Quality control project in ST elevation myocardial infarction

STEMI registration in Belgium

Focus on gender differences

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. In the literature female gender has been associated with less optimal treatment and higher mortality. Belgian data about gender in STEMI patient are scare.
The present report focus on management and outcome of female patients as compared to male patients in the Belgian STEMI patients admitted in the period 2007-2009

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 baseline characteristics according to gender status
2. describe the management and in hospital mortality according to gender status
3. Identify independent predictors (including female gender) of mortality

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, Killip class-cardiogenic shock.
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 6494 STEMI patients that were included from 1/1/2007 until 31/12/2009 in a total of 110 hospitals.

In attachment you may find an overview of enrolment rate of the different hospitals.

Data validity was checked in up to 10% of the case. This year the steering committee selected at random 14 centres for audit. A total of 2514 items could be retraced from the source document (which equals 86% of the expected number of items to be evaluated);
There was a 97% (2460/2514) concordance between the source document and the e-CRF.

Results:

The total STEMI population consists of 1629 (25%) females and 4865 (75%) males.

Baseline characteristics of the STEMI population according to gender status are depicted in table 1. Female patients were older and showed more cardiac risk factors such as hypertension and diabetes. In addition female patients had longer ischemic time delays and were hemodynamically more unstable. These unfavourable factors are also expressed in TIMI risk score which was higher in females.

Table 1: Baseline patient characteristics

Characteristics	Female N=1629	Male N = 4865	p-value
Age, y	69±14	61±12	<0.0001
Weight<67 kg, %	44	10	<0.0001
Previous CAD, %	16	20	<0.001
Previous PAD, %	11	10	0.2
Arterial hypertension, %	57	41	<0.0001
Diabetes, %	19	14	<0.0001
Killip Class>1, %	30	21	<0.0001
CPR, %	11	11	0.7
Infarct location, % Anterior	45	43	0.1
Time from symptom onset to treatment:			
<2h	16	22	0.0001
2-4 h, %	33	38	
4-8 h, %	22	18	
8-12 h, %	7	6	
12-24h,%	10	7	
>24h,%	11	7	
TIMI risk score	5.6±3.0	3.7±2.8	0.0001

Treatment modalities

Figure 1 shows the treatment modalities according to gender status. Female patients received significantly (p<0.0001) less primary PCI and were more often not treated with any reperfusion therapy

Fig 1
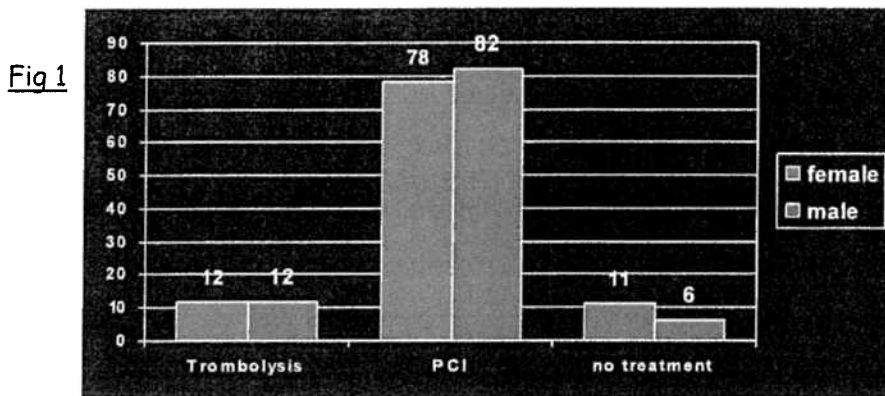
About 30% of the thrombolysed patients underwent rescue PCI both in men and female. Elective coronarography after successful thrombolysis was carried out less frequently in female as in man (50% vs. 56%,, p=0.2)
Thrombolyse was given within 60 min in 64% of female patients and in 63% of male patients.

Door-to-balloon time<90 min was achieved less frequently in female than in male (71% vs. 75% p=0.01)

In Hospital mortality

All cause mortality was twice as high in females as in males: 11.6% vs. 5.6% (p<.0001)
In order to correct for difference in risk score profile between both study groups, the observed rates of death were analyzed in each risk category for female vs. man (fig 2)

Fig 2: in hospital mortality and risk stratification
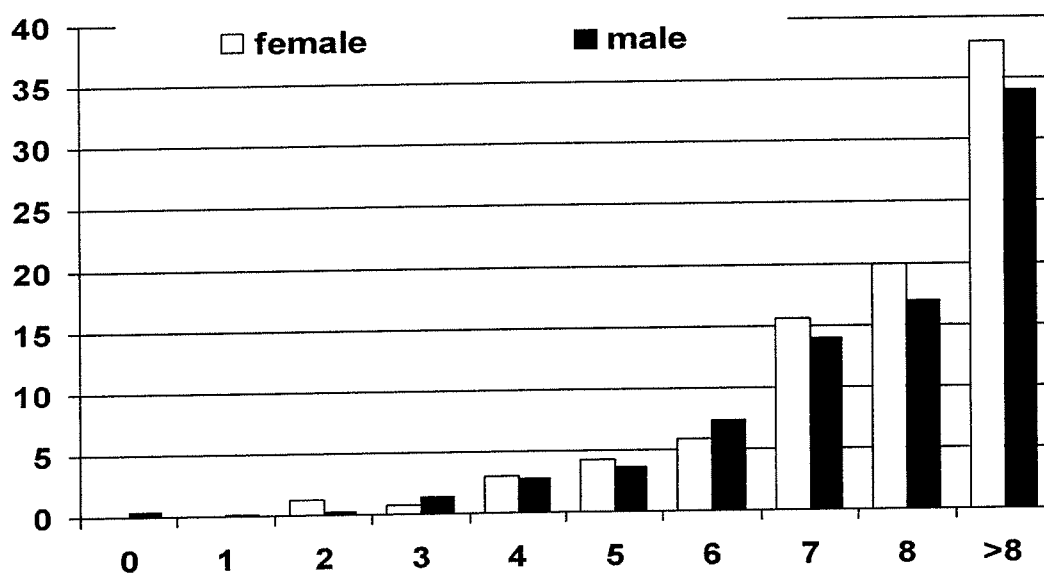
Adjusted mortality across different risk score was slightly higher in female than in male patients, particularly in the high risk group but without reaching statistical significance.

Finally logistic regression analysis was performed to evaluate whether female gender remains independently associated with high mortality after correction for differences in baseline risk profile and differences in treatment modalities. As shown in table 2 high age, long ischemic time periods, absence of PCI, presence of peripheral artery disease, hemodynamic instability, cardiopulmonary resuscitation (CPR) and female gender were independently associated with higher mortality.
Female gender status was associated with 1.5 increase in mortality risk

Table 2

	P value	OR (95%CI)
Age	<0.0001	1.04 (1.03-1.05)
Ischemia>4h	0.002	1.6 (1.2-2.0)
PAD	<0.0001	1.9 (1.4-2.6)
No-PCI	0.003	1.7 (1.25- 2.5)
Killip>1	<0.0001	5.8 (4.3-7.7)
CPR	<0.0001	4.6 (3.5-6.0)
PB<100	<0.0001	2.9 (2.3-3.8)
Female gender	0.006	1.47 (1.1 - 1.9)

Conclusion and Discussion

The Belgian STEMI registry is the first prospective registry enrolling STEMI patients from both PCI and no-PCI centres. The present analysis revealed that one quarter of the STEMI patients are female and that the in hospital mortality was twice as high in female as in male patients: 11.6% vs. 5.6%

Part of these differences is related to higher age and more cardiac risk factors (e.g. DM) found in female patients presenting with AMI.

Part of these differences is related to longer ischemic time delay. Apparently females wait longer before seeking medical support possible related to the more aspecific symptoms pattern observed in females with AMI. Late presentation is probably also the reason for the observed higher prevalence of hemodynamic instability (more extensive myocardial infarction) and for higher rate of not initiating reperfusion therapy.

Part of these differences is related to lower use of invasive procedures both in the acute phase as during hospitalisation.

Beyond all these possible explanatory factors there are still other gender related factors that are responsible for the higher mortality rate in female patients since after correction for previous factors female gender remains associated with 1.5 RR of death. (cf logistic regression analysis). Underuse of evidence-based discharge medication (which was not reported in our registry) may be a factor as was shown in a recent analysis of USA STEMI registry (JAMA 2009)

The underuse of evidence-based treatments and delayed reperfusion among women represent potential opportunities for reducing sex disparities in care and outcome after STEMI in Belgium

Reference:
1) Differences in the management and prognosis of women and men who suffer from acute coronary syndromes , JACC vol 46, No10,2005: 1845-51
(2) Sex differences in mortality following acute coronary syndromes, JAMA2009 vol 302(8), No 8874-882

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Enrolment by centre between 2008-2009

Enrolments by center