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Catatonia Following a Traumatic Brain Injury: A Case Report with Positive Findings after an Ativan Trial

Indorato DC*
Department of Physical Medicine and Rehabilitation, TIRR Memorial Hermann, Houston Texas, USA

***Corresponding author:** Daniel Indorato, American University of Antigua College of Medicine, 535 Haverhill Street Unit 3, Rowley MA 01969, USA

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Abstract

Following a traumatic brain injury, a 24-year-old Caucasian male presents with a recent onset of generalized spasticity, contractures, severe cognitive defects, and other features, suggesting a diagnosis of catatonia. The patient was immobile and would demonstrate intermittent periods of screaming and emotional arousal when asked questions or touched. An Ativan (lorazepam) trial was performed on the patient, in which his arousal, attention, alertness, and cognition were monitored when the drug was administered and removed from his treatment protocol. The patient's catatonic features were assessed according to the Bush-Francis Catatonia Rating Scale, with daily evaluation of responses during rounds and therapy. The patient demonstrated improvements in attention, arousal, concordance with therapy, and cognition after the application of lorazepam. Once lorazepam was removed from treatment, the patient displayed periodic bouts of emotional arousal, screaming, and was non-compliant with therapy. The findings in this case report suggest that a lorazepam treatment protocol could rapidly and efficiently relieve catatonic-like symptoms in a TBI patient without the presence of a mental disorder. The findings in this case-report also suggest the possible existence of a positive correlation between catatonia and acetaminophen toxicity. Future research should investigate the application of this treatment specifically in TBI patients without a previous medical history significant for psychiatric disorders, similar to the patient presented in the current report.

Keywords: Traumatic brain injury; Catatonia; Lorazepam; Benzodiazepines; Pain management

Abbreviations

TBI: Traumatic Brain Injury; TIRR: The Institute for Rehabilitation and Research at Memorial Hermann; ITB: Intrathecal Baclofen; BFCRS: Bush-Francis Catatonia Rating Scale

Introduction

Traumatic brain injury (TBI) represents one of the most common causes of death and disabilities among the younger population [1]. Under most circumstances, a TBI can result from a physical blow to the head due to falls, motor vehicle collisions, or sports related injuries [1,2]. Individuals with a history of a TBI have a significantly higher incidence of psychiatric disorders than the general population [3].

A systematic review from the journal of Neuropsychiatric Disease and Treatment, examined the epidemiology, diagnosis, associated factors, and treatments of the main psychiatric disorders that occur after TBI [4]. The most prevalent findings following TBI that were suggested in this review included depression, post-traumatic stress, disorders related to alcohol, changes in personality, and psychotic disorders [4]. Among the findings related to psychotic disorders, catatonia was suggested to be an important diagnostic feature of TBI patients, and was associated with a higher prevalence in the male population [5].

Catatonia has been identified in a variety of psychiatric, medical and neurological disorders, and drug-induced states, and is described as a syndrome of motor abnormalities accompanied with mood and behavior disorders [6,7]. Benzodizepines have been used to effectively treat catatonia, and are considered as a first-line treatment application, due to their favorable characteristic of producing few adverse side effects [7]. Although, the use of benzodiazepines at high doses has been associated with adverse side effects on the central nervous system as well as respiratory depression [8].

Here, we present the first case report of successful treatment with the benzodiazepine, lorazepam, for catatonia in a patient without a history of psychiatric disorders following a TBI. Written consent was obtained from the patient's family for the publication of the case report.

Case Presentation

Mr. K, a 24-year-old caucasian male was admitted to the Institute for Rehabilitation and Research at Memorial Hermann (TIRR) with a history significant for a TBI due to a motorcycle accident in 2017. The patient also presented with a potential anoxic brain injury with generalized spasticity, contractures, and severe cognitive defects. The patient's past medical history was insignificant for psychiatric history or risk factors that could predispose the individual to develop psychiatric disorders. The patient also presents to the physical medicine and rehabilitation department of TIRR with a recent onset of catatonic features.

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Table 1: Bush-Francis Catatonia Rating Scale; Presence or Absence of items 1-14 are used for screening, the 0-3 scale for items 1-23 is used to rate severity.

1.	**Excitement**
0 = Absent 1 = Excessive motion 2= Constant motion, hyperkinetic without rest 3 = full-blown catatonic excitement	
2.	**Immobility/Stupor**
0 = Absent 1 = Sits still, may interact briefly 2 = No interaction 3 = Stuporous, non-reactive to pain	
3.	**Mutism**
0 = Absent 1 = Verbally unresponsive 2 = Speaks less than 20 words/5 minutes 3 = No speech	
4.	**Staring**
0 = Absent 1 = Poor eye contact, repeatedly gazes less than 20 seconds between shifting attention 2 = Gaze held longer than 20 seconds 3 = Fixed gaze, non-reactive	
5.	**Posturing/Catalepsy**
0 = Absent 1 = <1 minute 2 = >1 minute, <15 minutes 3 = abnormal posture, maintained more than 15 minutes	
6.	**Grimacing**
0 = Absent 1 = <10 seconds 2 = <1 minute 3 = abnormal expression, maintained more than 1 minute	
7.	**Exhopraxia/echolalia**
0 = Mimicking of examiner's movements/speech 1 = Occasional 2 = Frequent 3 = Constant	
8.	**Stereotypy**
0 = Absent 1 = Occasional 2 = Frequent 3 = Constant	
9.	**Mannerisms**
0 = Absent 1 = Occasional 2 = Frequent 3 = Constant	
10.	**Verbigeration**
0 = Absent 1 = Occasional 2 = Frequent 3 = Constant	
11.	**Rigidity**
0 = Absent 1 = Mild resistance 2 = Moderate 3 = Severe, cannot be repostured	
12.	**Negativism**
0 = Absent 1 = Mild resistance and/or occasionally contrary 2 = Modereate resistance and/or frequently contraty 3 = Severe resistance and/or continually contrary	
13.	**Waxy Flexibility**
0 = Absent 3 = Present	
14.	**Withdrawal**
0 = Absent 1 = Minimal PO intake/interaction less than 1 day 2 = Minimal PO intake/interaction more than 1 day 3 = No PO intake/interaction for 1 day or more	
15.	**Impulsivity**
0 = Absent 1 = Occasional 2 = Frequent 3 = Constant or not redirectable	
16.	**Automatic Obedience**
0 = Absent 1 = Occasional 2 = Frequent 3 = Constant	
17.	**Mitgehen**
0 = Absent 3 = Present	
18.	**Gegenhalten**
0 = Absent 3 = Present	
19.	**Ambitendency**
0 = Absent 3 = Present	
20.	**Grasp reflex**
0 = Absent 3 = Present	
21.	**Perseveration**
0 = Absent 3 = Present	
22.	**Combativeness**
0 = Absent 1 = Occasionally strikes out, low potential for injury 2 = Frequent strikes out, moderate potential for injury 3 = Serious danger to others	
23.	**Autonomic abnormality**
0 = Absent 1 = Abnormality of 1 parameter 2 = Abnormality of 2 parameters 3 = Abnormality of 3 or more parameters	

Upon admission, an Intrathecal Baclofen (ITB) pump was administered to the patient at a dosage of 131.68mcg/day. A Baclofen trial was performed on the patient, beginning with a 10% increase of the ITB. Regarding the Baclofen trial, the ITB pump was gradually increased approximately 5-10% weekly until achieving a maximal dosage of 1000mg. Gabapentin and Acetaminophen (Norco) treatment was simultaneously administered to the patient at the start of the Baclofen trial at an initial dosage of 300mg TID, with the subsequent discontinuation of Seroquel from the treatment regimen. Before the patient underwent therapy, the dosage of acetaminophen was changed from TID to BID. Due to the gradual increase in the Baclofen dosage over the course of the patient's stay, a catheter tip aspiration was performed in order to examine the effectiveness of the ITB pump. The results of the catheter tip aspiration suggested that the ITB pump was providing an adequate amount of medication to the patient, and the patient's lack of responsiveness to the medication could simply be due to an increased tolerance to the therapeutic dosage.

Following the procedure, the patient experienced significant autonomic abnormalities, most of which was a consistent decrease in heart rate. It should be noted however, that the patient was burned in

his groin during bathing due to an iatrogenic cause. In order to relieve the associated pain, extra Acetaminophen was provided to the patient than what was normally administered to an average TBI or catatonic patient. Approximately 10 days after the ITB pump was placed in the patient, an Ativan (lorazepam) trial was performed. The patient's catatonic features were assessed according to the Bush-Francis Catatonia Rating Scale (BFCRS), with daily evaluation of responses during rounds and therapy (Table 1). The patient demonstrated improvements in attention, arousal, concordance with therapy, and cognition after the application of lorazepam. Once lorazepam was removed from treatment, the patient displayed periodic bouts of emotional arousal, screaming, and was non-compliant with therapy. Lorazepam was once again administered to the patient 2-3 days following these observations, in which an improvement in symptoms was noted.

Discussion

To our knowledge, there are no studies that have examined the presence of catatonia secondary to Acetaminophen overdose. However, a case report published in the Journal of Clinical Psychiatry described the presentation of a catatonic patient with a serum acetaminophen level of 213μmol/L and suggested that acetaminophen toxicity could be associated with the presentation catatonic-like features [9]. Following treatment with *N*-acetylcysteine, catatonic signs resolved after 36-48 hours. The report is limited by the fact the patient's history is significant for hepatitis C, polysubstance dependence including cocaine, methamphetamine, cannabis, and alcohol. These factors could have contributed to the observed mutism, hyperreflexia, and neurological symptoms seen in this patient.

Catatonia can be recognized by the presence of two or more "catatonic signs" [10]. Regarding Mr. K, while no definitive diagnosis of catatonia was confirmed, catatonia was heavily suggested due to the presence of most of the criteria that is needed for the classification of this condition. There is significant ambiguity surrounding the diagnostic criteria for catatonic schizophrenia which can consist up to 50 signs. The criteria used in the BFCRS for catatonic features presents concise and explicit descriptions of catatonic diagnostic criteria, and were used to assess the condition of our patient [11]. Some of the pertinent positive features seen in Mr. K that was consistent with the BFCRS criteria was mutism, staring, posturing/catalepsy, stupor, autonomic abnormalities, and rigidity. Mutism was rated at a 0, which is characterized as an absence of speech. It was also observed that the patient had a fixed gazed with minimal scanning of the visual environment, along with poor maintenance of eye contact leading to a score of 1. The patient scored a 1 on the immobility/stupor scale due to the brief interactions with the attending physician, along with immobility. The hypotension exhibited by the patient was the only abnormal autonomic parameter that was monitored, leading to a score of 1 in the BFCRS. The strongest features of this patient that provided us with the most confidence in the confirming the catatonic state of this patient was the abnormal posturing and contractures, as well as the sudden engagement in screaming and emotional impulsivity (Table 1).

As a result of the lorazepam trial, the patient showed great improvement in attention, alertness, and cognition. The most significant finding observed during the lorazepam trial was the decreased emotional impulsivity and screaming that was typically seen in this patient. Studies have shown the efficacy of lorazepam treatment for improving the symptoms associated with catatonia. However, these studies focused specifically on subjects with various mental disorders [12-15]. Also, studies which have investigated the application of benzodiazepines in the treatment of catatonia in a TBI patient, failed to examine whether there was a change in symptoms after the medication was removed. In a case report published in the Journal of Physical Medicine and Rehabilitation, the researchers evaluated the effects of an Ativan trial in a hypoxic brain injury patient diagnosed with catatonia [14]. The researchers found that the Ativan trial significantly improved cognition, wakefulness, verbal, and motor responses in the patient after one week [14]. To our knowledge, there are few published pharmacologic trials for the treatment of catatonic-like symptoms following TBI. Therefore, the current case report provides potential evidence for the clinical efficacy regarding the use of lorazepam to treat catatonia following TBI.

Limitations

The limitations of this case report, as with any, include the inability to establish a cause-effect relationship [15]. However, our case report differs from the previous literature due to the demonstration of a temporal relationship using a wash-out period with the removal of lorazepam with administration of the medication 2-3 days later. This subsequent addition of Ativan once negative symptoms became evident, relieved the majority of the patient's catatonic features and enhanced the clinical significance of this case.

Another major limitation of this case was the utilization of only the BFCRS to evaluate the patient's catatonic features. We believe that there is significant overlap among current catatonia rating scales, and the BFCRS compresses the vast array of over 50 diagnostic catatonic signs into a 23-item scale. The indication of using this 23-item is the increase in sensitivity and accuracy of the patient's diagnosis. The BFCRS has been one of the most widely used catatonia rating scales [15]. However, there are several limitations regarding the use of this scale for determining the presence of catatonia. A major limitation of the BFCRS is its lack of consistency in the definitions for its reference criteria. While the BFCRS can be used to measure treatment response, most of the items on the scale may still be exhibited by the patient after the patient's underlying condition has improved such as perseveration, combativeness, grasp reflex, etc… Due to this limitation, there is a possibility that some patients could still receive low scores even with clinical improvement of their condition.

Conclusion

Catatonia is an ambiguous condition due to the various etiologies and wide-range of diagnostic criteria. In this case-report, we found that a lorazepam treatment protocol could rapidly and efficiently relieve catatonic-like symptoms in a TBI patient. The findings in this case-report also suggest the possible existence of a positive correlation between catatonia and acetaminophen toxicity. Due to the sparse availability of pharmacologic trials recognizing the efficacy of lorazepam in treating catatonia following TBI, more researchers are necessary. Future research should investigate the application of this treatment specifically in TBI patients without a previous medical history significant for psychiatric disorders, similar to the patient presented in the current report.

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