



Struggling to survive: Post-traumatic stress disorder following nonfatal drowning in a professional rescuer with no other neurologic morbidity - A case report



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ARTICLE INFO

Keywords:

Case report

Nonfatal drowning

Post-traumatic stress disorder

Neuropsychiatric

Occupational health

ABSTRACT

Context: Psychiatric sequelae, including Post-Traumatic Stress Disorder (PTSD), have been described for survivors of traumatic, life-threatening events. While the experience of drowning can be terrifying and a frequently lethal event, the available literature regarding nonfatal drowning survivors has largely overlooked the psychiatric sequelae that may occur in this population.

Case Presentation: An American, middle-aged, white male career firefighter with extensive aquatics rescue training drowned during a routine ice diving training exercise. He was revived on scene and subsequent medical evaluation determined that he had suffered no neurologic morbidity. He did however experience a variety of psychiatric symptoms beginning with the evening of his drowning and culminating in a presumptive diagnosis of PTSD years after this event.

Discussion: There is a gap in the current drowning literature regarding the psychiatric sequelae in nonfatal drowning survivors. Medical post-drowning assessments and intellectual frameworks currently fail to account for this type of morbidity, typically measuring neurological outcome using the cerebral performance category scale. This case adds to the emerging evidence on the psychiatric morbidity associated with survivors of drowning and highlights the need for psychiatric follow-up even if medical issues have been resolved.

Conclusion: Researchers, academicians, and practitioners would be wise to include psychiatric symptomatology when addressing sequelae of nonfatal drowning events. To this end, further research is needed to identify and characterize the incidence and prevalence of psychiatric morbidity in this population. Likewise, medical evaluations and long-term care should include a psychiatric component after nonfatal drowning.

Background

Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid with outcomes classified as death, morbidity, and no morbidity (van Beeck et al., 2005). It is the third leading cause of unintentional injury death worldwide, though global estimates may significantly underestimate the scale of the actual public health problem (World Health Organization, 2021). Data categorization meth-

ods for drowning exclude intentional drowning deaths and those caused by flood, disasters, and water transport incidents.

Further compounding the underreporting, nonfatal drowning statistics in most countries are not readily available or are incomplete (World Health Organization, 2021). Nonfatal drowning includes cases of survival with the presence or absence of morbidity defined by neurological function (Beerman et al., 2019). Outcome scores such as the cerebral performance score (CPC) in cardiac arrest of all etiologies, in-

Abbreviations: PTSD, Post-Traumatic Stress Disorder.

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<https://doi.org/10.1016/j.psycr.2022.100098>

Received 11 November 2022; Received in revised form 19 December 2022; Accepted 22 December 2022

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cluding drowning, consider neurologic and physical morbidity without specific consideration of psychiatric morbidity.

While there is a growing body of literature on psychiatric morbidity in survivors of cardiac arrest, this does not currently include a description of the subset of drowned persons.

We present the case of a career firefighter who experienced significant psychiatric sequelae after his nonfatal drowning and discuss the need to include psychiatric morbidity in conceptualization and assessment of drowning survivors.

Case presentation

Patient information

The subject is a middle-aged man who survived a nonfatal drowning event during a routine ice diving training exercise in a frozen municipal pond. He is a first responder with significant aquatic qualifications; United States Marine Corps (USMC) combatant diver, swiftwater rescue, ice diving, and rescue diver.

Case in brief

After an equipment failure (see [appendix 1](#) for further details) the subject lost consciousness underwater and was rescued by the surface safety team. Once at the surface, he was cyanotic, pulseless, and apneic. After 12–15 rescue breaths and several chest compressions, spontaneous pulse and respirations returned. He was taken to the emergency department for observation and several hours later he was discharged home with no respiratory or neurologic deficits.

Although the subject was otherwise deemed medically sound, he began to experience psychiatric symptoms almost immediately. The night of his drowning, he began a pattern of nightmares and self-medication with alcohol. Over the following week he developed symptoms of anxiety, heightened emotions, and overwhelming despair. He also reported feeling profoundly isolated and worried that he was “losing [his] mind”.

Two weeks after drowning, he was diagnosed with anxiety by a physician, a general practitioner assigned by the state workers compensation insurance fund. His symptoms progressed and one month later he was also diagnosed with depression by his own general practitioner. He was prescribed paroxetine hydrochloride but never filled the prescription, disagreeing with the general practitioner about the diagnosis and its proposed treatment.

As the months progressed, he self-reported, to a subordinate and to a fellow diving captain, “extreme” emotional instability, crying for no reason, significant anger, hopelessness, and isolation. Mood swings and emotional lability occurred without identifiable provocation. One of his biggest complaints was an inability to make decisions including the most benign, such as what type of tea to select at a grocery store. This often resulted in a feeling of being completely overwhelmed and an inability to function - which was completely out of character for his military and firefighter training where he normally directed personnel at emergency scenes. See [appendix 2](#) for a case timeline and more details.

Follow-up and outcomes

In the early aftermath of his drowning, the subject was focused on his anxiety as he struggled with its overt symptomatology. While the emergency medicine physician medically cleared him for release in the hours after his incident, the following days proved extremely difficult. It was within the first two days that the subject told his coworkers that his anxiety was debilitating, and that he should not yet return to work, four days after the incident he was contacted by a supervisor: “I advised him of my anxiety...[and] told him I was a mess... I knew that something was really wrong with me, but I had no idea what it was...I couldn't control [my] emotions... anxiety welled in me... I was panic stricken ...I [felt like

I] was going insane... I felt like I was inhabiting someone else's body [and] nothing made sense.... No one was helping me define anything.”¹

Despite the immediacy and intensity of the subject's psychological symptoms, there was very little mention of his emotional distress by the medical professionals with whom he was in contact. During his annual dive physical, less than a week after his drowning, the physician merely noted that the subject was emotionally “shooked [sic] up” by his drowning. On the other hand, two weeks after his traumatic incident and during the subject's annual exam, the physician's impression was that the subject had “some symptoms of PTSD” as a result of his traumatic incident.

Consistent with a diagnosis of acute stress disorder (ASD), and later PTSD, the subject experienced a constellation of arousal, reexperiencing, and avoidance symptoms related to his drowning event. For example, less than 24 h later, in the night following the event, he began to experience the nightmares that would plague him for some time: “...the entire dream was about death, the entire dream was me, watching myself dead, dead floating in the water...The dreams varied in duration, seconds to minutes, but always concluding with the same terrified waking...pulse racing, scared, gasping, confused...”. The fact that the subject experienced nightmares subsequent to his drowning is common with PTSD. Between 71 and 91% of individuals with PTSD have difficulty falling or staying asleep (Baird et al., 2018; El-Solh, 2018; Levrier et al., 2016; Maher et al., 2006; Ohayon and Shapiro, 2000) This form of re-experiencing is so ubiquitous that nightmares, which may occur multiple times a week and last years after a traumatic event, are seen as one of the hallmarks of this disorder.

Individuals diagnosed with PTSD persistently re-experience the traumatic event in a variety of ways. In addition to nightmares, traumatized individuals can experience flashbacks, unwanted memories, intense physiological reactivity, and/or psychological distress to cues that remind them of the traumatic event (Bremner, 2006). For almost a decade after the initial incident the subject fought numerous structure fires and participated in hundreds of hours of non-aquatic training and simulations wearing a firefighting self-contained breathing apparatus (SCBA) mask with no adverse effects. In 2017 though during training it manifested an intense reactivity, which included the feeling of “anxiety”, a “mounting panic attack”, and the overwhelming urge “to rip the [SCBA] mask from my face.” He reported that during these events, he took active measures to control his mind and anxiety and worked to “reassure myself that I could breathe.” Nevertheless, it was exceedingly difficult.

Both anxiety and depression are part of the symptom pattern seen in PTSD, and it is quite possible that the subject's initial anxiety and depression symptoms were an early expression of this disorder. On the other hand, almost 80% of individuals with PTSD are diagnosed with a comorbid disorder, the most frequent being depression, an anxiety disorder, or a substance use disorder (Qassem et al., 2021).

In addition to his re-experiencing symptoms, the subject reported significant alterations in his arousal and mood following his drowning. He reported significant irritability and anger, the latter of which was driven by his experience of organizational general bureaucratic incompetence subsequent to his drowning as well as the adversarial nature of the workers compensation process.

With respect to the subject's diagnosis of PTSD, his traumatic event was characterized by a number of known risk factors that left him susceptible to this psychiatric injury. These included individual-level factors (prior trauma, compromised psychological functioning at the time of the incident), factors associated with the event itself (perceived degree of life threat, peritraumatic dissociation), and factors associated

¹ The emotional lability, intense emotions, feelings of lack of control, concern that one is going crazy, and no defining framework within which to interpret and contextualize these symptoms is emblematic of the experience of ASD/PTSD in first responders.

with the aftermath of the event (lack of social support, failed early intervention, employer/department capacity to efficiently respond to and support the subject). With respect to the subject's diagnosis of PTSD, his traumatic event was characterized by a number of known risk factors that left him susceptible to this psychiatric injury (Ness and Macaskill, 2003), despite the fact that it happened several years after the incident.

First responders are repeatedly exposed to events that involve severe injury or loss of life, that are gruesome or horrifying, and that involve extreme pain and suffering. Not surprisingly a consistent proportion of first responders report psychiatric sequelae as a result of this exposure, including higher rates of PTSD (Spitzer, 2020).

Finally, the subject described "chemical dumps" subsequent to his traumatic incident that resulted in tachycardia, anxiety, and panic attacks. While these symptoms seemed to him to be untethered to triggers in the environment, it is likely the case that the subject did indeed experience drowning-related triggers - but ones that were occurring just outside of his conscious awareness. Thus, while there was no conscious recognition of a trigger associated with drowning, his brain, operating under the errant and overactive threat processing engendered by PTSD, believed that another lethal incident was imminent. As such, the subject's fight-flight-freeze response was activated, and favoring flight, resulted in a cascade of anxiety and panic related symptoms on both physical and psychological levels.

Discussion

This is the first published case exploring the role of neuropsychiatric morbidity in a survivor of non-fatal drowning with the additional nuance that he worked as a professional rescuer at the time of the event. He survived drowning with no physical or neurologic morbidity, but experienced neuropsychiatric morbidity in the form of anxiety, depression, and PTSD, the latter of which was diagnosed after a delay of several years.

High rates of psychiatric morbidity exist after OHCA. In a recent review of survival following OHCA, depression has been reported in 14–45% of the patients, anxiety in 13–61%, and PTSD in 19–27% (Schaaf et al. 2013). A similar study out of the Netherlands reviewing out-of-hospital cardiac arrest survivors 1 to 6 years post-cardiac arrest, found that 74% of the patients experienced low participation levels in society, 50% reported severe fatigue 38% feelings of anxiety and depression, and 24% decreased quality of life (Wachelder et al., 2009; Wilder Schaaf et al., 2013). These results shed light on the post-arrest psychological distress often incurred by patients and further support the importance of psychological care following such traumatic events.

Nonfatal drowning is more common than fatal drowning with estimates of up to four times the fatal drowning rate (Beerman et al., 2019; Szpilman et al., 2012). While there is mounting evidence that shows a high prevalence for PTSD amongst survivors of cardiac arrest (Naber and Bullinger, 2018; Wilder Schaaf et al., 2013; Yaow et al., 2022), as well as in Intensive Care Unit patients placed on ventilators (Chamberlain et al., 2021) little is known about PTSD prevalence amongst survivors of drowning (Orona, 2021).

The survivor case presented here experienced psychiatric symptoms in the immediate aftermath of his drowning. While he was given a diagnosis of anxiety and depression in the weeks following his event, in retrospect, it appears that his symptoms were likely more consistent with Acute Stress Disorder (ASD) and then PTSD.² It is unfortunate that the subject did not receive a diagnosis of PTSD until many years after the original incident. A timelier diagnosis would have provided an array of benefits: an intellectual framework to understand the puzzling

reactions with which he was struggling, a more effective approach to management and treatment of symptoms, and a better use of resources.

It should be noted that the subject was eventually able to work through his symptoms with professional counseling and through art therapy, obtaining a Master in Fine Arts. He continued to work full time with the fire department until a scheduled retirement and now serves as an advocate for PTSD in first responders and drowning prevention.

Limitations

Although interviews were conducted with the subject, not all medical records were available due to the time elapsed since the incident. Additionally, we don't know the neurological impact of the drowning event because we don't have any baseline measurement and the gross neurological examination at the time of discharge from the hospital does not reveal all the possible sequelae related to hypoxic brain injury. Further investigation is needed for future researchers to identify the incidence of psychiatric morbidity in nonfatal drowning patients and identify risk factors, including pre-disposition to PTSD. Drowning is more common in children and long-term studies are needed to understand the lifelong effects of nonfatal drowning on emotional development.

Take-away lessons from this case report

- Future research efforts should aim to establish the prevalence and characteristics of neuropsychiatric morbidity in drowning survivors
- Drowning morbidity classification symptoms should be expanded to account for long-term neuropsychiatric issues
- The assessment, as well as short- and long-term management, of non-fatal drowning victims should include attention to neurological and neuropsychiatric morbidity
- Long-term follow-up of drowning survivors is strongly recommended
- Primary care and mental health providers play central roles in the long-term management of neuropsychiatric morbidity in drowning survivors.

Current drowning morbidity classification symptoms do not account for long-term neuropsychiatric morbidity, including PTSD, which has a known positive association with comorbidities and increased risk of all-cause mortality (Giesinger et al., 2020). Additionally, while there are some studies regarding the impact of a nonfatal drowning in short- and long-term neurological morbidity, there are no published studies on the incidence or prevalence of PTSD in survivors of drowning.

We hope that this case report prompts additional research on the neuro-psychiatric morbidity associated with non-fatal drowning in both professional and lay populations of all age ranges.

Final remarks

Primary care and mental health physicians should consider long-term neuropsychiatric morbidity, including PTSD, in the long-term management of drowning survivors, especially those who may be predisposed through personal or occupational factors.

We propose that the psychiatric morbidity of survivors of drowning should be studied as a distinct subgroup of OHCA survivors. Future studies on long-term outcomes following drowning should consider inclusion of neuropsychiatric outcomes to further characterize and identify the prevalence of psychiatric morbidity following nonfatal drowning on survivors.

Financial support

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

² PTSD cannot be diagnosed in the first 4 weeks following a potentially traumatic event. Rather, ASD is the initial diagnosis, and if the patient still meets diagnostic criteria after 4 weeks, a diagnosis of PTSD is given.

Ethical standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. This work was reviewed and approved by the Ethics Office of the University of Southern Queensland, Australia (H20REA248).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psycr.2022.100098.

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