Received: 14 February 2024 | Accepted: 12 September 2024

DOI: 10.1002/jpr3.12158

CASE REPORT

Gastroenterology

Chronic atrial and intestinal dysrhythmia: A rare genetic disorder of intestinal pseudo-obstruction

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Funding information
None

Abstract

Pediatric intestinal pseudo-obstruction (PIPO) is a rare and severe disorder of gastrointestinal (GI) motility; patients with PIPO display signs and symptoms of intestinal obstruction in the absence of occluding lesions. Chronic atrial and intestinal dysrhythmia (CAID) syndrome is an exceedingly rare autosomal recessive disorder caused by mutations in the SGO1 gene; SGO1 mutations disrupt the cohesin complex, a protein involved in chromosome organization during cell division and hence, DNA stability. CAID leads to both GI and cardiac dysfunction. This case report highlights an exceptional instance of early-onset pediatric CAID marked by recurrent pseudo-obstruction and, notably, developmental delay, which has not been previously described. The case emphasizes the importance of genetic evaluation in pediatric patients with unexplained pseudo-obstruction, and the importance of multidisciplinary management.

KEYWORDS

cohesinopathy, intestinal dysmotility, intestinal obstruction, SGO1 gene

1 | INTRODUCTION

Chronic atrial and intestinal dysrhythmia (CAID) syndrome is a rare genetic disease that causes pediatric intestinal pseudo-obstruction (PIPO), often leading to intestinal failure and transplantation. CAID is also associated with sick sinus syndrome.[1] CAID is a cohesinopathy caused by a mutation in SGO1, which is a cohesin complex modulator involved in DNA stabilization; patients who are homozygous carriers of SG01 develop failure of their pacemaker cells, affecting the sinoatrial node in the heart, and the interstitial network of Cajal in the gut.[2] Defective pacemaker cells in each organ system lead to the clinical phenotype observed in CAID. The prevalence of CAID is unknown as it is a very rare disease. To date, 17 affected individuals have been described in the medical literature. We present a case of pediatric CAID who presented with recurrent vomiting in infancy, and ultimately, recurrent pseudo-obstruction.

2 | CASE PRESENTATION

A 6-month-old male infant, with a history of prematurity of 31 weeks and developmental delay (DD) presented with a chief complaint of nonbilious vomiting. Throughout infancy, he was treated for gastroesophageal reflux disease. A modified barium swallow study revealed mild oropharyngeal dysphagia without signs of aspiration or penetration. He had chronic emesis throughout the

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first year of life despite antacid therapy, thickened feedings, and trials of various regular and hypoallergenic formulas. At age of 2, he was admitted to the hospital with vomiting, diarrhea, and failure to thrive. He briefly required nasogastric tube (NGT) feedings which were gradually transitioned to full oral feedings, with improved weight gain. He continued to have intermittent vomiting at home but was tolerating oral feeds and slowly gaining weight.

The patient was admitted to the hospital multiple times between the ages of 3 and 4, for ongoing chronic vomiting, often associated with dehydration. His symptoms were attributed to gastroenteritis and viral infection on more than one occasion; during one admission, his dilated loops of small bowel seen on radiograph were attributed to viral-induced ileus. He had an extensive workup during those admissions, the patient underwent an esophagogastroduodenoscopy, which was unrevealing. He had multiple ultrasounds of abdomen, which were noncontributory. He had persistent small bowel dilation visualized on repeated radiographs; a computed tomography scan was performed that revealed markedly dilated loops of bowel and no mechanical obstruction, consistent with pseudo-obstruction (Figure 1). An upper gastrointestinal (GI) series with small bowel follow-through showed dilated small bowel loops measuring up to 4 cm, with normal passage of contrast to the cecum; a barium enema revealed a normal-appearing colon, without an identifiable transition zone (Figure 2). Symptoms were managed with bowel rest, administration of intravenous fluids (IVFs), and NGT decompression. Additionally, the patient received short courses of peripheral parenteral nutrition when hospitalized.

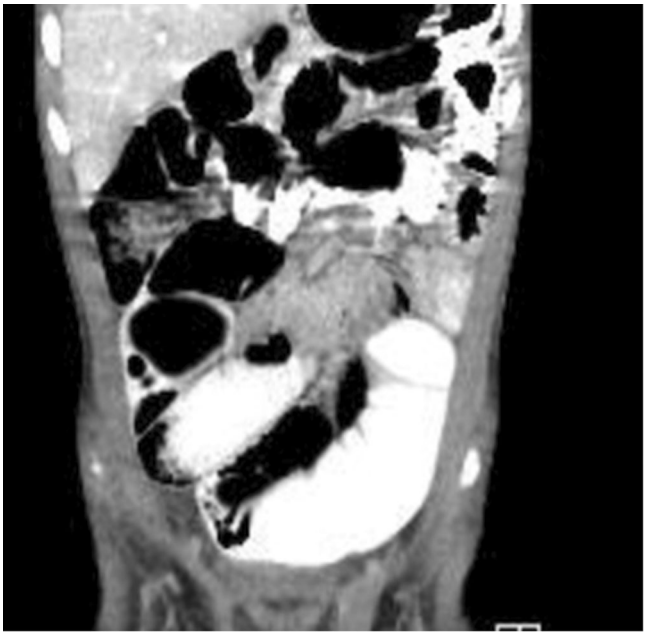

FIGURE 1 CT scan with dilation of jejunal small bowel loops without transition point.

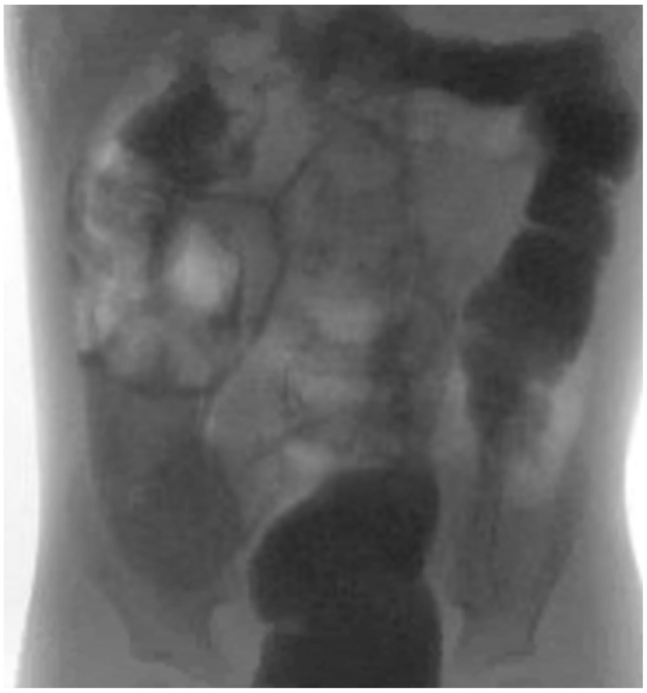

FIGURE 2 Barium enema with normal appearing colon without transition zone.

The patient had a prolonged admission for PIPO at age of 4, requiring bowel rest, IVFs, and NGT decompression; ultimately, a peripherally inserted central catheter (PICC) line was placed, and total parenteral nutrition (TPN) was started due to an inability to tolerate adequate enteral nutrition. He received trials of promotility agents, such as metoclopramide and erythromycin, that did not impact his tolerance of feeding or abdominal distention; antibiotics for presumed small intestinal bacterial overgrowth (cycled amoxicillin-clavulanic acid, metronidazole, ciprofloxacin, and rifaximin) also did not significantly impact his symptoms. He was discharged on TPN and trophic feedings.

After he became TPN-dependent, the patient was referred to a center with Neurogastroenterology; antroduodenal manometry revealed an absence of migrating motor complex Phase III during the fasting period and after the erythromycin challenge (Figure 3). He was also referred to medical genetics for his recurrent PIPO, DDs, and dysmorphic features. A single-nucleotide polymorphism microarray and whole-exome sequencing (WES) were performed. The microarray was negative but showed 381 Mb regions of homozygosity (13.22%). A WES revealed a homozygous pathogenic variant in the SGO1 gene called c.67 A>G (p. K23E), previously identified in some individuals with CAID. Of note, there was no history of consanguinity. Subsequently, the patient was referred to cardiology and has had a normal work up to date, including echocardiogram, electrocardiography, and Holter monitoring.

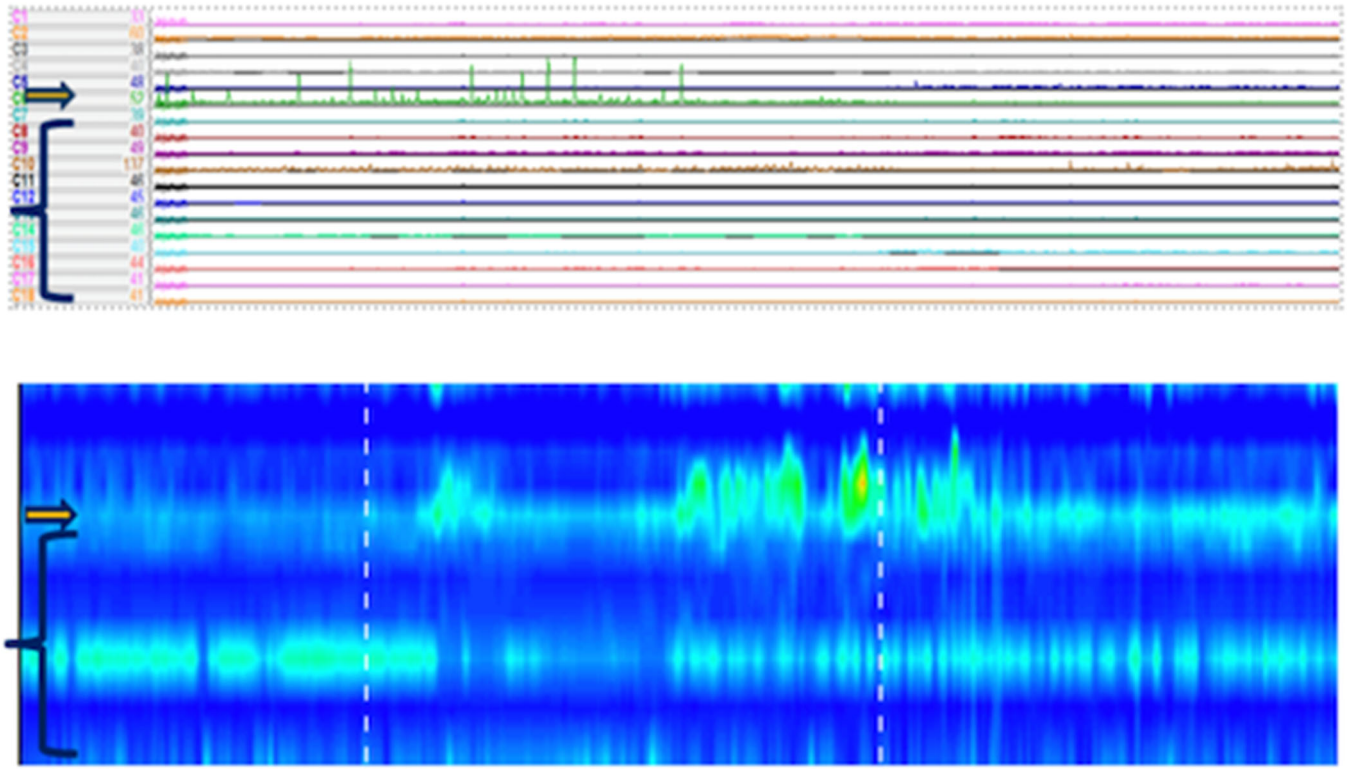

FIGURE 3 Fasting antroduodenal manometry tracing with notable absence of mirgrating motor complex (MMC phase III). Arrow points to the antrum. Bracket defines the duodenum.

Ongoing management at home includes TPN and a small enteral feedings by mouth with excellent growth. He is on antibiotic lock therapy for the PICC line. He has also had an evaluation for a small bowel transplant at a pediatric transplant center and is followed by the transplant team regularly. Furthermore, due to the risk of sick sinus syndrome, he is seen by cardiology for annual monitoring.

3 | DISCUSSION

CAID is a rare genetic condition known for its distinctive impact on heart and GI rhythms.[3] It follows an autosomal recessive inheritance pattern, necessitating the inheritance of two altered SGO1 gene copies, one from each parent, for the condition to manifest. CAID syndrome is classified among the cohesinopathies, a group of disorders resulting from alterations in different parts of the cohesin complex. This complex serves as a conductor, ensuring the precise organization of chromosomes during cell division; noncohesion-related functions of the cohesin complex have also been suggested in CAID pathogenesis.[2] A full understanding of the disease mechanism and pathway is not entirely clear. Given the rarity of CAID, the prevalence of disease is unknown, and clinical case reports are limited, particularly in the pediatric literature.

Our patient's WES results suggest that mutant SGO1 is pathogenic in pediatric CAID. Genetic counseling was provided to the family at diagnosis, and future prenatal testing for additional pregnancies was recommended. Subsequently, the mother of our patient had a one-term pregnancy, but two other pregnancies were terminated after chorionic villus sampling revealed an autosomal recessive mutation of the SGO1 gene. This outcome highlights the importance of genetic testing in pediatric patients with recurrent pseudo-obstruction as it may affect future pregnancies. CAID patients are not known to have intellectual or growth retardation; however, our patient's DD and facial dysmorphia may be part of a variable clinical phenotype. He was also premature which may be contributory. In conclusion, the management of pediatric patients with CAID requires a multidisciplinary team to address genetic, cardiac, and GI concerns. Ultimately, pacemaker implantation, parenteral nutrition, and intestinal transplantation may be life-saving.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

ETHICS STATEMENT

Verbal consent was obtained from the mother (as the patient is a minor) that this case will appear/be published in a journal. Discussed the content details with

her. She expressed understanding and consented for the case report to be published.

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REFERENCES

1. Piché J, Gosset N, Legault LM, et al. Molecular signature of CAID syndrome: noncanonical roles of SGO1 in regulation of TGF-β signaling and epigenomics. *Cell Mol Gastroenterol Hepatol*. 2019;7(2):411-431. doi:10.1016/j.jcmgh.2018.10.011
2. Piché J, Van Vliet PP, Pucéat M, Andelfinger G. The expanding phenotypes of cohesinopathies: one ring to rule them all!. *Cell Cycle*. 2019;18(21):2828-2848. doi:10.1080/15384101.2019.1658476
3. Chetaille P, Preuss C, Burkhard S, et al. Mutations in SGOL1 cause a novel cohesinopathy affecting heart and gut rhythm. *Nat Genet*. 2014;46(11):1245-1249. doi:10.1038/ng.3113

How to cite this article: Ahuja K, Pathania S, Baron N, Khlevner J, Bialer M, Mait-Kaufman J. Chronic atrial and intestinal dysrhythmia: A rare genetic disorder of intestinal pseudo-obstruction. *JPGN Rep*. 2025;6:162-165. doi:10.1002/jpr3.12158