Comprehensive Orthomolecular and Metabolic Approach to Treatment-Refractory Pediatric OCD: A Case Report with 9 Years of Follow-Up

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Abstract

Background: Pediatric acute-onset obsessive-compulsive disorder treatment may involve infectious, immunological, gastrointestinal, metabolic, and environmental aspects. Conventional psychiatric treatments like SSRIs and CBT are not always effective,necessitating exploration of metabolic and orthomolecular approaches for good outcomes.

Case Presentation: A 5-year-old male presented in 2017 with a sudden onset of irrational repetitive thoughts, anxiety, and anger outbursts unresponsive to conventional psychiatric treatment. An incidental improvement following antibiotic treatment with amoxicillin-clavulanic acid for a febrile illness prompted an extensive investigation. Assessments found gluten and dairy intolerance, D-lactate-producing gut bacteria in the gut (Organic Acid Testing by Mosaic Dx), Sleep apnea, elevated serum aluminium (20.80 µg/L), root canal-treated teeth with potential focal infection, and polymorphisms in MTHFR (heterozygous), GSTM1 (homozygous), and SOD2 (homozygous).

A comprehensive integrated protocol was implemented, including antimicrobial therapy; a gluten-free, casein-free diet; support (N-acetylcysteine, alpha-lipoic acid, L-carnitine, phosphatidylcholine); methylation and homocysteine pathway support (L-methylfolate, pyridoxine, IV glutathione, phosphatidylcholine); probiotics; CPAP therapy; and dental extraction of root canal-treated teeth.

Outcomes: Complete resolution of OCD, anxiety, and anger occurred within six months. His ADHD symptoms settled in 2 years. The patient has remained symptom-free for over eight years with excellent academic and extracurricular performance.

Conclusion: This case demonstrates the potential value of comprehensive integrative and metabolic evaluation and treatment for pediatric neuropsychiatric disorders refractory to other therapies.

Keywords: obsessive-compulsive disorder, PANS, PANDAS, orthomolecular medicine, clinical nutrigenomics, gastrointestinal-brain axis, methylation, mitochondrial support

Introduction

Obsessive-compulsive disorder (OCD) in children is characterised by intrusive, repetitive and irrational thoughts (obsessions) and ritualistic behaviours (compulsions), causing significant distress and functional impairment in kids (American Psychiatric Association, 2013). Standard treatments include cognitive-behavioural therapy (CBT) and selective serotonin reuptake inhibitors (SSRIs); however, a substantial subset of paediatric patients show inadequate treatment outcomes to these standard interventions (Marina Serrano-Ortiz, Blanca Llopis-Sánchez et al 2026).

The recognition of Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections (PANDAS) and Pediatric Acute-onset Neuropsychiatric Syndrome (PANS) has revealed the potential role of infectious and immune-mediated mechanisms in triggering sudden-onset OCD and related neuropsychiatric symptoms in children. (Swedo et al., 1998; Chang et al., 2015).

Paediatric neuropsychiatric presentations may arise from the interaction of multifactorial causes among infection, immune dysregulation, gut microbiome disturbances, nutritional deficiencies, toxic exposures, focal dental infections, and genetic susceptibility.

Orthomolecular medicine emphasises the therapeutic use of nutrients, vitamins, minerals, amino acids, and other naturally occurring substances to restore optimal biochemical function (Hoffer & Saul, 2008).

A metabolic and orthomolecular approach to managing underlying physiological imbalances—including gut dysbiosis, food intolerances, mitochondrial dysfunction, impaired methylation and detoxification, sleep-disordered breathing, and focal dental infections—may yield clinical improvements where typical treatments have failed.

This case report describes a young 5-6-year-old child with sudden-onset OCD, anxiety and anger refractory to conventional psychiatric treatment, whose symptoms resolved completely following comprehensive integrative and metabolic intervention. The patient has been followed for eight years without relapse.

Case Presentation

Patient Information

The patient was a 5-6-year-old male who presented in early 2017 with a sudden onset of obsessive-compulsive symptoms. Developmental milestones had been age-appropriate, though parents retrospectively noted mild attentional difficulties and behavioural irritability prior to the acute presentation.

Chief Complaints and History of Present Illness

The child developed abrupt-onset repetitive, intrusive thoughts and ritualistic behaviours over approximately one to two weeks.

Presenting symptoms included:

- Repetitive cleaning of hands, intrusive thoughts, and a need for excessive reassurance.
- Anxiety with significant distress with minor changes in routine.
- Sudden onset of frequent anger outbursts, irritability on minor issues,
- Behavioural patterns matching with attention-deficit/hyperactivity disorder (ADHD)

The sudden onset and severity of symptoms were distressing to the family and significantly impaired the child's daily functioning.

Past Medical and Dental History

- Two teeth had previously undergone **root canal treatment.**
- No significant medical history prior to symptom onset

enlarged adenoids and snoring while sleeping

The patient was evaluated by conventional psychiatric services and diagnosed with OCD. Treatment was initiated with:

- **Pharmacotherapy:** The child faced side effects from a low-dose SSRI, so the medication was discontinued. 5 mg hydroxyzine; his anxiety and repetitive thoughts were reduced to some extent, but he did not achieve remission.
- **Psychotherapy:** Cognitive-behavioral therapy (CBT)

Despite several months of treatment, **no meaningful clinical improvement** was observed.

Clinical Observation

During the course of conventional treatment, the child developed an **acute febrile illness**. He was treated with a 5-day course of **amoxicillin-clavulanic acid (Amoxyclav)**. Following antibiotic treatment:

- The fever resolved as expected in a few days.
- **Unexpectedly, the obsessive-compulsive symptoms also improved markedly.**

This striking temporal association between antibiotic therapy and neuropsychiatric improvement suggested a possible infectious or immune-mediated component to the child's condition and prompted a comprehensive integrative and metabolic evaluation.

Diagnostic Assessment

A thorough workup was undertaken to identify possible underlying contributors to the child's neuropsychiatric symptoms.

1. Food Intolerance Testing

IgG-mediated food intolerance panel showed significant reactivity to:

- **Gluten**
- **Dairy**

Food intolerances, particularly gluten sensitivity, have been associated with neuropsychiatric manifestations, including anxiety, depression, and psychosis-like psychiatric disorders. (Jackson et al., 2012).

2. Urinary organic acid testing **(Mosaic Dx Lab)**

Urinary organic acid testing showed elevated markers consistent with **D-lactate-producing bacterial overgrowth** in the gastrointestinal tract.

3. Sleep Study

Polysomnography confirmed central and obstructive **sleep apnea**. Pediatric sleep apnoea is associated with behavioural problems, inattention, hyperactivity, emotional dysregulation, and cognitive impairment (Marcus et al., 2012). Treatment of sleep apnea is necessary for addressing neuropsychiatric symptoms, along with the standard symptomatic approaches.

4. Toxic Element Assessment

- **Serum aluminum:** 20.80 µg/L (reference range typically <10 µg/L)

Heavy metal toxins, such as aluminium, are recognised as neurotoxins. Elevated heavy metal toxic burden has been associated with neuropsychiatric disorders,behavioural issues, and neurodegenerative disorders. (Heng YY, Asad I, Coleman B et al 2022).

5. Clinical Nutrigenomics

Clinical nutragenomics in his case showed MTHFR, GSTM1 and SOD2 polymorphisms:

MTHFR	Heterozygous	Reduced conversion of folate to methylfolate; impaired methylation capacity
GSTM1	Homozygous	reduced Phase II detoxification
SOD2	Homozygous	Altered mitochondrial antioxidant defense

These genetic variants are associated with impaired methylation, reduced detoxification capacity, and compromised antioxidant defence, which may enhance susceptibility to environmental toxins and metabolic stressors (Gilbody et al., 2007).

6. Dental Evaluation

The child had **two teeth with prior root canal treatment**. Root canal-treated teeth have been identified as potential sources of chronic focal infection, potentially harbouring anaerobic bacteria that may contribute to systemic inflammation and distant organ effects (Kulacz & Levy, 2014). Given the likely connection between focal dental infections and systemic/neurological symptoms, dental intervention was considered as part of the comprehensive treatment plan to restore cellular health.

Timeline of Key Events

Early 2017	Sudden onset of OCD, anxiety, and anger in a previously healthy 5-year-old male
Early-Mid 2017	Conventional psychiatric treatment initiated (hydroxyzine, CBT); mild reduction in symtoms only
Mid-Late 2017	Febrile illness treated with amoxicillin-clavulanic acid (5 days); unexpected improvement in OCD symptoms
Late 2017	Comprehensive orthomolecular and metabolic evaluation initiated
Late 2017	rifaximin initiated
Late 2017–Early 2018	Full orthomolecular and metabolic protocol implemented (diet, supplements, CPAP, dental extraction)
Mid 2018	Complete resolution of OCD, anxiety and anger,behaviors (6 months after protocol initiation)
2017–2026	Continued follow-up; no relapse; excellent academic and extracurricular functioning

Therapeutic Interventions

A comprehensive, multimodal orthomolecular and metabolic treatment protocol was implemented to address each identified contributing factor. The intervention was individualised based on the patient's clinical presentation, laboratory findings, and clinical nutrigenomic profile.

1. Antimicrobial Therapy

Rationale: The dramatic improvement following initial antibiotic treatment suggested an infectious or dysbiotic component.

Antibiotic treatment aims to treat potential gut bacterial overgrowth/chronic infection, helping reduce symptoms.

Amoxicillin-clavulanic acid (Amoxyclav)	5-day course; repeated once
Rifaximin 200 mg	2–3 months (discontinued after clinical stabilization)

2. Dietary Intervention

Rationale: To eliminate inflammatory foods and reduce intestinal and systemic Inflammation.

- **A strict gluten-free, casein-free (GFCF) diet** was implemented and maintained over the long term.

The gluten-free and casein-free, antiinflammatory, antioxidant-rich elimination diet has been associated with behavioural improvements in people with many neuropsychiatric conditions. (Whiteley et al., 2010).

3. Gastrointestinal Support

Rationale: To restore optimal gut microbiome , promote digestion, and reduce D-lactate-producing bacterial populations.

Probiotics	*Bacillus coagulans* (spore-forming probiotic
Digestive enzymes	To support nutrient absorption and reduce fermentation substrate
Rifaximin 200 mg	To treat gut dysbiosis

4. Mitochondrial Support

To support cellular energy production, address mitochondrial dysfunction.

N-acetylcysteine (NAC)	1,200 mg
Alpha-lipoic acid	100 mg
L-carnitine	500 mg
Magnesium	100mg

NAC serves as a glutathione precursor, which is particularly important given the patient's GSTM1 genotype and reduced detoxification capacity. NAC has also demonstrated efficacy in reducing OCD symptoms in clinical studies (Oliver et al., 2015). Alpha-lipoic acid provides mitochondrial antioxidant support and assists in heavy metal chelation. L-carnitine supports mitochondrial fatty acid transport and energy production.	1200mg

5. Methylation Pathway Support

Rationale: To compensate for MTHFR heterozygosity and support methylation-dependent neurotransmitter formation, detoxification, and cellular function.

L-methylfolate	2.5 mg
Pyridoxine (Vitamin B6)	20 mg
IV Glutathione	Once weekly (initial phase)
Phosphatidylcholine	1,000 mg

6. Micronutrient Support

Zinc	10 mg

Zinc deficiency has been associated with behavioural and mood disturbances in children (Cope & Bhagwagar, 2019).

7. Sleep Apnoea Management

Rationale: To address sleep apnea and its contribution to behavioral and cognitive symptoms.

- **CPAP (Continuous Positive Airway Pressure)** therapy was initiated and maintained

Treatment of pediatric OSA can produce considerable improvements in attention, behaviour, affect regulation, and psychiatric symptoms. (Marcus et al., 2012).

8. Dental Intervention

Rationale: To eliminate potential focal infection from root canal-treated teeth, which may harbour chronic bacterial populations causing systemic Inflammation.

- **Extraction of two root canal-treated teeth**
- A**ligners** are used to align teeth.

The concept of focal infection from dental sources, particularly root canal-treated teeth, has a historical basis and has experienced renewed interest in integrative dentistry (Kulacz & Levy, 2014). Despite being controversial in mainstream dentistry, the removal of these teeth was undertaken as part of the complete approach to eliminate potential sources of chronic infection.

Summary of Complete Treatment Protocol

Antimicrobial	Amoxyclav (5 days); Rifaximin (2–3 months)
Diet	Strict gluten-free, casein-free diet
Gut support	*Bacillus coagulans* probiotic; Digestive enzymes
Mitochondrial support	NAC 1,200 mg; Alpha-lipoic acid 100 mg; L-carnitine 500 mg; Magnesium
Methylation support	L-methylfolate 2.5 mg; Pyridoxine 20 mg; IV Glutathione (weekly, initial); Phosphatidylcholine 1,000 mg
Micronutrients	Zinc 10 mg
Sleep apnea	CPAP therapy
Dental	Extraction of 2 root canal-treated teeth; Aligners

Follow-Up and Outcomes

Short-Term Outcomes (0–6 Months)

Within **six months** of initiating the comprehensive orthomolecular protocol, the patient demonstrated:

- **Complete resolution of obsessive-compulsive symptoms**
- **Resolution of anxiety**
- **Resolution of anger and irritability**
- **Considerable improvement in attention and hyperactivity** in 2 years. (ADHD-type behaviours resolved)

The child's functional status returned to normal, with restoration of age-appropriate behaviour and affective regulation.

Long-Term Outcomes

The patient has been followed for **nine years** (2017–2026). During this period:

- **No relapse** of OCD, anxiety, anger, or ADHD symptoms has occurred.
- The patient is performing exceptionally well academically**.**
- The patient actively participates in and successfully completes **extracurricular activities.**

- Periodic nutritional supplementation based on the nutrigenomic profile is continued.
- CPAP therapy for sleep apnea is given for 6 months.

The sustained remission over 9 years without relapse is a notable outcome of this case.

Discussion

This case illustrates several core principles relevant to orthomolecular and metabolic medicine in pediatric neuropsychiatric disorders.

The Infection–Immune–Brain Connection

The dramatic improvement in OCD symptoms following antibiotic treatment for a febrile illness and subsequent sustained improvement with rifaximin suggests an underlying infectious aetiology of acute-onset childhood OCD. This is consistent with the literature on PANDAS and PANS, wherein infections trigger autoimmune responses affecting the basal ganglia along with related brain structures, producing sudden-onset OCD, tics, anxiety, and behavioural regression (Swedo et al., 1998; Frankovich et al., 2015). The response to amoxicillin-clavulanic acid—a broad-spectrum antibiotic —supports the possibility of an infectious cause for the acute onset of OCD.

Gut–Brain Axis

The identification of D-lactate-producing bacterial overgrowth confirms the importance of the gut–brain axis in neuropsychiatric illness. D-lactic acid, produced by certain gut bacteria, can cross the blood–brain barrier and produce neurological symptoms. The selection of *Bacillus coagulans* as a probiotic was strategic because it does not produce D-lactate and may help restore a healthy gut ecology. The improvement with rifaximin further supports the role of dysbiosis in this child's presentation.

Gut health ecosystem and gut microbiome have been implicated in a range of mental health disorders like anxiety, depression, psychosis, OCD, and other psychiatric disorders. (Dinan & Cryan, 2017).

Food Intolerances and Neuroinflammation

Gluten and dairy sensitivity can contribute to systemic and neuroinflammation, likely affecting brain function. The strict gluten-free and casein-free diet likely reduced inflammation , helping to achieve clinical improvement.

Mitochondrial Dysfunction and Oxidative Stress

The comprehensive mitochondrial support protocol—including NAC, alpha-lipoic acid, and L-carnitine—addressed potential mitochondrial dysfunction and oxidative stress. N-acetylcysteine(NAC), in particular, has demonstrated usefulness in obsessive-compulsive disorders and related psychiatric conditions, possibly through glutamatergic modulation and glutathione replenishment (Oliver et al., 2015).

Methylation and Nutrigenomics

The patient's MTHFR heterozygosity warranted methylation support with L-methylfolate and pyridoxine. Impaired methylation can modify neurotransmitter production(dopamine, serotonin, norepinephrine), detoxification, and DNA repair (Gilbody et al., 2007). The GSTM1 null genotype—resulting in the absence of glutathione S-transferase activity—

compromises Phase II detoxification and increases vulnerability to oxidative stress and environmental toxins (Pejovic-Milovancevic MM, 2016). IV glutathione and NAC supplementation compensated for this genetic limitation. Phosphatidylcholine provided additional methylation support through choline.

This case demonstrates the nutrigenomic principle of targeted nutritional intervention to compensate for genetic polymorphisms that affect metabolic pathways.

Toxic Burden and Aluminum

The elevated serum aluminium in this child raised concern for neurotoxic outcomes. Aluminium is a known neurotoxin associated with cognitive and behavioural dysfunction (Exley, 2014). The detoxification support provided—including glutathione, NAC, and alpha-lipoic acid—has facilitated aluminium clearance.

Sleep Apnea

Pediatric obstructive sleep apnea is an underrecognized contributor to behavioural, attentional, and emotional problems.

CPAP therapy addressed this factor, likely improving sleep quality and reducing the inflammatory burden of chronic hypoxia (Marcus et al., 2012).

Dental Focal Infections and Mental Health

The extraction of root canal-treated teeth represents a controversial but potentially important intervention. The theory of focal infection suggests that chronic dental infections may contribute to systemic illness, including neurological and psychiatric symptoms (Kulacz & Levy, 2014).

Comprehensive Orthomolecular and Metabolic Medicine Framework

This case points out the value of a comprehensive, systems-based approach to pediatric neuropsychiatric illness. Rather than viewing OCD as solely a brain-based disorder requiring pharmacological modulation of neurotransmitters, the orthomolecular perspective considers the patient holistically—including gut health, immune function, nutritional status, toxic burden, sleep, genetic predisposition, and dental health. Dealing with these multiple domains produced sustained clinical improvement where typical treatment had failed.

Limitations

This is a single case report, and the findings cannot be generalised without further research. The dramatic and sustained improvement may have resulted from the synergistic effect of addressing multiple contributing factors. Nevertheless, the sustained resolution of symptoms over 8-9 years suggests that the orthomolecular and metabolic approach was beneficial for the child.

Conclusion

This case report discusses an orthomolecular and metabolic treatment plan for a child with sudden-onset obsessive-compulsive behaviour, anxiety, anger, and ADHD behaviours refractory to conventional psychiatric treatment, who experienced complete and sustained resolution of all symptoms following comprehensive orthomolecular and metabolic intervention.

A multimodal protocol including antimicrobial therapy, elimination diet, gut restoration, mitochondrial and methylation support, CPAP therapy, and dental extraction comprehensively resulted in the resolution of acute psychiatric symptoms within

6 months. Though he initially responded to antimicrobials and mitochondrial support. The patient has remained symptom-free for 9 years and is doing well academically.

This case supports the potential value of an orthomolecular and metabolic approach in pediatric neuropsychiatric disorders, particularly when conventional treatments have failed. It highlights the importance of investigating and addressing multiple underlying physiological causes rather than focusing solely on symptom suppression.

More research is necessary to evaluate the efficacy of those multimodal comprehensive interventions in childhood-onset acute psychiatric disorders.

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