

Quality control project in ST elevation myocardial infarction

STEMI registration in Belgium

Focus on cardiogenic shock

Background

Acute heart attacks are a major healthcare problem with still high mortality and morbidity rates.

The major goal in the treatment of AMI is the rapid restoration of blood flow and myocardial perfusion in the infarct zone and this can be obtained either by pharmacological approach (fibrinolysis) or by mechanical approach (primary Percutaneous coronary intervention, PCI). Primary PCI has been shown to offer a substantial benefit over fibrinolysis (e.g. 30% reduction in mortality and re-infarction rate) at least if the procedure is performed by highly experienced operators and within 90 minutes after the first medical contact. As availability of PCI centres is limited, regional transfer protocols are important and should allow transfer of high risk patients (e.g. Killip class >1) to hospital with PCI facilities. Particularly AMI complicated with cardiogenic shock carries a high mortality risk. The previously reported Shock trial could demonstrate a benefit from early invasive intervention as compared to early thrombolysis. Belgian data about cardiogenic shock in STEMI patient are scarce.

The present report focus on management and outcome of cardiogenic shock in the Belgian STEMI patients admitted in the period 2007-2008

Purpose

The college of cardiology together with the Belgian working group on acute cardiology (BIWAC) set up a minimal data base registry for ST elevation myocardial infarction in all Belgian centres with a minimum acute cardiac care program A in order to

1. describe the incidence of cardiogenic shock
2. describe the management and in hospital mortality of cardiogenic shock
3. Identify predictors of mortality in cardiogenic shock patients

Methods

Collection of data is carried out by an electronic web-based registry that is governed by an independent software company specialised in electronic data capture solutions (Lambda-plus- website: <http://www.lambdaplus.com>).

A number of baseline characteristics for each patient is included which allows to stratify the patients according to a previous validated TIMI risk score: age, gender, collapse with cardiopulmonary resuscitation (CPR), history of coronary artery disease (CAD) or peripheral artery disease (PAD), location of infarction, total ischemic time. Especial attention is given to Killip class and cardiogenic shock:

Killip 1: no signs of heart failure

Killip 2: crepitations at both lung bases

Killip 3: pulmonary oedema with crepitations at both lung fields

Killip 4: = cardiogenic shock=

1. hypotension in the absence of hypovolemia (systolic blood pressure < 90 mmHg with need for vasopressors)
2. clinical signs of left and/or right heart failure

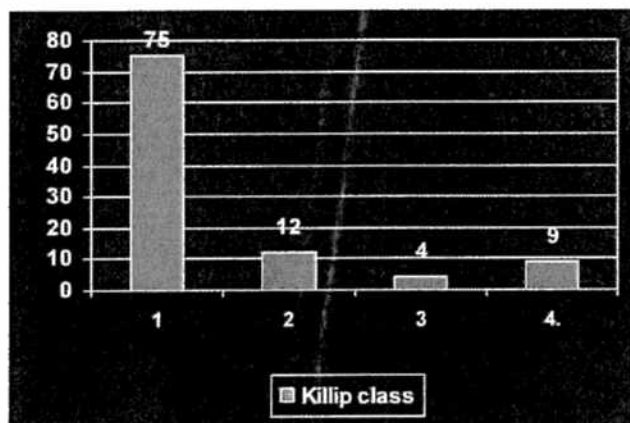
In addition the register includes data about reperfusion strategy (primary PCI, thrombolysis,) transfer issues and data about in hospital mortality.

Access to the registry was available in the first part of 2007 only to the members of the steering committee and from 1/7/2007 access was extended to all Belgian hospitals with acute cardiac care program. Over time there was a gradual increase in the enrolment of STEMI patients. For the present study we report the data of 3872 STEMI patients that were included from 1/1/2007 until 31/12/2008 in a total of 82 hospitals

Results:

Cardiogenic shock was present in 337 of the 3872 patients (9%). The proportion of shock was slightly lower in non-PCI centres than in PCI centres (8% vs. 9%). The distribution of Killip class is depicted in figure 1. Up to 75% of all STEMI patients were hemodynamically stable.

Fig 1



The most important differences in patient characteristics of patients with versus without cardiogenic shock are depicted in table 1. Patients with shock were older, had longer ischemic time delay's, had more cardiovascular disease, such as coronary artery disease (CAD) or peripheral artery disease (PAD) and suffered more from life threatening arrhythmia's (for which cardiopulmonary resuscitation needed to be initiated)

Table 1

	No shock N=3535	Shock N=337	P value*	OR *
age	63	67	<0.0001	1.02
CPR	6.5%	59%	<0.0001	25
Ischemic time>4h	40%	45%	0.0005	1.6
PAD	10	21	0.0001	2.1
Anterior infarct	42	52	0.004	1.5
CAD	19	29	0.07	1.35

* p value: multiple logistic regression analysis

Treatment modalities

A total of 113 patients were admitted in non-PCI centres. In those centres reperfusion therapy was initiated in 85%: 19% received thrombolysis of which half of them were sent to a PCI centre for rescue PCI, 66% were directly transferred to a PCI centre for further invasive coronary intervention. In 15% of the patients no reperfusion therapy was initiated mostly because of too late presentation.

A total of 224 patients were admitted in a PCI centre. The majority of these patients (87%) got direct PCI. In 10% no reperfusion therapy was given.

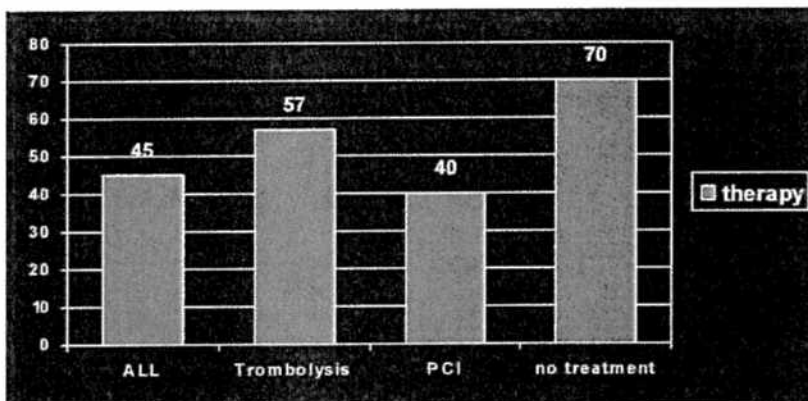
Mortality analysis

The in hospital mortality in all cardiogenic shock patients was 45%. In the non-cardiogenic shock patients the overall mortality was 3%. Death occurred at a mean of 1 +/- 7 days after admission in shock patients and at a mean of 2 +/- 9 days in the non-shock patients.

The mortality according to the different reperfusion strategies are depicted in figure 1

Mortality of cardiogenic shock was the lowest in the PCI group (40%) and the highest in patients not receiving any reperfusion therapy (70%) (p=0.0006).

Figure 3: in hospital mortality versus treatment



Finally we performed logistic regression analysis to identify the independent determinants for in hospital mortality in patients with cardiogenic shock . As shown in table 2 high age, long ischemic time periods, absence of PCI, presence of peripheral artery disease and female gender were independently associated with higher mortality.

Table 2

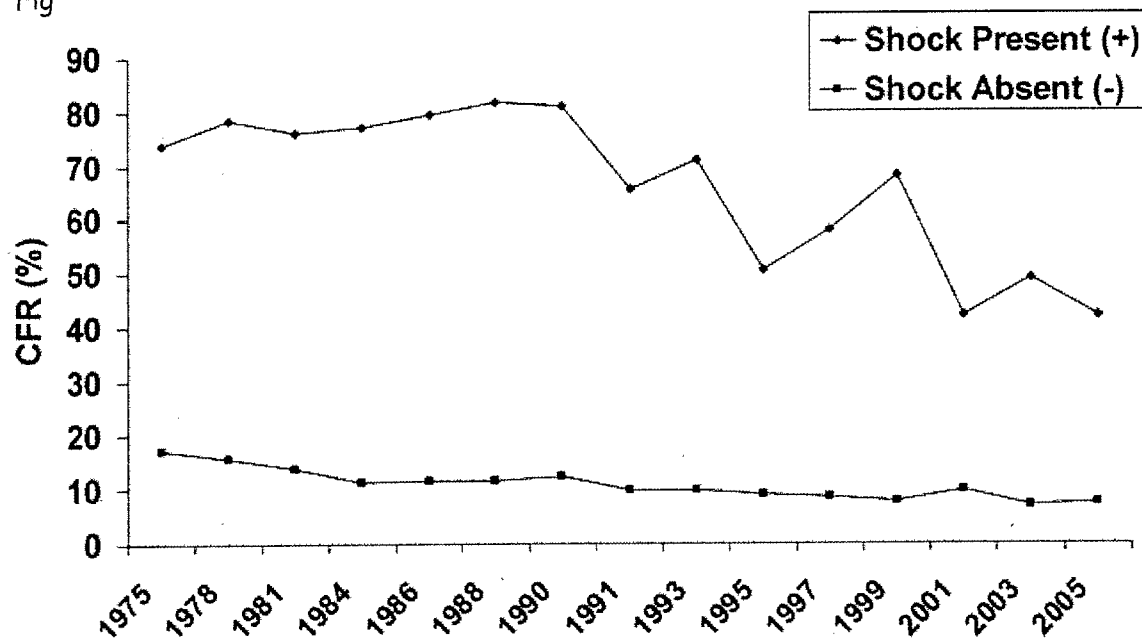
	P value	OR (95%CI)
Age	0.0052	1.03 (1.01-1.05)
Ischemia>4h	0.003	2.1 (1.3-3.6)
PAD	0.008	2.3 (1.3-4.4)
No-PCI	0.02	2.6 (1.1 - 5.9)
Female gender	0.008	2.2 (1.2 - 4.0)

Conclusion and Discussion

The present registry is the first prospective Belgian registry enrolling cardiogenic shock patients from both PCI and no-PCI centres. The incidence of cardiogenic shock was 9% which compares well with data from the literature (reported incidence between 5-15%). In concordance with previous studies, cardiogenic shock occurred more frequently in older patients with concomitant vascular disease and with more established transmural infarctions.

Despite use of contemporary management strategies, cardiogenic shock remains the leading cause of death in AMI patients. In the present registry 45% of cardiogenic shock patients died versus 3% of non cardiogenic shock patients. A recent report of the national registry of myocardial infarction in USA showed comparable data (40-50% mortality). In that report a gradual decrease of mortality over time was also presented (see figure). This decline occurs coincidentally with the more frequent use of reperfusion strategies over time.

Fig



Also in our registry there was a significant beneficial effect of primary PCI on outcome. Efforts should be therefore increased to offer primary PCI to all cardiogenic shock patients in Belgium. Besides treatment modality, long ischemic time delay was a independent determinant of poor outcome. This underscores the importance to shorten time delay between beginning of the pain and the initiation of reperfusion therapy (see also previous report).

Finally, in our analysis, female gender turned out to be related with higher mortality. This issue will be studied more into detail in the next study report which will address the issue of female gender and mortality in the total group of STEMI patients in Belgium.

Reference:

Hochman JS, Buller CE, Sleeper LA, et al. Cardiogenic shock complicating acute myocardial infarction--etiologies, management and outcome: a report from the SHOCK Trial Registry. Should we emergently revascularize Occluded Coronaries for cardiogenic shock? J Am Coll Cardiol 2000;36:1063-70.

Goldberg RJ, Spencer FA, Gore JM, Lessard D, Yarzebski J. Thirty-year trends (1975 to 2005) in the magnitude of, management of, and hospital death rates associated with cardiogenic shock in patients with acute myocardial infarction: a population-based perspective. Circulation 2009;119:1211-9.

Babaev A, Frederick PD, Pasta DJ, Every N, Sichrovsky T, Hochman JS. Trends in management and outcomes of patients with acute myocardial infarction complicated by cardiogenic shock. Jama 2005;294:448-54.

Contact person

On behalf of the steering committee

Prof dr Marc Claeys: Project coordinator

marc.claeys@ua.ac.be

June 2009