PTSD & Anesthesia

Brian Tolly, MD

ChooseVA HEALTH FAIRVIEW VA U.S. Department of Veterans Affairs

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Outline

- Personal Interest
- Case
- Definition
- Incidence & Risk Factors
  - Civilian vs Veteran
- Diagnosis
- Preexisting vs Postoperative PTSD
- Neurobiology
- Perioperative Significance of PTSD
- Anesthetic Management
  - Emergence Agitation

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Objectives

- Describe the diagnostic criteria and incidence of post-traumatic stress disorder (PTSD) relative to veterans undergoing surgery
- Discuss the perioperative significance of preexisting PTSD based on current literature
- Describe perioperative considerations and management strategies for patients with PTSD
  - Emergence Agitation
- No Disclosures

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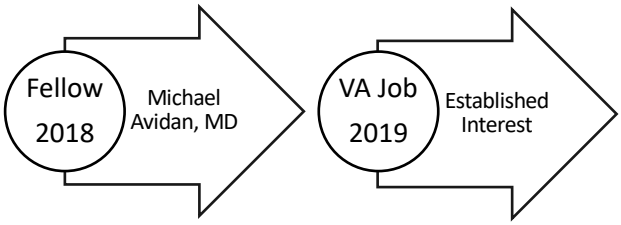
Why am I talking about this?



- Why are vets waking up agitated?
  - PTSD contributing?
  - Evidence based prophylaxis?
- Strong PTSD and Brain Health Initiative between UMN and VA

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Experiences of Military CRNAs with Service Personnel Who Are Emerging From General Anesthesia

MAJ John Tyler Wilson, CRNA, PhD, ANC, USA
Marie E. Pokorny, RN, PhD

Open Access Case Report DOI: 10.7759/cureus.921

Emergence Delirium With Post-traumatic Stress Disorder Among Military Veterans

Son Nguyen [1], Mila Pak [2], Daniel Paoli [3], Donna F. Neff [4]

1. Orlando VA Medical Center, Assistant Professor, Univ of Central Florida College of Medicine 2. Orando VAMC, Courtesy Professor at UCF Nursing 3. Anesthesiology, Orlando VA 4. Associate Dean for Nursing Research, UCF College of Nursing

CASE REPORT

Dexmedetomidine as a Rescue Therapy for Emergence Delirium in Adults: A Case Series

Matthew D. Read, MD, Christopher V. Maani, MD, and Scott Blackwell, MD

CONTINUING EDUCATION

Management of Emergence Delirium in Adult PTSD Patients: Recommendations for Practice

Donnamarie Lovestrand, MSN, RN, CPAN, Steven Lovestrand, PhD, COL Denise M. Beaumont, MSN, CRNA, MAJ Jonathan G. Yost, MSN, CRNA

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Editorial

Posttraumatic stress disorder and anesthesia: Respect for the military veteran's mind

ARTICLE INFO

Keywords:
Anesthesia
PTSD
Veterans
Surgery
Perioperative
Emergence Agitation

Geriatric Anesthesia

NARRATIVE REVIEW ARTICLE

Adult Emergence Agitation: A Veteran-Focused Narrative Review

Brian Tolly, MD,*† Amr Waly, MD,* Garrett Peterson, DNP, CRNA, APRN,*
Christopher R. Erbes, PhD,‡§ Richard C. Prielipp, MD, MBA, FCCM,† and Ioanna Apostolidou, MD*†

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Case presentation: 70M presents for EBUS and Biopsy

- PMH
  - Lung Nodule
  - Mild COPD
  - No significant cardiac disease
  - PTSD
- Social Hx
  - 1 PPD x 50 years
  - No EtOH or drug use
- Anesthesia Hx: "No problems"
- Meds
  - ASA 81 mg – primary prevention
  - Trazadone
  - Escitalopram
  - Tamsulosin

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Case presentation: 70M for EBUS and Biopsy

- Do you routinely ask questions related to PTSD?
- Do you assess PTSD severity and how?
- How do you tailor the anesthesia plan to the pt?

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PTSD

Post-Traumatic Stress Disorder

- 2013 DSM-5 (APA 2013)
  - Anxiety → Trauma-stressor related disorder
- DSM-5 Criteria
  - Death, injury, sexual violence (actual vs threat)
    - Experience, witness, or learn of
  - Core clusters:
    - Intrusion
    - Avoidance
    - Negative cognition + mood
    - Hyperarousal
- Acute stress disorder (<1 mo)
  - Combat and Operational Stress Reaction

DSM-5 criteria for PTSD

Trauma exposure	
Trauma	Actual or threatened violent death, serious injury or accident, or sexual violence
A. Exposure	Via any of the following: 1. Directly exposed to trauma 2. Eyewitness (in person) to others directly exposed to trauma 3. Learning of direct exposure to trauma of a close family member or close friend 4. Repeated or extreme exposure to aversive details of traumatic event (eg, trauma workers viewing human remains or repeatedly exposed to details of child abuse), in person or via work-related electronic media
Symptom groups B to E (symptoms beginning or worsening after the traumatic event)	
B. Intrusion	*≥1 intrusion symptoms:* 1. Recurrent, involuntary, distressing trauma memories 2. Recurrent, distressing trauma-related dreams 3. Dissociative reactions/flashbacks related to trauma 4. Intense or prolonged psychological distress to trauma reminders 5. Marked physiological reactions to trauma reminders
C. Avoidance	*≥1 avoidance symptoms:* 1. Avoidance/efforts to avoid distressing internal trauma reminders (memories, thoughts, feelings) 2. Avoidance or efforts to avoid distressing external trauma reminders (people, places, activities)
D. Negative cognition and mood	*≥2 negative cognition/mood symptoms:* 1. Amnesia for important parts of trauma exposure 2. Persistent, exaggerated negative beliefs about self, others, or the world 3. Persistent, distorted trauma-related cognitions leading to inappropriate blame of self/others 4. Persistent negative emotional state (eg, fear, horror, anger, guilt, shame) 5. Loss of interest or participation in significant activities 6. Detached/estranged feelings from others 7. Persistent loss of positive emotions (eg, happiness, satisfaction, love)
E. Hyperarousal	*≥2 marked alterations in trauma-related arousal and reactivity:* 1. Irritability and angry outbursts with little/no provocation (eg, verbal/physical aggression toward people/objects) 2. Reckless or self-destructive behavior 3. Hypervigilance 4. Exaggerated startle 5. Concentration problems 6. Sleep disturbance (eg, difficulty falling or staying asleep, restless sleep)
Additional criteria	
F. Duration	>1 month
G. Distress/ impairment	Clinically significant distress; social/occupational/other important functioning impairment
H. Not attributable to another disorder	Independent of physiological effects of a substance (eg, medication, alcohol) or another medical condition

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Trauma Exposure and PTSD Rates

- Civilian Population
  - Lifetime prevalence 6.1 – 9.2%
- Wartime rates
  - OIF/OEF: 23%
  - Gulf: 10.1%
  - Vietnam: 18.7-30.9%

- **Sexual Relationship Violence: 33%**
  - **MST, Rape**
- Interpersonal network traumatic experience: 30%
  - Loved one dies, Life-threatening illness of a child
- Interpersonal violence: 12%
  - Childhood abuse
- Exposure to organized violence: 3%
  - Kidnapped, refugee, civilian war zone
- **Participation in wartime atrocities and violence: 11%**
  - **combat, witnessing death, discovering dead bodies**
- Other: 12%
  - motor vehicle, natural disaster

Kilpatrick DG, et al. *J Trauma Stress*. 2013;26:537-547.
Fulton JJ, et al. *J Anxiety Disord*. 2015;31:98-107.
Kang HK, et al. *Am J Epidemiol*. 2003;157:141-148.
Kulka RA, et al. New York, NY: Brunner/Mazel, 1990.
Dohrenwend BP, et al. *Science*. 2006;313:979-982.
Magruder K, et al. *Psychiatric Annals*. 2009;39:778-788.

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Risk and Resilience Factors

65-87% people exposed to severe trauma

General:
- Women
- Native Americans
- Low SE Status
- Poor support
  - widowed, divorced
- Childhood Abuse
- Initial reaction severity

Resilience:
- Secure relationship attachment
- Community Integration

Combat-specific:
- Unit cohesiveness
- Strong leadership
- Peer support/morale
- Higher military rank

Military:
- Pre-deployment:
  - Women
  - Low SE Status
  - Prior Trauma
  - Other MH diagnosis
- Intra-deployment:
  - # and length
  - TBI or Physical Injury

Kessler RC. *World Psychiatry*. 2014;13:265-274.
Xue C. *PLoS One*. 2015;10:e0120270.
Able ML. *Curr Psychiatry Rep*. 2019;21:58.
Grieger TA. *Am J Psychiatry*. 2006;163:1777-1783
Koren D. *Am J Psychiatry*. 2005;162:276-282.
Richter JC. *Psychosomatics*. 2006;47:223-230.
Yurgil KA. *JAMA Psychiatry*. 2014;71:149-157.

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Diagnosis

- Clinician Administered PTSD Scale (CAPS-5)
  - Labor intensive, 30-min interview
- Screens:
  - Primary care PTSD – 5 items
  - PCL-5 – 20 item checklist

In the past month, have you...

1. Had nightmares about the event(s) or thought about the event(s) when you did not want to?
   YES / NO
2. Tried hard not to think about the event(s) or went out of your way to avoid situations that reminded you of the event(s)?
   YES / NO
3. Been constantly on guard, watchful, or easily startled?
   YES / NO
4. Felt numb or detached from people, activities, or your surroundings?
   YES / NO
5. Felt guilty or unable to stop blaming yourself or others for the event(s) or any problems the event(s) may have caused?
   YES / NO

Weathers FW. *Psychol Assess*. 2018;30:383-395.
Bovin MJ. *Psychol Assess*. 2016;28:1379-1391.
Arbisi PA. *Psychol Assess*. 2012;24:1034-1040.

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Postoperative Traumatic Stress

- Important distinction:
  - Stress phenotypes **subsequent** to surgery or acute medical illness
    - 12-25% of patients develop a stress-type reaction to surgery

Can J Anesth/J Can Anesth (2019) 66:1385–1395
https://doi.org/10.1007/s12630-019-01418-4

REVIEW ARTICLE/BRIEF REVIEW

Post-traumatic stress in the postoperative period: current status and future directions

Stress post-traumatique en période postopératoire : état de la situation et orientations futures

Renée El-Gabalawy, MA, PhD · Jordana L. Sommer, BA(Hons) · Robert Pietrzak, MPH, PhD · Donald Edmondson, PhD · Jitender Sareen, MD · Michael S. Avidan, MD · Eric Jacobsohn, MD

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Postoperative Traumatic Stress

Illness-induced PTSD

- Enduring Somatic Threat (Edmundson 2014)
  - Future-oriented intrusions (cancer diagnosis)
  - Arousal linked to internal triggers (pain)
  - Behavioral Avoidance impossible because body is source of threat

Postop Risk Factors (El-Gabalawy 2019)

- Emergency and Cancer surgeries
- Treatment for pre-existing mental health disorders
  - Depression protective?
- Intraoperative awareness
  - 20-70% with PTSD symptoms (paralysis)
- Delirium
- Pain
- Need for ICU stay, blood loss, benzo administration?

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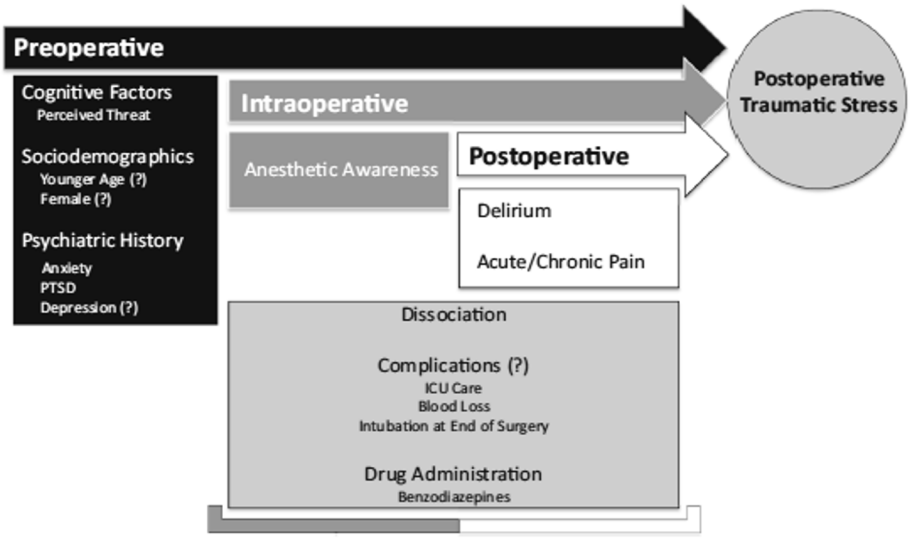

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Neurobiology

- Anatomical Model
  - Amygdala → Assesses fear and threat
  - Medial Prefrontal Cortex (mPFC) → Normally extinguishes amygdala
  - Hippocampus → Explicit memory formation and emotional context

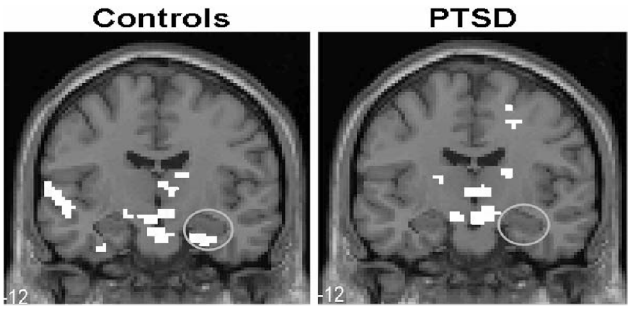

FIG. 2. Controls show more hippocampal activity (see circled area in right HPC) during the vMWT than the PTSD group.

Shin LM. Neuropsychopharmacology 2010;35:169-91
Sherin JE. Dialogues Clin Neurosci 2011;13:263-78.
Shin LM. Ann N Y Acad Sci 2006;1071:67-79.
Hughes KC. Expert Rev Neurother 2011;11:275-85.
Liberzon I. Biol Psychiatry 1999;45:817-26.
Gurvits TV. Biol Psychiatry 1996;40:1091-9.

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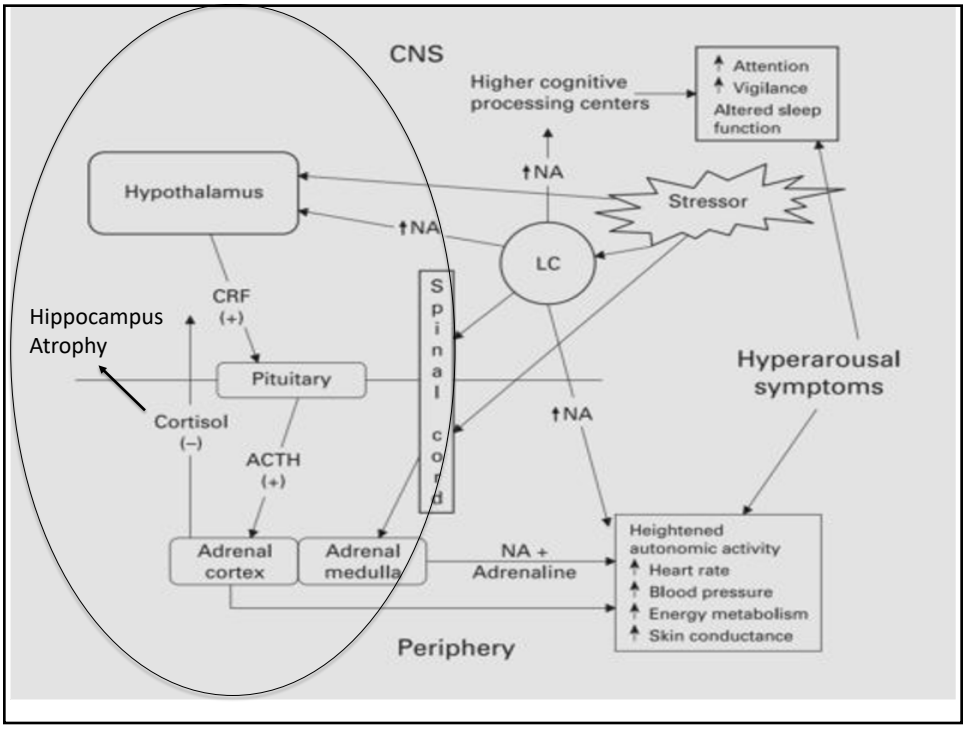

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Management

- Mental Health
  - Trauma-focused CBT
  - Exposure Therapy
  - Eye Movement De-sensitization
  - Cognitive Processing
  - Mindfulness & Relaxation
  - Grounding Maneuvers

Ketamine
Stellate Ganglion Blocks!

Medications
- **SSRI** – Serotonin Syndrome, Plt dysfunction
- **SNRI** – CYP 2D6 competition/inhibition
- **TCA** – Anticholinergic, Conduction, Orthostasis
- **MAOI** – HTN with ephedrine
- **2nd Gen Antipsychotics** – EPS, NMS, metabolic
- **Benzodiazepines**
- **Other:**
  - Bupropion – lower seizure threshold
  - Trazadone
  - Prazosin

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Perioperative Significance

- **Common Problem in VA Medical Centers**
  - *Copeland 2015:*
    - >300,000 VA operations over 3-year period
    - 5.2 vs 4.5% surgical rate in patients with major mental health diagnosis
    - PTSD most common MH diagnosis in those needing surgery (7%)
  - *Brzezinski 2009*
    - PTSD diagnosis 7.7-8.8% presenting for non-emergency surgery in San Francisco
  - >400,000 surgeries annually across VAHCS

1. **Comorbidities**
2. **Mortality and other post-surgical metrics**
3. **Emergence Agitation**

Copeland LA. *BMC Surg*. 2015;15:74.
Massarweh NN. *Surgery*. 2019;165:261-262.
Brzezinski M et al. ASA Abstracts. 2009.

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PTSD → Neuroendocrine activation, inflammation, oxidative stress…

Common Medical and Psychiatric Comorbidities in Veterans with PTSD	
Medical Disease	Mental Health
"Polytrauma triad" • **TBI** • **Chronic Pain** • **PTSD**	Anxiety
Poor Baseline Cognitive Function → POD?	Depression
Poor sleep quality • **OSA – HARD TO TREAT** • **Insomnia/Nightmares**	Elevated Suicide Risk
Coronary Artery Disease • **CAD risk factors**	Substance Use: • Alcohol • Opiate Dependence • Marijuana • Tobacco
Metabolic Syndrome, Obesity, and Insulin Resistance	
Combat Injury and Physical Disability	

VULNERABLE POPULATION!

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Mortality

Acquired Cardiovascular Disease — Dao et al

Clinical depression, posttraumatic stress disorder, and comorbid depression and posttraumatic stress disorder as risk factors for in-hospital mortality after coronary artery bypass grafting surgery

Tam K. Dao, PhD,[a,b,c] Danny Chu, MD,[b,d] Justin Springer, PhD,[b,c] Raja R. Gopaldas, MD,[e] Deleene S. Menefee, PhD,[b,c] Thomas Anderson, PhD,[b,c] Emily Hiatt, BA,[a] and Quang Nguyen, PhD[b,c]

Dao 2010

- 62,000 CABG
- 1,000 hospitals
- ~3% in-house mortality
- 14.7% PTSD diagnosis
- PTSD predicted higher mortality
  - Death 56.1%, Alive 13.4%
  - OR 2.09
- ANS dysfunction

Brzezinski 2009

- 1996-2008
- >10,000 non-emergent surgeries
- San Francisco VA
- >1 and 5 year mortality
  - OR > 30
- Controlled for CV disease risk factors
- ***Abstract

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Other Post-surgical Outcomes

- **Prolonged use of opioid prescriptions in PTSD patients after elective knee surgery**
  - Rozet I et al. *Anesth Analg*. 2014
- **Eye cases: longer OR times, higher need for block, higher sedation requirements, higher pain scores**
  - Rapoport Y et al. *BMC Ophthalmol*. 2017

Pain management

- **High risk of volatility – recent case series of 3 PTSD patients discharged AMA**
  - Brzezinski M et al. *Case Rep Anesthesiol*. 2017

Communication and Patient Relationship

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Emergence Agitation

CONTINUING EDUCATION

Management of Emergence Delirium in Adult PTSD Patients: Recommendations for Practice

Donnamarie Lovestrand, MSN, RN, CPAN, Steven Lovestrand, PhD, COL Denise M. Beaumont, MSN, CRNA, MAJ Jonathan G. Yost, MSN, CRNA

Open Access Case Report

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Emergence Agitation vs. Postoperative Delirium

Anesthesia and Analgesia Tolly et al. 2021 Feb 1;132(2):353-364.

Table 2. Suggested Diagnostic Framework of Emergence Agitation Compared to Defining Features of Delirium

Variable	Emergence Agitation	Postoperative Delirium
Presenting symptoms[6,7]	Psychomotor hyperactivity Nonpurposeful response to commands	Acute onset of impaired consciousness Altered attention and cognition Hypo-, hyper-, and mixed motor subtypes
Time-course features[6]	Confined to emergence[9] Point of end emergence difficult to clinically ascertain Self-limited Brief (<30 min)	Peak incidence rates 1–3 d postoperatively Fluctuating Typically resolves by 7 d or hospital discharge
Lucid interval following anesthetized state[1,6]	Usually not	Common
Assessment location[13]	Usually confined to OR assessed by in-room anesthesia providers	Any postoperative location (PACU, ICU, wards)
Most common demographic[6]	Children and young adults	Elderly
Commonly used diagnostic screens	RASS[27] RSAS[26] Aono 4-point scale[28]	CAM-ICU[8] NuDESC[30] CAM-PACU[5]
Significance[6]	Immediate patient and staff safety concerns Unclear long-term consequences	Prolonged hospitalization Associated longer-term cognitive dysfunction Risk of decreased functional status Increased morbidity and mortality

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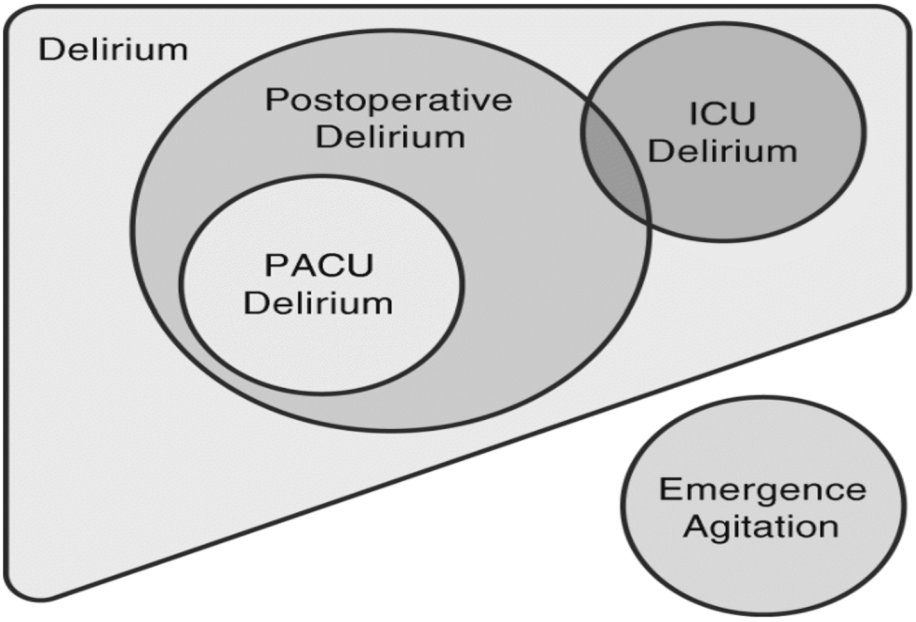

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A conceptual model for mechanism of EA in Veterans with PTSD

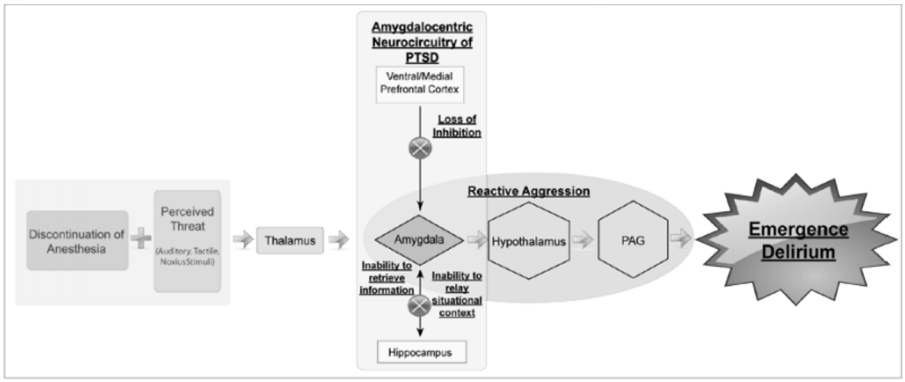

Figure. Theoretical Model of Amygdalocentric Neurocircuitry-Reactive Aggression
Progression of a perceived threat's stimulus through abnormal amygdalocentric neurocircuitry, activating the reactive aggression pathway, being displayed as emergence delirium. (Adapted from Rauch et al.[8])
Abbreviations: PAG, periaqueductal gray matter; PTSD, posttraumatic stress disorder.

McLott 2013

Why do we care?

- Self-limited, but long-term effects not known
- Not well quantified:
  - Dislodged tubes and catheters
  - Self-harm
  - Caregiver-harm
  - Hemorrhage
  - Resource utilization?
- Card et al → only **8%** of EA patients DID NOT go on to develop PACU delirium

CLINICAL PRACTICE

Emergence from general anaesthesia and evolution of delirium signs in the post-anaesthesia care unit

E. Card[1], P. Pandharipande, C. Tomes[3], C. Lee[3], J. Wood[3], D. Nelson[1], A. Graves[4], A. Shintani[5], E. W. Ely[6] and C. Hughes[2,*]

Incidence & Risk Factors of EA

- Best data in ADULTS: **19%** (Card 2015)
- 30 Adult Studies: **2.5% - 90.5%** (Tolly 2021)

- **Patient Risk Factors:**
  - Male
  - Extremes of age
  - Smoker
  - PTSD?
- **Non-patient related risk factors**
  - Type of procedures:
    - ENT
    - Oral Surgery
    - Breast surgery
  - Volatile anesthetics
  - Higher pain scores in PACU
  - Indwelling tubes/catheters

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Veteran Risk Factors for EA

ORIGINAL ARTICLES

The Incidence of and Risk Factors for Emergence Delirium in U.S. Military Combat Veterans

Jason M. McGuire, PhD, CRNA, CDR, NC, USN

- Link between mental health diagnoses and EA?
  - McGuire 2012
    - Incidence of agitation 20-27% in Veterans, 46% in those with MH diagnoses:
    - Risk Factors: State anxiety, PTSD, Depression
  - Umholtz 2016
    - PTSD retrospectively correlated with "PACU agitation" at VAHCS in New York
- Surveys of military anesthesiologists and CRNAs (Wilson 2014):
  - TBI, Age <30, Inhalation maintenance, Pain
- Case reports of malaria prophylaxis in Africa in 1990s (Gullahorn 1993)

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Perioperative Management of PTSD and EA

- No Society Guidelines
- Patient-Centered, Respectful
- Multidisciplinary

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Posttraumatic Stress Disorder and Anesthesia Emergence

Donnamarie Lovestrand, RN
MAJ P. Steven Phipps, CRNA, USAR
Steven Lovestrand, PhD

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Pre-Anesthetic Evaluation:
- Review past anesthetics for EA episodes
  - EMR
  - Preoperative interview
- Assess psychiatric history and medications
- Note comorbid TBI or physical combat injury
- Alcohol or illicit substance screen
- Note chronic pain and opiate use

Triggers for EA Prophylaxis
- Prior difficult wake-up or EA history
- Formal PTSD diagnosis
- Suspected PTSD based on history of nightmares, hyperarousal, or re-experiencing symptoms
- Individualized decision based on known patient and anesthetic factors

Preoperative - Day of Surgery:
- Develop trusting relationship with patient
  - Involve family members and close friends
  - Explain perioperative process from beginning to end in common terms
  - Validate PTSD triggers and symptoms
  - Elucidate specific concerns
- Anxiolysis
  - Avoid Benzodiazepines[34,37]
  - Reassure safety throughout procedure
  - Dexmedetomidine, if needed, 0.5 mcg•kg^{-1} over 10 min[58]
- Extra IV Tape
- Multimodal analgesia
- Plan for consistency of anesthesia providers through emergence and PACU delivery

Intraoperative:
- Include EA in time-out proceedings
- One provider speaking at a time
- Signs on OR door to minimize noise and traffic
- Dexmedetomidine 0.5-1.0 mcg•kg^{-1} over 10 min after induction + 0.5 mcg•kg^{-1}•hr^{-1} through emergence[50]
- Consider TIVA[25,34] and subanesthetic ketamine[2] in patients deemed high risk
- BIS monitor to avoid inappropriate depth of anesthesia

Emergence Preparation:[82]
- Quiet room:
  - Radio/Music off
  - Avoid garbage and instrument tray manipulation
- Operating Room lights dimmed
- Transfer to stretcher with side rails up before emergence
- Anesthesia provider consistency from pre-op setting

Emergence Agitation:
- Exclude reversible causes of altered mentation
- Call for assistance
- Attempt to re-orient and restore control to the patient via grounding measures[4,96]
- Rescue dexmedetomidine (0.5 – 1.0 mcg•kg^{-1} IV over 10 min with or without 0.5 mcg•kg^{-1}•hr^{-1})
- Consider additional pain medication of propofol[77] for re-sedation
- Alert recovery room prior to transfer

Post-Anesthesia Care Unit:[82]
- Quiet and private recovery bay
- Continue dexmedetomidine as needed
- Validate feelings surrounding EA episode
- Discuss interest in mental health referral if suspected PTSD diagnosis

BIS – Bi-spectral Index
EA – Emergence Agitation
EMR – Electronic Medical Record
PTSD – Post-traumatic Stress Disorder
TBI –Traumatic Brain Injury
TIVA – Total Intravenous Anesthesia

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Communication

- **Shame/stigma surrounding mental health**
- **Permission to discuss diagnosis**
  - Validate PTSD triggers and symptoms
- **Build Rapport**
  - Listening, empathy, understanding
  - Power of choice
  - Involve families
- **Explain perioperative process in lay terms**

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Preoperative Anesthesia Evaluation

- Prior EA events
- Substance use
- Chronic pain

- PTSD hx assessment:
  - Dx: current or past hx
  - Triggers
  - Meds
    - SSRI, SNRI, MAOI, TCAs, Prazosin, Trazadone, Benzos

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Preoperative – Anesthesia Plan

- Welcoming environment/offer warm blankets
- Anxiolysis
  - Reassure safety
  - Avoid benzos in "ED" (Lepouse 2006)
  - Consider dexmedetomidine 0.5 mcg/kg over 10 min. Bolus?
  - Extra IV tape
- Multimodal Analgesia
- Plan for consistent anesthesia provider

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Intraoperative

- Include EA in time-out process
- Signs on OR to minimize noise and traffic
- BIS monitor for depth of anesthesia
- Dexmedetomidine:
  - Bolus 0.5 mcg/kg after induction
  - Infusion 0.5-1 mcg/kg/hr through emergence
  - In high-risk patients: TIVA? Ketamine?

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Emergence

- **Preparation:**
  - Minimize External Stimuli
    - Lights Dim
    - Radio off
    - Tray Breakdown paused
  - Transfer to gurney
  - Provider Consistency
- Arouse with calm voice

Exclude reversible causes

Wild Patient

Suspected EA:
- Grounding measures
- Safety + call for help
- Avoid restraints
- Medications:
  - Precedex vs Propofol vs Fentanyl?
- Alert PACU
- Transfer when symptoms improve

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Evidence for EA Prophylaxis

Adults!
-Dexmedetomidine
-Ketamine
-TIVA
-Depth of Anesthesia

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Dexmedetomidine

Meta-Analysis > Drug Des Devel Ther. 2019 Aug 15;13:2853-2864.
doi: 10.2147/DDDT.S207016. eCollection 2019.

Effects of peri-operative intravenous administration of dexmedetomidine on emergence agitation after general anesthesia in adults: a meta-analysis of randomized controlled trials

Jian Zhang [# 1], Yang Yu [# 1], Shuai Miao [2], Lu Liu [1], Shuyuan Gan [1], Xianhui Kang [1], Shengmei Zhu [1]

- Alpha-2:alpha-1 receptor agonist (1620:1) (Scott Warren 2015)
- Lowered NE output from LC and spinal cord
  - Volatile excitation of LC mitigated by DEX (Yasui 2007)

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Ketamine

Aesth Plast Surg (2018) 42:847–853
https://doi.org/10.1007/s00266-018-1103-4
ISAPS CrossMark
ORIGINAL ARTICLE PATIENT SAFETY

- Competitive NMDA Antagonist
- One adult study (Demir et al)
  - 20 min prior to procedure finish 0.5 mg/kg bolus IV
  - 54.3% EA vs 8.6% after extubation
  - 28.6% EA in PACU vs 0%
- PTSD
  - Used as an infusion for severe outpatient cases (Feder 2014)
  - Military medicine – peri-combat use protective of PTSD? (McGee 2014)

Prevention of Emergence Agitation with Ketamine in Rhinoplasty

Canser Yilmaz Demir[1] · Nureddin Yuzkat[2]

Original Investigation

Efficacy of Intravenous Ketamine for Treatment of Chronic Posttraumatic Stress Disorder
A Randomized Clinical Trial

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The Correlation Between Ketamine and Posttraumatic Stress Disorder in Burned Service Members

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Volatile versus TIVA

- Consensus in pediatrics is that volatile anesthesia increases risk
- 2 adult studies, ENT protective effect of TIVA
  - Talih 2020
  - Jo 2019

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Effect of Total Intravenous Anesthesia vs Volatile Induction With Maintenance Anesthesia on Emergence Agitation After Nasal Surgery
A Randomized Clinical Trial

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Anesthesia Depth monitoring

- No Data on EA specifically
- Mixed data on POD/POCD
  - Earlier data favorable (Chan 2013)
  - Recent data: EEG guided anesthesia had no effect on postop delirium (Wildes 2019, ENGAGES RCT)
- But…
  - BIS-guided anesthetic protocols improved parameters and reduced PACU length of stay (Chiang 2018)
  - BIS-guided decrease in DEZ when Dex infusion used (Khagafy 2017)

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Case Presentation Follow-up

- **PTSD History**
  - +Nightmares
  - +Triggers
    - "Fueling up my car"
    - "Feeling confined"
- **EA Protocol**
  - Pre-procedure Brief Proceedings
  - Positioned after induction
  - Pharmacologic Prophylaxis
  - Emergence Preparation
- **Smooth Emergence!**

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Future Directions?

- PTSD and EA study at Minneapolis VA – will start soon!
  - Observational, No randomization to intervention
  - Predictors
    - Preoperative Mental Health Questionnaires
    - Chart Review Variables
  - Outcome: RASS Scale: (1) Emergence and (2) PACU

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