ORIGINAL RESEARCH

International Journal of Surgery 12 (2014) 315–319

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Early predictors for tissue healing deficit and leakage in geriatric critically ill patients receiving emergent abdominal surgery: A case control study

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ARTICLE INFO

Article history:
Received 9 November 2013
Received in revised form
26 November 2013
Accepted 21 January 2014
Available online 31 January 2014

Keywords:
Hypoalbuminemia
Vasopressor
Geriatric critical ill

ABSTRACT

Background: As our world ages and the elderly population grows. Surgery on the aged critically ill tend to result in additional morbidity and mortality. We sought to determine early predicting factors that were associated with postoperative leakage and tissue healing deficiency after emergent abdominal surgery in geriatric critically ill patients.

Material and method: Retrospectively, geriatric critically ill patients received anticipated, single-stage emergent abdominal surgery via emergency room were enrolled. Patients who received only one definitive surgery during their hospital course were labeled as group A, patients received anticipated one-stage surgery and eventually with postoperative leakage and tissue healing deficiency were labeled as group B. The demographics and parameters were obtained for comparison.

Result: There were 45 patients in group A, and 34 patients in group B. The mean age is 77.4 ± 6.1 years in Group A and 76.9 ± 8.5 years in Group B, the mean APACHE score was 20.3 ± 7.5 vs. 21.6 ± 7.7. There were no significances in age, gender, comorbidities, and physiological scores. There were significances in the persistent post-operative use of vasopressors and hypoalbuminemia. The 30-day mortality rate was 0% in group A and 38.2% in group B.

Conclusion: Persistent post operative vasopressor use and hypoalbuminemia are associated with higher rate of morbidity and mortality after emergent abdominal surgery in geriatric critically ill patients. Early recognition is essential for proper management. Further studies are required for a better understanding in identifying risk factors.

1. Introduction

The aging society has become a global issue; there were growing expenses of medical care for aging patients among countries. By the definition given by the World Health Organization and most developed countries, a person 65 years or older is considered “elderly” or an older person. The medical care and treatment of these aged patients should be carried out carefully [1–4].

Because of the decreased physiological reserve and tissue frailty in the geriatric patients, it would be rational to expect higher rate of morbidity and mortality in elderly patients that received surgery [5,6]. Nonetheless, the situation would be more complicated in geriatric critical ill patients that received emergent acute care surgery.

Evaluating the predicting and risk factors for the complications in geriatric patients receiving surgery is of importance, therefore, in this retrospective study, we tried to determine early predicting factors for tissue healing insufficiency in geriatric critical ill patients that received emergent abdominal surgery via emergency room and admitted for intensive care.

2. Material and method

During July 2008 and January 2011, we reviewed the charts of patients aged more than 65 years old that had received emergent

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http://dx.doi.org/10.1016/j.ijsu.2014.01.016

non-traumatic abdominal surgery via emergency room and had been admitted to our intensive care unit at the Trauma and Emergency Center. All patients received an emergent laparotomy under the evaluation and judgment of qualified gastroenterology surgeons preoperatively, the causes for emergent laparotomies were uncontrolled gastrointestinal tract hemorrhage or intra-abdominal infection and contamination induced sepsis state; as well as ischemia or gangrenous change of part of gastrointestinal tract or viscera. The operational procedures include hemostatic procedures; repair and reconstruction for gastrointestinal tract lesions or ischemic change. After the operator concerned the strategy of treatment and the severity of the clinical presentation, tissue viability, as well as the perioperative conditions while completion of the surgery; As a result, those patients received an anticipated single, definitive operative procedure and admitted to intensive care unit were selected for study.

Patients that were sustainable to receive a laparoscopic surgery procedure and patients received planned re-operations were not candidates for this study, patient expired within 48 h after the completion of surgery were also excluded.

Institutional review board approval was not required for this type of retrospective research in our institution.

Patients who receive anticipated single-stage laparotomy may develop signs/symptoms of tissue healing insufficiency that deviate from preoperative expectations and may require a relaparotomy for further management. In the current study, this include (1) post-operative site hemorrhage, (2) anastomosis leakage; (3) laparotomy wound dehiscence and evisceration that need repair in the operation theater, (4) non surgical site visceral ischemia or intestine perforation.

The decision of receiving relaparotomy in the operation theater was approved by both attending surgeon and intensivist. Patients who developed minor intra-abdominal infection or abscess and received a successful percutaneous drainage procedure or conservative antibiotic treatment were considered to have received a single-stage operation, as well as patients with laparotomy wound insignificant dehiscence and minor evisceration that can be amended at bedside.

Therefore, patients who received an anticipated, single definitive procedure preoperatively were enrolled in this study and divided into two groups, Group A, which received a single definitive laparotomy, and Group B, which received an anticipated, single definitive laparotomy initially, but with tissue healing insufficiency and received relaparotomy afterward.

The demographics, pre-existing medical conditions, laboratory data, and acute physiology and chronic health evaluation II (APACHE II) scores were obtained for study. Patients with sepsis and septic shock were managed according to the guidelines from the Surviving Sepsis campaign [7].

Patient received vigorous resuscitation and vasopressors (e.g: norepinephrine or dopamine) were given in the setting of a persistent, postoperative hemodynamic instability state. The use of persistent post-operative use of vasopressors was defined as use of vasopressors more than 72 h postoperatively. The use of vasopressors included the use of norepinephrine, dopamine, and epinephrine.

The preoperative laboratory data were obtained from emergency room, serum albumin level less than 2.4 g/dl was defined as hypoalbuminemia [8]. The calibrated normal range of serum lactate was 4.5–19.6 mg/dl in our institution.

2.1. Assessment of patient severity

It is difficult to estimate and assess the severity of surgical critically ill patients precisely because there were inter-tangled factors (i.e.: most risk factors correlate with one another, and cannot be assessed independently). However, we try to make the assessment of the severity of surgical critically ill patients in the current study.

We use ASA (American Society of Anesthesiologists) score for evaluation of physiological status during operation. We also use the physiological and operative severity scores for the enumeration of mortality and morbidity (POSSUM) scoring system for evaluating physiological status and surgical mortalities and morbidities in our surgical critical ill patients. The POSSUM includes evaluation of physiological severity, operative severities, operational procedures, total blood loss, degree and extent of peritoneal soiling, mode of surgery… etc; which is thought to be reliable for evaluation of patients and operative severity and for surgical audit [9,10].

Therefore, we use these scores (ASA score, physiological-POSSUM, operative-POSSUM, and Sum of POSSUM scores) as well as conventional APACHE II scores for incorporated evaluations and assessment of the preoperative and postoperative multiple clinical parameters of our surgical patients.

2.2. Statistical analysis

Means and standard deviations were used to summarize the continuous variables. Comparisons of the two groups were performed using a two-sample t-test for continuous variables, and a χ^2 test for nominal variables. For all tests, two-sided p-values were calculated with 0.05 as the level of significance. The Statistical Analysis System (SAS) was used in the analysis.

3. Result

During this 32 months, there were a total of 115 patients aged more than 65 y/o received emergent abdominal laparotomy and admitted to the intensive care unit. Among these 115 patients, there were 36 patients excluded because of surviving less than 48 h after the operation.

Therefore, a total of 79 aged patients received anticipated, one-stage emergent non-traumatic abdominal surgery were included in the current study. Of the 79 patients, 45 patients received only one definitive surgery during their hospital course and were labeled group A. The 34 remaining patients who received anticipated one-stage abdominal surgery, which progressed to unplanned relaparotomy were labeled group B.

There were no differences between the type and indications for receiving surgeries between two groups (Table 1). The mean age is 77.4 ± 6.1 years in Group A and 76.9 ± 8.5 years in Group B, the mean APACHE score was 20.3 ± 7.5 in Group A and 21.6 ± 7.7 in Group B. There were no significances in age, gender, pre-existing

Table 1
Type and indications for operation.

Type of operation	One staged op.		Unplanned relaparotomy	
	$N = 45$	%	$N = 34$	%
Upper GI (gastroduodenal) perforation, hemorrhage, obstruction	16	35.6	12	35.39
Upper GI (small intestine) perforation, hemorrhage, obstruction	9	20.0	12	35.3
Lower GI perforation, hemorrhage, obstruction	14	31.1	8	23.5
Hepato-biliary-pancreas infection	6	13.3	2	5.9

The Fisher's exact test showed that the distribution of type of operation was not statistically different between one staged operation and unplanned relaparotomy ($p = 0.397$).