LETTERS TO THE MJM

REPERFUSION FOR STEMI IN CURRENT CANADIAN PRACTICE: ARE WE CLOSING THE CARE GAP?

INTRODUCTION

The current standard of care for patients presenting with acute ST-segment Elevation Myocardial Infarction (STEMI) includes early reperfusion therapy with either fibrinolytics or primary percutaneous coronary intervention (primary PCI). Previous registry data has shown that 30% of patients with STEMI receive neither form of reperfusion (1,2,3). Furthermore, untreated patients have 30-day mortality rates that are 2-3 times higher than those who are treated (3,4). The goal of the present study is to document the current prevalence of reperfusion therapy at three Canadian teaching hospitals and to identify underlying demographic and clinical factors that correlate with rates of reperfusion in these patients.

METHODS

Patients were identified from a prospectively collected database of all STEMI patients presenting to three teaching hospitals in Hamilton, Ontario, between April 2004 and July 2006. This institutional database contains clinical, angiographic, and outcome variables collected by individuals using standardized criteria. One of the three hospitals is equipped with cardiac catheterization facilities. Patients presenting to the other two sites had to be transferred if cardiac catheterization was required.

Thirteen clinical and demographic variables were compared in order to identify predictors of not receiving reperfusion. Variables were selected based on both their proven significance in previous studies (age, sex, time from symptom onset to presentation, history of congestive heart failure, and history of diabetes) and the possibility that they might be specifically clinically relevant (history of hypertension, stroke, peripheral vascular disease, coronary artery disease, myocardial infarction, previous angioplasty, coronary artery bypass surgery and presentation during regular working hours). Odds ratios (OR) and 95% confidence intervals (95% CI) were calculated for each of the variables. Multiple logistic regression using a forward selection model was used to identify independent predictors of not receiving reperfusion. Statistical analyses were performed with SAS version 9.1 (SAS Institute Inc, Cary, NC). In patients who did not receive reperfusion, a retrospective chart review was done to identify any and all reasons that treatment was withheld. Each chart was reviewed by two of the authors (M.K. and D.Y.) and any differences were resolved by consensus.

RESULTS

Data was collected on 538 consecutive patients. Of these, 272 (50%) were treated with primary PCI, 116 (22%) with fibrinolytics, 84 (16%) with fibrinolytics and rescue PCI, and 66 (12%) received no reperfusion. Although the use of primary PCI was higher at the PCI-capable hospital, the overall rate of reperfusion (i.e. primary PCI + fibrinolytic use) was not significantly different between the three sites (data not shown). Of the thirteen variables studied, we identified five that were significant predictors of not receiving reperfusion (Figure 1): onset of symptoms to emergency room (ER) arrival > 12 hours (OR 6.5, 95% CI 3.7-11.5), age > 75 (OR 5.7, 95% CI 3.3-9.7), history of congestive heart failure (OR 4.5, 95% CI 2.1-9.9), female sex (OR 2.5, 95% CI 1.5-4.2) and diabetes (OR 1.8, 95% CI 1.0-3.3). When all thirteen variables were entered into a multivariate analysis, only two were found to be significant: onset of symptoms to ER arrival > 12 hours (OR 5.1, 95% CI 2.8-9.4) and age > 75 (OR 1.08, 95% CI 1.05-1.10). The only variable found to

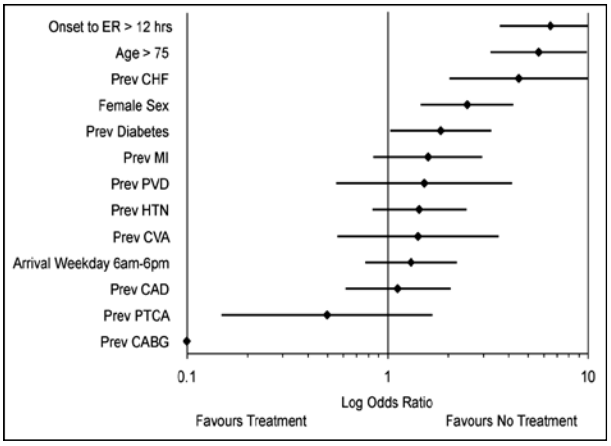

Figure 1: Forest plot of the thirteen clinical and demographic variables studied. Each point estimate represents the odds that a patient with that variable was not given reperfusion therapy. Error bars represent 95% confidence intervals around the odds ratios. ER = emergency room, CHF = congestive heart failure, MI = myocardial infarction, PVD = peripheral vascular disease, HTN = hypertension, CVA = cerebrovascular accident (stroke), CAD = coronary artery disease, PTCA = percutaneous coronary angioplasty, CABG = coronary artery bypass grafting surgery. A confidence interval could not be calculated for the variable "previous CABG" because all 18 patients with a history of CABG were treated with reperfusion.

Reason	Number of Patients	Percentage of Total
Late presentation or time of onset unclear	27	41%
Active bleeding or concern re: bleeding	13	20%
Patient or family decided on conservative management	9	14%
ECG changes resolved spontaneously before reperfusion could be offered	9	14%
Misinterpretation of ECG or delay in diagnosis of STEMI	6	10%
Physician felt that a conservative strategy was more appropriate	5	8%
Other/unknown	9	14%
	78	**118%**

Table 1: The reason(s) why reperfusion was withheld in individual patients, as identified by retrospective chart review. The numbers add to more than 100% because some patients had more than one reason identified.

favor treatment was history of previous coronary artery bypass grafting surgery (CABG), where all 18 patients with a history of CABG were treated with reperfusion. The main reasons patients were not offered reperfusion therapy were late presentation, bleeding concerns, patient preference for conservative therapy, and spontaneous resolution of ECG changes (Table 1). The unadjusted 30-day mortality of patients not treated with reperfusion was 26%, compared with 7% for those who were treated.

DISCUSSION

We found that 12% of patients presenting with STEMI did not receive primary reperfusion therapy. This represents a substantial improvement over data from several large international registries, (1,2,3) as well as over previous Canadian data (5), which showed that roughly 30% of patients are left untreated. 66% of our patients were offered early catheter-based reperfusion (primary PCI or rescue PCI), mirroring recent data from the GRACE registry (6).

Patients presenting late to the emergency department, the elderly, those with a history of CHF, women, and those with diabetes were less likely to be treated. Previous studies have shown that treatment gaps in these key subgroups have persisted over time, despite overall improvements in reperfusion rates (7). We found that two variables independently predicted no reperfusion: late presentation to the emergency department and age > 75. We know from previous studies that older age at presentation is associated with higher rates of congestive heart failure (8), perhaps explaining why CHF was not an independent predictor in our analysis. The absence of female sex as an independent predictor can be explained by the fact that women with STEMI present later to hospital and tend to be older than men (9).

Our chart review revealed that reperfusion therapy was often withheld for valid reasons (active bleeding, spontaneous resolution of ECG changes, patient preference for conservative therapy). However, the most common reason that treatment was withheld was late presentation to the emergency department. General knowledge about symptoms of acute coronary syndromes is poor (10) and large-scale efforts to educate the public are only modestly effective (11). Furthermore, many of the patients presenting late are women and the elderly, groups that often have atypical symptoms. A reperfusion rate of 88% may in fact be approaching an optimal level of reperfusion.

We found that mortality in patients not receiving reperfusion was nearly four-fold higher than in those who were given reperfusion. This demonstrates the treatment-risk paradox that exists with STEMI, where high-risk patients are least likely to be offered lifesaving therapy (12). It is possible that clinicians withhold treatment for fear of complications, even though the risk of not treating may be higher. Some have suggested that physicians should use clinical decision tools to improve the accuracy of their risk assessments (12). If reperfusion therapy is withheld because of late presentation or contraindications other than bleeding, it is important to remember that antithrombotic therapy (for example, fondaparinux) has been shown to have a mortality benefit in these patients (3,13).

The major limitation of our study is that it represents the experience of a single urban region with an organized STEMI management program and access to early reperfusion with primary or rescue PCI. It is unclear whether our experience reflects current trends in other regions of Canada. Of note, data from the GRACE registry (2) showed similar reperfusion rates in hospitals with and without PCI capabilities and also failed to show a difference in reperfusion rates between geographic regions. Conversely, an Austrian study demonstrated that reperfusion rates could be improved by reorganizing the delivery of reperfusion services in a city (4). While there has been much discussion over the last decade whether patients should receive primary PCI or thrombolysis as the initial reperfusion strategy, it is important to confirm whether all eligible patients are receiving some method of reperfusion in a timely fashion, as this has a major impact on survival. A national heart attack registry would allow us to assess rates of reperfusion across the country and identify areas for future quality improvement.

CONCLUSION

Our review of current practice patterns at three Canadian teaching hospitals found that 88% of patients with STEMI are offered acute reperfusion therapy, a substantial improvement over previous registry data. We found that patients presenting late to the emergency department, the elderly, those with a history of CHF, women, and those with diabetes were less likely to be treated. Of these, only age and late presentation were found to be independent predictors of not receiving reperfusion. Mortality among untreated patients remains very high and every effort should be made to optimize medical therapy in these patients.

Sincerely,

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