Maintenance treatment of catatonia with benzodiazepines: A case series and literature review

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Objective: Benzodiazepines, particularly lorazepam, are good options for acute catatonia treatment. Published catatonia literature on benzodiazepine maintenance treatment and benzodiazepine tolerance is limited. **Methods:** This is a chart review covering 30 years of clinical experience in the state of Kentucky, (United States of America), where there was no easy access to electroconvulsive therapy. Nine patients with prolonged catatonia requiring benzodiazepine maintenance treatment were selected for review. **Results:** Three cases were switched from oral lorazepam to oral clonazepam, but relapses happened in 2 of them. Two patients lost their response to lorazepam and clonazepam. One with periodic catatonia needed ECT added to maintenance lorazepam. The other patient had 3 episodes of catatonia secondary to sudden clozapine withdrawal and required a restart of clozapine. Four patients were treated only with lorazepam. Two of them had relapses due to non-adherence or taper and needed indefinite lorazepam maintenance with no known relapses. One case initially responded to 1.5 mg/day of oral lorazepam but the dosage had to be increased to 18 mg/day to keep the response. Chronic tolerance requiring higher doses was present in 4 of the 9 patients and 2 of them were catatonic for many months. **Conclusions:** Some patients may need to continue benzodiazepines indefinitely for maintenance treatment of catatonia following failed attempts at tapering. Sudden benzodiazepine discontinuation or non-adherence can lead to loss of benzodiazepine response or need for higher doses. A cross-taper from lorazepam to clonazepam can be accomplished, but is challenging and may result in relapse.

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INTRODUCTION

Since Kahlbaum first described catatonia in 1878 (Berrios, 2007; Kahlbaum, 2007), the understanding of this disorder has evolved significantly and the diagnosis now includes idiopathic catatonia, catatonia associated with mental illness, and catatonia associated with medical illness (American Psychiatric Association, 2013). There is general agreement that acute treatment for catatonia includes benzodiazepines or electroconvulsive therapy (ECT) despite few randomized controlled trials (RCT) (Rosebush and Mazurek, 2010). The literature provides substantial variations across settings and time of the prevalence of catatonia episodes (Rogers et al., 2023), but any clinician who has seen patients with severe forms of stuporous catatonia would agree that it has a high risk of lethality and it is not easy to collect larger samples to do comprehensive treatment studies (Puentes et al., 2017). Moreover, patients with catatonia have an urgent need to be treated and cannot collaborate with the requirements of inclusion RCTs, including signing a written consent form. Thus, it is not likely that we will ever have large RCTs to guide the treatment of catatonia (de Leon and Stephens, 2016).

Although there is consensus on the acute treatment, there is no consensus among experts on the duration of maintenance treatment for catatonia with benzodiazepines (Grover & Aggarwal, 2011), as summarized in Table 1 (Ungvari et al., 1999; Fink & Taylor, 2003; Lehman et al., 2004; Manjunatha et al., 2007; Rosebush and Mazurek, 2010; Lin & Huang, 2013; Lin et al, 2016; Heckers & Walther, 2021; Dubovsky and Marshall, 2022; Rogers et al., 2023; Hirjak et al., 2024). Neither recent reviews of catatonia (Zaman et al., 2019; Mormando and Francis, 2020; Edinoff et al., 2021) nor an updated schizophrenia guideline (Keepers et al., 2020) have commented on maintenance treatment with benzodiazepines.

Table 2 describes 6 individual case reports published on benzodiazepine maintenance treatment (Lee, 2004; Manjunatha et al., 2007; Grover and Aggarwal, 2011; Jiang et al., 2021; Rice et al., 2021; Weiss et al., 2022). Table 3 describes benzodiazepine maintenance treatment published as 4 case series which include 16 cases in total (Salam et al., 1987; Gaind et al., 1994; Ali et al., 2017; Thamiz et al., 2016).

Therefore, key issues in the treatment of catatonia with benzodiazepines that have not yet been fully addressed in the literature and the next two subsections focus on 1) the transition from acute to maintenance treatment and 2) the challenge of benzodiazepine tolerance.

Problems with benzodiazepines when transitioning from acute to maintenance treatment

Table 2 focuses on published individual cases demonstrating the risk of relapse when tapering benzodiazepines. Lee (2004) described a patient who relapsed when lorazepam was decreased from 3 to 2 mg/day, so the dose was increased to 3 mg/day which was tapered over 12 months. Manjunatha et al. (2007) reported one case with 7 attempts of discontinuation or taper leading to indefinite maintenance with 4 mg/day of oral lorazepam. Grover and Aggarwal (2011) reported one patient who underwent 8 failed attempts to discontinue or taper lorazepam leading to indefinite maintenance with 6 mg/day of oral lorazepam. Jiang et al. (2021) describe a patient who was acutely treated with lorazepam and ECT and later was maintained for more than 6 months on 4 mg/day of oral clonazepam. Rice et al. (2021) reported a failed attempt to switch from lorazepam to clonazepam, leading to 12 mg/day of oral lorazepam in order to discharge the patient. Weiss et al. (2022) described a patient with catatonia relapses after accidental discontinuation or attempts to taper clonazepam, and was maintained for more than 5 years on oral clonazepam 2 mg/day.

Table 3 focuses on 4 published case series including 16 patients. In 3 of the 16 patients, long-term benzodiazepine maintenance was not needed. In another 1.5 mg/day oral lorazepam was tapered after 6 months. In the other 12 cases long-term maintenance was needed but details were missing in many cases. The benzodiazepine maintenance dose was missing in 7 of these 12 cases and was 4 mg/day of oral lorazepam in 3 patients and 6 mg/day of oral lorazepam in 2 patients. The duration of long-term maintenance was not specified in 6 of 12 patients and in the other 6 ranged between 3 months and more than 5 years at the time of publication.

The challenge of benzodiazepine tolerance

Benzodiazepine tolerance is an issue described by pharmacologists (Vinkers and Olivier, 2012) and described by clinicians regarding their sedative actions when used at the intensive care unit (Jenkins, 2011) or for acute anti-seizure treatment (Pellock, 2004). Tolerance has not received much attention in the catatonia literature. In our experience, the pharmacological phenomenon of tolerance can manifest clinically in different ways, but there is no standard terminology to clearly differentiate these

Table 1. Published statements on benzodiazepine maintenance for catatonia

Lorazepam trial on chronic catatonia associated with schizophrenia: Ungvari et al. (1999) "No patient in this cohort showed any appreciable improvement in catatonic signs or symptoms"
Catatonia textbook: Fink & Taylor (2003) "High doses of benzodiazepines [are] needed to ameliorate catatonia" in patients more likely to relapse.
American Psychiatric Association Schizophrenia guideline: Lehman et al. (2004) "Benzodiazepines are effective for treatment of acute catatonic reactions. … One report has questioned the value of benzodiazepines in treating chronic catatonia, although patients were maintained on antipsychotic treatment during the study, and the contribution of tardive dystonia to the observed behaviors was uncertain" (referencing Ungvari et al.1999).
Case report on benzodiazepine maintenance and review: Manjunatha et al. (2007) "Some patients may require long-term treatment with lorazepam, especially those who may have downregulation of GABA-A receptors."
Review article: Rosebush & Mazurek (2010) "The dosage of [benzodiazepine] medication that was effective in resolving the catatonia should be continued, until treatment of the primary disorder is well underway." "If [benzodiazepines] are not maintained until treatment of the comorbid condition is underway, it is our experience that patients tend to relapse.
Case series on catatonia recurrence and review: Lin et al. (2016)[a] "The role of maintenance oral lorazepam in prevention of catatonia requires further research, but may have merits in certain cases"
Editorial on catatonia: Heckers & Walther (2021) "Long-term treatment with benzodiazepines, clozapine, or maintenance electroconvulsive therapy are often necessary"
Review of benzodiazepine use: Dubovsky & Marshall (2022) "There are no controlled studies of maintenance treatment of catatonia with benzodiazepines, but clinical reports suggest that lorazepam doses in the range of 4–10 mg/day are effective, and considerable experience indicates that maintenance lorazepam can be effective in reducing relapse and recurrence."
Catatonia guideline by consensus of experts: Rogers et al. (2023) "The speed of the taper depends on a balance of the therapeutic benefits and the risks of withdrawal effects against the possibility of dependence and the risks of long-term harm from benzodiazepines."
Review of benzodiazepine treatment in catatonia: Hirjak et al. (2024) "robust evidence on when benzodiazepines should be discontinued after full remission of acute catatonia is still lacking."[b]

[a] Lin and Huang (2013) described 9-year practice in Taiwan of using a protocol with intramuscular lorazepam and when there was no response intravenous diazepam. In an extension of this study, Lin et al. (2016) included 68 episodes in 30 patients and focused on recurrence and relapses. As the article provided no detail on whether or not the relapses were due to discontinuation of the oral lorazepam and/or other treatments, these cases could not be included in Table 3.
[b] This was a statement based on consensus in the absence of systematic evidence.

types; therefore, for clarity we describe 3 types of tolerance. First, a patient may develop acute tolerance (which may be called tachyphylaxis). Acute tolerance occurs when a patient has the desired response to a medication, but after one to several doses, the medication becomes ineffective and a higher dose is required to achieve the same original response. There is no specific timeline or number of doses that defines acute tolerance and this may vary from individual to individual. Second, patients may display chronic tolerance that is characterized by requiring higher doses to achieve the same response over a longer period of time, such as weeks to months. Lastly, specific to catatonia, patients often tolerate large doses of benzodiazepines without typical side effects such as sedation, whether or not the medication is therapeutically beneficial (Enterman and van Dijk, 2011). In this paper, due to lack of published terminology this third type of tolerance will be termed benzodiazepine side effect desensitization.

The literature provides some evidence for acute tolerance during benzodiazepine treatment for catatonia. Rosebush et al. (1990) described 15 catatonic patients in one of the earlier reports of using lorazepam for catatonia. Nine patients had an initial response to 1 to 2 mg lorazepam, and after 7 patients relapsed within 72 hours, repeat dosing yielded less robust responses. Similarly, Dunn et al. (2017) described a patient who initially achieved remission of catatonia with just 4 mg of lorazepam

Table 2. Case reports on benzodiazepine maintenance treatment in catatonia

Case description (Author)	
Medication and response	**Duration**
28-yo Australian Caucasian ♀ with intellectual disability (Lee, 2004)	
Oral LOR 3 mg/day, resolution of symptoms Oral LOR 2 mg/day, relapse Oral LOR 3 mg/day, resolution of symptoms	3 weeks Days Taper over 12 months
28-yo Caucasian ♀ with idiopathic catatonia from India (Manjunatha et al., 2007)	
Oral LOR 4 mg/day, resolution of symptoms Oral LOR reduction to 2 mg/day, with relapse Oral LOR 4 mg/day, 6 failed attempts to taper LOR 6 mg/day required for relapses Maintenance on oral LOR 4 mg/day	3 weeks Days 6 months Ongoing at time of publication
38-yo Indian ♀ with idiopathic catatonia (Grover & Aggarwal, 2011)	
Oral LOR 6 mg/day, 2 failed attempts to discontinue Oral LOR 2-4 mg/day, 6 failed attempts to taper Oral LOR 6 mg/day, maintenance	6 weeks 18 months Ongoing at time of publication
74-yo ♂ with periodic catatonia from the United States (Jiang et al., 2021)	
Medical admission with LOR IV and amantadine Psychiatric admission with 5 ECTs Home ↓ 4 mg/day oral LOR and amantadine Apparent response to 4 mg/day of CLO Maintenance on 4 mg/day of CLO	Not described Weeks 7 months 4 weeks >6 months
15-yo ♂ with psychosis and catatonia from the United States but born in another country (Rice et al., 2021)	
1st oral LOR trial up to 4 mg/day and RIS Switched from LOR to CLO and RIS Oral CLO up to 8 mg/day and LOR PRNs with RIS/OLA ↓ Oral CLO and ↑ oral LOR up 12 mg./day with OLA Discharged on 12 mg/day oral LOR and OLA	15 days 2 days 16 days 12 days after 45 days in total
8-yo Pacific Islander ♀ with psychosis and catatonia from the United States (Weiss et al., 2022)	
LOR, midazolam and APs IV LOR and IV midazolam Switched from IV to oral LOR up to 46 mg/day Discharged on 3 mg/day oral CLO and RIS Recurrence after CLO discontinuation Maintenance on CLO 2 mg/day and ARI	After ER visit: duration not described ICU: duration not described Pediatric unit: duration not described Psychiatric unit: 8 weeks >5 years

AP: antipsychotic; ARI: aripiprazole; CLO: clonazepam only used in oral formulations; ECT: electroconvulsive therapy; ER: emergency room; ICU: intensive care unit; IV: intravenous; LOR: lorazepam; OLA: olanzapine; PRN: as needed treatment; RIS: risperidone

daily, but after a relapse, required 8 mg of lorazepam daily. Wahidi and de Leon (2018) described a case of catatonia that achieved remission with 1 mg of lorazepam but the patient relapsed when lorazepam was not continued. The patient responded to 2 mg of lorazepam and experienced full remission but again lorazepam was not continued. The patient had another relapse and treatment escalated to 21 mg/day of lorazepam without full remission.

There is very little information published on how to manage benzodiazepine maintenance in catatonia. After reviewing currently published literature, this article will review the senior author's (JdL) experiences in managing maintenance treatment of catatonia with benzodiazepines during the last 30 years as a clinician and consultant in the state of Kentucky. ECT remains an optimal treatment modality for catatonia but is not always available, practical, or agreed to by

the patient. Kentucky public psychiatric hospitals have no easy access to ECT maintenance, so in some catatonic patients there is no choice but to use long-term maintenance with benzodiazepines.

METHODS

Nine patients with recurrent or prolonged catatonia treated with benzodiazepines were selected from the clinical experience of the senior author at a state hospital in Kentucky, United States of America (USA). Prolonged catatonia will be defined as a longstanding, single episode of catatonia that has not yet been successfully treated. The senior author personally treated cases 1 and 2 and acted as a consultant in cases 4 through 9. He also treated the first catatonic episode and was consulted for the second episode of Case 3. Data were obtained retrospectively from charts reviewed for patient age, sex, diagnoses, duration of catatonic episode(s), treatment, and hospital course. This retrospective review of charts of clinical work was approved by the University of Kentucky's Institutional Review Board which does not require individual consent from patients who were discharged from the hospital many years ago.

RESULTS

There 9 patients, 4 men and 5 women whose age ranged from 21 to 57 years old, had a mean age of 37.3 years at the time of the first episode. Three cases previously were published but without emphasizing the problems in benzodiazepine maintenance (White et al. 2015; Bilbily et al. 2017; Zwiebel et al. 2018). Patients were given a wide variety of diagnoses by the treating physicians varying from admission to admission including intellectual disability, schizophrenia, schizoaffective disorder, major depressive disorder, post-traumatic stress disorder, and periodic catatonia.

Three patients switched from lorazepam and clonazepam

Table 4 includes 3 patients (Cases 4, 5 and 9) who were converted from lorazepam to oral clonazepam for maintenance treatment and in 2 of these 3, this was complicated by relapses. Case 4 usually responded in the acute phase to 9 mg/day of oral lorazepam and was successfully switched in the first admission to 5 mg/day of oral clonazepam. Case 5 initially responded to 2 mg/day oral lorazepam but developed chronic tolerance and the dose had to be increased to 12 mg/day to maintain the response so he was switched to 3 mg/day of oral clonazepam and discharged on 2 mg/day of oral clonazepam. Case 9 usually responded in the acute phase to 6 mg/day of oral lorazepam and was successfully switched to 2 or 4 mg/day of oral clonazepam in different admissions.

Two other patients treated with lorazepam and clonazepam

Table 5 describes two patients who had repeated catatonic episodes which lasted for many months.

Case 2 had periodic catatonia, usually relapsing after having menses and missing treatment with benzodiazepine or ECT. She was maintained for years on 6 mg/day of oral lorazepam and monthly outpatient ECT. In the first episode she responded in 10 days to 6 mg/day of oral lorazepam added to 1 mg/day of clonazepam but when she lost the response to benzodiazepines, she became tolerant and did not respond to a trial of 4 mg IV or 12 mg/day of oral lorazepam. At that time in the late 1990s the senior author had never tried to go above 20 mg/day of lorazepam. The patient was catatonic for 509 days until she finally agreed to maintenance ECT that led to recovery of the response to benzodiazepines.

Case 3 had three episodes of catatonia secondary to sudden clozapine withdrawal with problems of benzodiazepine tolerance and relapses even when using high doses of benzodiazepines (up to 22 mg/day of lorazepam or 6 mg/day of oral clonazepam). This patient could not become stable until he agreed to restart clozapine.

Four patients treated only with lorazepam

Table 6 includes 4 patients who were treated only with lorazepam during the catatonic episode. Cases 7 and 8 had relapses due to non-adherence or a taper led to indefinite lorazepam maintenance with no known relapses.

Case 1 initially responded to 1.5 mg/day of oral lorazepam but the dose had to be increased to 18 mg/day to keep the response and ECT was not an option.

Four patients with chronic tolerance to benzodiazepines

Chronic tolerance was definitively present in 4 patients (Case 1, 2, 3 and 5) and 2 of them (Cases 2 and 3) were catatonic for many months.

Table 3. Four case series on benzodiazepine maintenance treatment in catatonia with 16 patients

Case description (Author)	
Medication and response	**Duration**
67-yo ♂ with catatonia only from the United States (Salam et al., 1987)	
Response to 2 mg IM LOR Maintenance dose not specified	Not described 8 months
63-yo ♂ with catatonia only from the United States (Salam et al., 1987)	
Response to 2 mg IM LOR but relapsed next day Second response to 2 mg IM LOR and oral maintenance	2 weeks 5 months
34-yo ♂ with catatonia only from the United States (Salam et al., 1987)	
Response to 2 mg IM LOR and total 10 mg IM No LOR and worsening Response to 2 mg IM LOR Maintenance with oral LOR 4 mg/d	2 days 3 days Not described
26-yo Canadian ♂ with intellectual disability (Gaind et al., 1994)	
Oral LOR 3 mg/day, resolution of symptoms Oral LOR 1.5 mg/day, asymptomatic	3 weeks 6 months, then slow taper
29-yo Canadian ♂ with intellectual disability (Gaind et al., 1994)	
Oral LOR 2 mg/day, partial response Oral LOR 4 mg/day, resolution of symptoms	Days Ongoing (>2 years)
33-yo Indian ♀ with acute transient psychosis (Ali et al., 2017)	
Resolution with 6 mg/day oral LOR Resurgence after 4 days of stopping 3 mg/day Maintenance dose not specified	2 weeks Tapered 2 mg every week Not specified
34-yo Indian ♂ with catatonia associated with severe psychotic depression (Ali et al., 2017)	
Resolution with 6 mg/day oral LOR Resurgence after 4 days of stopping 3 mg/day LOR restarted but dose was not provided	2 weeks Tapered 2 mg every week Maintenance was not needed
30-yo Indian ♂ with catatonic schizophrenia (Ali et al., 2017)	
Resolution with 6 mg/day oral LOR Resurgence after 7 days of stopping 2 mg/day LOR restarted but dose was not provided	1 week Tapered 6 mg every week Maintenance was not needed
26-yo Indian ♀ with catatonia associated with unspecific psychosis (Ali et al., 2017)	
Resolution with 6 mg/day oral LOR Resurgence after 3 days of stopping 2 mg/day LOR restarted but dose was not provided Maintenance dose not specified	2 days Tapered 6 mg every week Duration not described Not specified
27-yo Indian ♂ with catatonia associated with unspecific psychosis (Ali et al., 2017)	
Resolution with 6 mg/day oral LOR Resurgence after abrupt stoppage LOR restarted but dose was not provided	6 weeks Not tapered Maintenance was not needed
47-yo Indian ♀ with catatonia associated with psychotic mania (Ali et al., 2017)	
Resolution with 6 mg/day oral LOR Resurgence while on 3 mg/day LOR restarted but dose was not provided Maintenance dose not specified	2 days Tapered 2 mg over 1 week Duration not described Not specified

Table 3. continue...

Case description (Author)	
Medication and response	**Duration**
30-yo Indian ♂ with catatonic schizophrenia (Ali et al., 2017)	
Resolution with 6 mg/day oral LOR Resurgence after 7 days of stopping 2 mg/day LOR restarted but dose was not provided	1 week Tapered 6 mg every week Maintenance was not needed
27-yo Indian ♂ with catatonic schizophrenia (Thamiz et al., 2016)	
Resolution with oral 24 mg/day LOR, ECT and RIS 5 relapses 1 week after LOR< 4 mg/day and APs Maintenance with 8 mg/day RIS and oral 4 mg/day LOR	Not described The tapering not described in detail 5 years
21-yo Indian ♀ with idiopathic recurrent catatonia (Thamiz et al., 2016)	
Resolution after 10 mg/day oral LOR and VPA 7 episodes lasting 2 weeks: 10 mg/day oral LOR The relapses were within 1 week after LOR< 4 mg/day Maintenance with oral 4 mg/day LOR and VPA	1 week 1 year 3 months
15-yo Indian ♂ with catatonic schizophrenia and corpus callosum agenesis (Thamiz et al., 2016)	
Best response was with 10 mg/day oral LOR and OLA 3 recurrences after attempting to taper and stop LOR Maintenance with oral 6 mg/day LOR and OLA	Not described Not described 10 months
21-yo Indian ♀ with catatonia, psychotic mania and intellectual disability (Thamiz et al., 2016)	
Before admission Catatonia resolved with 8 mg/day oral LOR and HAL Recurrences after ↓ to 4 mg/day oral LOR Maintenance with oral 6 mg/day LOR and HAL	10 days of mania and 4 days of catatonia 1 week Not described Not described

AP: antipsychotic; ECT: electroconvulsive therapy; HAL: haloperidol; IM: intramuscular; LOR: lorazepam; RIS: risperidone; VPA: valproic acid

DISCUSSION

Catatonia symptoms requiring hospitalization for years

Three of 9 patients used benzodiazepines continuously for more than 1 year during very long and complicated hospitalizations (Cases 1, 2, and 3). The literature provides no similar detailed published cases.

Chronic tolerance to benzodiazepines

Increasing tolerance to benzodiazepines in general has long been recognized in the psychiatric literature (Swinson et al., 1987) and can be difficult to manage in catatonia when the prescriber is not aware that it can happen. Chronic tolerance was observed in Cases 1, 2, 3, and 5. No clear commonalities were observed among these cases except that discontinuation can facilitate the loss of response to lorazepam or the need for higher doses. All patients ultimately required much larger doses of lorazepam than were required for an initial response. Maintenance daily dosages of lorazepam were much higher than the initial therapeutic daily dosages. Case 1 went from 1.5 to 18 mg/day of oral lorazepam during the course of a year. Case 2 required ECT to recover the response to benzodiazepines. Case 3—who had catatonia secondary to clozapine withdrawal—required clozapine to stop the benzodiazepines. Case 5 responded to 2 mg/day of oral lorazepam but the dose needed to be increased to 12 mg/day and required a transition to clonazepam that was continued indefinitely. In conclusion, sudden benzodiazepine discontinuation or non-adherence can lead to loss of benzodiazepine response or the need for higher doses in catatonic patients. The need for higher doses during longer periods of time may also happen without known benzodiazepine discontinuation.

Table 4. New cases on benzodiazepine maintenance: 3 patients who were converted from LOR to CLO

CONVERSION FROM LOR TO CLO	
Case 4: Caucasian ♂ with schizophrenia; first admission at age 22 years	
Acute treatment with oral LOR 9 mg/day Maintenance switching to oral CLO 3 mg/day with 2 relapses Discharged on oral CLO 5 mg/day	65 days
Acute treatment with oral LOR 9 mg/day after relapse due to non-adherence Discharged on oral LOR 9 mg/day	15 days
Acute treatment with oral LOR 9 mg/day after relapse due to non-adherence Discharged on oral LOR 9 mg/day	11 days
Admission after suicide attempt due to overdose This time benzodiazepines were not prescribed	8 days
No further admissions	

CHRONIC TOLERANCE AND CONVERSION FROM LOR TO CLO	
Case 5: 43 yo Caucasian ♂ with schizophrenia	
Acute treatment with oral LOR 2 mg/day which had to be ↑ 12 mg/day due to chronic tolerance Maintenance rapid switching from LOR 12 mg/day to oral 3 mg/day CLO Discharged on oral CLO 2 mg/day	148 days
No further admissions	

CONVERSION FROM LOR TO CLO	
Case 9: 57 yo Caucasian ♂ with schizoaffective disorder	
Acute treatment with oral LOR 6 mg/day Adding oral CLO 2 mg/day and taper LOR over 7 days led to relapse on 8th day of taper Oral LOR restarted for 2 days and maintenance on oral CLO 2 mg/day Discharged on oral CLO 2 mg/day	62 days
Acute treatment with LOR converted to oral CLO 4 mg/day after 4 days Discharged on oral CLO 4 mg/day	63 DAYS
Next 5 admissions over 24 months	
Oral LOR 6 mg/day Maintenance oral CLO 4 mg/day Slow taper to oral CLO 0.5 mg/day No further admissions	

CLO: clonazepam; LOR: lorazepam; yo: years of age

Relapses with lorazepam taper

The literature describes catatonic episodes after sudden withdrawal from other psychiatric drugs (Duggal & Singh, 2005; Rogers et al., 2023) including clozapine (Bilbily et al., 2017) or antiseizure drugs, such as oxcarbazepine (Zwiebel et al., 2019). Thus, it is not surprising that too-rapid withdrawal of lorazepam may lead to catatonia relapses, even with complicated cases including both catatonia and seizures (Mader et al., 2020). Tables 2 and 3 highlight the limited published cases of relapse during lorazepam tapers and the need for maintenance for months to years. In a sample of 117 patients with catatonia, Ali et al. (2017) found 7 patients (0.6%) who had a resurgence of catatonia when tapering or stopping lorazepam and 3 of these 7 patients required long-term maintenance with lorazepam, which is described in Table 3.

Patients in this case series underwent lorazepam tapers with varying degrees of success and discontinuation. Cases 7 and 8 both required indefinite maintenance lorazepam. Case 7 was able to reduce the daily dosage of lorazepam by 50% and avoid a relapse. Case 8 failed a taper attempt, later

required increased doses of lorazepam, and was ultimately maintained on the dose of lorazepam that achieved initial remission of catatonia.

Conversion of lorazepam to clonazepam

Published case series used conversion from lorazepam to clonazepam in preparation for discharge due to clonazepam having an even longer half-life. Table 2 includes a failure of switching from lorazepam to clonazepam (Rice at el., 2021) and 2 cases of successful switching from clonazepam by Jing et al. (2021), and Weiss et al., (2022). Jing et al. (2021) initially used lorazepam with amantadine or ECT but the patient was discharged on a maintenance dose of 4 mg/day of clonazepam. Weiss et al. described up to 46 mg/day of lorazepam during the acute treatment but maintenance with 2 mg/day of clonazepam for more than 5 years.

Based on the pharmacological literature on converting lorazepam to clonazepam, 1 mg of lorazepam is traditionally considered equivalent to 0.25 to 0.5 mg of clonazepam (de Leon et al., 2012). Case 4 required 9 mg/day of lorazepam to achieve remission, and 5 mg/day of clonazepam for maintenance after 3 mg/day of clonazepam resulted in 2 catatonic relapses. Case 5 transitioned from 12 mg/day of lorazepam to 3 mg/day of clonazepam over several days without relapses. Case 9 experienced a complicated treatment course including a failure in the first attempt and a more successful second attempt of cross-tapering. During the patient's next admission, her clonazepam was then converted back to lorazepam due to catatonic symptoms even while taking clonazepam. After improvement in catatonic symptoms, the lorazepam was converted back to clonazepam, which was then tapered in several admissions, with no known relapses.

These cases demonstrate that converting lorazepam to clonazepam can be challenging for several reasons. Patients with catatonia may require equivalent clonazepam dosages at the upper end of the conversion range (1 mg lorazepam = 0.5 mg clonazepam) or even higher. A single patient can respond differently at different times, at first unable to maintain remission with clonazepam but later tolerating clonazepam and even a total taper from benzodiazepines. Some patients may become catatonic even while taking clonazepam.

In the experience of the senior author using the same doses of lorazepam, the intravenous route is more effective followed by the intramuscular route, while the oral route tends to be ineffective unless the patient has never been treated with benzodiazepines before. Similarly, oral lorazepam appears to be more effective than oral clonazepam. If future studies verify this clinical experience, this pharmacological pattern would be suggestive that the peak serum/plasma benzodiazepine concentrations may be more important that the trough concentrations. The intravenous route provides higher peaks than the intramuscular route while the oral route provides much lower peaks than the parenteral routes. Lorazepam, due to its shorter half-life, provides higher peaks when administered 2-3 times a day than clonazepam administered 1-2 times a day.

The relevance of ECT in this series

Not all patients can achieve remission of catatonia with lorazepam or other pharmacotherapy and may require ECT. Access to ECT varies across countries and states within the USA. In Kentucky, access to ECT can be challenging due to numerous restrictions involving informed consent and transporting the patient to an ECT center as ECT is not available on site at public psychiatric hospitals in Kentucky (Puentes et al., 2017).

Case 1 of ECT was ruled out by the only ECT site available in that city. ECT was only used in Case 2 after many months of waiting for consent from the patient and family despite their previous approvals of ECT during several psychiatric admissions at private hospitals. Case 2 demonstrated benzodiazepine tolerance and required ECT for full, sustained remission. She was successfully maintained on a regimen of ECT treatments in combination with benzodiazepines. This was first described by Petridis et al. (1997) in 5 patients with catatonia. These 5 patients did not initially respond to lorazepam, but after initiating ECT, lorazepam became effective when given concurrently with ECT. Two patients in that study were lost to follow up after resolution of catatonia, 1 patient was maintained on seasonally prescribed medication, 1 patient was maintained on 2.5 mg/day of lorazepam, and 1 patient was tapered off lorazepam over the course of several months with no known relapses for the 22-month follow-up period. Enterman and van Dijk (2011) also reported a case of catatonia that remitted only with ECT administered concurrently with lorazepam after lorazepam alone failed to provide symptom relief.

Table 5. New cases on benzodiazepine maintenance: 2 other patients who took both LOR and CLO

Medication and response	Duration
CHRONIC TOLERANCE: LOSS OF RESPONSE TO BENZODIAZEPINE RECOVERED WITH ECT	
Case 2: Caucasian ♀ with periodic catatonia (Zwiebel et al., 2018)	
Admission Age 48-53 yo	
Admitted after undiagnosed episode of excited catatonia	
Acute: as patient got better with LOR PRN, oral CLO 1 mg/day was added	136 days
Maintenance: oral CLO 1 mg/day and OLA 20 mg/day in unit managed by senior author	18 days
1st witnessed catatonic episode	
Associated with menses in spite of oral CLO 1 mg/day and OLA 20 mg/day Acute added to prior treatment: intermittent IM LOR and oral LOR 6 mg/day	10 days
Maintenance: oral 6 mg/day of LOR, 1 mg/day CLO and OLA that was tapered	147 days
2nd catatonic episode	
Associated with menses and sudden discontinuation of LOR and CLO Acute: no response to prior doses of LOR oral 6 mg/day and 1 mg/day CLO Oral LOR 12 mg/day; patient had partial response A trial of adding LOR 4 mg IV showed no benefit After adding maintenance ECT, LOR response was recovered Duration of this episode	509 days
Maintenance: monthly ECT and oral LOR 6 mg/day	364 days
in the absence of menses LOR withdrawal led to seizure (no catatonia relapse)	
3rd catatonic episode	
Associated with menses and delay in ECT Acute: 8 mg IV LOR, 3 ECTs and oral LOR 6 mg/day	14 days
Maintenance in community: monthly ECT and oral LOR 6 mg/day	281 days
4th catatonic episode at Age 52-yo admitted to university hospital	
Associated with LOR withdrawal due to 3 days of vomiting Acute: 2 ECTs in 3 days were added	4 days
Inpatient maintenance: ECT every 2.5 weeks and oral LOR 6 mg/day	22 days
Outpatient maintenance: ECT and oral LOR and only 1 relapse until patient died at age 60	8 years

Benzodiazepine desensitization to side effects

Rosebush and Mazurek (2010) recommended titrating the dose of lorazepam to effect while remaining mindful of the risk of sedation with benzodiazepines. However, catatonic patients often tolerate large doses of benzodiazepines without sedation and can exhibit a paradoxical effect of becoming less stuporous when receiving sedative-hypnotics. Fink and Taylor (2009) advise that lorazepam doses of 20 to 30 mg/day are occasionally necessary. Even in medically ill patients, Denysenko et al. (2018) recommended lorazepam doses up to 24 mg/day to treat catatonia. In one dramatic case report, a 28-year-old benzodiazepine-naïve man with schizophrenia and catatonia tolerated 60 mg/day of lorazepam without any side effects (Enterman and van Dijk, 2011). In the current case series, Case 1 tolerated 18 mg/day of lorazepam and Case 3 tolerated up to 22 mg/day; none of these patients displayed sedation.

Recommendations based on 30 years of experience

The Appendix provides brief recommendations for Kentucky psychiatric hospitals based on 30 years of experience and the literature (Berardi et al., 1998;

Table 5. continue...

Medication and response	Duration
CHRONIC TOLERANCE, RELAPSES AND CONVERSION FROM LOR TO CLO	
Case 3: African-American ♂ with catatonia secondary to clozapine withdrawal (Bilbily et al., 2017)	
Age 33-37 yo managed by senior author	
Intermittent IV LOR at medical hospital after suddenly stopping clozapine	7 days
LOR 8-16 mg/day combining oral and IM term at psychiatric hospital	3 days
Oral LOR 16 mg/day	18 days
Slow oral LOR taper leading to discontinuation	232 days
CLO 2 mg/day have to be added to avoid catatonia	10 days
Oral CLO trial: 6 mg/day was dose for stabilization	348 days
After the patient agreed to start clozapine up to 450 mg/day, CLO was slowly tapered	43 days
Treatment for this catatonic episode	661 days
Discharge was tried again after another 185 days of stabilization	185 days
Age 37-39 yo	
Relapse and medical admission after suddenly stopping clozapine	5 days
Acute LOR oral/IM (depending collaboration) initial dose 22 mg/day, stable on 12 mg/day	36 days
Somewhat stable on LOR	26 days
HAL up to 15 mg/day was added in order to taper LOR	61 days
Worse 3 days after last LOR dose 1 mg/day, another slow taper from 1.5 to 0.5 mg/day	12 days
On second day after stopping LOR clozapine 50 mg/day was started On clozapine trial, the patient become stable once 400 mg/day was reached	72 days
Treatment for this catatonic episode	212 days
Discharged on clozapine 600 mg/day was tried again after 183 days of stabilization	183 days
Age 39-41 yo	
Relapse after discharge after suddenly stopping clozapine	9 days
Admission at psychiatric hospital with LOR IM up to 16 mg/day	7 days
Several transfers to medical hospital with irregular oral LOR	2 days
Several attempts to start clozapine	54 days
The final clozapine trial forced by the court that led to recovery was started on day 73 Treatment for this catatonic episode	around 72 days
Discharged on clozapine 600 mg/day to a nursing home after 627 days of stabilization	627 days

CLO: clonazepam; LOR: lorazepam; yo: years of age

Clineball et al., 2014; Caroff et al., 2024; Saini et al., 2024). These cases support lorazepam as superior to clonazepam in treating acute-phase catatonia and perhaps in providing maintenance coverage as well, as patients did not always tolerate transitioning from lorazepam to clonazepam and sometimes became catatonic even while taking clonazepam. Additionally, intramuscular and intravenous lorazepam appear to be more effective than oral lorazepam in the treatment of catatonia. When using oral formulations, liquid formulations are easier to swallow than pills or tablets. In recent years in the USA, there have been shortages of oral lorazepam liquid formulations; even during periods of liquid lorazepam shortage, priority should be given to treating catatonia if the patient is too stuporous to take pills or tablets.

Table 6. New cases with benzodiazepine maintenance: 4 other patients who only took LOR

Medication and response	Duration
CHRONIC TOLERANCE	
Case 1: 55 yo AA ♂ with intellectual disability (Bilbily et al., 2017)	
Acute treatment oral LOR 1.5 mg/day Oral LOR has to be progressively ↑ 18 mg/day to avoid ↑ CK and symptoms ECT consultant determined the patient was not a candidate for ECT due to the risk of arrythmia Follow-up	1 year
BENZODIAZEPINES STOPPED DUE TO PREGNANCY	
Case 6: 21 yo C ♀ with changing diagnoses in each admission (last schizoaffective disorder)	
No benzodiazepines Discharged against medical advice with unresolved catatonia	14 days
Acute: oral (or IM if refused) LOR 4 mg/day Maintenance: ↓ to oral LOR 2 mg/day for discharge	42 days
Patient taking oral LOR 3 mg/day with no catatonic symptoms (adjustment disorder)	10 days
LOR stopped due to pregnancy but no catatonic symptoms	4 days
No benzodiazepines limited improvement of catatonia with ARI and CIT	12 days
No further admissions	
NON-ADHERENCE LED TO RELAPSE AND NEED FOR INDEFINITE MAINTENANCE	
Case 7: 29 yo C ♀ with changing diagnoses in each admission (last schizoaffective disorder)	
Acute: oral LOR 2 mg/day Maintenance: oral LOR 1 mg/day for discharge	19 days
After discharge from psychiatric hospital LOR was stopped due to pregnancy	
Post-partum relapse with catatonia Acute: oral LOR 4 mg once followed by oral LOR 6 mg/day Maintenance: ↓ to oral LOR 3 mg/day for discharge	72 days
Short admission following non-adherence with mild catatonic relapse Acute: oral LOR 3 mg/day and discharged on that dose	4 days
No further admissions	
LOR TAPER LED TO RELAPSE AND NEED FOR INDEFINITE MAINTENANCE	
Case 8: 29 yo C ♀ with changing diagnoses in each admission (last schizoaffective disorder)	
Acute: oral LOR 4 mg/day 1st relapse: oral LOR 4 mg/day tapered for 2 days and discontinued; relapse in 4 days Second acute trial: LOR restarted oral/IM to 6 mg/day for 29 days Maintenance: ↓ oral LOR 5 mg/day for 8 days and discharged on 4 mg/day	62 days
No further admissions	

AA: African-American; C: Caucasian; CLO: clonazepam; LOR: Lorazepam; yo: years of age

In reviewing our cases and previously published cases of successful lorazepam tapers, patients were often on their initial acute dose of lorazepam for 2-3 weeks or longer of good response and of a stabilized state. Future studies need to better define the time required for safe tapers after successful acute treatment of a catatonic episode. The taper can sometimes be associated with a protracted course, requiring months to prevent relapse and may be better done after discharge in an outpatient setting. If the treating clinician in the inpatient setting feels that converting lorazepam to clonazepam is indicated to facilitate outpatient treatment, we recommend a conversion of 1 mg of lorazepam to at least 0.5

mg of clonazepam. The patient should ideally be in remission while on twice-daily lorazepam prior to converting to clonazepam and a cross-taper should occur over the period of at least 1 week. If high doses of clonazepam (.>2 mg/day) are required it may be wise to use a twice- a-day administration of clonazepam to avoid extremely high doses in one administration. Moving from lorazepam three times a day to clonazepam twice a day reduces one administration and facilitates outpatient treatment. Moving from lorazepam twice a day to clonazepam twice a day still requires two administrations but it will facilitate the possibility of a successful future taper in the outpatient setting as clonazepam has a longer half-life.

Need for catatonia education

When a patient is discharged from a psychiatric hospital while taking very high doses of lorazepam or clonazepam, it is very important to educate the patient and family and the next managing clinicians on the need to continue these high doses in catatonia. Discontinuation through non-adherence or a decrease in dosage due to fear of high doses on the part of the outpatient prescriber may lead to a relapse in catatonia and the need for much higher benzodiazepine dosing.

Patients and family members should be counseled that medication non-adherence could result in a medication-refractory catatonic relapse. It is also important to notify the outpatient prescriber of the possible need for high doses of benzodiazepines and of any prior problems in tapering the dose. It may also be wise to recommend that only after several months of stability can a slow taper be considered by the outpatient provider. In our experience patients can relapse when the last 1-2 mg are tapered; thus, the outpatient provider may want to extend last doses by very slow titration using the minimum available doses every other day.

Limitations

This case series is limited by the small sample size of 9 patients, though the patients spanned 30 years of clinical experience; the series has attempted to briefly summarize months to years of maintenance treatment. These 30 years included 9 years managing a long-term unit for the severely mentally ill at one hospital and 21 years as a consultant at 7 hospitals (4 for patients with severe mental illness and 3 for patients with ID), so it is likely that he was not consulted for the less complicated catatonia cases. Since 2002, the senior author has reviewed all the deaths at these facilities and has found that pulmonary embolism in patients with catatonia is the main cause of preventable death in Kentucky psychiatric hospitals. Six deaths due to pulmonary embolism have been published (Puente et al., 2017) but until May of 2024, there have been 10 deaths due to pulmonary embolism in patients with catatonia. This has led to repeated catatonia lectures in these facilities.

Regarding the follow-up of the patients described, missing information about future unknown catatonic episodes is not likely, but it cannot be ruled out with absolute certainty that patients without known relapses had additional episodes of catatonia and presented to hospitals other than the state hospitals. The norm, facilitated for financial reasons, is that once a patient is admitted to the Kentucky state psychiatric hospital system, other hospitals, which are private hospitals, immediately divert these complicated patients to the state system for treatment. It is possible that some of the patients moved out of state, but this is also highly unlikely as Kentucky has a very stable population. This case series is limited to the experience of the senior author in using benzodiazepine maintenance when ECT was not available. Two catatonia scales, the Bush-Francis Catatonia Rating Scale (Bush et al., 1996) or the KANNER Scale (Carroll et al., 2008), were initially used in some of these cases by the senior author, but the treating clinicians did not consistently use these scales and only documented whether the patient recovered from the catatonic symptoms or not.

CONCLUSIONS

A few patients were identified in the literature who have continued benzodiazepines indefinitely for maintenance treatment of catatonia following failed attempts at tapering lorazepam. In this case series, patients who underwent cross-taper trials with clonazepam often required doses of clonazepam larger than initially expected. Benzodiazepine tapers should occur over weeks to months. Risk factors for relapse after acute treatment of catatonia with benzodiazepine remain unclear but sudden discontinuation by the prescriber or non-adherent patient is a definitive risk.

Patients who develop tolerance to lorazepam may require alternative therapies such as ECT or identification and treatment of the precipitating condition, such as clozapine withdrawal. However,

ECT may restore lorazepam's therapeutic effect. It is important to distinguish between benzodiazepine tolerance, in which increasingly larger doses are required to achieve the same effect, and what this paper terms benzodiazepine side effect desensitization, referring to the catatonic patients' ability to tolerate large doses of benzodiazepines without resultant sedation. There is no standard for duration of acute treatment following lysis of catatonia and the distinction between acute and maintenance treatment is ambiguous. These are important issues not addressed in this case series. Future research should also focus on identifying patients at risk for catatonic relapse when lorazepam is tapered, as currently the only clear risk factor appears to be rapid lorazepam taper or discontinuation. Recently Hirjak et al. (2022) have stressed the need for longitudinal studies to address the complexity of catatonia, while this literature review and case series stresses the complexity of and limited information regarding maintenance treatment of catatonia with benzodiazepines. Current information on benzodiazepine maintenance suggests that it is more an art than a science and different patients may need different benzodiazepine doses and may have different relapse risks. This indicates for the need for personalized approaches in each patient and the need to consider past responses in that specific patient and the risk of non-adherence (de Leon & De Las Cuevas, 2017).

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APPENDIX
RECOMMENDATIONS FOR PSYCHIATRIC HOSPITALS TO MANAGE CATATONIA (BASED ON EXPERIENCE IN KENTUCKY, USA)

ETIOLOGY

Try to rule out medical causes of catatonia, particularly when the patient has no prior episodes of catatonia associated with schizophrenia psychosis, psychotic mood disorders or intellectual disability.

MONITORING

The best way to monitor symptoms is to use the KANNER scale (Carroll et al., 2008), but it requires some training for raters.

Creatinine kinase (CK) levels can be used to follow catatonic symptoms (White et al., 2015), so you can measure CK several times a week to document that CK is decreasing as the treatment is working.

PROPHYLAXIS OF PULMONARY EMBOLISM (PE)

If the patient has been immobile for several days you need to consider pharmacological prophylaxis of venous thrombosis embolism (VTE) unless the risk of bleeding is high. Please be aware that since 2002 to 2024, we have identified 10 deaths in Kentucky state hospitals due to PE during catatonic episodes (the first 6 were described in an article by Puentes et al., 2017). Clinebell et al. (2014) recommended two options: 1) low-dose unfractionated heparin: heparin 5000 U subcutaneously: 2-3/day or low-molecular weight heparin: enoxaparin 20-30 mg subcutaneous: 2/day. You can use other options based on your internist's recommendations.

Measure plasma D-dimer levels as needed. Abnormal levels indicate the need to consider prophylaxis for VTE risk.

AVOID ANTIPSYCHOTICS AS MUCH AS POSSIBLE

Antipsychotics have been associated with risk of neuroleptic malignant syndrome (NMS) in patients with catatonia (Berardi et al., 1998; Caroff et al., 2024).

In some cases, there is need for antipsychotics during acute treatment, but it is usually better to try relieving the catatonic episode first, with benzodiazepines and/or electroconvulsive therapy (ECT), before considering antipsychotics. When an antipsychotic is needed, clozapine may be the best choice for patients with catatonia (Saini et al., 2024).

BENZODIAZEPINE TREATMENT

Lorazepam is superior to clonazepam in treating acute phase catatonia and perhaps in providing maintenance coverage as well, as patients do not always tolerate transitions from lorazepam to clonazepam and sometimes can become catatonic even while taking clonazepam.

Additionally, intramuscular (IM) and intravenous (IV) lorazepam appear to be more effective than oral lorazepam in the treatment of catatonia. Lorazepam liquid is easier to swallow than tablets; therefore, even during periods of liquid lorazepam shortage, priority should be given to treating catatonia with liquid formulations of lorazepam.

Determining effective IM dose at a state hospital where IV is not available

Double the dose each time until the IM dose leads to a return to baseline. If the patient has not received benzodiazepines (or similar sedating agents) the first injection may be 1 mg IM lorazepam, but for patients previously exposed, prior doses may provide orientation; starting with a 2 or 4 mg IM injection is reasonable.

After a response, the effective IM dose is given orally three times a day. Two examples are provided next:

- If a 2 mg IM dose clears the catatonia completely within 30 to 90 minutes, the psychiatrist needs to start 2 mg three times per day of oral lorazepam with the first dose given as soon as the patient is normal and can swallow.
- If an 8 mg IM dose clears the catatonia completely within 30 to 90 minutes, the psychiatrist needs to start 8 mg three times per day of oral lorazepam with the first dose given as soon as the patient is normal and can swallow.

Moving to maintenance

After several days of stability (1 week is better and 3 weeks is ideal), the psychiatrist should reduce oral lorazepam as slowly as possible. It is better to consider moving to two times per day first (in the example above, reduce from 8 mg three times per day to 8 mg twice per day). If the patient continues to do well and decreases can be given, then consider halving the doses (in this example from 8 mg twice per day to 4 mg twice per day), always monitoring for worsening. Once the patient is stable on lorazepam doses ≤ 4 mg/day administered in two divided doses and ready to be discharged, the treacherous conversion to clonazepam can be tried, but know that it is risky and consider that the clonazepam dose may be half the lorazepam dose. The positive side is that clonazepam is easier to very slowly taper in the community with lower risks due to its longer half-life. Assuming the patient is stable on 2 mg of lorazepam twice per day, a first dose can be switched to 1 mg of clonazepam and then the other dose.

The taper sometimes requires a protracted course, requiring months to prevent relapse. If the treating clinician feels that converting lorazepam to clonazepam is indicated to facilitate outpatient treatment; he/she may want to use a conversion of 1 mg of lorazepam to 0.5 mg of clonazepam. The patient should ideally be in a stable remission while on twice daily lorazepam prior to converting to clonazepam and a cross-taper should occur over the period of at least 1 week.

After discharge a slow taper can then be considered after months of stability, with particular caution advised as the last 1-2 mg are tapered. The outpatient psychiatrist may want to consider decreasing to 0.5 mg day for 1 week. Once the minimum dose available is reached (e.g., 0.5 mg) the outpatient psychiatrists may want to prescribe the minimum available dose every other day as long as there are no signs of relapse into catatonia. The last dose may be the most difficult to taper so be very vigilant one week after stopping it completely.

Patients and family members should be counseled that medication non-adherence during benzodiazepine maintenance could result in a medication-refractory catatonic relapse.

ECT

If the patient is not better after high doses of lorazepam IM for 2-3 days, ECT needs to be seriously considered due to the emergency nature of the situation. In patients who develop tolerance to lorazepam, ECT may restore lorazepam's therapeutic effect (Petrides et al., 1997).

A katatónia fenntartó terápiája benzodiazepinekkel: esetismertetés és irodalmi áttekintés

Bevezető: A benzodiazepinek (BZD), különösen a lorazepam, jó lehetőséget jelentenek a katatónia kezelésében. Ugyanakkor a katatóniával kapcsolatos szakirodalomban kevés adat áll rendelkezésre a BZD-k alkalmazására vonatkozóan a fenntartó kezelés során. **Módszerek:** Ez a tanulmány az Egyesült Államokbeli Kentucky állam (ahol az elektrokonvulzív terápia (ECT) kevésbé elérhető) 30 évnyi klinikai tapasztalatát tekinti át. Kilenc elhúzódó katatóniában szenvedő pácienst választottunk ki, akik fenntartó kezelésként BZD-t kaptak. **Eredmények:** Három esetben a lorazepamról clonazepamra váltottak, és ebből két esetben relapszus történt. Két esetben mind a lorazepam, mind a clonazepam egy idő után hatástalanná vált. Egy páciensnél periodikus katatónia diagnózisát véleményezték, az ő esetében a lorazepam fenntartó kezelés mellett ECT-t alkalmaztak. A másik páciensnél három alkalommal észleltek katatón epizódot a clozapin hirtelen megvonásának következményeként, ebben az esetben a clozapin visszaállítása enyhítette a tüneteket. Négy beteg kapott kizárólag lorazepamot fenntartó kezelésként, ebből két esetben adherenciacsökkenés mellett alakult ki relapszus, így ezekben az esetekben a lorazepamot emelték, de nem ismert, hogy ezt követően relabáltak-e. Az egyik betegnél a lorazepam kezdő dózisa 1,5mg/nap volt, de megfelelő terápiás választ csak 18mg/nap dózisnál sikerült elérni. A kilenc esetből négy esetben krónikus tolerancia miatt kellett emelni a gyógyszer dózisát, két esetben pedig hónapokig fennálltak a katatónia tünetei. **Konklúzió:** Egyes pácienseknél, amikor a BZD csökkentés nem jár sikerrel, a BZD-t fenntartó kezelés során is folytatni kell. A BZD kezelés hirtelen megszakítása után, vagy gyenge adherencia mellett a BZD elveszítheti effektivitását, dózisemelésre lehet szükség. A lorazepam és a clonazepam kereszttitrálása eredményes lehet, de kihívásokkal jár és relapszus lehet a következménye.

Kulcsszavak: benzodiazepinek/terápiás alkalmazás; benzodiazepinek/alkalmazás és dozirozás; katatónia; katatónia/gyógyszeres kezelés; clonazepam; lorazepam