An orthopaedic surgeon working in fracture clinics will be aware of the differences in the demeanor of some patients and of the apparent difference between the speed of recovery of those who face their injuries objectively compared with others who remain introspective and unhappy. The boundary between a normal psychological response to trauma and the pathological reaction is often difficult to recognize. It has been increasingly appreciated that post-traumatic psychological morbidity, including post-traumatic stress disorder (PTSD), is not confined to combat veterans and those affected by major civil accidents, but can also affect victims of road-traffic accidents (RTAs), assaults, and accidents in the workplace.\(^1-6\)

The diagnosis of PTSD was first defined in the *Diagnostic and statistical manual of psychiatric disorders* in the aftermath of the Vietnam War. Although its definition was an important milestone, the term is often loosely used to cover a range of post-traumatic psychopathological conditions. It is recognisable in the soldiers with ‘shell shock’ in the Great War,\(^8\) in the diaries of Samuel Pepys after the Great Fire of London,\(^9\) and in the psychological morbidity found in survivors of the Nazi holocaust.\(^10\) It is easy to see how such severe stressors can lead to psychological disturbance, but it is also important to recognize that 10% to 20% of victims of RTAs will have a major PTSD,\(^5,11\) with an estimated lifetime prevalence of 1% to 9%.\(^12,13\)

Despite the high level of occurrence of such psychopathology a recent study of medical and nursing staff in hospital trauma units revealed a poor understanding of acute and chronic psychiatric reactions to trauma and their management.\(^14\)

**Aetiology and pathogenesis**

The most innovative step in defining PTSD was to attribute the primary responsibility to the stressor and not to some deficiency in the patient.\(^15\) The pre-existing personality may alter the threshold, and patients with a previous history of depression, alcohol or drug abuse, or with a higher degree of neuroticism or introversion, are more likely to suffer PTSD.\(^13,16\) Concurrent life stresses can be particularly important, and one of us (DAA) stresses in his teaching to staff in the Accident and Emergency Department that patients should be asked not ‘Have you got someone to go home to?’ but rather ‘What are you going home to?’

Certain aspects of trauma will increase the risk of post-traumatic psychopathology, including prolonged exposure, such as when trapped, with perceived threat to life or of serious injury to self or others, and sudden events which give no time to prepare for them.\(^17\) RTAs carry all the hallmarks of such significant stressors.

**Diagnosis**

The psychological responses to stressful events are remarkably similar whatever the cause. PTSD may be an acute, chronic or delayed reaction to a markedly distressing event, outside the range of normal experience. The characteristic symptoms of flashbacks and nightmares are intrusive in nature, with a sense of numbness and emotional blunting, detachment from others, unresponsiveness and avoidance. Commonly, there is fear and avoidance of reminders of the trauma, with hyperarousal and hypervigilance. Other stress-related conditions, listed in the *International classification of mental and behavioural disorders* with PTSD, are associated with depression, anxiety, anger and despair, which may interfere with normal social functioning. There is a significant overlap between the symptoms of this group of conditions and other syndromes which may coexist, such as alcoholism, drug dependence, antisocial personality disorder and depression. Periods of hospitalisation may compound and increase the stress.\(^19\)

Normal and pathological reactions lie on a continuum. Initial numbness and denial are a natural protection against being overwhelmed, and fear is essential to the ‘fight/flight’
response. Anger and irritability may be turned against carers, while helplessness and guilt can lead to dependence. The characteristic symptoms of frank PTSD may also be present, but become pathological only if they persist for more than one month.

In the setting of the trauma unit and the fracture clinic, evidence of failure to cope with injuries may indicate psychopathology, warranting referral for specialist assessment and treatment. Excessive denial and numbness may be manifest in the failure of eye contact and the refusal to adhere to regimes of treatment. Repeated carelessness may result in minor injuries and patients may show evidence of excessive risk-taking. While some may delay their return to work or show less enthusiasm for it, others may demonstrate an obsessive dedication to their jobs that can be just as harmful. Troubled patients may also overindulge in alcohol or other drugs.

**Biological effects**

The sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis mediate the characteristic ‘fight, flight and fear’ response which places the body in a state of hypervigilance, and releases stores of energy to provide the fuel for appropriate action. The HPA axis also drives the metabolic response to trauma (MRT). Only when the turning point of the MRT is reached does the body turn towards anabolic activity, allowing active healing. In PTSD, the state of hypervigilance may maintain a prolonged and abnormal catabolic response, which can delay tissue healing.

Sleep is important for the restitutive functions of the body. Cell division and protein synthesis are most active during sleep. Deep sleep is also the principal stimulus for the release of growth hormone, and inhibition of cortisol and glucagon. Post-traumatic psychopathology may affect sleep in a variety of ways. Hyperarousal makes sleep difficult. Recurrent waking from sleep, because of nightmares or hypnagogic hallucinations (experienced as the patient falls asleep) disrupts the sleep cycle. Disturbed sleep, particularly dysfunctional rapid-eye-movement sleep, is common in PTSD, and may be exacerbated by the use of alcohol and caffeine, combining again to maintain the hypercatabolic state.

**Treatment**

Virtually every type of psychotropic agent has been used in treating PTSD, although there are few randomised, controlled trials. Until recently, the mainstays of management were tricyclic antidepressants and monoamine oxidase inhibitors (MAOIs). These are thought to work by reducing the noradrenergic response to stressful stimuli, decreasing a dysfunction in the neurotransmission of serotonin. Both have been shown to be effective for intrusive symptoms, but use of MAOIs requires dietary and substance restrictions which are often impossible in patients with established PTSD. More recent work suggests that the new selective serotonin re-uptake inhibitors (SSRIs) such as fluoxetine are as effective, and may also help avoidant symptoms.

Practically every form of psychotherapy has been used. Once again, there are few controlled trials. Behavioural therapy is designed to reduce anxiety by repeated and controlled exposure to feared stimuli, and may be progressive with graded exposure, or, less commonly, may involve extended high-intensity exposure (flooding). Cognitive therapy, which aims to provide patients with the skills to control fear and to alter their largely negative assumptions about their situation, has been shown to be of short-term benefit. The combination of behavioural techniques and cognitive therapy may prove to be most effective, but proof is still lacking.

Routine, preventative treatment for psychological morbidity after trauma may seem appropriate, but treating all such patients may be expensive and ineffective, and detrimental to those least likely to suffer PTSD. Recent efforts have focused on identifying those patients most at risk of post-traumatic psychopathology, such as those with abnormal dissociative symptoms in the early phase, and treating them accordingly.

**Conclusion**

Much more work is needed to allow identification of patients at highest risk of psychological disturbance after trauma, and to provide them with the best treatment. This should form the basis for developing a truly integrated system of trauma care, in which genuine and systematic attention is paid to the recovery of both mind and body. It is not enough simply to treat the fractures of these patients who often remain hidden and largely ignored.

**References**


