CLINICAL STUDY

Effects of Patients' Affect on Adverse Procedural Events during Image-Guided Interventions

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ABSTRACT

Purpose: To assess how a patient's affect on presentation relates to the likelihood of adverse events during their subsequent interventional image-guided procedures.

Materials and Methods: A secondary analysis was performed of an existing dataset from a clinical trial with 230 patients who underwent percutaneous peripheral vascular and renal interventions and who had completed the positive affect (PA) negative affect (NA) schedule (PANAS) before their procedures. Summary PANAS scores were split over the median and used to classify the participants into those with high vs low PA and high vs low NA. Associations between affect and the absence or presence of adverse medical events were examined by two-sided Fisher exact tests.

Results: Patients with high baseline NA were significantly more likely to have adverse events during their procedures than those with low baseline NA (18% vs 8%; $P = .030$). High baseline PA was not associated with a significantly higher frequency of subsequent adverse events compared with low PA (15% vs 9%; $P = .23$). Patients with high NA requested and received significantly more sedative and opioid agents than those with low NA (2.0 vs 1.0 units requested [$P = .0009$]; 3.0 vs 1.0 units received [$P = .0004$]). PA levels did not affect medication use.

Conclusions: High NA, but not PA, was associated with an increased likelihood of adverse events. Improving patients' NA before procedures seems a more suitable target than attempting to boost PA to improve the procedural experience.

ABBREVIATIONS

ASA = American Society of Anesthesiologists, NA = negative affect, PA = positive affect, PANAS = positive affect negative affect schedule

Distress in the radiology waiting room runs high, and many patients display negative emotions on arrival (1). Expectancies have been shown to elicit outcomes in terms of self-fulfilling prophecies in social and some medical contexts (2,3). However, it is unclear the extent to which a patient's negative thoughts/beliefs might affect interventional procedural complications, although it is known that patients expressing their negative feelings in speech and behavior can have adverse effects on medical team performance (4). In addition, very little is known regarding the associations between a patient's positive attitudes and the outcomes of medical procedures.

Patient mood in the medical context is commonly assessed by the degree of negative affect (NA) and positive affect (PA) a person endorses (5,6). NA refers to moods of individuals who feel distressed, guilty, fearful, angry, and nervous; are not satisfied; and come across as hostile (7). High NA can decrease pain tolerance (8) and has been associated with increased systolic blood pressure (9), cardiovascular disease (10–12), impaired immune function (13), irritable bowel syndrome (14), poor physical responses to stress (15), and dysregulation of the autonomic nervous system (16).

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E.V.L. is the founder and CEO of Hypnalgesics (d/b/a Comfort Talk; Brookline, Massachusetts) and has a patent for a self-sedation and suggestion system. None of the other authors have identified a conflict of interest.

J Vasc Interv Radiol 2017; ■:1–7

http://dx.doi.org/10.1016/j.jvir.2017.07.014

High levels of PA reflect a pleasurable engagement with the environment and are associated with enthusiasm, energy, and attention. PA is not the opposite of NA; both can coexist (5). For example, one can be upset about something and express that opinion with great outward energy (eg, politics) or one can also be very excited about and yet anxious of an upcoming event (eg, wedding). Research suggests that positive emotions support cardiovascular health and resilience, particularly in healthy populations, although the effects of PA in disease states and during acute stress management are less clear (17–19).

Given these considerations, the present study tested the hypotheses that high NA of a patient upon presentation is associated with a greater likelihood of adverse physiologic events during interventions and that PA is associated with improved procedural tolerance. These hypotheses were tested by using a validated tool for the assessment of PA and NA in patients and correlating NA and PA with adverse events recorded during vascular and renal procedures.

MATERIALS AND METHODS

Patients

The present study was approved by the institutional review board and Health Insurance Portability and Accountability Act–compliant. This study is the secondary analysis of previously unpublished data collected during a multicenter trial (20). The purpose of the original study was to compare two methods of nonpharmacologic analgesia for invasive procedures, whereas the present analysis investigates hypothesized relationships between baseline patient affect and the occurrence of adverse events.

Eligible individuals for the original study were adults referred for percutaneous transcatheter diagnostic and therapeutic peripheral vascular and renal interventions at a tertiary medical center. Exclusion criteria were severe chronic obstructive pulmonary disease, psychosis, intolerance of midazolam or fentanyl, pregnancy, and inability to hear or understand English. Patients were asked to participate in a research study to assess whether a relaxation exercise would enhance comfort during an invasive procedure. They were told that their chance to be guided in the exercise was one in three.

In the original study, 241 of 366 eligible patients were enrolled and randomized to receive standard care, empathic attention, or guidance in self-hypnotic relaxation consisting of a combination of empathic attention plus being read a script. After consent and before revelation of randomization, patients were given a PA NA schedule (PANAS) (5,6) to fill out. Of the 241 patients, 230 returned the completed PANAS and represent the present study population.

The intake forms of the original study documented the procedure category for each patient. The category “arterial” was mainly used for assessment of peripheral vascular disease or aortic aneurysms and commonly included runoff studies of the lower extremities without or with intervention. “Arterial” was also used for assessment and treatment planning of hepatic and renal tumors. The “arterial and venous” category was used for vascular mapping in the context of hepatic or renal organ transplantation (donors or recipients). “Venous” was used for venous occlusions, commonly in conjunction with venous access assessment or flow restoration for dialysis fistulae. “Percutaneous renal” was used for nephrostomies or nephroureteral stent placement.

Classification of baseline morbidity was based on the American Society of Anesthesiologists (ASA) classification and was entered in the clinical preprocedure sedation workup sheets with the following definitions: ASA status I for a healthy person, ASA status II for mild systemic disease, ASA status III for severe systemic disease, and ASA status IV for systemic disease that is a constant threat to life. In addition, a disease category classification was devised as follows: 1, benign, no threat to limb or life; 2, benign, threat to limb or organ, no threat to life; 3, malignant; and 4, acutely life-threatening.

Affect Assessments

The PANAS contains a list of 20 adjectives, each related to PA or NA (Fig 1). The 10 PANAS NA adjectives are “distressed,” “upset,” “guilty,” “scared,” “hostile,” “irritable,” “ashamed,” “nervous,” “jittery,” and “afraid.” The 10 PANAS PA adjectives are “interested,” “excited,” “strong,” “enthusiastic,” “proud,” “alert,” “inspired,” “determined,” “attentive,” and “active.” Respondents were asked to “…indicate to what extent you feel this way in general, on average” for each adjective on a 5-point Likert scale, ranging from a score of 1 indicating “very slightly/not at all” to a score of 5 indicating “extremely.” Scores were summed to create separate PA and NA scores ranging from 10 to 50. Higher scores indicate higher levels of NA or PA affect.

Adverse Procedural Events

An adverse event was defined as one or more of the following physiologic events: prolonged hypoxia $< 89\%$, de novo hypertensive or hypotensive episodes, prolonged de novo bradycardia, cardiac arrhythmia, procedure interruption for restoration of hemodynamic stability, severe nausea, or oversedation with somnolence, disorientation, or need for hospital admission. For the purposes of the present study, physiologic changes that did not divert the attention of the interventional radiologist, such as transient decreases in oxygen saturation that were relieved by nasal prongs or a low heart rate that persisted from the preprocedural baseline in an otherwise hemodynamically stable patient, were not counted as adverse events.

Medication Use

Intravenous sedation was provided in a patient-controlled analgesia model whereby, upon pushing a button, patients received nurse-administered midazolam and fentanyl in dosages of 1 unit (0.5 mg + 25 μg) × 4 with lockout times of 5 minutes, then with lockout times of 15 minutes. Medication was withheld during lockout times and when systolic blood pressure was lower than 89 mm Hg, oxygen