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Assessment of the Effectiveness of Enhanced Recovery after Surgery (ERAS) Programs for Gastrectomy Iraqi Patients

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Abstract: BACKGROUND: Over the past decades, the ERAS program has shown great benefit and efficacy in managing gastrectomy for patients with gastric cancer.

AIM: This study aimed to ascertain and enrol the benefits of the ERAS programme in terms of clinical outcomes for patients undergoing gastrectomy for gastric cancer.

PATIENTS AND METHODS: In different hospitals in Iraq, clinical and demographic data were collected for patients with gastric cancer who underwent Laparoscopic distal gastrectomy (LDG). This included 96 patients between March 2023 and October 2024. The clinical outcomes of patients were recorded before and after gastric cancer surgery. The effectiveness of the Enhanced Recovery After Surgery (ERAS) program was evaluated, as well as their impact on patients.

RESULTS: The current findings indicate that the gastric antrum was the most prevalent location of the tumour in patients undergoing laparoscopic distal gastrectomy (LDG) for gastric cancer. This was observed in 48.96% of the total number of patients. The operative time for laparoscopic distal gastrectomy (LDG) ranged from 2 to 4 cases, with an intraoperative bleeding volume of 140. The mean volume was 57 ± 13.63 mL, and the proportion of cases undergoing lymphadenectomy (%) D2 was 54. The mean length of stay was 5.2 ± 0.3 days, and four cases were transferred to the ICU. The 60-day mortality rate was only one case. The proportion of complications classified as mild was 28 cases, moderate was 16 cases, and severe was seven cases. In terms of the success of the ERAS Compliance Score on gastrectomy patients, we demonstrated that multimodal pain management had an average score of 87.44 ± 5.80, postoperative complications had an average score of 75.02 ± 5.88, postoperative nutrition had an average score of 88.74 ± 3.92, and patient satisfaction had an average score of 81.66 ± 5.78.

CONCLUSION: Even though there were no changes in morbidity and mortality rates, ERAS for gastrectomy enhanced the recovery of patients' mortality rate and minimized hospitalization costs.

Keywords: Effectiveness of the Enhanced Recovery After Surgery (ERAS) program; Gastric cancer; Gastrectomy surgery; Complications; and Hospital stays.

INTRODUCTION

Gastric tumors (GT) were often seen among people ages 45 and above (World Cancer Statistics). According to Global Cancer Statistics 2020, GC rates accounted for the fifth position by incidence and

fourth by mortality in the whole world [1,2,3,4]. Today, the main treatment available remains surgical, and it comprises of total and partial gastrectomy. [5]

The degree of surgical excision was determined by the location of the tumour in relation to its adjacent lymph nodes, with a higher rate of resection being observed in the distal stomach. Though, open surgery was associated with more complications, slower recovery, and worse prognosis than that of minimally invasive surgery. [6,2,7,8,9]

Laparoscopic distal gastrectomy (LDG) for GC was reported for the first time in 1994 by Kitano et al., and due to its advantages, including reduced blood loss, quicker recovery times, and better aesthetics, this surgical technique became popular [10,11]. However, despite all the merits of LDG, possible postoperative complications still existed. Hence, proper perioperative handling was imperative in enhancing patient prognosis. [12,13,9,8,14]

ERAS software was designed to enable expedient recovery of patients after surgery by employing certain perioperative control measures to suppress or diminish the body's strain reflexes [15]. Professor Kehlet put forth the ERAS Programme during the '90s, which was more of a management strategy in perioperative practice than an established technique that contradicted conventional methods and was also readily applicable for many surgical procedures. [16,17]

First for colorectal surgery, but now also used in Surgery of other gynaecology and bladder, liver, and spine. In 2014, the International ERAS Society released gastrectomy guidelines, which constitute a full implementation of perioperative management with eight items specific to the procedure and 17 that are not. [18,19,20,21]

At present, almost all the works relating to and focusing on the use of the ERAS Program by GC patients who go through laparoscopic therapy have been published [22], but our scrutiny has established that they never dealt with a comprehensive examination of the laparoscopic surgical techniques and the areas of stomach subjected to surgical resection [23,24]. The non-randomized controlled trials (RCTs) that was included in all these studies could result in evidence based on unreliable evidence. The commonly used site of GC invasion was the gastric antrum and was therefore commonly treated with distal gastrectomy. [25]

PATIENTS AND METHODS

We conducted a cross-sectional study of gastric cancer patients who underwent gastrectomy (total and partial), which included 96 patients with ages ranging from 40 to 70 years. This study collected data from patients from different hospitals in Iraq during the period between March 2023 and October 2024. Our study excluded patients who were followed for each of the following cases: patients under 40 years and over 70 years, patients who had serious diseases (e.g., fractures, thyroid, gallbladder, and other diseases), patients who consumed alcohol while the following cases were included: smokers, patients with diseases (hypertension, diabetes, cardiovascular diseases, respiratory diseases, and kidney diseases), patients with a body mass index between 27 and greater than 40.

All patients underwent gastrectomy by laparoscopic distal gastrectomy and were diagnosed with tumors of different sites, including (Proximal, Body, Antrum, Remnant). Patients underwent this surgery, and the procedure took between 2 and 4 hours, and the data of lymph node dissection (%) included D1+, D2, D2+, admission to the intensive care unit, and postoperative complications.

The early gastric cancer was subjected to D1+ lymphadenectomy, while the advanced tumors were subjected to D2 or extended D2 lymphadenectomy.

Seventeen patients with oligometastatic gastric cancer who underwent radical gastrectomy after intensive chemotherapy were included. Length of hospital stay (LOS) and direct cost were the main outcomes, while the secondary ones included 90-day morbidity and mortality, 60-day readmission rate, the need for post-discharge care, and enteral support at home. Adherence to ERAS criteria was utilized as a method of controlling the quality of protocol implementation. Morbidity was defined as any complications that happened within 60 days following surgery. Clavien-Dindo (CD) classification was

used to classify complications in 14 grades: minor, moderate, and major. Before Admission and after the Surgery, compliance with the protocol was measured in terms of twelve ERAS factors. For the postoperative period, they included urinary catheter removal on POD 2, early resuming of liquid and soft diet, physiotherapy (mobilization and ambulation) aimed to be implemented in these patients, as well as no drain placement during subtalar gastrectomy or its removal at an early stage after total gastrectomy.

Furthermore, we evaluated the effectiveness of enhanced recovery after surgery (ERAS) programs for gastrectomy patients which determined the patient's treatment adherence to ERAS protocols where the scale ranged from 0 to 100, where higher scores indicate the success of the ERAS program in improving the general health of patients while lower scores indicate poor ERAS program which weakens the patient's health.

RESULTS

Table 1: *Enrol of Patients' characteristics in this study.*

Variables	No. of participants [n = 96]	Percentage [%]
Age		
40 – 50	25	26.04%
51 – 60	33	34.38%
61 – 70	38	39.58%
Sex		
Male	40	41.67%
Female	56	58.33%
BMI, [Kg/m2]		
27 – 30	26	27.08%
31 – 34	38	39.58%
> 34	32	33.33%
Comorbidities		
Hypertension	66	68.75%
Cardiovascular	54	56.25%
Respiratory	6	6.25%
Diabetes	32	33.33%
Kidney diseases	10	10.42%
ASA		
I	7	7.29%
II	18	18.75%
III	26	27.08%
IV	45	46.88%
Smoking use		
Yes	36	37.5%
No	60	62.5%
Previous surgery		
Yes	11	11.46%
No	85	88.54%
Education level		
Primary	22	22.92%
Secondary	43	44.79%
University/post–graduated	31	32.29%

Monthly income, $		
420 – 600	45	46.88%
601 - 860	34	35.42%
> 860	17	17.71%

Table 2: *Preoperative symptoms of gastric cancer.*

Items	***No. of cases [96]***	***Percentage [%]***
Persistent indigestion or heartburn	20	20.83%
Feeling full or bloated after eating small amounts	11	11.46%
Severe and persistent stomach pain	30	31.25%
Unexplained weight loss	6	6.25%
Loss of appetite	7	7.29%
Difficulty swallowing	4	4.17%
Nausea and vomiting	8	8.33%
Fatigue	3	3.13%
Blood in the stool	7	7.29%

Table 3: *Location of gastric cancer prevalent in the patients.*

Locations	***No. of cases [96]***	***Percentage [%]***
Proximal	19	19.79%
Body	16	16.67%
Antrum	47	48.96%
Remnant	14	14.58%

Table 4: *Classify clinical stages of illness at patients.*

Stages	***No. of cases [96]***	***Percentage [%]***
0 - I	22	22.92%
II	20	20.83%
III	49	51.04%
IV	5	5.21%

Table 5: *Surgical features of patients who underwent Gastrectomy under the ERAS program.*

Variables	**No. of cases [96]**	**Percentage [%]**
Type of surgery (%)		
Subtotal gastrectomy	46	47.92%
Total gastrectomy	50	52.08%
Surgical approach		
Laparoscopic distal gastrectomy (LDG)	96	100%
Operative time, hours	2 – 4 hours	
Intraoperative bleeding volume, mL	140.57 ± 13.63	
Laboratory tests		
Radiology	72	75.0%
Other	24	25.0%
Lymphadenectomy (%)		
D1+	15	15.63%
D2	54	56.25%
D2+	27	28.13%

Nodal harvesting	45 [31 – 53]	
Extended organ resection (%)	16	16.67%
Length of stay, days	5.2 ± 0.3	
ICU	4	4.17%
Timed discharge (%)	49	51.04%
60 – Day mortality (%)	1	1.04%
60 – Day readmission (%)	5	5.21%
Post-discharge care (%)	4	4.17%
Enteral support at home (%)	2	2.08%

Table 6: *Enrol post-operative complications outcomes and classification in terms of mild, moderate, and severe.*

Complications	***Mild, n (%)***	***Moderate, n (%)***	***Severe, n (%)***
Infection	*12 [12.5%]*	*5 [5.21%]*	*2 [2.08%]*
Bleeding	*2 [2.08%]*	*1 [1.04%]*	*1 [1.04%]*
Anastomotic leak	*3 [3.13%]*	*4 [4.17%]*	*2 [2.08%]*
Pulmonary	*1 [1.04%]*	*2 [2.08%]*	*1 [1.04%]*
Cardiac	*2 [2.08%]*	*3 [3.13%]*	*0 [0%]*
Other	*8 [8.33%]*	*1 [1.04%]*	*1 [1.04%]*
Total	*28 [29.17%]*	*16 [16.67%]*	*7 [7.29%]*

Table 7: *Considerations of conducting in postoperative (ERAS) Programs.*

Parameters	**Details**
Analgesia	*Fixed of time within interval-opioid sparing analgesia + therapy with NSAIDs.*
Fluids	*Stopping of iv fluids within a fourth postoperative day*
Abdominal drain	*Can be placed post-total gastrectomy, no conduct anastomotic leak test*
Line management	*Perform removing of the urinary catheter during two post-operative days and remove also peridural catheter during post-operative days.*
Diet	*Clear fluids within one post-operative day, Nutritional counselling: within 2 - 4 days after surgery, soft diet: in the third day of post-operative*
Length of stay	*In the sixth post-operative day, taking into account done timed discharge*

Table 8: *Assessment of the Effectiveness of Enhanced Recovery After Surgery (ERAS) Programs for Gastrectomy Patients by ERAS Compliance Score*

Items	***ERAS Compliance Scores***
Preoperative education	*63.81 ± 6.29*
Preoperative fasting	*72.57 ± 6.42*
Multimodal pain management	*87.44 ± 5.80*
Postoperative symptoms	*78.55 ± 7.36*
Early mobilization	*82.93 ± 9.22*
Post-operative complications	*75.02 ± 5.88*
Postoperative nutrition	*88.74 ± 3.92*
Patients' satisfaction	*81.66 ± 5.78*

DISCUSSION

It has been shown that ERAS can be applied to gastrectomy in Western patients, which has also been shown to reduce the length of stay and the incurred expenses sufficiently [26]. In addition, it has been shown that there are no complications or readmission rates after the introduction of ERAS, making it

safe for all patients, while mortality has rarely been reported among them [27,28]. Similarly, our study showed that the 60-day mortality rate was 1.04% of the total patients, and the complication rate, including mild (28 cases), moderate (16 cases), and severe (7 cases), was high. The findings of our research concur with recent studies done in America and Germany indicating that the duration of hospital stay following the application of ERAS is shorter, while the mortality rate remains almost constant at 5.2 ± 0.3 days; it was also observed that there was a smaller chance of coming back within the ERAS cohort with just five instances. It is important to note that all but one (the prospective cohort series on 252 patients from the UK) of the studies considered were conducted in countries located in the East, and they included not only gastrectomy but also esophagectomies [29 – 31]. It has been established that in the East countries, detection of gastric cancer has often been done at an early stage during examinations, which leads to the tendency of operating them laparoscopically. Also, these patients tend to be younger and healthier which lowers their chances of getting any post-surgical problems [32]. Therefore, the results obtained from such studies are insufficient to reach conclusive answers on ERAS concerning gastrectomy in the Western world. On the contrary, we found that those between 61-70 years had 38 cases, while those aged 51-60 and 40-50 had 33 and 25, respectively, all of whom registered high success rates in terms of health with fewer complications. [33] A small cohort of patients (n = 96) was used in the USA to compare retrospectively the ERAS group with a historical control group. The study revealed promising outcomes, which included no significant difference in complication rates, increased quality of life y induced by an implemented ERAS program, and less time spent at hospitals, where we found the success of the ERAS program affects on patients' health, which multimodal pain management was 87.44 ± 5.80, post-operative complications was 75.02 ± 5.88, and postoperative nutrition was 88.74 ± 3.92. Compliance is frequently underrated in ERAS investigations; however, it constitutes a quality assurance for the application of protocols and gets more crucial with the rising complication rates following more intricate interventions and demanding post-operative routines. A prospective, multi-center observational study carried out at seven Italian centers [34] was aimed at evaluating adherence to ERAS components in patients undergoing gastrectomy, exhibiting a high degree of variability in their application, with some parameters having as low as possible compliance levels [35]. For every ERAS component, patient traits, regulatory constraints of the hospital, and disadvantages accounted for a patient satisfaction rating of 100% that is uniform across all; the value was recorded as 81.66±5.78.

CONCLUSION

Our study reveals that ERAS programs can considerably enhance postoperative results for patients following gastrectomy through decreased length of hospitalization, fewer complications, quick bowel recovery, and increased patient satisfaction.

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