CASE REPORT

Diagnostic conundrum: lessons from the man who accidentally set fire to his home

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SUMMARY

A 62-year-old man presented to psychiatric services with a 3-month history of a range of symptoms which included obsessional thoughts, self-neglect, lack of mental flexibility, reduced ability to plan, organise and follow instructions, reduced capacity to empathise and disinhibition. He also accidentally set fire to his house. Overall these findings are compatible with a dysexecutive syndrome. This man has a significant history of polysubstance misuse and chronic hepatitis C infection. Neuroimaging revealed an acquired traumatic brain injury which could account for his dysexecutive syndrome. The patient was managed in a holistic manner. A community psychiatric nurse was allocated, he had social services input and he was started on trazodone. He is currently housed in short-term housing and is awaiting a long-term residential placement.

BACKGROUND

This case highlights the need to consider organic causes for dysexecutive syndrome. Considering acquired traumatic brain injury (ABI) as the underlying pathology is essential in a patient who presents with dysexecutive syndrome. It is essential to take a careful history and undertake a mental state examination and initial bedside cognitive tests, including tests of frontal lobe function. A full physical examination should be performed, including full neurological examination. Blood tests and neuroimaging should be undertaken. Formal neurocognitive testing can also be helpful.

This report also highlights that holistic and multidisciplinary liaison are essential in managing patients with complex conditions such as dysexecutive syndrome. By the time these patients present for medical attention, they may have been experiencing significant difficulties such as social isolation and self-neglect and they may lack insight into their difficulties. Serotonergic medications such as trazodone may be useful in managing the behavioural and emotional symptoms of dysexecutive syndrome.

CASE PRESENTATION**Presenting features**

In September 2014, a 62-year-old man presented to psychiatric services with a 3-month history of vivid dreams which were prophetic in nature. He was known to be a former heroin user and at the time of referral was using methadone. Following his initial assessment, he was lost to psychiatric follow-up and he was not placed on any treatment regimen.

In March 2015 he was re-referred to psychiatric services. He had been seen urinating in public places, and several weeks later he accidentally set fire to his flat after carelessly throwing a lit cigarette on the floor. Following the fire his home was deemed uninhabitable. He was subsequently evicted from three rented flats because he had desecrated his bedrooms. He had been neglecting himself through not washing and faeces and pornographic magazines were found covering his bedroom floor. Flies were infesting his accommodation. It was difficult to engage the patient with follow-up appointments.

In early May 2015 the patient presented to the accident and emergency department with suicidal ideation and ideas that his bowels were no longer working and thoughts that his neighbour was watching him. It was thought these were paranoid ideas rather than these being held with true delusional intensity.

While attending the accident and emergency department, he was seen by a psychiatrist. He started on mirtazapine 15 mg and olanzapine 10 mg. At this point, the working diagnosis was of a psychiatric illness possibly psychotic depression.

He was referred to further follow-up with mental health services. Representatives from this team observed that he was eating from the bins and rubbish was found on the floor of his temporary home.

In late May 2015, his general practitioner (GP) again wrote to general adult psychiatry services because he was expressing beliefs that neighbours were harassing him. Subsequently, he was referred to the Home Treatment Team (who can provide intensive daily psychiatric home treatment as an alternative to hospital treatment). This team observed that he was sleeping rough by the sea and having more prophetic dreams. At that time, he denied illicit substance use or alcohol use. He subsequently moved to a temporary residential placement for people with mental health problems.

Alcohol and substance misuse history

The patient had an extensive substance misuse history and explained that he had abused a variety of substances from an early age. The patient started to drink alcohol regularly at the age of 9. This had progressed to daily beer and wine by the age of 11. During his adolescence, he started using vodka and other spirits. He described features of physical alcohol dependence from the age of 15, including daily intake of vodka or other spirits, salience of drinking, cravings and physical withdrawal symptoms during periods of abstinence. His alcohol

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intake then varied but for much of his adult life he had been drinking approximately one and a half bottles of wine a day plus of half a bottle of vodka. He stated that at the time of presentation to psychiatric services he had been free from alcohol for the preceding 12 months.

He started consuming cannabis at the age of 13 and during early adulthood he took lysergic acid diethylamide (LSD) on a daily basis. Other drugs frequently used included magic mushrooms, cocaine, ecstasy and injectable heroin. Over the preceding 15 years, he had been having input from the local community drug and alcohol services. He had attempted a variety of detoxification regimens, and his most recent detox was in December 2014.

Medical history

In 2001, he had been diagnosed with hepatitis C but he had been lost to follow-up with hepatology services. His viral load was not known at the time of presentation. He stated that he had sustained a number of head injuries resulting from various falls and other accidents when he was intoxicated with drugs and alcohol. He was unable to provide additional information regarding the nature and the severity of his head injuries. His GP records did not list any traumatic head injuries sustained, and he did not recall seeking medical attention for his head injuries.

Family history

His son was an inpatient in the local psychiatric hospital for treatment of psychotic symptoms and a possible dissociative episode.

Forensic history

He had received a caution for the possession of cannabis.

Personal history

He was born in the UK. He reached his normal developmental milestones. His early childhood was spent in Zimbabwe living with his grandparents, and he returned to the UK at the age of 10. He had erratic school attendance, and he left school with no qualifications. It was thought he might have been dyslexic. He spent much of his late adolescence taking drugs and socialising in pubs and clubs. He was unable to maintain employment because of his daily substance misuse. He married his wife in 1996 but they divorced in 2004.

Social history

The patient was housed in temporary social services accommodation. This was a residential unit for people with chronic mental health problems.

What happened next

The patient was provided with a community psychiatric nurse and was followed up in the general adult psychiatry outpatient clinic. He was given the provisional diagnosis of depression with psychotic features. During a follow-up assessment in August 2015, there were several features which appeared to be inconsistent with this diagnosis. The mirtazapine and olanzapine had no impact on his behavioural symptoms or paranoid ideas.

During the consultation, he was observed to be overfamiliar with his carers and his speech was tangential. At times he appeared to be demanding and haughty. He was perseverative in his speech and repeated words such as 'lack of sleep' and 'bowels not working' to subsequent questions when the

response was no longer appropriate. He appeared to be insensitive towards other people's feelings. His carers at his residential care accommodation reported that he was oblivious to social graces and displayed impulsive eating habits such as continuously eating even though he had eaten just 10 min previously. There were episodes where he would cross the road and nearly get run over by the oncoming vehicles because he failed to look left or right. He continued to drop lit cigarettes on the floor in his bedroom. He accrued unpaid bills of thousands of pounds, which distressed him, but he seemed unable to plan ways of addressing his debts. On mental state examination at that stage, there was no evidence of suicidality or psychotic phenomena.

Assessments and investigations

An Addenbrookes Cognitive Examination (ACE-III) revealed deficits in verbal fluency, attention and visuospatial skills with an overall score of 73 of 100. The score of 73 is in the impaired range. A neurological examination was normal with no evidence of focal neurological signs or cerebellar signs. His speech was fluent, and there was no evidence of aphasia. There was no disruption of the grammatical form of speech. Semantic knowledge was informally assessed by asking the patient to name as many animals as possible, asking him the colour of grass and where it could be found. The patient was able to perform these tasks correctly.

Additional physical examination revealed no peripheral stigmata of chronic liver disease. There was no asterixis. There was no evidence of jaundice, anaemia, lymphadenopathy or oedema. Old scars from opiate injection were observed on all limbs. His heart rate was 60 bpm and regular. Jugular venous pressure (JVP) was not raised. Heart sounds were normal, and no additional sounds or murmurs were detected. On respiratory examination, his chest was clear with vesicular breath sounds audible throughout the chest. Abdominal examination was normal with no ascites and no hepatomegaly or splenomegaly.

A frontal assessment battery was performed. This comprised the similarities test, lexical fluency test, conflicting instructions test, go no go test and a test of prehension behaviour. The patient was unable to perform the Luria test (motor fluency), the conflicting instructions test and the go no go test. He scored poorly in the lexical fluency test, and overall he scored 11 of 18 in the frontal assessment battery.

INVESTIGATIONS

An MRI head revealed discrete frontal and temporal abnormalities, in particular, encephalomalacia to the right anterior temporal lobe, the posterior temporal convexity, the right lateral orbitofrontal region, the gyri recti and the right superior frontal gyrus. See [figure 1](#) for the patient's MRI head image. Following discussion with the consultant neuroradiologist, it was confirmed that the neuroanatomical changes were secondary to direct trauma rather than inflammatory, infection related or vascular damage.

Cognitive screening and hepatitis screening blood tests revealed positivity for hepatitis C with a viral load of over 300 000 IU/mL. His liver function tests were deranged with raised alanine transaminase (ALT) of 60 IU/L (7–56), gamma-glutamyl transpeptidase (GGT) of 222 IU/L (10–71), aspartate transaminase (AST) of 29 IU/L (10–40) and ALP of 33 IU/L (44–147). An HIV test, hepatitis A and B serology and syphilis serology were negative. Platelet levels were slightly reduced at 127 million per millilitre of blood (150–450).

Figure 1 MRI head (coronal section) of the patient indicating various abnormalities in the frontal lobe.

Haemoglobin, white cell count, clotting, erythrocyte sedimentation rate, thyroid function tests, vitamin B₁₂, renal function and folate levels were within normal ranges.

Taking all these factors into consideration, a revised diagnosis of dysexecutive syndrome secondary to traumatic brain injury was made.

DIFFERENTIAL DIAGNOSIS

There are several differential diagnoses to consider in this man. The provisional diagnosis was thought to be depression with psychotic features. Although a diagnosis of severe depression with psychotic features would be consistent with his paranoid thoughts suicidal ideation and self-neglect, it could not account for symptoms such as his overfamiliarity, lack of ability to plan and sequence, disinhibition, mental rigidity and lack of ability to understand other people's feelings.

The symptoms described fit with a diagnosis of dysexecutive syndrome. The underlying aetiology of dysexecutive syndrome can be varied but can include brain tumours, behavioural variant frontotemporal dementia (bvFTD), cerebrovascular disease, antisocial personality disorder, attentional deficit hyperactivity and schizophrenia. Careful history, examination, blood tests and neuroimaging should reveal the underlying aetiology.

A very important differential diagnosis to consider would be the bvFTD. Although his age and his poor performance on the frontal lobe battery and the ACE-III scores are supportive of this diagnosis, the MRI head findings were more consistent with traumatic damage as opposed to degenerative changes affecting the frontal lobes. Overall, given his history of head trauma, his condition is more consistent with the diagnosis of an acquired brain injury (ABI). Thus, a diagnosis of ABI secondary to trauma was made. His protracted history of polysubstance misuse and his subsequent diagnosis of hepatitis C with a high viral load are important factors to reflect on. Studies have suggested a higher prevalence of executive function deficits observed in users of substances such as cocaine, alcohol and heroin.¹

Untreated hepatitis C (HCV) is associated with complex neuropsychiatric sequelae in multiple cognitive domains.² Neuroimaging studies have demonstrated brain changes in the basal ganglia in HCV-positive patients.³ Deficits in the dopamine and serotonin pathways have been observed in hepatitis C positive individuals.⁴ These cognitive deficits have been observed in patients with and without HCV-associated liver cirrhosis.⁵

TREATMENT

The patient was managed in a holistic manner. He was allocated a care coordinator who was also a community psychiatric nurse. The care coordinator was in charge of mental health and social care needs. In order to seek further support for him to manage his ABI, he was referred to Headway. Headway is a charitable brain injury organisation providing social and practical support for individuals who have endured acquired brain injuries.

A capacity assessment to judge his ability to make informed discussions about his future housing was conducted. This revealed that he lacked the capacity to make decisions about this issue. Subsequently, an Independent Mental Health Advocate (IMCA) was selected to advocate for the patient's best interests involving housing. The patient continued to be housed in short-term social services housing. He was started on incremental doses of trazodone to treat his symptoms of disinhibition and mental rigidity. He was also referred to hepatology for the management of his hepatitis C.

OUTCOME AND FOLLOW-UP

The patient was followed up by a psychiatrist, a community psychiatric nurse and a social worker. Initially, he continued to be disinhibited and he would impulsively try to run away from his temporary housing by climbing the garden walls. He would also display idiosyncratic eating patterns and would become extremely anxious when attempting to deal with his finances. Subsequently, he was deemed as a vulnerable adult and authorisation was made for him to be managed under the Deprivation of Liberty Safeguards (DoLS).⁶ This enabled the staff to regulate the patient's movements in and out of his temporary accommodation. A sleep diary revealed that despite his repeated concerns about poor sleep quality he was observed to sleep well during the night. Trazodone may have contributed to his good sleep quality.

A case conference was organised to discuss his long-term prognosis, management and housing. The patient responded very well to the incremental doses of trazodone and he became much calmer and less impulsive. He is currently awaiting a permanent residential care home placement.

Formal genotyping of his hepatitis C revealed a genotype of 3a. He is currently awaiting treatment for his hepatitis C.

DISCUSSION

Dysexecutive syndrome is a term used to describe a cluster of complex emotional, cognitive and behavioural symptoms which can occur in a range of conditions in the context of frontal lobe brain damage or disruption.^{7 8} These symptoms may include disinhibition, apathy, lack of ability to engage appropriately in social activities, reduced capacity to problem solve and mood disturbances.⁸ These may be accompanied by cognitive deficits in verbal fluency, impairment in tests of intelligence, disruption of memory and attention and in cognitive process involving inhibition, planning, sequencing and multitasking.⁸

In this case study, we have observed dysexecutive syndrome in the context of an ABI, but it may also be a feature of brain

tumours, cerebrovascular disease, antisocial personality disorder, attentional deficit hyperactivity and schizophrenia.⁹

It can be assessed by using a frontal lobe battery¹⁰ which tests cognitive abilities such as inhibition, sequencing and planning,¹⁰ or by more sophisticated measures such as the Stroop Test¹¹ or the Wisconsin Card Sorting Test.¹¹ Some experts assert that there are two distinctive types of dysexecutive dysfunction, 'metacognitive executive dysfunction syndrome'¹² which is characterised by damage to the dorsolateral frontal lobe¹² while 'emotional and motivational executive dysfunction' is characterised by orbito-frontal and medial frontal dysfunction.¹² The latter may provoke disinhibition, impulsivity and behavioural disturbance while metacognitive dysfunction may present with deficits in tests of intelligence.¹² In addition to the symptoms we have observed in the patient, patients with dysexecutive syndrome may present with difficulties with regulating their emotions or cognitive processes.^{11 13} An unlicensed indication for the use of trazodone is in the treatment of the behavioural symptoms of FTD.¹⁴

Trazodone is an antidepressant belonging to a class of drugs which includes serotonin reuptake inhibitors and receptor antagonists. It is also used in the treatment of insomnia and anxiety.¹⁴ Following a literature search, we were unable to find any empirical studies exploring the use of trazodone in ABI.

A randomised controlled trial examined 26 patients diagnosed with the bvFTD who were prescribed either 300 mg of trazodone or placebo.¹⁵ The Neuropsychiatry Inventory (NPI) scores were used to measure the severity of the behavioural symptoms before and after either intervention.¹⁵ The study revealed that consistent and marked reduction in (NPI) score in the 18 individuals treated with trazodone compared to placebo. In 10 of the patients given trazodone, there was a >50% reduction in the NPI score.¹⁵ There was an observed reduction in eating disorder, depression and irritability in the group taking trazodone.¹⁵ Our rationale for prescribing trazodone was extrapolated from the current evidence for the treatment of the behavioural symptoms of FTD.

A variety of psychotropic medication has been used in the treatment of agitation and aggression in ABI including antipsychotics, benzodiazepines, anticonvulsants, amantadine, antidepressants, β blockers and lithium.¹⁶ These pharmacological options may be considered for significant behavioural symptoms if the patient cannot tolerate trazodone. A Cochrane Review revealed there are few research studies which have explored psychotropic medication in the treatment of agitation and aggression in patients with ABI.¹⁶ This review evaluated six randomised controlled trials exploring amantadine, methylphenidate, propranolol and pindolol.¹⁶ The strongest evidence for treatment of agitation and aggression in ABI was for β blockers.¹⁶

Up to 33% of HCV-positive patients may present with a cognitive disorder.^{2 17}

HCV infection may be linked to higher prevalence of executive function deficits in processes such as mental flexibility, mental reasoning, as well as provoking diminished verbal recall, reducing psychomotor speed and working memory capacity.⁵ This cognitive dysfunction may represent a unique form of minimal hepatic encephalopathy.⁵ Although the patient's liver function tests were not grossly abnormal, he presented with a high hepatitis C viral load. It is possible that the chronic hepatitis C infection may have contributed to the cognitive deficits observed in the patient. It would be interesting to observe whether these cognitive deficits improve following treatment of the hepatitis C.

Our patient's perspectives of being diagnosed with an ABI are very pertinent and reveal that he is suffering from anosognosia. Anosognosia refers to a deficit of self-awareness where a patient

is unaware of his or her disability.¹⁸ Anosognosia may result from neurological damage in the right parietal lobe or diffuse damage in the right hemispherical frontotemporal-parietal area.¹⁹ Anosognosia may occur in conditions such as stroke²⁰ and

Patient's perspective

The patient had a conversation with his carer and although he required some prompting he was able to make the following answers to the questions.

- ▶ Question: What has been explained to you about your mental health problem?
- ▶ Response: "Frontal brain damage."
- ▶ Question: Can you think of any difficulties you might be experiencing because of this diagnosis?
- ▶ Response: "I can't, no."
- ▶ Question: Does the brain damage affect you in any way?
- ▶ Response: "I don't think so, no. Just lack of sleep."
- ▶ Question: How is your mood?
- ▶ Response: "Poor at the moment. I've got this awful cold that's keeping me awake."
- ▶ Question: Is there anything on your mind?
- ▶ Response: "I don't know why I am still here. I'm sure I can manage on my own. I'm used to going out and meeting people."
- ▶ Question: Are there any risks associated with your brain damage were you to live independently?
- ▶ Response: "All that happened was there was a fire in my flat and I presented at Barts House a few times. I don't know what the criteria is I'm being judged on. I've been independent since I was 15. I don't see any of my friends anymore. And my ex-wife has poisoned my son against me again."
- ▶ Question: What's your overriding need at the moment?
- ▶ Response: "I've recently been getting no sleep at all. I've asked for a doctor's appointment today."

Learning points

- ▶ It is essential to exclude an organic cause for a patient's psychiatric presentation and an acquired traumatic brain injury may be an important consideration.
- ▶ Dysexecutive syndrome is an important differential diagnosis for patients presenting with neuropsychiatric symptoms such as disinhibition, lack of emotional regulation, disinhibition and poor sequencing and planning skills. In these cases, a full neurological assessment complimented with full neurocognitive assessment should be performed.
- ▶ A holistic approach encompassing liaison of multiple health agencies is often required to manage patients with traumatic brain injuries.
- ▶ An application under deprivation of liberties safeguards (DoLS) may be an appropriate intervention in a vulnerable patient such as this patient if they lack capacity to consent and a residential placement is deemed to be in their best interests.
- ▶ Trazodone may be a useful agent in controlling symptoms such as disinhibition, and impulsivity in a patient with dysexecutive syndrome.

schizophrenia.²¹ The presence of anosognosia may complicate a capacity assessment as the patient may not understand that he or she has a condition requiring management. In these circumstances, there may need to be an IMCA who can advocate for the patient's best interests.

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