ELSEVIER

Journal of Affective Disorders 99 (2007) 173–179

JOURNAL OF AFFECTIVE DISORDERS

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Research report

Type-D personality predicts chronic anxiety following percutaneous coronary intervention in the drug-eluting stent era

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Received 25 July 2006; received in revised form 6 September 2006; accepted 6 September 2006
Available online 13 October 2006

Abstract

Background: Anxiety is an often overlooked risk factor in coronary artery disease (CAD). Hence, little is known about predictors of unremitting chronic anxiety in CAD patients. We examined whether the distressed personality (type-D) predicts chronic anxiety post percutaneous coronary intervention (PCI).
Methods: Unselected patients ($n=167$) treated with PCI using sirolimus-eluting or bare metal stents as part of the RESEARCH registry, who were anxious 6 months post-PCI, qualified for inclusion. Patients completed the Hospital Anxiety and Depression Scale at 6 and 12 months and the Type-D Scale (DS14) 6 months post-PCI.
Results: Of 167 patients anxious at 6 months, 108 (65%) were still anxious 12 months post-PCI. Significant univariable predictors of chronic anxiety were type-D personality (OR: 3.17; 95% CI: 1.64–6.14) and sirolimus-eluting stent implantation (OR: 0.51; 95% CI: 0.27–0.98), with sirolimus-eluting stent showing a protective effect. In multivariable analyses, type-D personality (OR: 3.31; 95% CI: 1.59–6.87) and sirolimus-eluting stent implantation (OR: 0.44; 95% CI: 0.21–0.92) remained significant independent predictors of chronic anxiety adjusting for depressive symptoms at 6 months, demographic and clinical risk factors.
Limitations: All psychological measures were based on self-report, and we had no information on cardiac rehabilitation or use of pharmacotherapy; however our sample represented patients seen in daily clinical practice.
Conclusions: These findings suggest that type-D personality is a risk factor and sirolimus-eluting stent implantation a protective factor for the occurrence of chronic anxiety. The protective effect of sirolimus-eluting stents in relation to anxiety warrants replication in future studies.

Keywords: Anxiety; Type-D personality; Coronary artery disease; Drug-eluting stent; Percutaneous coronary intervention

1. Introduction

The impact of depression on the progression of coronary artery disease (CAD) has been studied extensively. Generally, depression has been associated with at least a 2-fold increased risk of mortality, which

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doi:10.1016/j.jad.2006.09.009

was also confirmed in two recent meta-analyses (Barth et al., 2004; van Melle et al., 2004), although a recent systematic review questions the validity of these findings (Sørensen et al., 2005). Given the wealth of studies on depression and the relative consistency of the results, it is perhaps not surprising that depression may be the first psychosocial factor to gain risk factor status on par with traditional biomedical factors (Rumsfeld and Ho, 2005). In contrast, anxiety is often overlooked as a psychosocial risk factor in CAD (Abbey and Stewart, 2000; Grace et al., 2004; Januzzi et al., 2000), although studying anxiety and depression in concert has been advocated given their frequent co-occurrence (Maser and Cloninger, 1990; Clark and Cook, 1998).

A recent review also emphasizes the importance of studying anxiety in the context of CAD, as anxiety triples the risk of all-cause mortality following myocardial infarction (MI), almost doubles the risk of reinfarction at 5 years follow-up, and the risk of sudden cardiac death by a factor of 6 (Januzzi et al., 2000). It should be noted, however, that not all studies have been able to confirm a link between anxiety and mortality (Lane et al., 2002). Anxiety has also been associated with impaired health status 1 (Lane et al., 2001; Mayou et al., 2000) and 5 years following a cardiac event (Sullivan et al., 2000), and with increased health care consumption post-MI (Strik et al., 2003). Accumulating evidence also indicates that depression in CAD is often accompanied by symptoms of anxiety (Denollet et al., in press), and that anxiety predicts cardiac events in post-MI patients over and above the effect of depression (Grace et al., 2004; Strik et al., 2003). In addition, in a recent study we showed that anxiety enhances the detrimental effect of depressive symptoms on health status post-percutaneous coronary intervention (PCI) (Pedersen et al., in press). Taken together, there is compelling evidence that anxiety should *not* be considered just an epiphenomenon of depression, but should be studied as a risk factor in its own right (Steptoe and Whitehead, 2005; Ballenger et al., 2001).

A paucity of studies has also investigated predictors of anxiety, including predictors of chronic anxiety. Knowledge of these predictors is important for secondary prevention, in particular given that anxiety has been associated with increased risk of adverse clinical events (Januzzi et al., 2000) and impaired health status (Lane et al., 2001). A recent report from the National Heart, Lung and Blood Institute in the United States also emphasizes the importance of studying patient-centered outcomes such as anxiety and its determinants, as a means to bridge the gap between research and clinical practice (Krumholz et al., 2005).

Personality may be an important determinant and explanatory factor of individual differences in chronic anxiety in CAD patients. The *distressed* (type-D) personality is an emerging risk factor in CAD that has been associated with a wide range of emotional distress, including anxiety, depression, and post-traumatic stress disorder, and adverse clinical prognosis (Denollet et al., 2000; Pedersen and Denollet, 2003, 2004, 2006). Persons with a type-D personality are characterized by the tendency to experience increased negative affectivity paired with the tendency not to express these emotions in social interactions due to fears of how others may react (Denollet, 2005). In other words, type-D personality is defined by the interaction of these two traits, with social inhibition modulating the effect of negative affectivity on prognosis, as shown in a recent study (Denollet et al., 2006). This supports the notion that type-D personality is more than depression and anxiety, with type-D also referring to how people deal with these increased levels of negative emotions.

To date, no study has looked at the role of type-D personality in chronic, unremitting anxiety in CAD patients in general and in a sample of patients undergoing PCI in particular. Hence, the objective of the current study was to investigate whether type-D personality is a predictor of chronic, unremitting anxiety in consecutive patients treated with PCI in the drug-eluting stent era.

2. Methods

2.1. Study design and participants

Patients ($n=167$) were drawn from a population of unselected patients ($n=875$; response rate=71%) participating in a psychological sub-study of the RESEARCH registry, who were treated with PCI using either sirolimus-eluting stent or bare metal stent implantation. The sirolimus-eluting stent is a drug-eluting stent that has been shown to decrease the risk of restenosis post-PCI substantially (Roiron et al., 2006). However, the use of drug-eluting stents in general and the sirolimus-eluting stent in particular confers no benefits on survival (Roiron et al., 2006). The inclusion criterion for the current study was the presence of anxiety 6 months post-PCI (Fig. 1). Details of the RESEARCH study design (Lemos et al., 2003) and the psychological sub-study have been published previously (Pedersen et al., 2004a). In brief, the registry was set up to evaluate the efficacy of sirolimus-eluting stent implantation. For this purpose, no clinical or anatomical exclusion criteria were applied so as to reflect patients