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Original Research Article

Postoperative complications and mortality after major gastrointestinal surgery

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ARTICLE INFO

Article history:
Received 28 September 2013
Accepted 27 January 2014
Available online 27 June 2014

Keywords:
Major abdominal surgery
High-risk patients
Postoperative complications
Mortality

ABSTRACT

Background and objective: The incidence of postoperative complications and death is low in the general population, but a subgroup of high-risk patients can be identified amongst whom adverse postoperative outcomes occur more frequently. The present study was undertaken to describe the incidence of postoperative complications, length of stay, and mortality after major abdominal surgery for gastrointestinal, hepatobiliary and pancreatic malignancies and to identify the risk factors for impaired outcome.

Material and methods: Data of patients, operated on for gastro-intestinal malignancies during 2009–2010 were retrieved from the clinical database of Tartu University Hospital. Major outcome data included incidence of postoperative complications, hospital-, 30-day, 90-day and 1-year mortality, and length of ICU and hospital stay. High-risk patients were defined as patients with American Society of Anesthesiologists (ASA) physical status ≥3 and revised cardiac risk index (RCRI) ≥3. Multivariate analysis was used to determine the risk factors for postoperative mortality and morbidity.

Results: A total of 507 (259 men and 248 women, mean age 68.3 ± 11.3 years) were operated on for gastrointestinal, hepatobiliary, or pancreatic malignancies during 2009 and 2010 in Tartu University Hospital, Department of Surgical Oncology. 25% of the patients were classified as high risk patients. The lengths of intensive care and hospital stay were 4.4 ± 7 and 14.5 ± 10 days, respectively. The rate of postoperative complications was 33.5% in the total cohort, and 44% in high-risk patients. The most common complication was delirium, which occurred in 12.8% of patients. For patients without high risk (ASA < III; RCRI < 3) in-hospital, 30-, 90-day and 1-year mortality were 2%, 5%, 12.7% and 26.0%. Patients with ASA ≥ III and RCRI ≥ 3 had 2.3% in-hospital mortality, and at 30-, 90 days and 1 year the mortality was 8.5%, 17.8%, and

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Peer review under the responsibility of the Lithuanian University of Health Sciences.

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http://dx.doi.org/10.1016/j.medici.2014.06.002
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42.2%, respectively ($P = 0.001$, $P < 0.0001$ and $P < 0.0001$ compared to the lower risk patients). On multivariate analysis, age above 70 years, ASA ≥ III, RCRI ≥ 3, duration of surgery >130 min, and positive fluid balance >1300 mL after the 1st postoperative day, were identified as independent risk factors for the development of complications.

Conclusion: The complication rate after major gastro-intestinal surgery is high. ASA physical status and revised cardiac risk index adequately reflect increased risk for postoperative complications and worse short and long-term outcome.

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1. Introduction

Recent estimates indicate that millions of major surgical procedures are performed worldwide each year [1]. The high-risk non-cardiac surgical population represents a major global healthcare challenge [2–7]. The incidence of postoperative complications and death is low overall, but the sub-group of high-risk patients accounts for over 80% of postoperative deaths, even though these high-risk patients account for fewer than 15% of the in-patient procedures [4,6]. Advanced age, co-morbid disease, and major and urgent surgery are the key factors associated with increased risk [4,6,7]. Patients undergoing gastrointestinal surgery for malignancy are typical representatives of such high-risk patients. Despite strong evidence of their impact on poor surgical outcomes, our understanding of standards of postoperative care is limited. Neither short- nor long-term outcomes after major gastrointestinal surgery in Estonia have been reported. For a population of 1.3 million there exist two national tertiary care centres. The present retrospective study has been performed in one of these centres, Tartu University Hospital. The present study was undertaken first, to describe the incidence of postoperative complications, length of stay, and mortality after major abdominal surgery for gastrointestinal, hepatobiliary and pancreatic malignancies in our centre, and, second, to identify the risk factors for impaired outcome.

2. Material and methods

This study was approved by the Research Ethics Committee of the University of Tartu (protocol No. 204/T-6).

Records of patients who were operated on in Tartu University Hospital, Department of Surgical Oncology between January 1, 2009, and December 31, 2010, were retrieved from the hospital clinical database and retrospectively reviewed. Patients' demographics, underlying diagnoses, main perioperative and intensive care data were extracted and analyzed. ASA physical status score [8] and revised cardiac risk index (RCRI) [9] were documented for assessment of risk associated with concomitant diseases. High risk patients were defined as patients with American Society of Anesthesiologists (ASA) physical status ≥3 and revised cardiac risk index (RCRI) ≥3. Postoperative complications were retrospectively documented using the definitions in Table 1. Duration of intensive care unit

Table 1 – Definition of complications.

Infection	Pneumonia – confirmed chest X-ray, marked in case history Abdominal – confirmed abdominal computed tomography, marked in case history Urinary tract – clinical diagnosis, UTI marked in case history Wound – clinical diagnosis, marked in case history Septic shock – ACCP consensus criteria [10], marked in case history
Respiratory	Mechanical ventilation >24 h Reintubation regardless of the reason
Cardiovascular	Acute myocardial infarction – ECG signs of ischaemia, troponin T > 0.03 ng/mL; diagnosis marked in case history Cardiac arrest Cardiac arrhythmia – atrial fibrillation, ventricular fibrillation, marked in case history, use of iv antidysrhythmics (amiodarone ≥150 mg/day; metoprolol ≥5 mg; propafenone ≥70 mg)
Neurological	Transient confusion – needing intravenous therapy with haloperidol and/or clonidine, marked in case history Stroke – clinical diagnosis confirmed with computed tomography, marked in case history
Abdominal	Anastomotic leak – needing drainage or reoperation, marked in case history Ileus – requiring nasogastric aspiration or surgery, marked in case history
Renal	Urine output <0.5 mL/kg/h for more than 12 h or increased creatinine (2×) [11] Required dialysis for acute renal failure
Other	Postoperative massive haemorrhage – need for therapeutic endoscopy or re-operation, marked in case history Re-operation for other reasons than listed above

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