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Immediate coronary artery bypass graft surgery for acute coronary syndrome – Outcomes and trends over the past eight years

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ABSTRACT

Background: Patients with acute coronary syndrome (ACS) who are indicated for an immediate cardiac procedure represent a high-risk population, burdened with an increased frequency of serious postoperative complications and higher mortality. In our study, we present the outcomes and trends within a group of patients who underwent a surgical procedure at our centre between 2006 and 2013.

Methods: We retrospectively analyzed data obtained from the National Registry of Cardiac Surgery for the period between 2006 and 2013; the patient population was further subdivided into two time periods, in order to facilitate the comparison: 2006–2009, $n = 185$; 2010–2013, $n = 112$. Furthermore, three groups were defined within each of the time periods, according to the main reason for performing the emergency surgery: unstable angina (UA), acute myocardial infarction (AMI) and cardiogenic shock (CS). Consequently, corresponding groups in both time periods were compared.

The main observed parameter was the postoperative mortality within 30 days from the procedure. Other analyzed attributes included the overall length of stay, length of ICU stay, ventilation time and the number of postoperative complications (reoperation due to bleeding, infectious complications of the sternotomy, renal failure requiring haemodialysis, multiple organ failure, stroke).

Results: Immediate surgical procedures represented on average 6.45% (4.7-9.2%) of the total number of surgeries performed at our centre per year between 2006 and 2013. The number of this type of surgery manifests a downward trend: 7.7% (2006–2009) vs. 5.2% (2010–2013). We also noted changes in the trends of the number of patients undergoing surgery due to UA: 40% (2006–2009) vs. 25% (2010–2013), AMI: 50% (2006–2009) vs. 55% (2010–2013) and CS: 11% (2006–2009) vs. 20% (2010–2013). The thirty-day mortality in the whole patient group was 15.49%: 12.4% (2006–2009) and 20.5% (2010–2013).

Conclusions: The analysis of our patient file shows a decreasing trend in the number of patients undergoing emergency surgery due to ACS in our centre in the course of the last

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eight years. Between 2010 and 2013, the proportional representation of patients undergoing surgery due to UA decreased, while the percentage of patients undergoing surgery due to AMI and CS increased. Within the population of patients with ACS, we were also able to determine an increased frequency of some risk factors and increased thirty-day mortality among patients undergoing surgery.

Introduction

Acute coronary syndrome (ACS) is a summary of clinical manifestations of the myocardial ischaemia. It refers to patients with unstable angina pectoris (UA), non-ST segment elevation myocardial infarction (N-STEMI) and ST-segment elevation myocardial infarction (STEMI). The incidence of ACS in the Czech Republic is about 3.25 cases per 1000 inhabitants per year. The hospitalization mortality reaches 5.1%. In case of STEMI, the mortality comes up to 5.5% in patients undergoing percutaneous coronary intervention (PCI), and 25% in the non-PCI group [1]. Cardiogenic shock (CS) develops in about 5–10% of patients with acute myocardial infarction (AMI). CS is most frequently caused by heart failure, in approximately 80% of cases, CS most frequently appears within 5–6 h from the onset of the AMI symptoms (STEMI), however it may become manifested within up to 70 h [2–5]. The mortality in this group is as high as 50–80%. The development of mechanical complications of the myocardial infarction may be placed within the interval between the second and the seventh day from the onset of myocardial infarction (MI) [6–8].

Patients with ACS represent a very heterogeneous group. Also the published postoperative outcomes, or mortality, are variable. Whereas in the group of patients with AMI, the presented mortality reaches the level of 1.6–20%, in patients undergoing a revascularization procedure in CS the mortality reaches about 20–50% [9–14].

Methods

Our study reports on a population of patients undergoing an immediate revascularization procedure on the myocardium due to acute coronary syndrome at the Cardiac Surgery Centre of the University Hospital Ostrava between 1st January 2006 and 31st December 2013.

The year 2006 was selected as the beginning of the monitored period on purpose, due to the changes which occurred in the National Registry of Cardiac Surgery, which do not allow us to obtain identical information for patients undergoing surgery before the year 2006.

Immediate surgical procedures are defined as procedures performed immediately after presentation and determination of indication for surgical intervention. Median time between assign to surgical intervention and induction of anaesthesia is about 90 min. Our population comprise catastrophic or salvage interventions of patients requiring cardiopulmonary resuscitation en route to the operating room.

The operated patients presented with clinical manifestations of acute myocardial ischaemia (recurrence angina, ischaemic changes on electrocardiography (ECG), manifestations of cardiac failure, malignant ventricular arrhythmia, etc.). The main reasons for performing an immediate surgery procedure included unstable angina pectoris, acute myocardial infarction, pulmonary oedema and cardiogenic shock. Taking into consideration the small number of patients operated due to pulmonary oedema, these patients were included in the group of patients with cardiogenic shock.

In these patients, it was not possible to perform PCI for various reasons (anatomy not suitable for PCI, left main stem stenosis, diffusion impairment, impossibility to determine the culprit lesion), the PCI was not successful, or the symptomatology connected with myocardial ischaemia continued, although the PCI intervention had been performed.

Together with a revascularization procedure, also heart valve surgery was performed in indicated cases, together with a correction of mechanical complications of AMI and complications pertaining to PCI.

The group of patients who underwent surgery was further divided into two time periods of 2006–2009 and 2010–2013, according to the date of surgery, in order to facilitate the comparison and determine the trends. Three subgroups were further determined in each of the time periods, according to the reason for performing the emergency surgical procedure: UA, AMI and CS. The pre-surgery risk factors, perioperative variables and postoperative outcomes in individual subgroups from the 2006–2009 period were compared with the respective subgroups from 2010 to 2013.

The main observed parameter in the study was the postoperative mortality, which was determined by the number of patients who died within thirty days from the surgery during hospitalization, as well as following a discharge from the healthcare establishment.

The observed secondary attributes included the overall length of stay, length of stay at the intensive care unit (ICU), ventilation time and the number of postoperative complications (reoperation due to bleeding, infectious complications of the sternotomy, renal failure requiring haemodialysis (RF), multiple organ failure (MODS), neurological complications), the number of off-pump surgeries and surgeries on pump, the use of intra-aortic balloon pump (IABP) and ventricular assist device (VAD)/extracorporeal membrane oxygenation (ECMO).

The overall length of stay was defined as the number of days from the surgery to discharge of the patient from our hospital, transfer to another hospital, or death of the patient.

Cases of immediate myocardial revascularizations indicated due to critical findings on coronary arteries in asymptomatic