Prevalence and predictors of posttraumatic stress disorder in patients with acute myocardial infarction

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Prevalence and predictors of posttraumatic stress disorder in patients with acute myocardial infarction

Abstract

OBJECTIVE: We estimated the prevalence of posttraumatic stress disorder (PTSD) and identified predictors of self-rated PTSD symptoms in patients post-myocardial infarction (MI). METHODS: We recruited 400 patients (mean age 60 +/- 12 years, 79% were men) with a previous acute index MI who were referred to a tertiary cardiology clinic. PTSD was assessed by the Clinician-administered PTSD Scale, and self-rated severity of PTSD symptom levels were assessed by the Posttraumatic Diagnostic Scale. RESULTS: Of the 190 patients who completed the Posttraumatic Diagnostic Scale, 34 met the cutoff for clinically significant PTSD symptomatology and 32 agreed to be interviewed. Among these patients, the Clinician-administered PTSD Scale interview yielded a prevalence of full and subsyndromal PTSD of 9.5% (95% confidence interval 7.4-11.6). Retrospectively rated feelings of helplessness (beta = .47, P < .001) and pain intensity during MI (beta = .15, P = .019) independently predicted PTSD symptom level. CONCLUSIONS: Approximately 10% of patients post-MI had full or subsyndromal PTSD. Subjective perception of MI predicted self-rated PTSD symptom level.
PREVALENCE AND PREDICTORS OF POST-TRAUMATIC STRESS DISORDER (PTSD) IN ACUTE MYOCARDIAL INFARCTION PATIENTS

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ABSTRACT

Objective: We estimated the prevalence of Posttraumatic Stress Disorder (PTSD) and identified predictors of self-rated PTSD symptoms in post-myocardial (MI) patients.

Methods: We recruited 400 patients (mean age 60±12 years, 79% men) with a previous acute index MI referred to a tertiary cardiology clinic. PTSD was assessed by the Clinician-administered PTSD Scale (CAPS) and self-rated severity of PTSD symptom levels by the Posttraumatic Diagnostic Scale (PDS).

Results: Of the 190 patients who completed the PDS, 34 met the cut-off for clinically significant PTSD symptomatology and 32 agreed to be interviewed. In these, the CAPS interview yielded a prevalence of full and subsyndromal PTSD of 9.5% (95% CI 7.4-11.6). Retrospectively rated feelings of helplessness (β=.47, p<.001) and pain intensity during MI (β=.15, p=.019) independently predicted PTSD symptom level.

Conclusions: Almost 10% of post-MI patients had full or subsyndromal PTSD. Subjective perception of MI predicted self-rated PTSD symptom level.
INTRODUCTION

Patients commonly perceive a heart attack as a vital threat to their life inflicting feelings of fear, loss of control, and helplessness.1,2 This intense psychological distress may extend the acute phase of a myocardial infarction (MI) in a number of patients.3 Two recent reviews found that, on average, 15% of patients develop posttraumatic stress disorder (PTSD) post-MI.4,5 To meet the diagnostic criteria for PTSD according to the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV),6 the patient must have experienced the MI as an event involving threatened death (criterion A1) to which he or she responded with intense fear, helplessness, or horror (criterion A2). Three characteristic symptom clusters related to reexperiencing the MI (criterion B), avoidance of stimuli associated with the MI (criterion C), and hyperarousal (criterion D) must have persisted for at least one month (criterion E) and have caused clinically significant distress or impairment in daily functioning.

In addition to increased psychological distress,7 reduced quality of life, and impaired social functioning,8 PTSD may prospectively increase cardiovascular morbidity in MI patients9 and overall cardiovascular mortality.10 Some of the cardiovascular risk of PTSD may relate to poor adherence to cardiac medication,9,11 and to the clustering of established cardiovascular risk factors12-15 and poor life style habits16,17 in these patients. Pathophysiological evidence exists for a systemic low-grade proinflammatory and procoagulant state and a sympathovagal imbalance in PTSD, all of which could contribute to atherosclerosis and complicate acute coronary syndromes.5,18 Therefore, a considerable proportion of post-MI patients might benefit from screening for and treatment of PTSD.

Previous estimates of prevalence of PTSD in post-MI patients are limited by studies with comparatively small samples and the heterogeneity of tools applied to diagnose PTSD.5 In fact, only three studies on 52 or fewer patients have performed a clinical interview to diagnose PTSD related to MI.19-21 Importantly, these investigations yielded lower prevalence
rates of PTSD (i.e. 0-8%) than those inferred from studies using self-report questionnaires asking into PTSD symptoms. Moreover, the Clinician-administered PTSD Scale (CAPS) diagnostic interview to diagnose PTSD according to DSM-IV criteria was not used in any of these previous studies. Before resources are allocated in clinical trials addressing PTSD in MI patients, there is an urgent need for larger studies administering sound diagnostic procedures to estimate the frequency of PTSD post-MI.

Our primary aim and the novel aspect of this study was therefore to determine the prevalence of PTSD applying the CAPS diagnostic interview in a sizeable sample of consecutive patients who had experienced an acute MI. Based on previous research, we hypothesized that applying a structured interview in a reasonably large sample would yield a prevalence of about 10% of post-MI patients having PTSD. Research suggests that subjective perception of a heart attack is more important in predicting PTSD symptom severity than objective measures of MI severity such as levels of creatine kinase (CK) and duration of hospitalization. Patients’ retrospective ratings of higher awareness of having MI at the time of symptoms and of lower degree of control during MI, as well as prospective ratings of more perceived threat immediately after MI and of pain intensity during MI predicted higher levels of PTSD symptoms. Therefore, our secondary aim was to retrospectively identify subjective predictors of self-rated PTSD symptom level related to MI, namely fear of dying, feelings of helplessness, and pain intensity perceived during MI. We hypothesized that these subjective measures of perceived distress would have a comparably stronger predictive value for PTSD symptom level than objective measures of MI severity.

METHODS

Study design and participants

The Ethics Committee of the State of Berne, Switzerland, formally approved the study protocol and all participants provided informed consent. All patients were recruited between
January and December 2005 from the Cardiology Department of the University Hospital of Berne. After having verified the diagnosis of an acute MI from medical records, we contacted eligible patients by mail. We approached a consecutive sample of 400 patients with a previous acute index MI (i.e. first-time MI or most recent MI in patients with recurrent MI). A power analysis justifying this sample size was made based on the following assumptions. The weighted prevalence of PTSD across three previous smaller studies was 6% when the diagnosis was made by a clinical interview.\(^5\) In line with a recent study, we assumed that about half of the 400 eligible patients approached would not respond to our PTSD survey because of avoidance behavior and other reasons.\(^26\) Therefore, the statistical power to detect our initially hypothesized 10% prevalence of PTSD in a sample of 200 post-MI patients we assumed would eventually participate was 72% at an alpha error of 5%.

Acute MI was defined as per a typical rise and fall of biochemical markers of myocardial necrosis (twice the upper norm level in CK-MB (>380 U/L) or in troponin (>0.4 \(\mu\)g/L)) with at least one of the following: (a) ischemic symptoms; (b) development of pathologic Q waves on the electrocardiogram (ECG); (c) ECG changes indicative of ischemia (ST segment elevation or depression); or (d) coronary artery intervention (e.g., coronary angioplasty)\(^27\). Patients were excluded if they did not speak German or lived too far away from the University Hospital (>90 minutes by car or train). As an incentive, participants were offered counselling for their traumatic experience, which included referral to a psychologist trained in trauma therapy.

**Psychometric assessment**

The Posttraumatic Diagnostic Scale (PDS)\(^28\) was mailed home to all 400 patients with an index MI. The PDS is a self-report measure consisting of 17 questions mapping onto DSM-IV symptoms for PTSD. In the questionnaire we replaced the term “event” with the term “heart attack”.\(^24\) Patients rated on a 4-point scale how often they had experienced each
symptom during the past month (0=not at all, 3=often). We applied the validated German version of the PDS\textsuperscript{29} showing excellent internal consistency (Cronbach’s $\alpha = .91$) (Steil, unpublished manuscript). The PDS performs well as a screening tool to identify clinical cases of PTSD.\textsuperscript{30} Patients who met the cut-off for mild PTSD symptom level ($\geq 15$ PDS points)$^{31}$ were invited for the CAPS interview.

When completing the PDS, patients also rated three aspects of subjective perception of MI severity on a Likert scale: a) \textit{fear of dying}: “During my referral to the hospital, the emergency unit, or the intensive care unit, I was afraid I was dying.” (0 = absolutely not true, 10 = absolutely true); b) \textit{helplessness}: “When the doctor told me I had a heart attack, I was frightened, felt helpless, and was afraid of losing control of the situation.” (0 = absolutely not true, 10 = absolutely true); c) \textit{pain intensity}: “Please indicate how strong your pain was during the heart attack.” (0 = no pain at all, 10 = intolerable pain).

We selected the CAPS for the structured interview because this instrument has been developed by the National Center for PTSD to diagnose current and lifetime PTSD as defined in DSM-IV.\textsuperscript{22} This instrument allows quantification of the frequency and intensity of each of the 17 PTSD symptoms according to the DSM-IV. A diagnosis of PTSD can also be made based on the CAPS. The German version of the CAPS shows good internal consistency for the severity score of all 17 items (Cronbach’s $\alpha = .88-.92$) and for each of the three PTSD symptom clusters ($\alpha = .73-.88$).\textsuperscript{32} The frequency and intensity of each symptom is rated on a 5-point scale ranging between e.g. “never” (0 points) to “almost always” (4 points). A particular symptom is regarded as present when rated with a frequency of $\geq 1$ point and an intensity of $\geq 2$ points. According to the DSM-IV, to meet diagnostic criteria for a particular symptom cluster, 1 of 5 symptoms must be given for criterion B (re-experiencing), 3 of 7 symptoms for criterion C (avoidance), and 2 of 5 symptoms for criterion D (hyperarousal),
respectively. Overall severity of diagnostic PTSD is obtained by adding up symptom scores of criteria B+C+D.

We estimated the prevalence of PTSD in two different ways depending on whether the criterion A2 (i.e. subjective response of intense fear, helplessness, or horror to the MI) was affirmed or not. This distinction might be important because the DSM-IV explicit requirement that only traumatic events meeting the two-part definition (A1 and A2) qualify as PTSD-level stressors might be a source of bias in that e.g. women may report more A2 symptoms than men. \(^{33}\) Patients were diagnosed with subsyndromal PTSD if they met criterion A and criterion B (re-experiencing cluster) plus either criterion C (avoidance cluster) or criterion D (hyperarousal cluster). \(^{34}\)

**Sociodemographic and biological data**

Age, gender, date of index MI, type of MI (first-time vs. recurrent MI), left ventricular ejection fraction (LVEF) as measured by ventriculography during coronary angiography, and proxy measures of infarct size (serum levels of total CK and troponin-I) were all obtained from medical charts. Biochemical markers of myocardial necrosis were measured by different laboratories and were, therefore, not standardized. Nevertheless, left ventricular function as determined by LVEF has prognostic value in post-MI patients. \(^{27}\) Determination of the time courses of CK- and troponin-levels during the acute phase of the MI did not follow a standardized protocol; therefore, “highest” levels of total CK and troponin-I do not necessarily reflect “peak” levels.

**Statistical analyses**

Data analysis used SPSS 13.0 statistical software package (SPSS Inc. Chicago, IL). All tests were two-tailed with significance level set at \(p<.05\). Values of PDS and Likert scale scores, number of days after MI the PDS was sent out, levels of CK and troponin, and LVEF
showed no normal distribution (Kolmogorov-Smirnov Test) and were transformed by the Blom procedure before statistical analyses. For clarity, we present all data in original units (means±SD with range). Differences between two grouping variables were calculated using Student’s $t$-test, Pearson chi-square test, and Fisher’s exact test where appropriate. Pearson correlations quantified the bivariate relationship between continuous variables. Multiple linear regression analysis was calculated using the enter method to identify predictors of PTSD symptom level. Prevalence estimates are given as percent values with 95% confidence interval (CI).

**RESULTS**

**Patient characteristics**

Of the 400 MI patients approached, 204 PDS questionnaires were returned (51%), which had been sent out after a median of 40 days (range 12 days – 4.5 years) after the index MI. Six patients had died and their relatives returned the questionnaire. Eight patients returned the questionnaire but declined to complete it. Screening for PTSD symptomatology was therefore performed in 190 MI patients (48%). These patients were not significantly different in age from the 196 patients who did not respond to the survey ($p=.60$). However, the proportion of women was significantly higher in patients who did not return the questionnaire than among those who completed it (13% vs. 8%, $p=.025$).

Table 1 shows demographic, diagnostic and psychological characteristics of 190 MI patients screened for PTSD. One and two PDS items were missing in six and in one patient, respectively, and were replaced by the mean of completed items. Likert scores for fear of dying, helplessness, and pain intensity were missing in five, four, and three cases, respectively. Levels of CK and troponin could not be obtained in 38 and 55 cases, respectively. We therefore used LVEF (missing in eight patients) as an objective proxy measure of MI severity and used CK and troponin values only for complementary analyses.
Prevalence of PTSD diagnosis

Thirty-four patients (17.9%; 95% CI 15.2-20.6) had a PDS score ≥15 meeting the cut-off for the diagnostic interview for PTSD. Two female patients with a PDS score of 15 and 19 points, respectively, declined to participate in the CAPS interview. The patient sample undergoing the diagnostic interview included 24 men and 8 women with a mean age of 54±9 years who had experienced first-time MI in 27 cases and recurrent MI in 5 cases, respectively (p=1.00 for type of MI). On average, patients were interviewed 95±68 days (range 24-336) post-MI. One patient was interviewed 24 days post-MI (i.e. within less than one month of the trauma) but did not meet criteria for either full or subsyndromal PTSD. Mean PTSD severity score obtained by the CAPS was 45±27 (range 9-119) and, as expected, correlated highly with the PDS score (r=.81, p<.001) but not significantly so with time since MI. Average scores for fear of dying were 6.2± 3.2, for feelings of helplessness 6.7±3.1, and for pain intensity 7.2±2.5. Table 2 shows that the PTSD patients were of younger age, and, as expected, had also higher scores of posttraumatic symptoms, fear of dying, helplessness, and pain relative to patients without PTSD. The proportion of gender and type of infarction, as well as objective measures of MI severity, were not significantly different between patients with PTSD and those without.

Table 3 shows the prevalences of full PTSD and subsyndromal PTSD according to different definitions of the DSM-IV criterion A. A total of 9.5 % (95% CI 7.4-11.6) of patients were diagnosed with either full or subsyndromal PTSD if criterion A2 was not taken into account for the diagnosis. When an affirmative response for the A2 criterion was explicitly required, all nine subjects with a full PTSD (4.7%; 95% CI 3.2-6.2) maintained their diagnosis, but the prevalence of subsyndromal PTSD dropped slightly from 4.7% (95% CI 3.2-6.2) to 3.2% (95% CI 1.9-4.5).
Predictors of self-rated PTSD symptom level

In bivariate analyses, PDS score correlated with age ($r=-.19$, $p=.010$, Fig. 1, Panel A), fear of dying ($r=.56$, $p<.001$; Fig. 1, Panel B), helplessness ($r=.64$, $p<.001$; Fig. 1, Panel C), and pain intensity ($r=.31$, $p<.001$; Fig. 1, Panel D). In contrast, there were no significant associations between PDS score and gender, type of MI, time after MI PDS was sent out, LVEF, and highest CK and troponin levels. We then regressed age, gender, type of MI, time after MI the PDS was sent out, the three Likert scale scores (fear of dying, helplessness, pain), and LVEF in one block on PDS scores. Helplessness (standardized $\beta$-coefficient $=.47$, $t=4.86$, $p<.001$) and pain intensity ($\beta=.15$, $t=2.37$, $p=.019$) were independent predictors of self-rated PTSD symptom levels. In addition, female gender reached borderline significance as a predictor of PTSD symptom level ($\beta=.11$, $t=1.80$, $p=.074$). Results did not substantially change when highest levels of CK and troponin were also entered into the regression equation. Levels of CK and troponin did not significantly predict PTSD symptom level.

DISCUSSION

We applied the CAPS structured interview in the hitherto largest study investigating the prevalence of a DSM-IV PTSD diagnosis in a sample of patients with a previous MI. We found that almost 10% of post-MI patients had full or subsyndromal PTSD. This diagnosis posits that patients experienced their MI as an intense threat to their life to which they responded emotionally with intense fear, helplessness, or horror. For at least one month, these patients re-experienced aspects of the MI (e.g. intrusive thoughts or nightmares), avoided stimuli related to the MI (e.g. intake of cardiac medication), and had symptoms of increased arousal (e.g. sleep disturbances and irritability). The combined prevalence of full and subsyndromal PTSD was similar to PTSD prevalence (7-8%) found in two previous studies using an interview on 27 and 52 post-MI patients, respectively,$^{20,21}$ but higher than in a small study on 23 patients of whom none was diagnosed with full PTSD.$^{19}$ This prevalence of
clinical PTSD post-MI is noteworthy given that 12-month prevalence of subsyndromal PTSD was <2% and no individual met criteria for full PTSD in a representative Swiss population sample. A comparatively high PTSD prevalence as in our post-MI patients was found in Swiss accident victims one year after referral to the intensive care unit where 1.9% had full PTSD and 12.3% had subsyndromal PTSD. Notably, PTSD diagnosis was not associated with time since MI, suggesting and corroborating review data that post-MI PTSD does not readily wane over time.

Previous studies did not clinically assess subsyndromal PTSD now acknowledged as a specific nosological subcategory of PTSD. In a clinical setting, patients with subsyndromal PTSD should not be overlooked because they endorse marked levels of psychological distress and low functional status. The distinction between patients who affirmed the A2 criterion in the interview (i.e. negative emotional response to MI) and those who did not had no influence on the prevalence of full PTSD. The prevalence of subsyndromal PTSD decreased only slightly if the A2 criterion was requested. This suggests that in post-MI patients with clinical PTSD the traumatic event of experiencing an acute MI regularly evoked intense emotional distress. Or, in other words, if patients did not perceive emotional distress at the time of MI, the odds for not developing PTSD were substantially higher. This notion is in line with a large community-based study showing that traumatic events not involving symptoms of the A2 criterion rarely resulted in PTSD.

Parsimoniously interpreted, subjective perception of MI was more important than demographic variables and LVEF, a proxy measure of objective MI severity, in predicting self-rated PTSD symptom level. Higher levels of all three measures of subjectively perceived distress (i.e. fear of dying, helplessness, and pain) correlated with higher levels of PTSD symptom levels in bivariate analyses with helplessness and pain intensity emerging as independent predictors of PDS scores. These findings are in line with other studies showing that posttraumatic stress, along a continuum of severity, related to aspects of subjective
appraisal of the MI as a traumatic event\textsuperscript{21,23-25} but not to objective severity of MI.\textsuperscript{23} We propose that decreasing feelings of helplessness and improving pain control during MI could be reasonable means to possibly decrease clinically significant PTSD symptom level and perhaps the development of diagnostic PTSD in the aftermath of an acute MI. Female gender showed borderline significance as an independent predictor of relatively higher PTSD symptom level in accordance with the observation that women with PTSD endorse more A2 symptoms (e.g. helplessness) than men.\textsuperscript{33}

Besides lacking a control group, we address several limitations of our study. First, prevalence of diagnostic PTSD and self-rated PTSD symptom level may not necessarily transfer to a general population of post-MI patients. Only 48\% of patients contacted by mail were available for PTSD screening and women were underrepresented in patients who consented to the screening procedure. On average, women experience more emotional distress with PTSD than do men.\textsuperscript{33} Why did half of contacted patients not respond to our survey? Female MI patients, but also patients with high avoidance scores in general, might feel comparatively reluctant to take part in a survey asking into traumatic MI experiences in order to avoid reminders of their heart attack.\textsuperscript{24} If this is the case, the “true” prevalence of PTSD in a general population of post-MI patients would be even higher than here observed. For instance, if we assume that in the non-responding subjects the prevalence of PTSD was twice as high (19\%) as in the sample we could screen for PTSD (9.5\%), then the prevalence of PTSD in the entire study population of 400 patients would have been 14.5 \% (95\% CI 12.3-16.7). Consequently, a considerable number of PTSD patients would go undiagnosed since they were not reached by the screening questionnaire. Future studies may want to address the question whether with a recruitment strategy that is more specifically tailored to increase accrual rate among post-MI patients with high posttraumatic symptom levels the prevalence rate of PTSD would be different from that observed in our study.
Second, to rule out recall bias, and to corroborate the importance of subjective MI perception in predicting PTSD symptom level, future studies should assess emotional distress prospectively and along with standardized assessment of biochemical markers of myocardial necrosis (i.e. peak levels of CK-MB) and more precise measurements of left ventricular wall motion abnormalities or ST-elevation findings on ECG. Third, like the bulk of previous studies on PTSD in post-MI patients, we did not control for depression, which shows high comorbidity with PTSD and is prevalent in post-MI patients. For instance, sleep problems and irritability of the PTSD hyperarousal symptom cluster are also characteristic of depression. As most recently shown, approximately half of major depressive episodes are already present prior to MI. Depression is associated with both increased reporting of chest pain by cardiac and non-cardiac patients and feelings of helplessness. Helplessness and pain intensity during MI could therefore mediate some of the effect of depression on PTSD symptom level. In turn, depression immediately following MI onset is often reactive raising the question to what extent PTSD symptoms account for depressive adjustment disorder following MI. Fourth, although the questions of the CAPS interview were tailored to ask for PTSD symptoms specifically related to MI, we did not ask for other potential sources of PTSD symptoms such as related to the intensive care unit treatment, invasive procedures performed, cardiac arrest, resuscitation, and a history of trauma. Fifth, we did not consider the use of beta-blocking agents, selective serotonin reuptake inhibitors, and benzodiazepines around the acute phase of MI or thereafter. Therefore, we are unable to state whether in some patients such drugs mitigated manifestation of PTSD.

We conclude that the prevalence of PTSD in post-MI patients is of clinical relevance and that patients’ subjective perception of their MI substantially predicts PTSD symptom level all of which may have important clinical implications. There is substantial impairment in daily functioning and health care consumption in patients with PTSD. Moreover, first evidence suggests that PTSD symptom level prospectively predicts cardiovascular events in
subjects initially free of coronary artery disease\textsuperscript{45} and in post-MI patients.\textsuperscript{9} We therefore would like to encourage clinicians to regularly evaluate post-MI patients in terms of PTSD symptoms related to acute MI. Although specific interventions for post-MI patients suffering of PTSD are only beginning to emerge,\textsuperscript{46} there are established treatments available for PTSD due to other sources, broadly referring to counseling, cognitive-behavioral and interpersonal psychotherapy, and psychopharmacology.\textsuperscript{43,44} However, in a busy cardiology setting, clinicians may also want to test whether an undemanding intervention aimed at reducing emotional distress (e.g. leaflet information, short-term cognitive restructuring, and pain control) in the acute phase of MI can prospectively reduce PTSD symptomatology and the risk of developing diagnostic PTSD post-MI, respectively.

REFERENCES


Legend to Figure 1

Panels A-D depict the significant bivariate correlations between the Posttraumatic Diagnostic Scale (PDS) score ("stress score") and age (A), perceived fear of dying (B), feelings of helplessness (C), and pain (D) during infarction.
Table 1. Characteristics of 190 patients screened for PTSD

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men / Women [%]</td>
<td>165 (84%) / 33 (16%)</td>
</tr>
<tr>
<td>Age [years]</td>
<td>60 ± 12 (38-85)</td>
</tr>
<tr>
<td>First-time / recurrent infarction [%]</td>
<td>177 (89%) / 21 (11%)</td>
</tr>
<tr>
<td>Highest serum total creatinine kinase level obtained [U/L]</td>
<td>1244 ± 1313 (65-6339)</td>
</tr>
<tr>
<td>Highest serum troponin-I level obtained [μg/L]</td>
<td>129 ± 277 (0.2-2436)</td>
</tr>
<tr>
<td>Left ventricular ejection fraction [%]</td>
<td>50 ± 11 (20-70)</td>
</tr>
<tr>
<td>Posttraumatic diagnostic scale score</td>
<td>8.5 ± 9.1 (0-48)</td>
</tr>
<tr>
<td>Fear of dying score</td>
<td>2.6 ± 3.2 (0-10)</td>
</tr>
<tr>
<td>Feelings of helplessness score</td>
<td>3.0 ± 3.3 (0-10)</td>
</tr>
<tr>
<td>Perceived pain score</td>
<td>5.7 ± 3.0 (0-10)</td>
</tr>
</tbody>
</table>

Data are given as means ± SD (range)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Patients with PTSD</th>
<th>Patients without PTSD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=18)</td>
<td>(n=172)</td>
<td></td>
</tr>
<tr>
<td>Men / Women [%]</td>
<td>15 (83%) / 3 (17%)</td>
<td>145 (84%) / 27 (16%)</td>
<td>1.000</td>
</tr>
<tr>
<td>Age [years]</td>
<td>50 ± 8 (39-65)</td>
<td>61 ± 11 (38-85)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>First-time / recurrent infarction [%]</td>
<td>16 (89%) / 2 (11%)</td>
<td>154 (90%) / 18 (10%)</td>
<td>1.000</td>
</tr>
<tr>
<td>Highest serum total creatinine kinase level obtained [U/L]</td>
<td>1447 ± 1687 (78-6339)</td>
<td>1222 ± 1271 (65-5880)</td>
<td>0.608</td>
</tr>
<tr>
<td>Highest serum troponin-I level obtained [μg/L]</td>
<td>98 ± 153 (0.2-560)</td>
<td>133 ± 288 (0.2-2436)</td>
<td>0.869</td>
</tr>
<tr>
<td>Left ventricular ejection fraction [%]</td>
<td>53 ± 10 (25-65)</td>
<td>50 ± 11 (20-70)</td>
<td>0.333</td>
</tr>
<tr>
<td>Posttraumatic diagnostic scale score</td>
<td>28.9 ± 9.9 (15-48)</td>
<td>6.3 ± 5.7 (0-22)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fear of dying score</td>
<td>7.8 ± 2.6 (3-10)</td>
<td>2.1 ± 2.7 (0-10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Feelings of helplessness score</td>
<td>8.1 ± 2.3 (3-10)</td>
<td>2.4 ± 2.9 (0-10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Perceived pain score</td>
<td>7.7 ± 2.2 (4-10)</td>
<td>5.5 ± 3.0 (0-10)</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Data are given as means ± SD (range)
Table 3. Diagnosis of full and subsyndromal PTSD in 32 patients interviewed

<table>
<thead>
<tr>
<th>CAPS Diagnosis</th>
<th>Criterion A2 not required</th>
<th>Criterion A2 required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full PTSD</td>
<td>n=9 (4.7%; 95% CI 3.2-6.2)</td>
<td>N=9 (4.7%; 95% CI 3.2-6.2)</td>
</tr>
<tr>
<td>Subsyndromal PTSD</td>
<td>n=9 (4.7%; 95% CI 3.2-6.2)</td>
<td>N=6 (3.2%; 95% CI 1.9-4.5)</td>
</tr>
<tr>
<td>No PTSD</td>
<td>n=14 (7.4%; 95% CI 5.5-9.3)</td>
<td>N=17 (8.9%; 95% CI 6.9-10.9)</td>
</tr>
</tbody>
</table>

CAPS, clinician-administered PTSD Scale; PTSD, posttraumatic stress disorder

Percent values of prevalence estimates with 95% confidence intervals refer to the total sample of patients who completed the Posttraumatic Diagnostic Scale (n=190)
Figure 1. Associations with posttraumatic stress symptom severity

Panel A. Age and stress score

Panel B. Fear and stress score

Panel C. Helplessness and stress score

Panel D. Pain and stress score