AANA Journal Course
Update for Nurse Anesthetists

The Perioperative Implications of Posttraumatic Stress Disorder

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Posttraumatic stress disorder (PTSD) is an anxiety disorder that develops after exposure to a traumatic event and is characterized by symptoms of reexperiencing, emotional numbing, persistent arousal, and avoidance. Approximately 6.8% of the people in the United States will be diagnosed with PTSD at some point in their lives. The presence of PTSD in a surgical patient can be important because PTSD is associated with the use of psychoactive medications, risky health behaviors, cardiovascular comorbidities, depression, chronic pain, and cognitive dysfunction, all of which may influence the risk of perioperative morbidity and mortality. In addition, patients with PTSD are anxious around unfamiliar people and in unfamiliar environments. The purposes of this journal course are to provide anesthetists with a working knowledge of the symptoms, treatments, and comorbidities associated with PTSD and to suggest ways of interacting with patients with the disorder that increase trust and decrease the risk of evoking posttraumatic symptoms in the perioperative environment.

Keywords: Anesthesia, mental health, posttraumatic stress disorder, PTSD, surgery.

Objectives
At the conclusion of this educational activity, the student should be able to:

1. Describe the incidence, symptoms, etiology, and treatment of posttraumatic stress disorder (PTSD).
2. Describe the prevalence of PTSD in patients undergoing surgery.
3. Describe the risk factors and patterns of comorbidity anesthetists can expect to encounter when caring for patients with PTSD.
4. Describe the known effect of surgery on the severity of posttraumatic symptoms.
5. Describe general approaches for providing anesthesia care to patients with PTSD.

Introduction
There are no established guidelines for the perioperative management of a patient with posttraumatic stress disorder (PTSD).1 Studies suggest that patients with PTSD exhibit patterns of comorbidity, substance use, and use of psychoactive medications that must be accounted for when planning an anesthetic. In addition, patients with PTSD can be very anxious during the perioperative process, and that anxiety can be ameliorated if anesthetists adhere to certain basic tenets when interacting with patients before and after surgery. Therefore, the purposes of this journal course are to familiarize practicing nurse anesthetists with the perioperative implications of PTSD and suggest strategies for caring for patients with the disorder. To accomplish this purpose, this journal course will do the following: (1) describe the epidemiology, phenomenology, and treatment of PTSD; (2) systematically review the prevalence of PTSD in patients undergoing surgery, the comorbidities associated with PTSD, the

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This course will provide 6 contact hours of continuing nursing education.
relationship between PTSD and postoperative morbidity and mortality, and the potential effects of surgery on posttraumatic symptom severity; and (3) suggest general strategies for interacting with and providing anesthesia care for patients with PTSD.

**Posttraumatic Stress Disorder**

Posttraumatic stress disorder is an anxiety disorder that develops after exposure to a traumatic event. Approximately 6.8% of people in the United States will be diagnosed with PTSD at some point in their lives. There are 17 recognized symptoms of PTSD, divided into 3 clusters (Table 1). For a patient to be diagnosed with PTSD, he or she must meet the following criteria: (1) exposure to a traumatic event that evoked intense feelings of fear, hopelessness, or horror; (2) demonstration of at least 1 clinically significant symptom of reexperiencing, 3 clinically significant symptoms of avoidance or emotional numbing, and 2 clinically significant symptoms of persistent arousal; (3) the presence of symptoms that persisted for at least 1 month; and (4) the presence of symptoms that adversely impacted functioning or resulted in significant distress. Although a clinician may not encounter a patient with PTSD until decades after the traumatic event, posttraumatic symptoms may still affect that patient’s care. For many people, PTSD is a chronic disorder that can persist for decades, waxing and waning in severity. In addition, age-related cognitive decline may be associated with recurrence of clinically significant posttraumatic symptoms after decades of symptom remission.

Studies account for PTSD in surgical patients by describing the prevalence of a PTSD diagnosis among participants or the severity of posttraumatic symptoms in all subjects. When reporting the prevalence of PTSD, researchers identify and count patients who have been diagnosed with PTSD per the criteria set forth by the American Psychiatric Association. A limitation of studies describing the prevalence of PTSD is that a diagnosis of PTSD does not indicate the clinical severity of posttraumatic symptoms at the time of surgery because this diagnosis may have been made by a clinician months or years before the patient presents for surgery.

In contrast, studies describing the severity of posttraumatic symptoms use posttraumatic symptom severity scales such as the Impact of Events Scale, the Post-traumatic Diagnostic Scale, or the PTSD Checklist-Civilian. Posttraumatic symptom severity scales are self-report instruments that require the respondent to subjectively rate the severity of some or all of the 17 symptoms of PTSD. Patients reporting a posttraumatic symptom severity exceeding a certain threshold are likely to have PTSD, but a clinician must confirm the diagnosis because severity scores do not assess the exposure to a traumatic event or relative distribution of symptoms across clusters (see Table 1) required for a diagnosis of PTSD. Therefore, a limitation of studies describing only posttraumatic symptom severity is that they only estimate the true prevalence of PTSD, because measures of posttraumatic symptom severity are insufficient in isolation to diagnose PTSD. In addition, severity scales may be strongly affected by the presence of depression because depressive symptoms overlap with posttraumatic symptoms.

Dual representation is a predominant theory of how a PTSD is developed and maintained after exposure to a traumatic event. Dual representation theory posits that memories of a traumatic event exist in the form of verbally and/or situationally accessible memories. Verbally accessible memories are voluntarily accessible and have manageable emotional impact when recalled. In contrast, situationally accessible memories are accessed involuntarily in response to reminders of the trauma or during states of intense arousal and are accompanied by an emotional state similar to that experienced during the traumatic event.

Posttraumatic stress disorder develops when situationally accessible memories of a traumatic event are accompanied by incomplete verbally accessible memories of that event. When triggered by reminders of the trauma or heightened states of emotional arousal, unopposed

**Table 1. Symptoms of Posttraumatic Stress Disorder**

<table>
<thead>
<tr>
<th>Symptom cluster</th>
<th>Symptom</th>
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<tbody>
<tr>
<td>Reexperiencing</td>
<td>Intrusive recollection</td>
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<tr>
<td></td>
<td>Recurrent distressing dreams</td>
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<tr>
<td></td>
<td>Flashbacks</td>
</tr>
<tr>
<td></td>
<td>Psychological distress on exposure to trauma-related cues</td>
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<tr>
<td></td>
<td>Physiological reactivity to trauma-related cues</td>
</tr>
<tr>
<td>Avoidance and emotional numbing</td>
<td>Avoidance of trauma-related thoughts, feelings, or conversations</td>
</tr>
<tr>
<td></td>
<td>Avoidance of people, places, and activities that are reminders of the trauma</td>
</tr>
<tr>
<td></td>
<td>Inability to recall an important aspect of the trauma</td>
</tr>
<tr>
<td></td>
<td>Diminished interest or participation in significant activities</td>
</tr>
<tr>
<td></td>
<td>Feelings of estrangement or detachment from others</td>
</tr>
<tr>
<td></td>
<td>Inability to experience positive feelings</td>
</tr>
<tr>
<td></td>
<td>Sense of foreshortened future</td>
</tr>
<tr>
<td>Persistent arousal</td>
<td>Difficulty sleeping</td>
</tr>
<tr>
<td></td>
<td>Irritability or outbursts of anger</td>
</tr>
<tr>
<td></td>
<td>Difficulty concentrating</td>
</tr>
<tr>
<td></td>
<td>Hypervigilance</td>
</tr>
<tr>
<td></td>
<td>Exaggerated startle response</td>
</tr>
</tbody>
</table>
situationally accessible memories produce intense emotional and somatic states similar to those experienced during the trauma, resulting in an overgeneralized fear response. Cognitive and exposure therapies for PTSD assist the person to form verbally accessible memories of the information held in situational accessible memories by talking about, imagining, or actually being exposed to trauma-related cues. \(^\text{17}\)

Although cognitive and exposure therapies are the mainstays of treatment, many patients with PTSD will receive some form of pharmacotherapy (Table 2). \(^{18-25}\) The first-line medications for the treatment of PTSD are the selective serotonin reuptake inhibitors. \(^{18}\) When selective serotonin reuptake inhibitors and time are ineffective in decreasing the severity of posttraumatic symptoms, additional medications may be added. \(^{18}\)

**Prevalence of PTSD in Surgical Patients**

The prevalence of posttraumatic stress disorder in surgical patients is associated with the presence of chronic pain and risk of having been traumatized. In patients undergoing major noncardiac surgery, 8% to 15% were previously diagnosed with PTSD \(^{7,8}\) or reported posttraumatic symptoms severe enough to suggest a diagnosis of PTSD. \(^{15}\) In addition, patients who reported the presence of chronic pain before major elective surgery were more likely to demonstrate posttraumatic symptom severity indicative of a diagnosis of PTSD than patients who denied chronic pain (23% vs 10%). \(^{15}\) The prevalence of PTSD in patients undergoing cardiac surgery varies according to geographic location and the likelihood of previous exposure to trauma based on life course. In 2006, approximately 15% of patients who underwent coronary artery bypass graft surgery (CABG) in the United States were previously diagnosed with PTSD, while in 2 studies in Australia, only 1% to 8% of patients undergoing cardiac surgery reported posttraumatic symptoms severe enough to suggest a diagnosis of PTSD. \(^{9,13,26-28}\) However, the prevalence of PTSD in patients undergoing cardiac surgery was greater in populations with exposure to traumatic events, with 35% of a sample of military veterans previously diagnosed with PTSD and 36% of a sample of Holocaust survivors reporting posttraumatic symptoms severe enough to indicate a diagnosis of PTSD. \(^{10,14}\) Therefore, PTSD was more prevalent in patients who reported chronic pain and in patients who are members of populations with greater risk of exposure to traumatic events.

**Cardiovascular Risk Factors**

Patients diagnosed with PTSD before surgery had a greater prevalence of cardiovascular risk factors, and this finding is most likely attributable to lifestyle. \(^{8}\) In patients presenting for major elective surgery, patients with PTSD had a greater prevalence of hypertension, diabetes, and hypercholesterolemia than patients without PTSD, despite being an average of 6 years younger. \(^{8}\) Patients with PTSD presenting for major elective surgery also had greater prevalence of risky health behaviors, including smoking, drug abuse, and alcohol abuse, than patients without PTSD. \(^{5}\)

**Depression**

A number of studies have noted an association between PTSD and depression. Among patients who underwent major noncardiac surgery, the prevalence of depression was 36% in patients with PTSD and 3.5% in patients without PTSD. \(^{8}\) Among patients who underwent CABG, the prevalence of depression was 53% to 61% in patients with PTSD compared with 17% to 26% in patients without PTSD. \(^{9,10}\) The relationship between PTSD and depression extends to symptom severity: Posttraumatic symptom severity and depressive symptom severity were significantly correlated \((r = 0.54)\) in patients awaiting CABG. \(^{13}\) These results indicate that patients presenting for surgery with PTSD were more likely to have comorbid depression, and patients with more severe posttraumatic symptom severity were likely to have more severe depressive symptoms.

A portion of this relationship can be attributed to the similarity of posttraumatic and depressive symptoms. Depression and PTSD share the symptoms of loss of interest in significant activities, insomnia, and difficulty concentrating, \(^{3}\) and items assessing these symptoms appear on measures of both depression and PTSD. However, studies on pairs of twins who served in the military during the Vietnam era have shown that PTSD and depression may share a common genetic liability. Pairs of monozygous twins were more likely than pairs of dizygous twins to develop comorbid PTSD and depression when controlling for various life experiences, including exposure to traumatic events. \(^{29}\) Therefore, depressive symptoms and posttraumatic symptoms correlate, and this correlation may arise from a genetic basis.

**Substance Use**

Among patients presenting for surgery, patients with PTSD had a greater prevalence of alcohol, tobacco, and other drug abuse than patients without PTSD. Before major elective surgery, veterans with PTSD demonstrated 3 times greater prevalence of smoking \((37.1\% \text{ vs } 11.6\%\)\), 5 times greater prevalence of alcohol abuse \((25.8\% \text{ vs } 4.4\%\)\), and more than 3 times greater prevalence of other drug abuse \((57.7\% \text{ vs } 14.6\%\)\) compared with veterans.
Table 2: Medications Used in the Treatment of Posttraumatic Stress Disorder and Its Comorbid Conditions and Symptoms

<table>
<thead>
<tr>
<th>Drug class</th>
<th>Medications</th>
<th>Notes and anesthetic safety considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective serotonin reuptake inhibitors (SSRIs)</td>
<td>Sertraline,9 paroxetine,9 fluoxetine, citalopram, escitalopram, fluvoxamine</td>
<td>First-line treatment18; preoperative withdrawal associated with greater risk of delirium in patients with depression19; administration of methylene blue associated with serotonergic crisis20</td>
</tr>
<tr>
<td>Selective norepinephrine reuptake inhibitors (SNRIs)</td>
<td>Venlafaxine, duloxetine</td>
<td>First- or second-line treatment18; no anesthetic safety considerations noted</td>
</tr>
<tr>
<td>Monoamine oxidase inhibitors</td>
<td>Phenelzine</td>
<td>Rarely used owing to side effects and dietary concerns18; avoid ephedrine, meperidine, tramadol, methadone, and dextromethorphan owing to risk of precipitating serotonergic crisis21</td>
</tr>
<tr>
<td>Tricyclic antidepressants</td>
<td>Imipramine, amitriptyline, desipramine, nortriptyline, doxepin</td>
<td>Third-line treatment for patients with symptoms refractory to SSRIs/SNRIs18; exaggerated response to sympathomimetic agents have been reported22; risk of prolonged QTc interval with nortriptyline23</td>
</tr>
<tr>
<td>Tetracyclic antidepressant</td>
<td>Mirtazapine</td>
<td>Second-line treatment or adjunct treatment for insomnia18; no anesthetic safety considerations noted</td>
</tr>
<tr>
<td>Monocyclic amino ketone antidepressant</td>
<td>Bupropion</td>
<td>Third-line treatment or adjunct for added antidepressant effect18; lowers seizure threshold</td>
</tr>
<tr>
<td>Serotonin modulators</td>
<td>Trazodone, nefazodone</td>
<td>Adjunct therapy for insomnia18; no anesthetic safety considerations noted</td>
</tr>
<tr>
<td>α-Antagonists</td>
<td>Prazosin</td>
<td>Adjunct therapy for nightmares18; no anesthetic safety considerations noted</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>Lamotrigine, tiagabine, topiramite, sodium valproate/valproic acid, carbamazepine</td>
<td>Third-line treatment or adjunct for irritability, impulsivity, and pain18; no anesthetic safety considerations noted</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Alprazolam, lorazepam, clonazepam, diazepam, temazepam</td>
<td>Ineffective in the treatment of symptoms of reexperiencing, emotional numbing, and avoidance24 but may be added as adjunct therapy for insomnia, irritability, anxiety, and panic19; effects will be additive with sedatives administered perioperatively</td>
</tr>
<tr>
<td>Atypical antipsychotics</td>
<td>Quetiapine, ziprasidone, olanzapine, risperidone, aripiprazole</td>
<td>Adjunct treatment of insomnia, irritability, anger, anxiety, impulsivity, and psychotic symptoms18; refractory hypotension reported after spinal anesthesia with risperidone25; risk of prolonged QTc interval23</td>
</tr>
</tbody>
</table>

*These are the only US Food and Drug Administration–approved medications for posttraumatic stress disorder.
without PTSD.8 Before CABG, veterans with PTSD had more than 2 times greater prevalence of alcohol dependence (50% vs 20%) than veterans without PTSD.10 These findings are consistent with studies of outpatients with PTSD. Outpatient veterans with PTSD reported approximately twice the national average prevalence of tobacco, alcohol, and drug use,30 and outpatient civilians with PTSD were more likely to abuse tobacco and drugs other than alcohol.31 The prevalence of concurrent substance abuse disorders and PTSD may represent self-medication of PTSD symptoms or a vulnerability of the patient that facilitates the development of substance use disorder and PTSD.32 Therefore, patients with PTSD are more likely to be engaged in some form of substance use regardless of the setting in which they are encountered.

Cognitive Function
In addition to greater prevalence of cardiovascular risk factors and depression, patients with PTSD also have worse preoperative cognitive function. Before CABG, patients with PTSD had worse cognitive functioning on measures of verbal memory in comparison with patients without PTSD and nonsurgical control subjects of similar age.10 This finding was consistent with previous research regarding the relationship between PTSD and cognitive functioning in nonsurgical populations that suggests that cognitive capability was inversely related to post-traumatic symptoms.33-35 In particular, patients with PTSD performed worse than did control subjects without PTSD on tasks that required respondents to immediately learn and retain new information for a short period, manipulate that information in a meaningful way, and produce a response based on the manipulated information, a set of tasks collectively known as executive function.36-38 These findings suggest that the cognitive deficits associated with PTSD are concentrated in specific domains rather than affecting overall intelligence and result in the patient having decreased cognitive reserve.37,38

Cognitive reserve refers to the hypothesis that pre-morbid cognitive abilities create a buffer against the sequelae of degenerative neurological processes like Alzheimer disease, allowing cognition to undergo a process of graceful degradation as damage or disruption progresses.39 When less cognitive reserve is present, less damage or disruption is required to produce overt clinical signs of brain dysfunction like dementia or delirium. Cognitive reserve has been estimated with proxies such as performance during neuropsychological testing and educational level,40 and these proxies of cognitive reserve have demonstrated predictive validity for delirium and cognitive decline after surgery.31-43

To date, to our knowledge, only 1 study has investigated PTSD as a predictor of cognitive decline after surgery. One week after CABG, subjects with preexisting PTSD were more likely to demonstrate a greater decline in nonverbal memory, verbal memory, and executive function than subjects without PTSD.10 This finding suggests that patients with preexisting PTSD may be more vulnerable to cognitive decline after surgery and is consistent with the cognitive reserve hypothesis.

Postoperative Mortality
In large studies, preexisting PTSD was associated with greater risk of short- and long-term postoperative mortality.7,8 A significantly greater proportion of patients with a diagnosis of PTSD or comorbid PTSD and depression died in hospital after CABG compared with patients without PTSD.9 In addition, patients with PTSD were approximately 3 times more likely to die within 1 or 5 years of undergoing major elective surgery than patients without PTSD, even after controlling for other predictors of mortality such as age, hypertension, diabetes, hypercholesterolemia, depression, and tobacco use.7 However, the investigators did not report on the statistical effect of interactions among predictors of mortality; that is, they did not report whether greater mortality was related to specific combinations of mortality predictors in a given patient.8 In addition, no studies to date have compared survival in patients with PTSD who underwent surgery with survival of patients with PTSD who did not undergo surgery. Therefore, data suggest that there was an association between preexisting PTSD and postoperative mortality, but do not elucidate whether this greater mortality was related to the presence of specific combinations of comorbid cardiovascular risk factors, to the severity of comorbid illness that was not captured by the databases, or to an effect of PTSD that was independent of surgery.

The greater risk of postoperative mortality in patients with PTSD may be an epiphenomenon unrelated to surgery. Studies of Vietnam-era veterans have demonstrated that since the war, veterans with PTSD were more likely to die of cardiovascular and external causes, including suicide, homicide, and accidents, than veterans without PTSD.44-47 As noted, this greater mortality is likely mediated by lifestyle.45 Therefore, studies that estimate the risk of postoperative mortality in patients with PTSD in comparison with patients without PTSD may be confounding maturation and history; that is, studies may confound the natural maturation of mortality in patients with PTSD with the historical effect of having surgery. Such a comparison may lead to data that suggest that patients with PTSD are exposed to greater risk of mortality by undergoing surgery, when actually they are at greater risk of mortality than their peers without PTSD but the magnitude of risk is relatively unaffected by surgery.

Other Postoperative Outcomes
Despite its association with postoperative mortality, the presence of PTSD or severity of posttraumatic symptoms was unrelated to many other common metrics of postop-
Postoperative outcome. Hudetz et al reported that a previous diagnosis of PTSD was unrelated to length of stay in the intensive care unit and 6-month incidence of hospital readmission after cardiac surgery. In addition, Oxlad et al found that the severity of posttraumatic symptoms was inversely related to length of stay in the intensive care unit and unrelated to risk of rehospitalization within 6 months of surgery. After gastric bypass surgery, a previous diagnosis of PTSD was unrelated to length of hospital stay, incidence of postoperative complications, and 1-year weight loss. Therefore, PTSD has not been demonstrated to be a predictor of hospital length of stay, readmission rate, or certain surgery-specific outcomes after cardiac or gastric bypass surgery.

**Surgery and Posttraumatic Symptom Severity**

At present, the effect of surgery on the severity of posttraumatic symptoms is largely unknown. The only study to report presurgical and postsurgical posttraumatic symptom severity scores found that Holocaust survivors undergoing cardiac surgery did not experience a significant increase in posttraumatic symptom severity from immediately before surgery to 6 months after surgery. After gastric bypass surgery, outpatient medical records indicated that mental health clinicians’ global impressions were that the severity of posttraumatic symptoms had improved in 41%, worsened in 8.3%, and remained unchanged in 50% of patients with preexisting PTSD. Although these studies did not find that surgery was associated with an increased severity of posttraumatic symptoms, a case report provides anecdotal evidence of possible acute posttraumatic symptom exacerbation by perioperative experiences. A young woman, who developed PTSD as a result of sexual and physical assault during a civil conflict in her home country, developed PTSD as a result of sexual and physical assault during the perioperative period and must be accounted for when planning the anesthetic (see Table 2).

**Clinical Implications**

For many patients, PTSD is a chronic illness associated with the accumulation of risk factors across the life course. Therefore, members of populations at high risk for developing the disorder should be asked if they have PTSD. There is only anecdotal evidence of the exacerbation of posttraumatic symptoms after surgery, so if a patient has PTSD, alterations in the anesthetic plan should focus on managing comorbidities rather than preventing hypothetical behavioral problems. A patient with PTSD should be carefully assessed for cardiovascular risk factors, substance use, depression, chronic pain, and baseline cognitive impairment before surgery, and discussions of perioperative risk should focus on the contribution of the specific risk factors present in the individual patient. The presence of chronic pain may necessitate multimodal pain management techniques after surgery. In addition, certain medications used to treat PTSD can catastrophically interact with drugs commonly administered in the perioperative period and must be accounted for when planning the anesthetic (see Table 2). However, psychoactive medications should generally be continued throughout the perioperative period to avoid side effects from acute withdrawal.

In general, patients with PTSD are anxious in unfamiliar environments and around unfamiliar people. Therefore, the operating room team should establish trust and reassure the patient that the environment is as safe as possible. Team members should calmly and slowly approach the patient in his or her field of vision, introduce themselves by name, and explain their role in the perioperative process. At all times, staff should minimize loud unexpected noises and movements and wake or gain the attention of patients verbally rather than by touch. Furthermore, the team should emphasize that its goal is to make the patient as comfortable and safe as possible throughout the process of having surgery, including managing the patient's pain and anxiety. The overall goal is to ensure the patient understands and can anticipate what will happen throughout the perioperative process.

During assessment, it is reasonable to briefly ask about potential triggers: “Is there anything specific that makes you really anxious, so that we can avoid upsetting you?” However, extensive discussion of traumatic events and posttraumatic symptoms can exacerbate anxiety and is, therefore, not prudent or informative during the preoperative interview. If a patient does report specific triggers, efforts should be made to avoid exposing the patient to situations that could precipitate acute anxiety. Benzodiazepines and other drugs that produce short-term amnesia should be used judiciously and with caution because the patient may become agitated if he or she loses orientation to place and time. If a patient becomes acutely anxious or has a flashback, the presence of a trusted family member, friend, or healthcare provider may help the patient restore and maintain his or her orientation to the present place.

**Conclusions**

Patients with preexisting PTSD present for surgery with risk factors that predispose them to greater postoperative morbidity and mortality, including greater prevalence of cardiovascular risk factors, depression, substance abuse, and chronic pain, than patients without PTSD. Patients...
with PTSD also perform worse on preoperative measures of cognitive function and may be at greater risk of cognitive decline after surgery, but this finding has been investigated only in patients undergoing cardiac surgery. Patients with PTSD have greater risk of short-term mortality after cardiac surgery and long-term mortality after noncardiac surgery in large studies, but the mechanism by which PTSD influences the risk of mortality after surgery is unclear. Anecdotal evidence suggests that the perioperative process can transiently exacerbate PTSD symptoms, but the effect of surgery and anesthesia on posttraumatic symptom severity has only been explored in patients undergoing CABG.

There are many unanswered questions about the effect of surgery on patients with PTSD. Accurate estimation of risk of postoperative morbidity and mortality in this population is further confounded by the patterns of risk factors associated with PTSD, and, at present, there are no good theories in the literature that explicate a causal process between preexisting PTSD and greater risk of long-term mortality after surgery. Therefore, future research should aim to better define the contribution of PTSD to postoperative morbidity and mortality and to identify the unique perioperative needs of patients with PTSD.

REFERENCES


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