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Situational but Not Dispositional Pain Catastrophizing Correlates With Early Postoperative Pain in Pain-Free Patients Before Surgery

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Abstract: **Pain catastrophizing may be assessed as a dispositional measure using a previous painful experience as a reference or as a situational measure using an actual ongoing pain as a reference. The latter has shown more robust correlations with pain-related outcomes; the relative influence of dispositional and situational pain catastrophizing remains unknown in relation to populations with no pain before surgery. Forty-two consecutive patients who underwent corrective surgery for funnel chest were asked to complete the Pain Catastrophizing Scale with reference to 1) a previous painful experience (dispositional pain catastrophizing), 2) experimental pain during a 2-minute cold pressor test (situational experimental pain catastrophizing), and 3) clinical pain 3 days after surgery (situational clinical pain catastrophizing) to investigate whether these measures predicted immediate pain intensity and unpleasantness in the early postoperative period. Thirty-four patients were available for analyses. Dispositional pain catastrophizing was unrelated to situational experimental and situational clinical pain catastrophizing and to postoperative pain and unpleasantness ($P > .05$). In contrast, the 2 situation-specific pain catastrophizing measures were strongly associated ($\rho = .59$, $P = .0002$). In analyses adjusted for preoperative anxiety, depression, and cold pressor pain sensitivity, situational experimental and situational clinical pain catastrophizing correlated with postoperative movement-evoked pain ($\beta = 1.36$, $P = .01$ and $\beta = 1.24$, $P = .02$, respectively) and unpleasantness ($\beta = 1.32$, $P = .01$ and $\beta = 1.36$, $P = .01$, respectively).**

Perspective: ***Pain catastrophizing should be captured in relation to specific painful events in otherwise healthy patients. Future studies might benefit from assessing situational pain catastrophizing to identify patients at risk for increased postoperative pain to optimize stratified pain treatment.***

Key words: *Dispositional pain catastrophizing, situational pain catastrophizing, postoperative pain, cohort studies, thoracic surgery.*

Surgery is a plausible and predictable cause of pain. Nevertheless, a large proportion of surgical patients continue to experience unsatisfactory levels of postoperative pain and pain control.[2] Part of this problem is related to the high between-patient variability in pain experience and analgesic treatment response.[23,25] Insight into predictors of postoperative pain may facilitate the identification of patients who are likely to require optimized perioperative pain management. Pain catastrophizing, which denotes a negative cognitive affective response to anticipated or actual pain[42] is one of the psychological variables that most distinctively predict clinical pain outcomes.[35,45] Accordingly, higher preoperative pain catastrophizing levels have repeatedly been associated with higher postoperative pain ratings.[14,17,19,21,22,29-33,37,38,41,49] Most available studies on pain catastrophizing have assessed patients' recall of pain catastrophizing during previous nonspecific painful events, also referred to as dispositional or trait pain catastrophizing. Recent studies have, however, queried that this approach measures different pain experiences

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than pain catastrophizing measured during or directly after exposure to a specific painful stimulation, also referred to as situational or situation-specific pain catastrophizing.[4,12,13] In head-to-head comparison of the 2 measures, situational pain catastrophizing has initially shown more robust correlations with pain-related outcomes than dispositional measures of pain catastrophizing in healthy and in clinical populations.[4,12,13,35,41] However, the effects of dispositional and situational pain catastrophizing on postoperative pain outcomes have not been properly investigated in a longitudinal clinical study. In addition, most research in pain catastrophizing has thus incompletely accounted for negative affect constructs, particularly anxiety and depression, when assessing associations between measures of pain catastrophizing and pain-related outcomes.[43,44,47] Similarly, it remains unknown if situational pain catastrophizing predicts postoperative pain outcomes differently dependent on whether the situational pain catastrophizing measures are obtained in relation to an experimental pain stimuli or in relation to clinically relevant pain. Surgical procedures represent ideal models for studying pain catastrophizing and pain outcome because they offer unique opportunities for controlled assessment of patients before surgery and prospective follow-up of clinical postoperative pain development. We have previously shown that preoperative situational pain catastrophizing in response to experimental pain predicted the acute postoperative pain response to corrective chest wall surgery in younger men without preoperative pain.[16] This study essentially assessed pain catastrophizing with reference to 1) a nonspecific general pain experience (dispositional pain catastrophizing); 2) experimental pain during a 2-minute cold pressor test before surgery (situational experimental pain catastrophizing); and 3) in relation to clinical pain 3 days after surgery (situational clinical pain catastrophizing). This is the second report from this study in which we aimed to determine the associations between these distinctive measures of pain catastrophizing with measures of early postoperative pain and specifically to explore whether such associations remain when statistically controlled for potentially confounding factors, including anxiety, depression, and pain sensitivity.

Methods

Study Design

This observational study was designed to investigate associations between measures of pain catastrophizing with early postoperative pain intensity and pain unpleasantness 3 days after surgery. The study thus included 1 preoperative experimental session and 1 postoperative clinical session with 3 days in between. A schematic illustration of the study protocol is depicted in Fig 1 and explained in detail in the Study Overview section. The principal investigator (K.G.) recruited and tested all patients. Throughout the study patients were unaware of the specific objectives of the study.

Ethics Statement

The Central Denmark Region Committee on Biomedical Research Ethics (M-20110064) and the Danish Data Protection Agency (J. no: 2011-41-6061) approved the study and all participating patients provided informed signed consent before participation in the study.

Setting and Study Population

Consecutive patients scheduled for surgical repair of funnel chest were prospectively recruited at the Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital in Denmark during a 1-year period (May 2011–May 2012). The size of the study population was on the basis of a conservative estimate for a predetermined 1-year study period. Preoperatively, all patients considered themselves pain-free and presented with a normal sensory function in the anticipated surgical area. The surgical technique was standardized and performed by an experienced thoracic surgeon (H.K.P.) in general anesthesia, with preoperative use of continuous epidural block, in addition to administering systemic opioid and nonopioid analgesics. In brief, 1 or more convex steel bars were inserted under the sternum through small bilateral incisions in the thoracic wall to achieve sternal elevation and improve cosmetic appearance of the chest. We prospectively enrolled 51 patients (50 men and 1 woman) according to the following

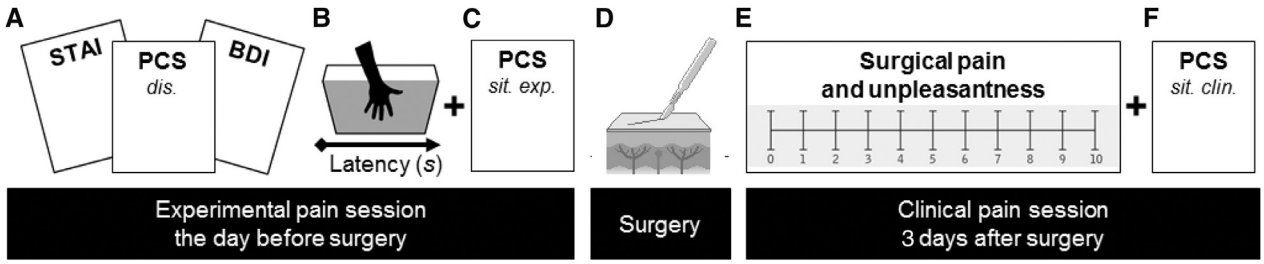

Figure 1. Study overview: the day before elective corrective chest wall surgery, patients completed **(A)** a baseline questionnaire battery, including the PCS using a general nonspecific pain experience as reference, the Spielberger State-Trait Anxiety Inventory (STAI), the Beck Depression Inventory (BDI). Later that day patients completed **(B)** a 2-minute cold pressor test in which they immersed their hand in stirred ice water (1°C). Pain sensitivity was derived from the cold pressor test response immediately after which they completed **(C)** the PCS with reference to the experienced cold pressor pain. The next morning patients underwent **(D)** standardized surgery. Three days after surgery, patients' recorded ratings of **(E)** postoperative pain intensity and pain unpleasantness on numerical rating scales and completed **(F)** the PCS with reference to surgical pain experienced when rising from a horizontal to a standing position. Abbreviations: PCS *dis.*, dispositional pain catastrophizing; PCS *sit. exp.*, situational experimental pain catastrophizing; PCS *sit. clin.*, situational clinical pain catastrophizing.