

IMPLEMENTATION OF ENHANCED RECOVERY AFTER SURGERY (ERAS) IN EMERGENCY SURGERY FOR PERFORATED DIVERTICULITIS: A CASE REPORT

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Citation/
библиографиялық сілтеме/
библиографическая ссылка:

Desy Natalia, Adianto Nugroho, Maria Edith Sulistio, Ramzi Djauhari, Hendra Koncoro, Eddy Setijoso. Implementation of Enhanced Recovery After Surgery (ERAS) in Emergency Surgery for Perforated Diverticulitis: A Case Report. West Kazakhstan Medical Journal. 2020;62(2):192–196.

Дези Наталья, Адьянто Нугрохо, Мария Эдит Сулистио, Рамзи Джаухари, Хендра Конкоро, Эдди Сетийосо. Перфоративті дивертикулиттің жедел хирургиясында отадан кейін (ERAS) жеделдетілген оңалтуды енгізу: ауру тарихы. West Kazakhstan Medical Journal. 2020;62(2):192–196.

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Implementation of Enhanced Recovery After Surgery (ERAS) in Emergency Surgery for Perforated Diverticulitis: A Case Report

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Abstract. We shared a case of an iatrogenic large perforated diverticulitis occurred in 59 years old female patient, that was originally found accidentally by scheduled colonoscopic procedure, and already taken endoscopic clips maneuver. Unfortunately, the perforation was still opened and later on caused massive pneumoperitoneum and pneumomediastinum, which was found using abdominal CT Scan. Immediately, exploratory laparotomy including sigmoid resection and primary anastomosis took place and the patient was observed carefully in the Surgical Intensive Care Unit using Enhanced Recovery After Surgery (ERAS) protocol approach.

During the hospitalization, ERAS protocol approach was used to observe and monitor this patient, that helped the patient to fully recovered within ten days of hospitalization and there was no readmission at all. Carefull considerations should took place regarding specific case that happened, but we shared succesfull story of resection sigmoid with primary anastomosis combined with ERAS protocol approach for perforated diverticulitis with generalized peritonitis.

Keywords: *perforated diverticulitis, Enhanced Recovery After Surgery, emergency surgery.*

Перфоративті дивертикулиттің жедел хирургиясында отадан кейін (ERAS) жеделдетілген оңалтуды енгізу: ауру тарихы

Адьянто Нугрохо, Дези Наталья, Мария Эдит Сулистио, Рамзи Джаухари, Хендра Конкоро, Эдди Сетийосо

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Біз жоспарлы колоноскопиялық процедура кезінде бастапқыда кездейсоқ анықталған және эндоскопиялық қысқыштармен маневрлеу арқылы алынған 59 жастағы науқас әйелде пайда болған ятрогенді жайылған перфоративті дивертикулит жағдайымен бөлістік. Өкінішке орай, перфорация ашық күйінде қала берді және кейін іш құрылысының компьютерлі тофографиясының көмегімен анықталған массивті пневмоперитонеум мен пневмомедиастинумның пайда болуына себеп болды. Дереку сигмовидті ішектің резекциясы және бастапқы анастомозбен қоса диагностикалық лапаратомия жүргізілді. Пациент отадан (Enhanced Recovery After Surgery, ERAS) кейінгі жеделдетілген оңалту



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Received/
Келін түсті/
Поступила:
06.06.2020.

Accepted/
Басылымға қабылданды/
Принята к публикации:
22.06.2020.

ISSN 2707-6180 (Print)
© 2020 The Authors
Published by West Kazakhstan Marat Ospanov
Medical University

хаттамасының қолданылуымен интенсивті хирургиялық терапия бөлімінде мұқият тексерілді. Госпиталдау кезінде осы науқасты бақылау үшін ERAS хаттамасы қолданылды, бұл оның оның ауруханаға түскеннен кейін он күн ішінде толық сауығып кетуін қамтамасыз етті және қайтадан госпиталдау мүлдем болған жоқ. Сипатталған нақты жағдайда мұқият тексеру керек, бірақ біз жалпыланған перитонитпен перфорацияланған дивертикулит үшін ERAS хаттамасына сәйкес бастапқы анастомозбен сигмовидті ішек резекциясының сәтті оқиғасымен бөлістік.

Негізгі сөздер: *перфоративті дивертикулит, отадан кейінгі жеделдетілген оңалту, жедел хирургия.*

Внедрение ускоренной реабилитации после операции (ERAS) в неотложной хирургии перфоративного дивертикулита: история болезни

Адьянто Нугрохо, Дези Наталья, Мария Эдит Сулистрио, Рамзи Джаухари, Хендра Конкоро, Эдди Сетийосо

Больница Святого Каролуса, Джакарта, Индонезия

Мы поделились случаем ятрогенного распространенного перфоративного дивертикулита, возникшего у 59-летней пациентки, который первоначально был случайно обнаружен при плановой колоноскопической процедуре, и уже взят маневрированием эндоскопическими зажимами. К сожалению, перфорация все еще оставалась открытой и позже послужила причиной массивного пневмоперитонеума и пневмомедиастинума, которые были обнаружены с помощью компьютерной томографии брюшной полости. Сразу же была проведена диагностическая лапаротомия, включающая резекцию сигмовидной кишки и первичный анастомоз. Пациентка была тщательно осмотрена в отделении хирургической интенсивной терапии с использованием протокола ускоренной реабилитации после операции (Enhanced Recovery After Surgery, ERAS). Во время госпитализации использовался протокол ERAS для наблюдения за этой пациенткой, что обеспечило ее полное выздоровление в течение десяти дней после госпитализации и повторной госпитализации не было вообще. Тщательное рассмотрение должно иметь место в отношении описанного произошедшего конкретного случая, но мы поделились успешной историей резекции сигмовидной кишки с первичным анастомозом в сочетании с протоколом ERAS для перфорированного дивертикулита с генерализованным перитонитом.

Ключевые слова: *перфоративный дивертикулит, ускоренная реабилитация после операции, неотложная хирургия.*

Introduction.

It is estimated that only 10-15% of patients with diverticular disease, will be symptomatic and approximately 5% develops diverticulitis, which lead to complications such as abscess formation, obstruction or perforation. Until recently, there is still no consensus on the optimal management of perforated diverticulitis [1]. It is essential deliver a comprehensive care, not only focusing on the surgical aspect, but also to optimize its perioperative care [2].

The Enhanced Recovery After Surgery (ERAS) protocol is designed to reduce perioperative and intraoperative stress responses, and to support the recovery of organ function for a better outcome and faster recovery. Despite the acknowledgement of ERAS protocol in elective surgery, there are only few studies that have investigated the effectiveness of ERAS protocol for emergency surgical patients [3]. We would like to share our experience with ERAS protocol in emergency surgical strategies for complicated diverticulitis.

Case Illustration

A colonoscopy procedure was scheduled for a 59 years old female, with a history of abdominal discomfort for over a year, who was otherwise healthy. There were no history of bloody diarrhea nor changes nor reduce of body weight. During the colonoscopy, a large diverticula was found approximately 16 cm from the anal, with signs of perforation (Figure 1). Several measures have been advocated to close the perforation, including the use of endoscopic clips, but unfortunately it was still opened.

With a stable condition, abdominal CT Scan was performed and reveal a ruptured diverticula with a clip on its wall, sized of 30x20 mm on the left medial of sigmoid colon, with massive pneumoperitoneum and pneumomediastinum (Figure 2).

Immediately after CT, surgical consultation was commenced and exploratory laparotomy was done. Perforation of the sigmoid colon was found, approximately 5 cm from the pelvic floor, with fecal mass inside and 50 cc pus in the pelvic area (Figure 3). She underwent a sigmoid resection and anastomosis, together with a transcecal ileostomy (Figure 4A and 4B), and was admitted for a close monitoring at Surgical Intensive Care Unit.

The histo-pathology report also confirmed acute perforated diverticulitis of sigmoid with active chronic inflammation, mild destruction, non-dysplastic at the edges of the rupture site. Later on, the patient's subcutaneous emphysema and pneumomediastinum resolved within a few days after the operation. She was discharged 10 days later and in a good condition.

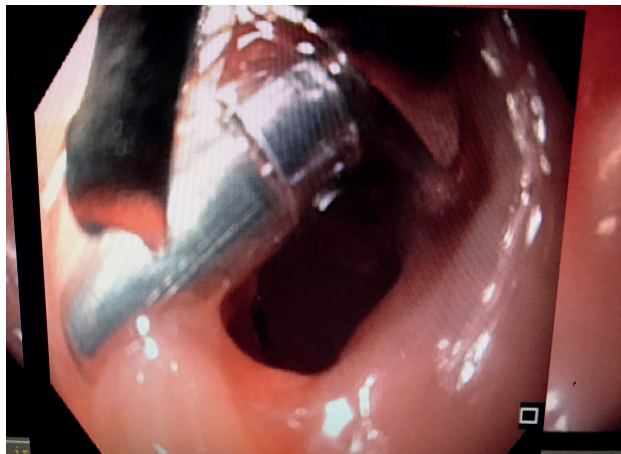


Figure 1. The colonoscopic finding of the diverticulitis and the closure attempt using endoclip



Figure 2. Free gas was noted in the pelvic area, retroperitoneal space, upper abdominal area, and the thoracic area. Subcutaneous emphysema in the abdominal and thoracic area were also showed in the CT Scan

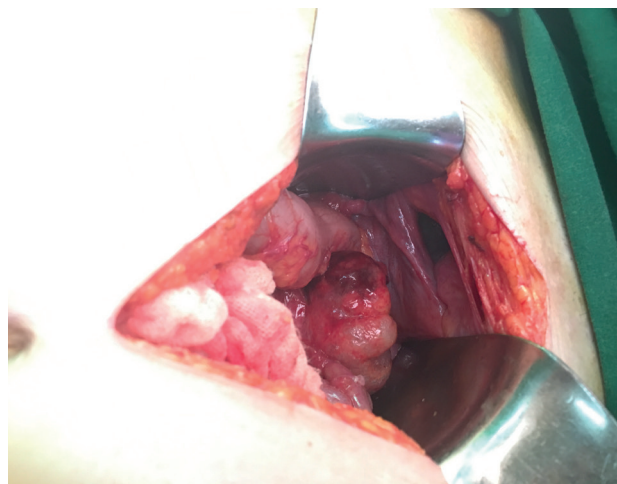


Figure 3. Intraoperative finding showed a perforated sigmoid colon and pus around it

Table 1. ERAS Protocol in Emergency Surgery for Perforated Diverticulitis

Time Interval	Emergent ERAS Protocol Approach
Day 1	<p>Preoperative : Bowel preparation (patient went through endoscopic procedures first) Preoperative education and emergency consultation to digestive surgeon No prolonged or overnight fasting</p> <p>Intraoperative : General anesthesia with short-acting anesthetic agent Sigmoid resection with colorectal anastomosis and trancaecal ileostomy Combined antibiotics</p> <p>Postoperative : Multimodal analgesia Prevention of nausea and vomiting</p>
Day 2	Started to take oral clear fluid 50 cc / hour
Day 3-4	Early mobilization Increased oral nutrition uptake
Day 5	Removal of Naso Gastric Tube (NGT) and urinal catheter Decreased the use of parenteral nutrition
Day 6	Stop intra-venous injection Started oral medications, such as : antibiotic and analgetic (NSAID)
Day 7	Total enteral nutrition and fluid
Day 8	Removal of trancaecal drain Stop the intra-venous line
Day 9	Applied the stoma bag Postoperative education, while assessing the outcomes
Day 10	Successfully recovered and discharged from the hospital in a good condition

Discussion

Complicated diverticulitis (such as diverticulitis accompanied by free gas or perforation), still remains as the most common indication for emergent operative

intervention. Emergency surgical management in diverticular perforation related to endoscopy is necessary if endoscopic approach failed to close the perforation [2]. Early warnings for iatrogenic perforations should be prompted by unusual abdominal pain with distension, chest pain, subcutaneous emphysema, or shortness of breath [5,6], while at a later stage is associated with more severe symptoms or signs, such as Systemic Inflammatory Response Syndrome (SIRS), hypotension, and mental confusion [4].

Since the 1980's, many surgeons has performed two-stages procedures, consist of resection of diseased segment, followed by either anastomosis and diverting stoma or construction of end-colostomy (Hartmann's procedure) [1,7]. Vermeulen J, et al argued that the restoration of bowel continuity after Hartmann's procedure is technically a challenging operation and is associated with significant morbidity (25%) and mortality (14%), respectively. Hartmann's procedure also often results in a permanent colonostomy, whereas the patient will seems to face the physical and physiological challenges [1]. A randomized controlled study demonstrated that patients underwent Hartmann's procedure were significantly less likely to undergo stoma reversal (57%) compared with patients that underwent ileostomy procedure (90%) [7].

Although Hartmann's procedure is considered as a safer procedure and especially suitable for patients with multiple co-morbidities [4], but several prospective studies have shown that resection with primary anastomosis as a reasonable option in patients undergoing emergency surgical operation for complicated diverticulitis [7]. In the terms of severe postoperative complications and mortality, primary anastomosis with or without defunctioning loop ileostomy seems not to be inferior to Hartmann's procedure. Salem and Flum also confirmed that mortality rates after primary anastomosis reached 10% compared to Hartmann's procedure that reached the percentage of 19%, respectively [1].

Moreover, present studies also revealed a tendency towards a lower incidence of both major and minor postoperative complications in the setting patients with ERAS protocol. These reduction is likely to result from combination of multimodal perioperative interventions, with the intention to attenuate metabolic response to surgery, to support the recovery of organ function, and to preserve postoperative immune system [8,9]. Wisely et al. have identified that ERAS elements should be considered are not only for elective colorectal surgery, but they are also appropriate for emergency surgical patients. Based on their study, most elements were considered appropriate in varying degrees, such as avoiding the use of drain was identified as appropriate only for some emergency surgical patients, regarding their type of cases [8].

ERAS protocol approach with resection and primary anastomosis, together with trancaecal ileostomy were successfully performed in our case. Although, we realized that there was variability in the way some elements were applied, most notably for early postoperative oral feeding and mobilization, but the range of implementations itself were not so deviated at all from the concept of ERAS. Total of 10 days hospitalized looks promising because this result might be partly due to combination of the administration of prevention from nausea and vomiting, fluid management, and the preferential of NSAID use rather than opioid-analgesia in the ERAS protocol. Roulin et al. also reported that there was no evident difference both in elective surgical and emergency surgical patients from the first postoperative day to functional recovery following ERAS protocol [9]. Other parameters such as the stabilization of the patient's hemodynamic intraoperatively and there were no other co-morbidities and usage of immunosuppression drugs from the history of patient also contributed the decision to do one-stage procedure with the possibility to develop anastomosis leakage and intraabdominal late infection was small.

Richter et al. also confirmed that perforated sigmoid diverticulitis in Hinchey stages III/IV can be safely be treated by one-stage sigmoid resection and primary anastomosis. More interestingly, in their study they also showed that only 1 case out of 33 patients that underwent one-stage sigmoid resection with primary anastomosis was found with anastomosis leakage, and then underwent a second laparotomy with redo anastomosis and protective ileostomy [10].

Conclusions

Although primary sigmoid resection with Hartmann's procedure still consider as the mainstay of operative treatment for perforated diverticulitis patient, but resection with primary anastomosis can also be considered in younger patient, healthy patients whose stable physiology and with minimal faecal contamination, thus could allow this approach more aggressively [1]. Moreover, ERAS protocol in the setting of emergency colorectal surgery was safe and feasible, that significantly produce shorter hospitalization and faster recovery of bowel function, without an increase in 30 days postoperative mortality and readmission [3].

With generally better outcomes, ERAS protocol still needs to adapt when it comes to emergency surgical setting as compliance with all ERAS elements that can be difficult to be done. A multidisciplinary team approach and more study are required to formulate this ERAS protocol into an effective care pathway for the heterogeneous emergency surgical patient.

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Acknowledgment

Medical Record Department of St. Carolus Hospital, Jakarta, Indonesia

Financial Support

No funding body or institution

Conflict of Interest : None declared