



Clinical Effects of Using the Enhanced Recovery after Surgery (ERAS) Approach on Postoperative Bariatric Surgery Status: A Review Study

Keleidari B¹, Dehkordi MM¹, Shahrahi MS¹, Heydari M², Hajian A² and Mirzaei H^{1*}

¹Department of Surgery, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

²Department of Surgery, School of Medicine, Kashan University of Medical Sciences, Kashan, Iran

Abstract

Background: Enhanced Recovery after Surgery (ERAS) is an approach to make patient more favorable recovery time after bariatric surgery. There is no comprehensive consensus to apply it worldwide yet. This study reviewed previously performed studies concentrated on ERAS to find if it is appropriate to use globally.

Methods: In this narrative review we searched in PubMed/MEDLINE, Google scholar, and PLoS database following keywords as “bariatric surgery” OR “gastric bypass” OR “gastric surgery” AND “ERAS” OR “enhanced recovery” OR “recovery after surgery”. Searching results was considered articles from January 1st, 2000 to December 31st, 2020. Human article including systematic review, review, randomized clinical trial, and meta-analysis that its English full text was available were enrolled. To evaluate efficiency of using the ERAS protocol we analyzed its content including of hospital length of stay, postoperative pain, nausea and/or vomiting, incidence rate of complication, readmission, and reoperation.

Results: Finally, from total 106 articles 11 were eligible for study purpose. Total of 4,570 patients' related data was extracted. Laparoscopic roux-en-y gastric bypass surgery was the most common surgical technique (52%). In almost all studies using hospital length of admission reduced following the ERAS applying. Although some reports advocated using ERAS to lessen postoperative pain and nausea and/or vomiting there was no advantage in case of incidence rate of complication, readmission, or reoperation.

Conclusion: Applying the ERAS protocol absolutely decreases hospital length of stay, and partially lowers severity of pain, and nausea and/or vomiting although has no effect on complications after bariatric surgery.

Keywords: Bariatric surgery; ERAS; Obesity; Recovery; Review

OPEN ACCESS

*Correspondence:

Mirzaei H, Department of Surgery,
School of Medicine, Isfahan University
of Medical Sciences, Isfahan, Iran, Tel:
+989128253037;
E-mail: Dr.m.heydari1365@gmail.com

Received Date: 08 Jul 2021

Accepted Date: 27 Jul 2021

Published Date: 30 Jul 2021

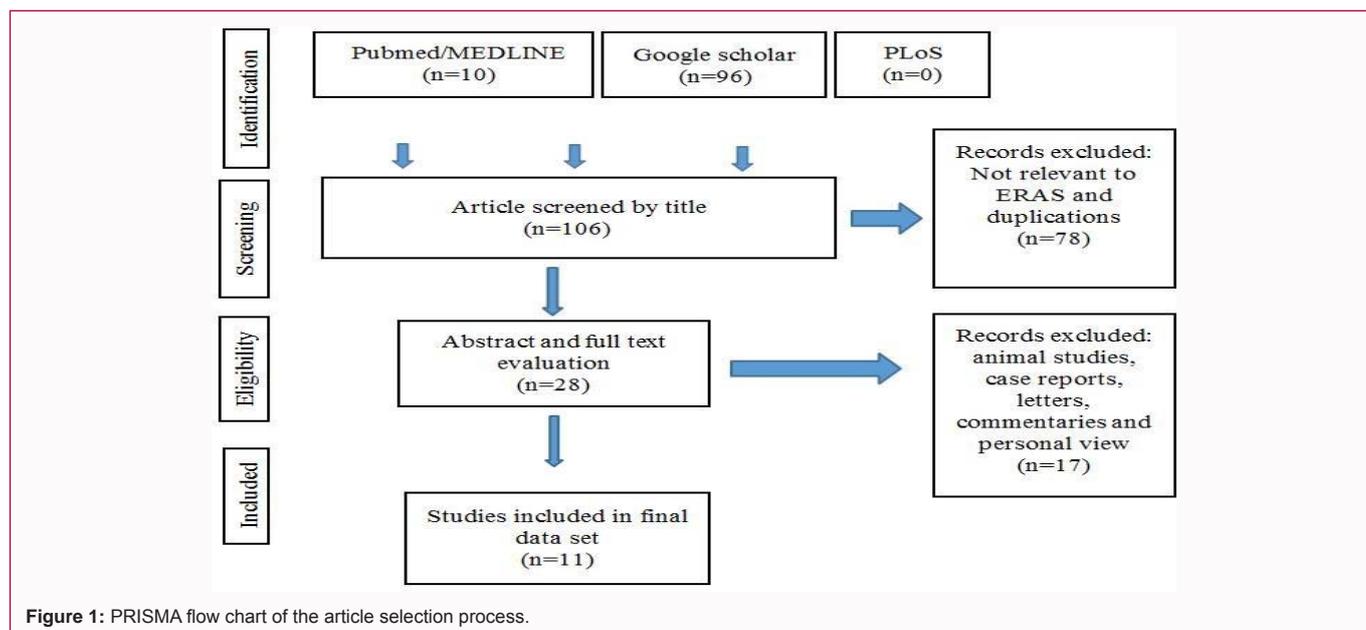
Citation:

Keleidari B, Dehkordi MM, Shahrahi MS, Heydari M, Hajian A, Mirzaei H. Clinical Effects of Using the Enhanced Recovery after Surgery (ERAS) Approach on Postoperative Bariatric Surgery Status: A Review Study. *Clin Surg*. 2021; 6: 3269.

Copyright © 2021 Mirzaei H. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction

Obesity is a common expanding health problem worldwide which is defined as a calculated Body Mass Index (BMI) equal or over 30 kg/m² [1]. Prevalence of obese patients has increased dramatically among whether children (15% to 20%) or adults (34%) since last three decades particularly in developing countries [1-3]. To explain the latter authors have implied on changes in life style with spending more sedentary days in addition to increase in eating more industrial foods [2-6]. Overweighing (25 ≤ BMI < 30 kg/m²) or obesity is not limited to a part of metabolic syndrome and could even be an unforgiving initializer for other body systems involvement including cardiovascular, cerebrovascular, endocrine, respiratory, musculoskeletal, and psychiatric [5]. However in case of severe obesity (BMI ≥ 40 kg/m²) in addition to life style effects existence of other predisposing risk factor including of genetic susceptibility, sociocultural condition, and psychological disorder is needed [7]. The pathophysiologic clue of obesity is referred to imbalance of energy intake, reserve, and consumption [8]. To deal with obesity several medical treatments concentrating on weight loss including of life style, and dietary modification, medication consumption has been presented. Bariatric surgical approach is reserved for resistant and/or life-threatening obesity [9-11]. Adjustable Gastric Banding (AGB), Roux-en-y Gastric Bypass surgery (RYGB), Mini Gastric Bypass omega operation (MGB), Vertical Sleeve Gastrectomy (VSG), and Biliopancreatic Diversion with Duodenal Switching (BPD-DS) are of common to date bariatric surgery techniques



[12-16]. Obese patient is faced with more perioperative complication comparing with a non-obese one including of myocardial infarction, respiratory failure, renal dysfunction, deep vein thrombosis, pulmonary thromboembolic event, glucose intolerance, and poor wound healing [13-15]. Therefore, early postoperative recovery seems to be mandated to reduce complication. Although most of referral bariatric surgery centers have their own instruction to recover patients sooner after surgery there is no general consensus on any approach. In 1997 Kehlet et al. firstly described a medical term as Enhanced Recovery after Surgery (ERAS) which concentrates on preparing postoperative stable condition for patient following by decreasing pain and physiological stress. The ERAS approach contains of several components including of early initiation of oral feeding, blocking pain with optimal opioid prescription, physical mobilizing patient shortly after surgery, and regular favorable follow up visits [17]. Because of lacking a structured and generally accepted guideline to recover patient after a bariatric surgery this study aimed to review previously performed studies that discussed on using the ERAS method after bariatric surgery.

Methods

This narrative review was conducted under supervision of University of Medical Sciences and the applied method was confirmed. We searched in PubMed/MEDLINE, Google scholar, and PLoS database following keywords as “bariatric surgery” OR “gastric bypass” OR “gastric surgery” AND “ERAS” OR “enhanced recovery” OR “recovery after surgery”. We added English full text and 20 years publication in filter search engine. Searching results was considered articles from January 1st, 2000 to December 31st, 2020. We regarded articles discussed on postoperative enhanced recovery following bariatric surgery. Therefore, all original human articles that were written as review, systematic review, meta-analysis, controlled trial, and cohort study in selected 20 years were included. Literatures adopted from book section, conference presentation, commentaries, guidelines, animal studies or personal views were excluded. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline to conduct this review [18]. Figure 1 shows step by step approach to discover articles based on

the PRISMA method. All abstract was screened by two reviewers independently to determine whether it met eligibility criteria to enroll or not. Finally, full texts of eligible studies were reviewed and their data was extracted to discuss in current study. We considered data including of type of surgery, postoperative pain, nausea and/or vomiting, length of hospital stays the incidence rate of complication (like bleeding, thromboembolic events, and infection), reoperation, and also readmission. The extracted data then was registered into a table. Quantitative extracted data was presented by mean and standard deviation. Qualitative variables accordingly were introduced by numbers and percent. Pearson’s correlation analysis was applied to investigate any possible correlation between parameters. We considered $p < 0.05$ as the level of significance. Analysis was conducted using the SPSS v.24 (IBM, USA).

Results

Searching results showed totally 106 articles that among all finally 11 were enrolled which evaluated patient’s recovery after bariatric surgery by using the ERAS protocol. Eventually total of 4,750 patients’ data were adopted from five cohort studies, three controlled trials, three review articles, and one meta-analysis. These studies were published from 2015 to 2019. Table 1 shows extracted data from selected studies accordingly. Analysis manifested that the mostly common performed procedure was laparoscopic RYGB (52%) followed by laparoscopic VSG (21.9%). The mean length of hospital stay was 1.98 ± 0.94 days (from 0.72 to 3.57 days). Incidence rate for complication was differed from 1.3% to 10.5% among patients ($4.37 \pm 3.23\%$). Postoperative pain feeling was ranged $17.21 \pm 15.65\%$ (from 2.2% to 34.84%) although $18.53 \pm 37.47\%$ (from 0.77% to 94.9%) of patients suffered from postoperative nausea and/or vomiting. About $3.17 \pm 2.58\%$ (up to 6.5%) of subjects were readmitted while $1.18 \pm 1.07\%$ (up to 3.4%) of them underwent reoperation. We found no significant correlation to report between parameters including of type of surgery, length of hospital stays incidence rate of complication, pain feeling, nausea and/or vomiting, readmission, and reoperation ($P > 0.05$).

Table 1: Extracted data from previous studies concentrated on Enhanced Recovery after Surgery (ERAS).

Author	Year	Study design	Sample size	Surgical approach	HLOS ¹ (days)	POC ² (%)	POP ³ (%)	PONV ⁴ (%)	Readmission (%)	Reoperation (%)
Ruiz- Tovar	2019	RCT ⁵	180	LRYG B ⁶	1.7	2.2	2.2	2.2	0	1.1
Geubbels	2019	RCT	220	LRYG B LRYG	0.7	7.3	NS ¹⁰	NS	6.4	NS
Meunier	2019	Cohort	464	B, LSG ⁷	2.4	1.3	6	1.7	6.5	1.3
Gondal	2019	Review	435	LRYG B, LSG	1.2	4	NS	NS	1.5	0
Loots	2018	Cohort	62	LRYG B, LSG	3.1	3.2	NS	NS	NS	NS
Aktimur	2018	Cohort	216	OAGB ⁸	1.2	3.3	NS	NS	0.9	0
Major	2018	Systematic review	574	LRYG B, LSG	3.5	7.6	34.8	5.7	6.4	1.5
Deneuvy	2017	Review	1667	LRYG B, LSG	2.4	2.5	NS	94.9	1.2	0.7
Blanchet	2017	RCT	374	MGB ⁹ , LSG	1.2	2.9	NS	NS	2.1	1.3
Hahl	2016	Cohort	388	LRYG B	1.3	9.8	NS	0.7	4.9	3.4
Matlok	2015	Cohort	170	LRYG B, LSG	2.9	10.5	25.8	5.9	1.7	NS

Discussion

The more the enhanced recovery after bariatric surgery the lesser the incidence of complication, costs, and discomfort either for patient or for the physician. Early postoperative mobilization and discharge the patient from hospital with no further side effects after elective surgery including bariatric procedures is followed by every surgeon. To achieve the latter appropriate structured guide is needed for any particular procedure accordingly. The ERAS is introduced firstly in 1997 to prepare physician a plan to make a favorable recovery period after bariatric surgery [17]. However, there is no general consensus on the ERAS applying postoperatively there is no alternative common approach is introduced too. Considering recent increase in obesity prevalence and following therapeutic bariatric interventions it seems important to prepare generally acceptable guidelines that concentrate on lowering patients and health providers whether side effects or costs. In 2019, Ruiz-Tovar et al. in a controlled trial study showed postoperative pain, and nausea and/or vomiting (2.2%) were obviously decreased when the ERAS was applied in compared to controls (8.9%). Additionally, significant difference was reported between study groups regarding days of hospital stay (1.7 vs. 2.8 among ERAS-treated and controls respectively). Although author didn't point to any difference considering postoperative incidence rate of complication, readmission, and reoperation he measured 24-h postoperative white blood cell count, plasma fibrinogen level, and C-Reactive Protein (CRP) obviously lower for the ERAS-treated than for controls [19]. Another controlled trial study in 2019 was published by Geubbels et al. which compared the use of ERAS and conventional method among patients experienced laparoscopic RYGB surgery. The author concluded in more favorable postoperative characteristics of pain, nausea and/or vomiting, early oral feeding tolerance, mobilization, and also hospital discharge among the ERAS-treated patients. However, there was no difference between groups considering incidence rate of complication, and readmission [20]. Again in 2019, Meunier et al. presented a cohort study which was resulted in that ERAS-treated subjects compared to controls had significant decrease in length of hospital stay. Author showed three quarter of patients in ERAS-treated group discharged during 48 h of operation. Interestingly there was no discharge happened among controls during this time after surgery. For both study groups incidence rate of complication and readmission was equal [21]. A review study in 2019 was performed by Gondal et al. The author was implied on that short-term consequence of using the ERAS method

among patients underwent bariatric surgery was not also safe and easy but concurrently reduced postoperative length of hospital stay and discomfort. Author was finally offered that the conventional postoperative care should be replaced with the ERAS approach [22]. In 2018 Loots et al. presented a cohort study in which obese subjects underwent laparoscopic RYGB or VSG procedures. Conclusively author presented that the use of the ERAS method was in association with reducing the length of hospital stay and also favorable follow-up of the patients after the surgery [23]. Aktimur et al. performed a cohort study in 2018 using the ERAS method after One Anastomosis Gastric Bypass (OAGB) surgery. They saw significant reduction in postoperative length of hospital stay although no obvious change was reported regarding incidence rate of complication or readmission after surgery [24]. Another review study in 2018 was performed by Major et al. that was resulted in decrease whether in length of hospital stay or postoperative morbidity when the ERAS guideline was considered [25]. A Chinese meta-analysis in 2018 which evaluated seven other ERAS-related studies implied on that using this recovery method could be safe and easy. Analysis showed that patient's length of hospital stay was shortened by using the ERAS although no further benefit was released considering incidence rate of postoperative complication, readmission, or reoperation [26]. In 2017, Deneuvy et al. also reviewed the ERAS effects after bariatric surgery among 1,667 patients. Results generally supported from applying the ERAS in case of preparing patient more favorable recovery time postoperatively [27]. Blanchet et al. conducted a controlled trial in 2017 in which using ERAS after MBG was concomitant with early discharge with no further increase in incidence rate of complication, readmission, or reoperation [28].

In 2016, Hahl et al. evaluated effects of the ERAS method after laparoscopic RYGB surgery in a cohort study. Over 83% of their subjects were discharged during first day of operation in addition to that no more incidence rate of complication, readmission, or reoperation were observed compared to controls [29]. Lastly in 2015 a cohort study by Matlok et al. manifested that using the ERAS could decrease postoperative analgesic need while no extra risk was generated to occur complication, readmission, or reoperation [30]. It should be considered as limiting point of this study since the data was extracted from some of medical literatures it was possible to miss some available related studies. Additionally, we had to omit any other study that was not written in English language, its full text was not available, or was not fully concentrated on the ERAS guideline.

Conclusion

Regarding current available data about the ERAS guideline on patient's status after bariatric surgery it seems the method is absolutely helpful in shortening postoperative length of hospital stay and partially effective in preparing patient more comfortable recovery time by decreasing pain and nausea and/or vomiting. It should also be considered that the method although was not favorably beneficial in lowering incidence rate of postoperative complication, readmission, or reoperation it was not a risk factor for these latter too. Conclusively it is recommended to generally applying the ERAS guideline after bariatric surgery however more study is needed to make it developed.

Acknowledgment

We present our great thanks to departments of general and laparoscopic surgery of the School of Medicine in Isfahan University of Medical Sciences, Isfahan, Iran.

Funding

This study was conducted under order and supervision of Isfahan University of Medical Sciences and all advantages referred back to this university.

References

- Dobbs R, Manyika J. The obesity crisis. The Cairo Review of Global Affairs. 2015.
- Katzmarzyk PT, Barreira TV, Broyles ST, Champagne CM, Chaput JP, Fogelholm M, et al. Relationship between lifestyle behaviors and obesity in children ages 9-11: Results from a 12-country study. *Obesity*. 2015;23(8):1696-702.
- Arroyo-Johnson C, Mincey KD. Obesity epidemiology worldwide. *Gastroenterol Clin*. 2016;45(4):571-9.
- Webb VL, Wadden TA. Intensive lifestyle intervention for obesity: Principles, practices, and results. *Gastroenterology*. 2017;152(7):1752-64.
- Sahakyan KR, Somers VK, Rodriguez-Escudero JP, Hodge DO, Carter RE, Sochor O, et al. Normal-weight central obesity: Implications for total and cardiovascular mortality. *Ann Intern Med*. 2015;163(11):827-35.
- Stang J, Huffman LG. Position of the academy of nutrition and dietetics: Obesity, reproduction, and pregnancy outcomes. *J Acad Nutr Diet*. 2016;116(4):677-91.
- Kagan J, Balliro J, Carr-Locke D, Dann M, Guterman L, Ikramuddin S, et al. Apparatus and methods for treatment of morbid obesity. Google Patents. 2015.
- Jeon JY, Ha KH, Kim DJ. New risk factors for obesity and diabetes: Environmental chemicals. *J Diabetes Invest*. 2015;6(2):109-11.
- Krentz AJ, Fujioka K, Hompesch M. Evolution of pharmacological obesity treatments: Focus on adverse side-effect profiles. *Diabetes Obes Metab*. 2016;18(6):558-70.
- Mingrone G, Panunzi S, De Gaetano A, Guidone C, Iaconelli A, Nanni G, et al. Bariatric- metabolic surgery vs. conventional medical treatment in obese patients with type 2 diabetes: 5-year follow-up of an open-label, single-centre, randomised controlled trial. *The Lancet*. 2015;386(9997):964-73.
- Wolfe BM, Kvach E, Eckel RH. Treatment of obesity: Weight loss and bariatric surgery. *Cir Res*. 2016;118(11):1844-55.
- Ells LJ, Mead E, Atkinson G, Corpeleijn E, Roberts K, Viner R, et al. Surgery for the treatment of obesity in children and adolescents. *Cochrane Database Syst Rev*. 2015;24(6):CD011740.
- Ding S-A, Simonson DC, Wewalka M, Halperin F, Foster K, Goebel-Fabbri A, et al. Adjustable gastric band surgery or medical management in patients with type 2 diabetes: A randomized clinical trial. *J Clin Endocrinol Metab*. 2015;100(7):2546-56.
- Tremaroli V, Karlsson F, Werling M, Ståhlman M, Kovatcheva-Datchary P, Olbers T, et al. Roux-en-Y gastric bypass and vertical banded gastroplasty induce long-term changes on the human gut microbiome contributing to fat mass regulation. *Cell Metabolism*. 2015;22(2):228-38.
- Plamper A, Lingohr P, Nadal J, Rheinwalt KP. Comparison of mini-gastric bypass with sleeve gastrectomy in a mainly super-obese patient group: First results. *Surg Endosc*. 2017;31(3):1156-62.
- Keleidiari B, Mahmoudieh M, Sayadi M, Ahmadi ZS, Heidari M, Hajian A, et al. Bile reflux after one anastomosis gastric bypass surgery: A review study. *Ann Med Surg*. 2021;64:102248.
- Grantcharov TP, Kehlet H. Laparoscopic gastric surgery in an enhanced recovery programme. *BJS*. 2010;97(10):1547-51.
- Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JPA, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *PLoS Med*. 2009;6(7):339.
- Ruiz-Tovar J, Garcia A, Ferrigni C, Gonzalez J, Castellon C, Duran M. Impact of implementation of an Enhanced Recovery After Surgery (ERAS) program in laparoscopic Roux-en-Y gastric bypass: A prospective randomized clinical trial. *Surg Obes Relat Dis: Official J Am Society for Bariatric Surg*. 2019;15(2):228-35.
- Geubbels N, Evren I, Acherman YIZ, Bruin SC, van de Laar A, Hoen MB, et al. Randomized clinical trial of an enhanced recovery after surgery programme vs. conventional care in laparoscopic Roux-en-Y gastric bypass surgery. *BJS Open*. 2019;3(3):274-81.
- Meunier H, Le Roux Y, Fiant AL, Marion Y, Bion AL, Gautier T, et al. Does the Implementation of Enhanced Recovery After Surgery (ERAS) Guidelines Improve Outcomes of Bariatric Surgery? A propensity score analysis in 464 patients. *Obes Surg*. 2019;29(9):2843-53.
- Gondal AB, Hsu C-H, Serrot F, Rodriguez-Restrepo A, Hurbon AN, Galvani C, et al. Enhanced recovery in bariatric surgery: A study of short-term outcomes and compliance. *Obes Surg*. 2019;29(2):492-8.
- Loots E, Sartorius B, Paruk IM, Clarke DL. The Successful Implementation of a Modified Enhanced Recovery after Surgery (ERAS) Program for Bariatric Surgery in a South African Teaching Hospital. *Surgical laparoscopy, endoscopy & percutaneous techniques*. 2018;28(1):26-9.
- Aktimur R, Kirkil C, Yildirim K, Kutluer N. Enhanced Recovery after Surgery (ERAS) in one- anastomosis gastric bypass surgery: A matched-cohort study. *Surg Obes Related Dis: Official J Am Society Bariatric Surg*. 2018;14(12):1850-6.
- Major P, Stefura T, Małczak P, Wysocki M, Witowski J, Kulawik J, et al. Postoperative care and functional recovery after laparoscopic sleeve gastrectomy vs. laparoscopic Roux-en-Y gastric bypass among patients under ERAS protocol. *Obesity surgery*. 2018;28(4):1031-9.
- Wang W, Yang C, Wang B. [Meta-analysis on safety of application of enhanced recovery after surgery to laparoscopic bariatric surgery]. *Zhonghua Wei Chang Wai Ke Za Zhi*. 2018;21(10):1167-74.
- Deneuvy A, Slim K, Sodji M, Blanc P, Gallet D, Blanchet MC. Implementation of enhanced recovery programs for bariatric surgery. Results from the Francophone large-scale database. *Surg Obes Related Dis*. 2018;14(1):99-105.
- Blanchet M-C, Gignoux B, Matussièrè Y, Vulliez A, Lanz T, Monier F, et al. Experience with an Enhanced Recovery after Surgery (ERAS) program for bariatric surgery: comparison of MGB and LSG in 374 patients. *Obes Surg*. 2017;27(7):1896-900.
- Hahl T, Peromaa-Haavisto P, Tarkiainen P, Knutar O, Victorzon M. Outcome of Laparoscopic Gastric Bypass (LRYGB) with a Program for Enhanced Recovery After Surgery (ERAS). *Obes Surg*. 2016;26(3):505-11.

30. Matłok M, Pędziwiatr M, Major P, Kłęk S, Budzyński P, Małczak P. One hundred seventy- nine consecutive bariatric operations after introduction of protocol inspired by the principles of enhanced recovery after surgery (ERAS) in bariatric surgery. *Med Sci Monit.* 2015;21:791-7.