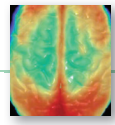

PTSD in Combat Veterans With Cognitive Decline

Rajdip Barman, MD; Mark B. Detweiler, MD, MS; and Kye Y. Kim, MD

Patients may exhibit posttraumatic stress disorder symptoms prior to the onset of dementia or uncover long quiescent symptoms of the disease, adding to the challenge of treating this population.

The number of veterans aged ≥ 65 years is expected to increase steadily as the Vietnam-era cohort ages. In 2012, the number of veterans aged ≥ 85 years was expected to peak at nearly 1.4 million. Vietnam-era veterans comprise the largest cohort of veterans, and > 15% of male and > 8% of female Vietnam veterans receiving care in the VA system have been diagnosed with posttraumatic stress disorder (PTSD). These veterans are rapidly approaching age groups in which cognitive disorders increase exponentially in prevalence.

Combat exposure has been called a common but "hidden variable" in studies of aging and health.[1] Combat exposure may be even more hidden for Vietnam veterans who have pursued health care outside the VA system, and are less likely to announce their service to health care providers.

Even veterans who did not serve in traditional combat roles can experience chronic debilitation from the psychological stress of overseas deployment to a war zone. Indeed, cases of noncombat trauma have been presented in the context of cognitive decline and late-onset PTSD.[2] It is probable that survivors of sexual assault, child abuse, crime, and natural disaster are also vulnerable to a recurrence of trauma symptoms if they experience cognitive slippage. In this article the authors report a case of delayed onset PTSD symptoms, precipitated by cognitive decline.

Dr. Barman is a senior resident physician in psychiatry; **Dr. Detweiler** is an attending geriatric psychiatrist; and **Dr. Kim** is a professor of psychiatry, all at Virginia Tech Carilion School of Medicine in Roanoke. Dr. Detweiler is an attending geriatric psychiatrist at Salem VA Medical Center in Virginia. Dr. Kim is an attending geriatric psychiatrist at Catawba Geriatric Center/Catawba Hospital in Virginia.

CASE REPORT

Mr. B was a 72-year-old Korean War veteran referred for neuropsychological evaluation to establish baseline cognitive status before elective cardiac surgery. Mr. B relied on his wife to fill in many details of his personal history. His wife reported that the patient's memory problems had increased significantly over the previous 12 months. Mr. B had been treated with donepezil 10 mg daily for about 1 year, with no observed benefit. His wife described life at home as "tense" due to his increased irritability and poor insight into his condition. Mr. B reported that he was often afraid of noises at night and needed to go outside and look around. His wife reported that he was very afraid of "strangers coming into the house."

Mr. B was born in Arizona and experienced significant physical abuse while under the care of an alcoholic foster parent. He dropped out of high school and enlisted in the U.S. Marine Corps. Upon his discharge from military service, he worked as a truck driver for 23 years. He retired after experiencing hip problems. He drank heavily for many years after the war and, according to his wife, was "very violent," but stopped 27 years previously, after injuring his wife while intoxicated. The patient's medical history included hospitalization about 1 year prior to the evaluation following a fall associated with altered level of consciousness and confusion, which lasted several hours. He was discharged the same day and was thought to have had a stroke. The patient also had hypertension, hyperlipidemia, and sciatica. A carotid ultrasound showed bilateral carotid stenosis > 50%.

Mr. B was married for 45 years and had 5 children and 12 grandchildren. He enlisted in the U.S. Marine Corps at age 19 and served as a tank gunner during the

Korean War. He experienced extremely heavy combat, was wounded several times (including loss of consciousness due to an explosion), and was hospitalized for 4 months in Japan. When he returned to the frontline, he found that many of the men in his unit had been killed. He was promoted to staff sergeant and tank commander. Mr. B received an honorable discharge after the war and a 50% service-connected disability pension for PTSD. He reported having received group psychotherapy at a VA hospital soon after the war but no other psychiatric treatment. He avoided watching the news because the Gulf War news reminded him of Korea.

Mr. B was smiling, pleasant, and cooperative throughout the 2 hours of testing and interviewing. He wore a Korean War veteran baseball cap festooned with military pins and ribbons, including a Purple Heart ribbon that he proudly showed to the test administrators. Unbidden, he also presented for inspection an assortment of life membership cards in various veterans service organizations. Mr. B reported frequent nightmares, night sweats, and intrusive thoughts about his combat experiences. During testing, he was repeatedly triggered by innocuous items and launched into a discourse on his combat experiences. When asked to memorize a short list of words that included the word *fire*, he said, "You know what that reminds me of...we had to fire big guns, 90 millimeter, that's what it was…killing and how to kill." When shown an abstract design that resembled the number 44, he said, "You know what that is? It was the radio call sign of our tank—'This is 44, come in, we need some help.'"

Mr. B's memory problems were marked by rapid forgetting, impaired ability to learn new information, and impaired ability to recall previously learned information. Language problems were also present, including difficulty recognizing and naming common objects, impaired auditory comprehension, and problems with verbal associative fluency during timed tasks. He also showed difficulties with executive functioning, attention, and working memory. His mini-mental state examination score was 21/30. He stated the year was 2020, did not know the day of the week, registered 2/3 words and recalled 0/3, he counted 3/5 in serial 7s, and was unable to repeat the phrase, "no ifs, ands, or buts."

DISCUSSION

Posttraumatic stress symptoms were present during the immediate aftermath of the initial trauma exposure for this patient. He managed to lead a relatively successful and productive life, sustained a marriage, and raised a family. The onset of cognitive decline precipitated a recrudescence of PTSD symptomology. In fact, the effects of combat trauma seem more malignant and extreme at the time of the memory disorders evaluation than at any prior time in his life.

A number of case reports have been published in recent years that describe comorbid presentations of cognitive disorder and PTSD symptomatology.[3-6] A clinical consensus that cognitive decline can exacerbate previously well-managed symptoms of earlier psychological trauma seems to be emerging. Several published case studies have noted that comorbid presentation of dementia and PTSD is often marked by violence, psychotic symptoms, and increased risk of hospitalization.[7-9]

PTSD Research

Unfortunately, systematic investigation into the relationship between PTSD and cognitive decline is in its infancy. Previous authors have posited various mechanisms to explain the exacerbation of dormant PTSD symptoms after cognitive decline.[10,11] Some have attributed the phenomenon to an age-related failure of either repression or avoidance or to a compromised ability to actively focus their attention elsewhere.[2,12] A finding of preservative errors on neuropsychological tests has been associated with an inability to organize and inhibit intrusive thought.[13] In one case, the effects of combat trauma were purported to be denied, repressed, and largely forgotten for 30 years until rekindled by the patient's deteriorating health and loss of employment.[14] Several case examples have been presented in which physical illness, interpersonal loss, retirement, or losses of social support were other factors.[15-18] Two major studies of veterans with PTSD, found that subjects were twice as likely to develop dementia.[3,4] There is a strong association between chronic psychological stress and later development of dementia. In a study by Wilson and colleagues, subjects with higher baseline stress had twice the chance of developing Alzheimer disease.[19] Similar findings of accelerated or higher cognitive decline were found by other studies, too.[17,20]

Hippocampal damage associated with prolonged, intense psychological stress has been cited as a possible contributor to PTSD symptom recrudescence in older adults.[21] It is well known that emotional arousal leads to better-encoded memories. In the context of a cognitive disorder marked by gradual memory loss, traumatic memories might be the last to go.[22] Another proposed biologic mechanism is a reduction in hippocampal volume

and decreased inhibition of the amgydala, which results in preferential recall of the nondeclarative, amygdaloidal traumatic memories.[8]

Research on selective area damage in the hippocampus opens a new era of understanding of consequences of stress. The dentate gyrus (DG) is the main area of hippocampus that helps in neurogenesis and cornus ammonis 3 (CA3) for dendritic branching.[23-25] In recent studies by Wang and colleagues, PTSD has been found to be associated with selective volume loss of the CA3/DG subfields, consistent with animal studies.[24-28] Abundance of glucocorticoid receptors in the hippocampus, especially at CA3,[29,30] may make it more vulnerable to the neurotoxic effect of glucocorticoids, causing suppression of neurogenesis,[29] diminished dendritic branching,[30] loss of synapses,[26,31] and eventually diminished neuroplasticity,[32] because CA3/DG is the main target of neurotoxicity by glucocorticoid and inflammatory damage.

The results of neuroimaging studies suggest that decreased integration of the prefrontal cortex and the hippocampus results in impaired short-term memory and perhaps increasing the prominence of long-term distressing memories.[33] Clinical observation confirms that patients with PTSD experience vivid, intense, detailed, and realistic recollections of remote memories at a time when their ability to recall nontraumatic autobiographical detail is severely compromised.

Symptom Reemergence

Both prospective and retrospective studies have shown that PTSD symptoms can evolve, even after a 20-year long symptom-free period, and reemergence of PTSD symptoms is not uncommon.[34,35] A longer delay usually presents with less severe symptoms.[36] The unavailability of complete information regarding a patient's past adjustment to psychological trauma has encouraged some experts to label exacerbation of PTSD symptoms precipitated by cognitive disorder as delayed onset PTSD. In most cases, it seems that this is more accurately described as a recrudescence of symptoms that were better managed previously. The picture is clouded by the often bizarre and extreme manifestation of PTSD symptoms in patients with memory disorders. The course of PTSD often does involve a delay between the time of exposure to trauma and symptom manifestation. In addition, symptom intensity can fluctuate significantly over the course of this often chronic illness.

The suffering associated with PTSD is often personal and concealed. Family and other collateral sources may be able to report only on social and occupational functioning. The authors recommend increased attention to proper assessment of (1) remote trauma history in patients being evaluated for memory disorders; and (2) cognitive decline in patients with history of PTSD. The problem of underreported cognitive decline is well known, although its extent is not. Early detection may help to mitigate the combined effects of these conditions. Aggressive early treatment of symptoms during the onset of cognitive dysfunction may prolong patients' ability to remain at home.

Patient Care

Mr. B's case was marked by significant tension in the home. Education and support of caregivers is essential to maintaining care in the least restrictive setting, such as the patient's home. Families might be utterly bewildered by a patient's apparently sudden preoccupation with traumatic memories. For many, this might be the first time they have ever heard the patient speak at length about the traumatic events. Simple strategies to limit exposure to distressing stimuli, improve grounding, and understand the effects of trauma can be taught. Psychopharmacologic intervention to improve sleep, slow cognitive decline, and decrease behavioral disturbances may be indicated.

Behavioral disturbance is frequently encountered when treating patients with cognitive impairment. In the limited literature on the subject, patients with both PTSD and cognitive impairment do not seem to be more prone to behavioral disturbance than patients with cognitive impairment alone.[9] However, the case reports cited here demonstrate a high incidence of violence or potential violence in these comorbid patients. Routine assessment of potential harm from firearms or other weapons should be conducted assiduously.

It is possible that Vietnam War veterans may be more likely than previous veterans to exhibit behavioral disturbances in the context of cognitive decline and PTSD. A higher incidence of aggression, violence, and resistance to authority has been documented in this group.[37] Substance abuse and dependence also occurs with higher frequency in this cohort and may complicate treatment of cognitive impairment and PTSD.[38,39] A large number of these veterans may initially present to non-VA health care providers and these clinicians may be unaware of a patient's prior combat exposure and thus fail to accurately assess PTSD.

Although the relation of PTSD and vulnerability to dementia has been well established, it is unknown how the presence of PTSD symptomatology impacts dementia symptoms or how the presence of dementia impacts PTSD symptoms. Posttraumatic stress disorder and dementia share similar risks like traumatic brain injury, low IQ, poor education, substance abuse, precipitated by stressful life events and impairment of coping, physical health and related risk factors. Unmasking PTSD symptoms resulting from dementia is a well-known phenomenon described in recent studies on late-onset stress symptomatology (LOSS).[5,10,40]

Since PTSD is a major risk factor that doubles the chance of developing dementia, mandatory screening for dementia in older patients along with assessment of other risk factors as a standard of care may help physicians in the early detection and initiation of care. Recognition of LOSS may be an important milestone in the treatment of delayed onset PTSD, which is considered a normal aging process and a premorbid stage of PTSD.[10,40]

Although there is no established treatment, early psychotherapeutic approaches like reminiscent therapy along with psychoeducation may be beneficial in patients with LOSS.[40-42] Effective treatments for PTSD with patients with dementia may be challenging, though dementia was not found to be a barrier to implement prolonged exposure therapy in patients with mild cognitive impairment.[43] Patient aligned care teams can be an ideal approach for the care of these veterans.

CONCLUSION

Posttraumatic stress disorder and dementia are well studied and documented disorders, although PTSD has been studied far more extensively in younger populations. Accounts of comorbidity of the 2 disorders are limited in the literature. Individuals may exhibit PTSD symptoms prior to the onset of dementia. They also may develop or uncover long quiescent symptoms of the disease. The populations of patients with PTSD and dementia are recognized, but their characteristics are largely unstudied and thus unknown.

Although the authors believe this to be a phenomenon of unrecognized coexistence of the 2 disorders, a disproportionate number of patients may be found in certain populations, especially among veterans. There is good evidence to expect increased numbers of these patients in the VA system, especially given the relative frequency of PTSD symptoms in aging cohorts of VA patients. ●

Author Disclosures

The authors report no actual or potential conflicts of interest with regard to this article.

Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of Federal Practitioner, *Frontline Medical Communications Inc., the U.S. Government, or any of its agencies. This article may discuss unlabeled or investigational use of certain drugs. Please review complete prescribing information for specific drugs or drug combinations—including indications, contraindications, warnings, and adverse effects—before administering pharmacologic therapy to patients.*

REFERENCES

1. Spiro A 3rd, Schurr PP, Aldwin CM. Combat-related posttraumatic stress disorder symptoms in older men. *Psychol Aging.* 1994;9(1):17-26.
2. Van Achterberg ME, Rohrbaugh RM, Southwich SM. Emergence of PTSD in trauma survivors with dementia. *J Clin Psychiatry.* 2001;62(3):206-207.
3. Yaffe K, Vittinghoff E, Lindquist K, et al. Posttraumatic stress disorder and risk of dementia among US veterans. *Arch Gen Psychiatry.* 2010;67(6):608-613.
4. Qureshi SU, Kimbrell T, Pyne JM, et al. Greater prevalence and incidence of dementia in older veterans with posttraumatic stress disorder. *J Am Geriatr Soc.* 2010;58(9):1627-1633.
5. Barman R, Detweiler MB. Late onset stress symptomatology, subclinical PTSD or mixed etiologies in previously symptom free aging combat veterans. *J Trauma Stress Disor Treat.* 2014;3:4.
6. Barman R, Detweiler MB. The case for early psychotherapy in aging combat veterans experiencing late onset stress symptomatology. *J Psychol Psychother.* 2015;5:200.
7. Johnston D. A series of cases of dementia presenting with PTSD symptoms in World War II combat veterans. *J Am Geriatr Soc.* 2000;48(1):70-72.
8. Mittal D, Torres R, Abashidze A, Jimerson N. Worsening of post-traumatic stress disorder symptoms with cognitive decline: case series. *J Geriatr Psychiatry Neurol.* 2001;14(1):17-20.
9. Verma S, Orengo CA, Maxwell R, et al. Contribution of PTSD/POW history to behavioral disturbances in dementia. *Int J Geriatr Psychiatry.* 2001;16(4):356-360.
10. Potter CM, Kaiser AP, King LA, et al. Distinguishing late-onset stress symptomatology from posttraumatic stress disorder in older combat veterans. *Aging Ment Health.* 2013;17(2):173-179.
11. Cook JM. Post-traumatic stress disorder in older adults. *PTSD Res Q.* 2001;12(3):1-8.
12. Horowitz MJ. *Stress Response Syndromes.* 2nd ed. New York, NY: Jason Aronson; 1978.
13. Grossman AB, Levin BE, Katzen HL, Lechner S. PTSD symptoms and onset of neurologic disease in elderly trauma survivors. *J Clin Exp Neuropsych.* 2004;26(5):698-705.
14. Van Dyke C, Zilberg NJ, McKinnon JA. Posttraumatic stress disorder: a thirty-year delay in a World War II veteran. *Am J Psychiatry.* 1985;142(9):1070-1073.
15. Yehuda R. Status of glucocorticoid alterations in post-traumatic stress disorder. *Ann N Y Acad Sci.* 2009;1179:56-69.
16. Elder GH Jr, Clipp EC. Combat experience and emotional health: impairment and resilience in later life. *J Pers.* 1989;57(2):311-341.
17. Peavy GM, Salmon DP, Jacobson MW, et al. Effects of chronic stress on memory decline in cognitively normal and mildly impaired older adults. *Am J Psychiatry.* 2009;166(12):1384-1391.
18. Deng J, Lian Y, Shen C, et al. Adverse life event and risk of cognitive impairment: a 5-year prospective longitudinal study in Chongqing, China. *Eur J Neurol.* 2012;19(4):631-637.
19. Wilson RS, Arnold SE, Schneider JA, Kelly JF, Tang Y, Bennett DA. Chronic psychological distress and risk of Alzheimer's disease in old age. *Neuroepidemiology.* 2006;27(3):143-153.
20. Johansson L, Guo X, Waern M, et al. Midlife psychological stress and risk of dementia: a 35-year longitudinal population study. *Brain.* 2010;133(pt 8):2217-2224.

21. Charney DS. Psychobiological mechanisms of resilience and vulnerability: implications for successful adaptation to extreme stress. *Am J Psychiatry.* 2004;161(2):195-216.
22. McGaugh JL. Memory—a century of consolidation. *Science.* 2000;287(5451):248-251.
23. Duan X, Kang E, Liu CY, Ming GL, Song H. Development of neural stem cell in the adult brain. *Curr Opin Neurobiol.* 2008;18(1):108-115.
24. McKittrick CR, Magariños AM, Blanchard DC, Blanchard RJ, McEwen BS, Sakai RR. Chronic social stress reduces dendritic arbors in CA3 of hippocampus and decreases binding to serotonin transporter sites. *Synapse.* 2000;36(2):85-94.
25. Pham K, Nacher J, Hof PR, McEwen BS. Repeated restraint stress suppresses neurogenesis and induces biphasic PSA-NCAM expression in the adult rat dentate gyrus. *Eur J Neurosci.* 2003;17(4):879-886.
26. Sandi C, Davies HA, Cordero MI, Rodriguez JJ, Popov VI, Stewart MG. Rapid reversal of stress induced loss of synapses in CA3 of rat hippocampus following water maze training. *Eur J Neurosci.* 2003;17(11):2447-2456.
27. Cameron HA, McKay RD. Adult neurogenesis produces a large pool of new granule cells in the dentate gyrus. *J Comp Neurol.* 2001;435(4):406-417.
28. Magariños AM, McEwen BS. Stress-induced atrophy of apical dendrites of hippocampal CA3c neurons: involvement of glucocorticoid secretion and excitatory amino acid receptors. *Neuroscience.* 1995;69(1):89-98.
29. McEwen BS. Stress and hippocampal plasticity. *Annu Rev Neurosci.* 1999;22:105-122.
30. Li S, Wang C, Wang W, Dong H, Hou P, Tang Y. Chronic mild stress impairs cognition in mice: from brain homeostasis to behavior. *Life Sci.* 2008;82(17-18):934-942.
31. Tata DA, Marciano VA, Anderson BJ. Synapse loss from chronically elevated glucocorticoids: relationship to neuropil volume and cell number in hippocampal area CA3. *J Comp Neurol.* 2006;498(3):363-374.
32. Takemura NU, Kato N. Adult neurogenesis and systemic adaptation: animal experiments and clinical perspectives for PTSD. *Prog Brain Res.* 2008;167:99-109.
33. Grady CL, Furey ML, Pietrini P, Horwitz B, Rapoport SI. Altered brain functional connectivity and impaired short-term memory in Alzheimer's disease. *Brain.* 2001;124(pt 4):739-756.
34. Horesh D, Solomon Z, Keinan G, Ein-Dor T. The clinical picture of late-onset PTSD: a 20 year longitudinal study of Israeli war veterans. *Psychiatry Res.* 2013;208(3):265-273.
35. Herrmann N, Eryavec G. Delayed onset post-traumatic disorder in World War II veterans. *Can J Psychiatry.* 1994;39(7):439-441.
36. Port CL, Engdahl B, Frazier P. A longitudinal and retrospective study of PTSD among older prisoners of war. *Am J Psychiatry.* 2001;158(9):1474-1479.
37. McFall M, Fontana A, Raskind M, Rosenheck R. Analysis of violent behavior in Vietnam combat veteran psychiatric inpatients with posttraumatic stress disorder. *J Trauma Stress.* 1999;12(3):501-517.
38. Simpson TL, Rillamas-Sun E, Lehavot K, et al. Alcohol consumption levels and all-cause mortality among women veterans and non-veterans enrolled in the Women's Health Initiative. *Gerontologist.* 2016;56(suppl 1):S138-S149.
39. Jacobsen LK, Southwick SM, Kosten TR. Substance use disorders in patients with posttraumatic stress disorder: a review of the literature. *Am J Psychiatry.* 2001;158(8):1184-1190.
40. Davison EH, Pless AP, Gugliucci MR, et al. Late life emergence of early life trauma: the phenomenon of late-onset stress symptomatology among aging combat veterans. *Res Aging.* 2006;28(1):84-114.
41. Wu LF. Group integrative reminiscence therapy on self-esteem, life satisfaction and depressive symptoms in institutionalised older veterans. *J Clin Nurs.* 2011;20(15-16):2195-2203.
42. Bohlmeijer E, Roemer M, Cuijpers P, Smit F. The effects of reminiscence on psychological well-being in older adults: a meta-analysis. *Aging Ment Health.* 2007;11(3):291-300.
43. Duax JM, Waldron-Perrine B, Rauch SAM, Adams KM. Prolonged exposure therapy for a Vietnam Veteran with PTSD and early stage dementia. *Cogn Behavl Pract.* 2013;20(1):64-73.