sciences, Raipur, Chhattisgarh. Main aim of this study is „"**To study the effectiveness of Enhanced Recovery After surgery (ERAS) Protocol compared with the conventional way of management of patients undergoing gastrointestinal surgeries."**

In my study there is 13 male and 23 females are included, male to female ratio is 1.8/1 while in ERAS group 21 males and 15 females are present and male to female ratio is 1.4/1 found.

Giacomo Bertazzoni et al was aimed to describe the prospective implementation of the enhanced recovery after surgery (ERAS) in tertiary academic center. Forty ERAS and 40 non-ERAS patients were analysed. There were no significant differences between the cohorts regarding age, gender, stage of disease, comorbidity, ASA score, and duration of surgery.

There is appendicular lump is most common diagnosis in ERAS group, followed by subacute intestinal obstruction, while there is appendicular lump, hydatid cyst of liver and incisional hernia equally disease diagnosed in conventional group.

Mostly surgical procedure done in ERAS group is appendicectomy, cholecystectomy and exploratory laparotomy while in conventional group appendicectomy followed by exploratory laparotomy and cholecystectomy.

Pędziwiatr et al., studied Enhanced Recovery After Surgery (ERAS) represents a evidence-based revolution in perioperative care, demonstrating significant reductions in recovery time and postoperative complications across various surgical disciplines. Colorectal surgery has firmly established ERAS as the preferred care protocol, while gastric surgery adopted ERAS for gastrectomies in 2014, yielding positive meta- analytical results. Liver surgery has embraced ERAS benefits, with widespread implementation underway. Although ERAS proves advantageous in pancreatic surgery.

Preoperative Counselling

In this study we found that, the mean value for ERAS_COUNSELLING is approximately 0.976, notably higher than the mean for CONVENTIONAL_COUNSELLING, which is 0. This outcome underscores the effectiveness of ERAS_COUNSELLING over conventional methods,

emphasizing its potential benefits or superiority in the context under study.

Steenhagen et al., Perioperative surgical care is undergoing a transformative shift with the adoption of Enhanced Recovery After Surgery (ERAS) pathways, steering away from traditional practices like extended preoperative fasting and delayed reintroduction of oral nutrition. This multimodal perioperative care approach focuses on early recovery by maintaining preoperative organ function and mitigating the stress response after surgery. ERAS protocols encompass elements such as preoperative counseling, optimized nutrition, standardized analgesic and anesthetic regimes, and early mobilization.[13]

Preoperative Carbohydrate Loading

The Carbohydrate Loading ERAS and Carbohydrate Loading CONVENTION groups reveals a ***significant disparity*** in their effectiveness. The test, yielding a t-value of 37 and a remarkably small p-value (< 2.2×10−162.2×10−16). Specifically, the mean for Carbohydrate Loading ERAS is approximately 0.974, while it is 0 for Carbohydrate loading CONVENTION. This substantial gap underscores the potential superiority or advantages associated with the ERAS method of carbohydrate loading, which may have implications for clinical practice or decision-making in relevant contexts.

Preoperative Meachanical Bowel Preparation

The comparison between Enhanced Recovery After Surgery (ERAS) and conventional methods across three medical interventions revealed ***significant differences*** in Mechanical Bowel Preparation and Carbohydrate Loading. ERAS demonstrated lower means in Mechanical Bowel Preparation and higher means in Carbohydrate Loading compared to conventional methods, indicating potential advantages of the ERAS approach in terms of efficiency and effectiveness.

This study suggests that the effectiveness or outcomes associated with mechanical bowel preparation differ significantly between the ERAS and conventional methods, when mechanical bowel preparation is prepared, the analysis between ERAS and convention groups reveals another significant contrast. This difference is supported by a t-value of -15.627 and a p-value below 2.2×10^{-16}, emphasizing the superiority of the ERAS method in this aspect of preoperative preparation.

The mean for mechanical bowel preparation ERAS stands at approximately 0.132, while for mechanical bowel preparation convention, it is notably higher at 1.000. This disparity highlights a distinct advantage or superiority of the ERAS method over the conventional approach, potentially informing clinical practice or decision-making in relevant contexts.

However, an error was encountered in the analysis of Antibiotic Prophylaxis, requiring further investigation to determine differences accurately. Overall, these findings suggest that the ERAS approach may offer superior outcomes in specific aspects of perioperative care, highlighting the importance of tailored approaches in surgical protocols.

Maria C Mir et al., explained This review focuses on the application of Enhanced Recovery After Surgery (ERAS) pathways to reduce morbidity in Radical Cystectomy (RC). Preoperatively, strategies like medical optimization, avoiding mechanical bowel preparation, and administering high-energy carbohydrate drinks are suggested. Intra-operatively, the importance of epidural analgesia and standardized anaesthetic protocols, including considerations for minimally invasive approaches, are highlighted. Post-operatively, recommendations include avoiding routine nasogastric tube placement, promoting early mobilization, and implementing a multifaceted approach to optimize gut function and reduce post-operative ileus. Overall, the review underscores the potential benefits of ERAS in enhancing recovery and minimizing complications in RC patients.[14]

Yannick Cerantola et al, this study aimed to evaluate the potential application of Enhanced Recovery After Surgery (ERAS) pathways in cystectomy patients, drawing on evidence from colorectal procedures. However, bowel preparation did not yield significant improvements.

Preoperative DVT

The mean proportion of patients receiving DVT prophylaxis is notably higher in the ERAS group (mean = 1.000) compared to the conventional group (mean = 0.425). This suggests that the ERAS protocol may be associated with a more consistent application of DVT prophylaxis measures compared to conventional methods. These findings suggest a more consistent application of DVT prophylaxis measures with the ERAS protocol. Results indicate a ***significant difference*** between the groups receiving DVT prophylaxis in the ERAS protocol and the conventional protocol ($t(39) = 7.2639$, $p < 0.001$). The confidence interval for the difference in means ranges from 0.414 to 0.735,

Preoperative Standard Analgesia

Moving to the utilization of standard analgesia, another crucial aspect of preoperative management, the analysis underscores a significant difference between ERAS and conventional protocols. A greater tendency for the ERAS protocol to employ standard analgesia, potentially reflecting a proactive approach to pain management in the preoperative phase.

A ***significant difference*** in the usage of standard analgesia between the ERAS protocol and the conventional protocol ($t = 39$, $df = 39$, $p < 2.2e-16$). The 95% confidence interval for the difference in means ranges from 0.924 to 1.026. This suggests that the mean usage of standard analgesia is substantially higher in the ERAS protocol group (mean = 0.975) compared to the conventional protocol group (mean = 0.000). Therefore, it can be interpreted that the ERAS protocol shows a significantly greater tendency to utilize standard analgesia than the conventional protocol.

Postoperative Mobilization

This indicates a significant association between treatment protocols (ERAS and conventional) and mobilization outcomes. Thus, the choice of treatment protocol likely influences the extent of mobilization achieved postoperatively. The Pearson's chi- squared test was conducted to assess the association between mobilization status and treatment protocols (ERAS and conventional). The analysis yielded a chi-squared statistic of 18.943 with 7 degrees of freedom, resulting in a p-value of 0.008367. This p-value indicates a ***significant association*** between the variables, suggesting that the choice of treatment protocol likely influences mobilization outcomes.

Postoperative Enteric Feed

This indicates a statistically significant association [p-value of 0.008367] between the distribution of enteric feed types and treatment protocols. In essence, there is evidence to suggest that the distribution of enteric feed types significantly differs between the ERAS and conventional groups, potentially influencing postoperative recovery and nutritional management.

Postoperative Compilcation

The occurrence of complications differs significantly between the two groups, with the conventional group exhibiting a higher incidence of side effects. This finding underscores the potential advantages of the ERAS protocol in mitigating postoperative complications and enhancing patient recovery.
Chunxiao Wei et al., this retrospective cohort study aimed to assess the efficacy of enhanced recovery after surgery (ERAS) in patients undergoing radical cystectomy (RC). ERAS implementation in RC patients may effectively hasten rehabilitation, decrease postoperative complications, readmission rates, and overall hospitalization costs. [18]

Postoperative Hospital Stay

Finally, the examination of Length of Hospital Stay (LOHS) highlights a significant difference between the ERAS and conventional groups. Patients in the ERAS group tend to have a significantly shorter hospital stay, with a mean LOHS of approximately 4.4 days, compared to approximately 10.53 days for those in the conventional group. This underscores the potential of the ERAS protocol to expedite postoperative recovery and reduce hospitalization duration compared to conventional approaches. Therefore, patients in the ERAS group tend to have a significantly shorter hospital stay compared to those in the conventional group.

A ***significant difference*** in the Length of Hospital Stay (LOHS) between the ERAS andconventional groups (t = -12.338, df = 67.95, p-value < 2.2e-16). This indicates a substantial difference in mean LOHS between the two groups. The 95 percent confidence interval for the difference in means ranges from -7.118864 to -5.136692.

There is a statistically ***significant association*** between complications in the ERAS and conventional groups (chi-squared = 6.54, df = 2, p-value = 0.03 S).

Pędziwiatr et al., studied Enhanced Recovery After Surgery (ERAS) represents a evidence-based revolution in perioperative care, demonstrating significant reductions in recovery time and postoperative complications across various surgical disciplines. ERAS proves advantageous in pancreatic surgery. [15]

Bona et al., explained the aim of this study was to investigate the implementation of an enhanced recovery after surgery (ERAS) program at a large University Hospital, study assessed compliance with the ERAS protocol in two phases: an initial pilot study with 47patients and a later phase involving 143 patients. The study compared outcomes such aslength of postoperative hospital stay, readmission rate, protocol compliance, and morbidity. [16]

Yushi Naito et al., This retrospective study aimed to assess the safety and efficacy of implementing Enhanced Recovery After Surgery (ERAS) protocols in the management of patients undergoing radical cystectomy (RC) at Toyohashi Municipal Hospital in Japan. ERAS group experienced a significantly shorter duration of surgery, lower complication rates, and a shorter length of hospital stay (LOS) after RC compared to the traditional group. The study suggests that the adoption of ERAS protocols may contribute to reduced LOS and postoperative complications in RC patients at thisJapanese hospital. [17]

Yuanyuan shang et al. studied to reduce perioperative stress in several surgical disease. here investigated whether ERAS is associated with beneficial effects in the setting of emergency colorectal surgery. ERAS was associated with postoperative gastrointestinal function recovery, including time to first flatus (p=.002) first defecation (p=.008) and prolonged ileus(p=.016), according to the Cliven dindo , classification fewer total episodes grades II or higher postoperative complications were observed in patient cared for with ERAS than in patients with traditional care (p=.002) median postoperative hospital stay in the ERAS was6(3.22days) versus 9 (7-27) days in the traditional care group (p<.001) furthermore, the interval from operation to postoperative chemotherapy was significantly shorter. [14]

Giacomo Bertazzoni et al was aimed to describe the prospective implementation of the enhanced recovery after surgery (ERAS) in tertiary academic centre. Forty ERASand 40 non-ERAS patients were analysed. A significantly shorter LOS for the ERAS group (median, 14 days; range, 10-19) than for non-ERAS patients (median, 17.5 days; range, 13-21) was observed (p = 0.0128). The incidence of complications was not significantly different (p = 0.140). [19]

Bona et al., explained the aim of this study was to investigate the implementation of an enhanced recovery after surgery (ERAS) program at a large University Hospital, study assessed compliance with the ERAS

protocol in two phases: an initial pilot study with 47patients and a later phase involving 143 patients. The study compared outcomes such aslength of postoperative hospital stay, readmission rate, protocol compliance, and morbidity. [16]

Al Balawi Z et al., The study investigated the impact of implementing the Enhanced Recovery After Surgery (ERAS) program in Alberta, Canada, focusing on colorectal surgery patients, including those with diabetes. The study found a significant reduction in length of stay (LOS) post-ERAS, but this was attributed to a pre-existing trend rather than a direct association with ERAS. No significant changes were observed in postoperative outcomes, including 30-day death/readmission rates. [20]

Wenxian Zhang et al., ERAS protocol, designed to alleviate surgery-related stress and reduce hospital stays, has been the focus of debate in its application to colorectal surgery. ERAS care significantly decreased overall length of stay (-4.12 days), post- operative hospital stay (-1.91 days), and post-operative complications (OR = 0.42). However, readmissions were higher in the ERAS group. [21]

G B Schulz et al, The study focuses on the application of fast-track/ERAS® protocols in the context of radical cystectomy, a procedure known for its significant morbidity and mortality. The findings suggest that ERAS® implementation in radical cystectomy is associated with a reduced length of stay without a concurrent increase in complication rates. [22]

Gianluca Giannarini et al., In recent years, there has been a growing emphasis on optimizing perioperative care pathways to enhance recovery and reduce morbidity in patients undergoing radical cystectomy (RC). A significantly faster recovery of bowel function, quicker return to a regular diet, and shorter hospital stays. Importantly, there was no increase in 30-day and 90-day major complications, mortality, or readmission rates compared to standard care. [23]

Mark D Tyson et al., This systematic review and meta-analysis aimed to assess the effectiveness of ERAS protocols compared to standard care in perioperative outcomes following cystectomy. In conclusion, ERAS protocols for cystectomy were found to be associated with reduced complications, shorter hospital stays, and quicker recovery of bowel function. [24]

5. Conclusion

The study was conducted in the Department of Surgery at The Raipur Institute of Medical Sciences, Raipur, Chhattisgarh. Main aim of this study is was “to study the effectiveness of “Enhanced Recovery After surgery (ERAS) Protocol compared with the conventional way of management of patients undergoing gastrointestinal surgeries.”

From this study we concluded that implementation of ERAS protocol in surgical patient like- preoperative counselling, avoiding bowel preparation, preoperative carbohydrate loading, optimizing fluid substitution, employing multimodal pain management, encouraging early mobilization, promoting oral diet, DVT prophylaxis. this leads to significantly reduces postoperative complications, and postoperative hospital stay. So implication of eras is beneficial for patient and should be applied in surgical patients.

CONVENTIONAL PROTOCOL MASTER CHART

					PREOP							POST OP		
SNO	AGE&SEX	DIAGNOSIS	PROCEDURE	COUNSELLING	MECHANICAL BOWEL PREPARATION	Carbohydrate Loading	Antibiotic prophylaxis	DVT prophylaxis	Standard analgesia	Mobilisation	ENTERICFEED	COMPLICATION	LOHS
1	38/F	GIST	WHIPPLE SX	NO	YES	NO	YES	YES	NO	POD3	POD5	NIL	10
2	33/M	APPENDICULAR LUMP	INTERVAL APPENDECTOMY	NO	YES	NO	YES	YES	NO	POD2	POD2	NIL	7
3	40/F	CHOLELITHIASIS	OPEN CHOLECYSTECTOMY	NO	YES	NO	YES	YES	NO	POD2	POD2	NIL	7
4	49/M	SUBACUTE INTESTINAL OBSTRUCTION	EXPLORATORY LAPROTOMY WITH ADHESIOLYSIS	NO	YES	NO	YES	YES	NO	POD2	POD3	NIL	7
5	34/F	RECTOVAGINAL FISTULA	DIVERSION COLOSTOMY	NO	YES	NO	YES	YES	NO	POD3	POD4	RECURRENCE	10
6	40/F	CA GALL BLADDER	CHOLECYSTECTOMY	NO	YES	NO	YES	YES	NO	POD4	POD3	NIL	12
7	57/M	F/C/O LOOP COLOSTOMY	COLOSTOMY CLOSURE	NO	YES	NO	YES	YES	NO	POD3	POD3	NIL	9
8	42/F	CHOLELITHIASIS WITH CHOLECYSTITIS	OPEN CHOLECYSTECTOMY	NO	YES	NO	YES	YES	NO	POD3	POD4	NIL	10
9	35/M	HYDATID CYST OF LIVER	PERICYSTECTOMY	NO	YES	NO	YES	YES	NO	POD3	POD4	NIL	10
10	60/M	INTESTINAL TB	EXPLORATORY LAPROTOMY WITH ADHESIOLYSIS	NO	YES	NO	YES	YES	NO	POD3	POD3	NIL	10
11	38/M	INCISIONAL HERNIA	OPEN HERNIOPLASTY	NO	YES	NO	YES	YES	NO	POD2	POD3	SSI	12
12	39/F	SPLENOMEGALY	SPLENECTOMY	NO	YES	NO	YES	YES	NO	POD3	POD3	NIL	13
13	38/M	SUBACUTE INTESTINAL MASS	EXPLORATORY LAPROTOMY WITH EXCISION	NO	YES	NO	YES	YES	NO	POD3	POD3	SSI	12
14	35/M	HYDATID CYST OF LIVER	PERICYSTECTOMY	NO	YES	NO	YES	YES	NO	POD3	POD4	NIL	12
15	52/M	PANCREATITIS WITH PSEUDOCYST	EXPLORATORY LAPROTOMY WITH CYSTOGASTROSTOMY	NO	YES	NO	YES	YES	NO	POD3	POD3	NIL	12
16	57/M	POST JEJUNOSTOMY	JEJUNOSTOMY CLOSURE	NO	YES	NO	YES	NO	NO	POD2	POD3	NIL	11
17	45/F	INCISIONAL HERNIA	OPEN HERNIOPLASTY	NO	YES	NO	YES	NO	NO	POD3	POD2	SSI	10
18	40/M	SUBACUTE INTESTINAL OBSTRUCTION	EXPLORATORY LAPROTOMY	NO	YES	NO	YES	NO	NO	POD2	POD3	NIL	9
19	25/M	APPENDICULAR LUMP	INTERVAL APPENDECTOMY	NO	YES	NO	YES	NO	NO	POD2	POD2	NIL	8
20	55/M	CA STOMACH	GASTRECTOMY	NO	YES	NO	YES	NO	NO	POD5	POD4	NIL	15
21	44/F	CHOLELITHIASIS	OPEN CHOLECYSTECTOMY	NO	YES	NO	YES	NO	NO	POD2	POD2	NIL	8
22	46/M	PANCREATIC PSEUDO CYST	EXPLORATORY LAPROTOMY WITH CYSTOGASTROSTOMY	NO	YES	NO	YES	NO	NO	POD4	POD3	NIL	10
23	39/M	SUBACUTE INTESTINAL OBSTRUCTION	EXPLORATORY LAPROTOMY	NO	YES	NO	YES	NO	NO	POD2	POD3	NIL	9
24	49/F	RECTOVAGINAL FISTULA	DIVERSION COLOSTOMY	NO	YES	NO	YES	NO	NO	POD4	POD3	NIL	9
25	52/M	CA GALL BLADDER	OPEN CHOLECYSTECTOMY	NO	YES	NO	YES	NO	NO	POD3	POD3	NIL	10
26	50/M	POST COLOSTOMY	COLOSTOMY CLOSURE	NO	YES	NO	YES	NO	NO	POD2	POD3	NIL	9
27	58/M	INTESTINAL TB	EXPLORATORY LAPROTOMY WITH ADHESIOLYSIS	NO	YES	NO	YES	NO	NO	POD2	POD4	SSI	13
28	45/M	SPLENOMEGALY	SPLENECTOMY	NO	YES	NO	YES	NO	NO	POD2	POD2	NIL	10
29	44/M	INCISIONAL HERNIA	OPEN HERNIOPLASTY	NO	YES	NO	YES	NO	NO	POD2	POD2	NIL	12
30	45/M	GIST	WHIPPLE SX	NO	YES	NO	YES	NO	NO	POD2	POD3	NIL	11
31	32/F	HYDATID CYST OF LIVER	PERICYSTECTOMY	NO	YES	NO	YES	NO	NO	POD2	POD4	NIL	14
32	52/M	CA ESHOPHAGUS	ESHOPHAGECTOMY	NO	YES	NO	YES	NO	NO	POD5	POD6	NIL	16
33	40/F	CHOLELITHIASIS WITH CHOLECYSTITIS	OPEN CHOLECYSTECTOMY	NO	YES	NO	YES	NO	NO	POD4	POD2	NIL	10
34	59/F	F/C/O LOOP COLOSTOMY	COLOSTOMY CLOSURE	NO	YES	NO	YES	NO	NO	POD3	POD2	NIL	10
35	24/M	APPENDICULAR LUMP	INTERVAL APPENDECTOMY	NO	YES	NO	YES	NO	NO	POD 2	POD2	NIL	8
36	55/M	PANCREATIC PSEUDOCYST	EXPLORATORY LAPROTOMY WITH CYSTOGASTROTOMY	NO	YES	NO	YES	YES	NO	POD2	POD4	SSI	11

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