

Auto-Brewery Syndrome (ABS) - A Rare Cause of Acute Alcohol Intoxication

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1. Background

Auto-Brewery Syndrome (ABS) is a rare condition caused by endogenous alcohol fermentation in the gut. Patients present with signs of alcohol intoxication, including staggering gait, slurred speech, gastrointestinal distress and confusion¹. ABS was first documented in Japan in 1972, when two patients developed symptoms of alcohol intoxication and altered mental status despite denying alcohol ingestion. Since then, fewer than 100 cases have been reported worldwide, although small-scale studies suggest its prevalence may be underestimated. It is theorized that ABS occurs when microorganisms capable of fermenting carbohydrates into alcohol overgrow the normal gut flora, leading to elevated blood ethanol levels sufficient to cause intoxication. The primary intestinal pathogens implicated are *Candida* and *Saccharomyces*².

included apixaban, carvedilol, tamsulosin, albuterol, sertraline, trazodone and gabapentin.

The patient reported falling out of bed while getting up to use the restroom. He denied loss of consciousness but was unable to recall further details. According to his wife, he had become more agitated and talkative the night before, consistent with previous ABS flare-ups.

On arrival, his vital signs included a blood pressure of 125/96 mmHg, a respiratory rate of 10 breaths per minute and an oxygen saturation of 98% on room air. He was not in acute distress but had superficial abrasions above his left eye and a chronic sacral ulcer. The auscultation of the lungs and heart was unremarkable. His mental status was at baseline. Laboratory results revealed an ethanol level of 195 mg/dL (reference: <10 mg/dL), despite the patient denying alcohol ingestion. He and his wife stated that his last alcoholic drink was nine months prior (**Table 1**). Other notable laboratory findings included a glucose level of 123 mg/dL (reference: 70-99 mg/dL), hemoglobin of 12.8 g/dL (reference: 13.3-17.5 g/dL) and a slightly elevated mean corpuscular volume (MCV) of 99 fL (reference: 80-98 fL). Prothrombin time (PT) and international normalized ratio (INR) were within normal limits. Two sets of troponins were negative. Thyroid-stimulating hormone (TSH), folate and vitamin B12 levels were unremarkable. The urine drug screen was positive

2. Case Report

A 70-year-old male with a past medical history significant for type II diabetes mellitus, atrial fibrillation status post Watchman device placement, alcohol use disorder, ulcerative colitis, left hip prosthetic joint infection with methicillin-sensitive *Staphylococcus epidermidis* (MSSE), benign prostatic hyperplasia, hypertension, asthma, Factor V Leiden with a history of deep vein thrombosis (DVT) and pulmonary embolism (PE), depression and a questionable history of ABS was admitted to the hospital following a ground-level fall. His home medications

for cannabinoids. A non-contrast computed tomography (CT) scan of the head showed no evidence of an intracranial process. A CT scan of the cervical spine confirmed normal alignment with no acute fractures.

Table 1: Labs during admission and 1 month later.

Lab Values	On Admission	1 month later	Reference
Ethanol	195	-	<19 mg/dL
Hemoglobin	12.8	13.1	13.3-17.5 g/dL
Hematocrit	38.5	40.8	38.7-55.1%
MCV	99	101	80-98 fL
MCH	32.9	32.4	26.7-33.6 pg
MCHC	33.2	32.1	31.7-36.3 g/dL
Platelets	231	195	150-420 x 10E9/L
TSH	0.854	-	0.350-4.940 uLU/mL
Folate	14.4	-	7-31.4 ng/mL
B12	827	-	213-816 pg/mL
PT	13.5	-	12.1-14.8 sec
INR	1.1	-	0.9-1.1
Glucose	123	92	70-99 mg/dL
Magnesium	1.6	-	1.6-2.6 mg/dL

Further chart review and history obtained from the patient's wife revealed a working diagnosis of ABS established four years prior after years of persistently elevated ethanol levels in the absence of known alcohol consumption. However, the patient had never undergone confirmatory testing. Stool cultures were unavailable for review, though a prior note mentioned a stool culture positive for yeast. The patient's wife described multiple discrete episodes of dizziness, disorientation, mood changes and tremors, which had responded variably over the years to fluconazole treatment. This year, the patient reported strict adherence to a low-carbohydrate diet but mentioned regularly consuming kombucha and a THC drink. He was observed overnight and prescribed fluconazole 100 mg daily for 10 days to treat his ABS exacerbation. He remained stable and was discharged the next morning with counseling on avoiding fermented foods, carbohydrates and alcohol. One month later, the patient followed up with Gastroenterology. Laboratory studies revealed slight macrocytosis (MCV 101), but liver enzymes were normal, with no evidence of liver disease. He was started on an empiric trial of fluconazole 100 mg daily for two weeks and advised to follow a high-protein, low-carbohydrate diet in the interim. Gamma-glutamyl transferase (GGT) and phosphatidylethanol (PETH) tests were ordered to rule out exogenous alcohol use but have yet to be collected. A colonoscopy is scheduled for later this year, with a repeat follow-up in six months. A safety plan was discussed in preparation for future episodes of altered mental status and the patient was counseled to abstain from driving.

3. Discussion

Auto-Brewery Syndrome (ABS) is a rare condition characterized by endogenous alcohol fermentation in the gut, presenting both diagnostic and therapeutic challenges for medical providers. Patients typically exhibit signs of acute alcohol intoxication but may also report neurological symptoms, loss of coordination and mood changes³. While an imbalance in the gut microbiome is the primary mechanism-allowing the overgrowth of fermenting microbes and rare bacteria-ABS may also be influenced by comorbid conditions such as diabetes,

liver disease, gut dysmotility disorders and inflammatory bowel disease⁴.

Diabetes and cirrhosis are thought to precipitate ABS episodes by increasing glucose levels (which are subsequently converted into ethanol) and decreasing hepatic ethanol metabolism. However, further studies are needed to elucidate these mechanisms. Our patient exhibited multiple risk factors, including diabetes mellitus, chronic antibiotic use (having been on doxycycline for four years following a left hip prosthetic joint infection with methicillin-sensitive *Staphylococcus epidermidis*) and ulcerative colitis.

Due to its rarity, ABS is often difficult to diagnose. However, clinicians should maintain a high index of suspicion in patients with unexplained elevated ethanol levels despite denying alcohol ingestion. A thorough history, including a detailed dietary history, is crucial, along with laboratory tests such as blood alcohol levels, drug screening and stool culture with sensitivity testing. Confirmatory testing involves a 24-hour observation period with a high-carbohydrate diet and subsequent measurement of blood or breath ethanol levels following a glucose challenge test³. This typically consists of a 200 g glucose challenge, with blood and breath alcohol concentrations measured at intervals of 0, ½, 1, 2, 4, 8, 16 and 24 hours³. Failure to diagnose ABS can result in significant harm, as evidenced by case reports in which patients were misdiagnosed as alcohol abusers, with some even undergoing psychiatric treatment for detoxification.

Acute management of ABS involves supportive care and targeted drug therapy based on culture and sensitivity results, with most patients requiring one or more courses of azole or polyene antifungal treatment³. Long-term management includes strict adherence to a low-carbohydrate, high-protein diet with minimal intake of simple and complex sugars⁵. Patients may also benefit from probiotic supplementation to restore gut microbiome balance; however, this approach has not been systematically studied. Fecal microbiota transplantation (FMT) is emerging as a potential treatment for ABS. A 2020 case report described successful management of chronic, relapsing ABS with FMT, suggesting a novel therapeutic approach for refractory cases⁶.

4. Conclusion

Auto-Brewery Syndrome is a rare clinical condition in which endogenous gut fermentation leads to inebriation. Clinicians should maintain a high degree of suspicion in patients with unexplained intoxication, particularly when blood ethanol levels are elevated despite alcohol abstinence. Treatment primarily involves antifungal therapy and dietary modifications, though emerging therapies such as probiotics and fecal microbiota transplantation warrant further investigation.

5. Conflicts of Interest

None.

6. References

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