

Resolution of flashbacks of PTSD with propranolol: a case report

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An individual suffering from post-traumatic stress disorder (PTSD) can continue to re-experience the traumatic incident, which can involve a sense of extreme fear. In this article, the authors describe the case of a 36-year-old gentleman in whom the use of propranolol for the management of these persistent PTSD symptoms proved beneficial and led to the resolution of his flashback symptoms following difficulty in initial management with multiple other first-line treatment modalities. Propranolol is currently not licensed for use in PTSD.



In 2013, the American Psychiatric Association revised the PTSD diagnostic criteria in the fifth edition of its Diagnostic and Statistical Manual of Mental Disorders (DSM-5).¹

The diagnostic criteria in DSM-5 identify the various specific triggers for PTSD as exposure to actual or threatened death, serious injury or sexual violation. The exposure must result from one or more of the following scenarios: the individual directly experiences the traumatic event; or witnesses the traumatic event in person; or learns that the traumatic event occurred to a close family member or close friend (with the actual or threatened death being either violent or accidental); or experiences first-hand repeated or extreme exposure to aversive details of the traumatic event.²

The subsequent disturbance, regardless of its trigger, leads to clinically significant distress or impairment in the individual's social interactions, capacity to work or other important areas of functioning. DSM-5 pays more attention to the behavioural symptoms that accompany PTSD. These are described as re-experiencing, avoidance, negative

cognitions and mood, and arousal. Re-experiencing covers spontaneous memories of the traumatic event, recurrent dreams related to it, flashbacks or other intense or prolonged psychological distress. Avoidance refers to distressing memories, thoughts, feelings or external reminders of the event. Negative cognitions and mood represent a set of complex feelings, from a persistent and distorted sense of blame of self or others, to estrangement from others or markedly diminished interest in activities, to an inability to remember key aspects of the event. Arousal is marked by aggressive, reckless or self-destructive behaviour, sleep disturbances, hypervigilance or related problems. DSM-5 only requires that the disturbance continue for more than a month and eliminates the distinction between acute and chronic phases of PTSD.²

PTSD symptoms may show a natural decline in intensity in the initial months and years after a traumatic event, a high proportion of individuals recovering without treatment in the following years, with a steep decline in the rate of symptoms of PTSD occurring in the first year.^{3,4} However, at least a third of the individuals who initially develop PTSD stay symptomatic for 3 years or longer, and are

at risk of secondary problems such as substance abuse.⁴

The prevalence of PTSD is variously quoted. Kessler *et al.*,⁴ using DSM-III-R criteria, estimated the lifetime prevalence of PTSD of 7.8% (women: 10.4%; men: 5.0%) in a representative sample from the USA. The estimated one-year prevalence has been reported to range between 1.3%⁵ and 3.6%⁶ in Australia and the USA respectively. Estimates of the one-month prevalence range between 1.5% and 1.8% using DSM-IV criteria^{7,8} and 3.4% using the less strict ICD-10 criteria.⁸

A current area of research for the treatment of PTSD is the use of propranolol, a non-selective beta-adrenergic antagonist that crosses the blood-brain barrier. Its current licensed indications are for use in hypertension, angina, essential tremor, thyrotoxicosis, as prophylactic treatment for migraine, situational and generalised anxiety and in portal hypertension.⁹ The use of propranolol to mask the physical symptoms of anxiety is well established but it is not licensed for use in PTSD.

Case presentation

After obtaining all the appropriate consents we present the case of Mr A, a 36-year-old white, single, unemployed man suffering from PTSD, with a strong family history

of depression. His mother, grandmother and his older brother all suffered from depression. His mother required treatment with ECT to recover from her depressive illness.

Mr A first came in contact with mental health services in 1997 at the age of 19 years, when he was referred to secondary care services. He was seen by a consultant psychiatrist who felt that the primary issues affecting his mood at the time related to low self-esteem secondary to being bullied (including being stripped by peers at the age of 13 years) whilst at school. He was advised to attend counselling and an outpatient follow-up plan was made. However, he did not engage.

Mr A subsequently came to the attention of mental health services in 1999 at the age of 21 years, when he was first admitted as an inpatient. As per the history documented in his medical records, Mr A had allegedly been assaulted in a nightclub in Birmingham, whilst under the influence of alcohol, cocaine and cannabis. He had been chased by a group of people from Birmingham to his home in another town (approximately 10 miles away). He was suffering from regular flashbacks of someone chasing him, which were triggered by the sound of the slamming of car doors, and would usually increase his anxiety and paranoia many-fold. He would try to cope by drinking alcohol in excess. He had spoken about the incident to his family who initially sought help from his GP. His GP had subsequently referred him to mental health services, which had led to this admission.

His paranoia was, however, initially attributed to cannabis misuse. Mr A was presenting with features suggestive of depressive illness – suicidal thoughts, anxiety and extreme paranoia (that some-

one would assault him). During the admission period he was regularly assessed, his history of assault confirmed; serial mental state examination did not show any evidence of psychosis. At the time of discharge a plan was made to follow up in outpatients and a referral to psychology services was made. It was extremely difficult to tease out the severity of the individual comorbidities. However, what seemed most relevant to the patient was his constant fear of being assaulted. He was constantly troubled by nightmares and flashbacks. This was impacting on his social life and he had stopped going out of the house and socialising, which included avoiding going on nights out.

Mr A had been treated with antidepressants, which had only helped with his depressive symptoms and suicidal ideations. The initial diagnosis was depression with probable paranoia contributed by cannabis misuse.

The psychologist's report from that time, documents how after years of being bullied and excluded, Mr A had initially tried to get himself accepted into his peer groups and for a while found attachment via the music and club scene. Unfortunately he experienced a genuinely terrifying incident which reinforced the developmental trauma of his past (bullying). Mr A had been assessed at length by a clinical psychologist who noted that he experienced and demonstrated hypervigilance and hyperarousal features, including exaggerated startle response, and he was exhibiting avoidance both socially and in his relationships. He was trying to block this by drinking beer, which he reported was partly alleviating the nightmares and flashbacks, intrusive memories and thoughts.

All these features were strongly indicative of PTSD.

Mr A had been referred for cognitive behavioural therapy (CBT) and was simultaneously prescribed antidepressants, which required frequent changing (venlafaxine, dothiepin, fluoxetine, citalopram and mirtazapine). He had also been treated with trifluoperazine, without significant benefit. He received CBT from 2000–2002 for approximately 30 sessions. Mr A required treatment as an inpatient briefly in 2002 with similar presentations of depression, feeling anxious and paranoid, with recurrent thoughts of being assaulted again.

He had stopped using cocaine and amphetamine since 1999 and gave up cannabis use in 2004. His paranoia persisted despite abstaining from cannabis and responded poorly to antipsychotic medication.

Mr A received treatment at Main House Therapeutic Community Centre from where he discharged himself after 7 months due to persistently increasing intrusive thoughts. He also received private CBT during this period.

He was first diagnosed with PTSD in 2005 due to persistent symptoms of nightmares, flashbacks, paranoia and an inability to relax, anger outbursts, avoidance of going out to nightclubs, and hypervigilance when cars passed outside his home. His usual coping strategy remained to rely on alcohol.

He received trauma-focused CBT, which he felt was unhelpful. Later he was referred for eye movement desensitisation and reprocessing (EMDR). But he could not engage with this therapy. He attended psychodynamic therapy in 2009 for 16 sessions with little benefit.

Mr A had been treated with paroxetine and risperidone for the previous 4 years. His depressive symptoms were improving but there was little benefit to the paranoia, flashbacks and nightmares.

He was also treated with pregabalin for anxiety.

Over the years his alcohol consumption would vary according to his stress levels as he was struggling to cope with the flashbacks and nightmares. The clinical notes suggested that over the past 4 years his alcohol consumption was usually between 10–15 cans of lager per day. It was also noted that he would commence drinking alcohol by about noon.

In February 2014, he was once again admitted to the inpatient unit with complaints of recurring flashbacks and nightmares leading to insomnia and anxiety, all of which were making him feel suicidal.

As we had exhausted every avenue to help and support this gentleman, we noted a few case reports from the USA of the use of propranolol in PTSD. We discussed and agreed with Mr A a trial of propranolol, starting at a daily dosage of 40mg in the first week, to be increased to 80mg daily by the second week. Within 4 days following the commencement of propranolol Mr A reported a complete resolution of flashbacks along with a relaxed state of mind and a significant reduction in the frequency of his nightmares. He stated that although he still experienced nightmares his emotional response to them was significantly lowered: he could cope with them more effectively and was able to go back to sleep, which had not been the case earlier. He scored his anxiety on a scale of subjective 1 to 10 (where 1 is the minimum and 10 the worst and maximum). He reported that during the day, his anxiety symptoms had substantially reduced, with a score of 9/10 (pre-propranolol) compared with 2–3/10 (post-propranolol). The residual anxiety he attributed to paranoia. He did not report any benefit to his paranoia symptoms. As his anxiety symptoms reduced

and as he felt more relaxed, his alcohol consumption reduced significantly. Following his discharge from the supportive and protective environment of the inpatient unit, Mr A currently drinks about four cans of lager every day and he generally starts his first drink late in the evening. He was able to engage with EMDR and even managed to get a job. He reported a great improvement in the quality of his life and on follow-up was reporting a benefit and a significant reduction in his PTSD symptoms, even after 10 months of commencing propranolol.

Discussion

PTSD is a debilitating disorder which, after a sufficient delay, may be diagnosed among individuals who respond with intense fear, helplessness or horror to significant traumatic events. Clinically characteristic features of PTSD include re-experiencing symptoms, avoidance of certain situations, and hyperarousal symptoms along with the possibility of other miscellaneous symptoms. These clinical features can cause social, occupational and relational dysfunction.

A previous history of neurotic illness may lower the threshold to development of this disorder.¹⁰ The condition can be complicated by comorbid depressive, anxiety disorders, psychosis and substance misuse; suicidal ideations are not infrequent.

Patients with PTSD typically have higher levels of noradrenaline and adrenaline, which induce stress. Adrenaline is thought to aid memory consolidation, playing a role in the re-experiencing of symptoms of PTSD.¹¹ Beta-blockers inhibit the binding of these neurotransmitters at the receptors (beta-1 and beta-2 for adrenaline, beta-1 for noradrenaline) – the proposed clinical mechanism of action of propranolol.¹² The

beta-adrenergic system is associated with response and memory formation as well as the emotional response associated with the memory. Propranolol may both dampen memory formation and dissociate the memory from the emotional response. Although this treatment has been termed ‘forgetting therapy’, it is not meant to make individuals forget their physical experiences but rather enable them to dissociate the emotions and fears from the memories.¹³

Various treatment modalities licensed for PTSD include antidepressants (SSRI), trauma-focused CBT and EMDR. Treatment with medication is superior to placebo. In spite of combining the medical and psychological interventions a third of patients fail to recover even after many years.

Clinicians often use benzodiazepines, pregabalin or z-hypnotics to deal with the symptoms of anxiety and insomnia.

There are not many studies done in the UK that specifically address PTSD and the use of propranolol; the studies or case reports are mainly from the USA and Canada. Propranolol interferes with consolidation of traumatic memories and the physiological response can be lowered while participants engage in script-driven mental imagery of the traumatic event.¹⁴ Brunet *et al.* found that the physiological response to trauma reactivation was low even at four months after the treatment.¹⁵ Another study suggested that propranolol can reduce the intrusive thoughts in newly diagnosed cancer patients and subsequently reduce psychological stress.¹⁶

There is increasing evidence of the use of prazosin for treatment of nightmares in PTSD.¹⁷

One study compared propranolol and placebo. This trial was based on *a priori* hypotheses about

the role of the amygdala in the development of PTSD. Participants were administered propranolol (40mg four times a day) or placebo, beginning within 6 hours of the traumatic event. The evidence is inconclusive and so it is not possible to determine if there is a clinically important difference between propranolol and placebo on reducing the likelihood of having a PTSD diagnosis at 1 month ($k=1$; $n=41$; $RR=1.14$, 95% CI 0.55 to 2.35). There is limited evidence suggesting a difference favouring placebo over propranolol on reducing the likelihood of having a PTSD diagnosis at 3 months' follow-up ($k=1$; $n=41$; $RR=1.28$, 95% CI 0.69 to 2.38).¹⁸

Another study suggests that propranolol given within hours of a psychologically traumatic event reduces physiological responses during subsequent mental imagery of the event.¹⁹ A Cochrane review of pharmacological interventions for preventing PTSD concluded that there is moderate quality evidence for the efficacy of hydrocortisone for the prevention of PTSD development in adults.²⁰ They found no evidence to support the efficacy of propranolol, escitalopram, temazepam and gabapentin in preventing PTSD onset. The findings, however, were based on a few small studies with multiple limitations.

The benefit following the use of propranolol in our case was very clear and sustained even after 5 months: the flashbacks stopped completely and the emotional

response to the nightmares was significantly reduced. It has led to a reduction in alcohol consumption along with an improvement in the quality of the life of the patient.

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Declaration of interest

None declared.

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