

Neuro-reproductive Malformations and Hypogonadism in a Young Adult with Type 1 Diabetes: A Case Report of Partial Dysgenesis of the Corpus Callosum

YUGANSHU TIRTHARAJ BISEN¹, ARUSH PAREEK²

 CC BY-NC-ND

ABSTRACT

The coexistence of partial dysgenesis of the corpus callosum, reproductive tract anomalies, and endocrine disorders in the patient presents unique diagnostic and management challenges. This case report contributes to the limited literature on complex multisystem presentations that require coordinated multidisciplinary care. This case is about a phenotypically female patient who presented to the Department of General Medicine with chief complaints of poorly controlled Type 1 Diabetes Mellitus (diagnosed eight years ago) and acute systemic symptoms, which included fever, non-bilious vomiting (2-3 episodes), decreased appetite for three days, and a history of primary amenorrhoea that had never been previously evaluated. Patient's vitals were normal except for a temperature of 101°F. Physical examination revealed dysmorphic facies, with hypertelorism, rudimentary breast, a left-sided unilateral complete cleft lip and a unilateral cleft palate. Neurological assessment indicated global developmental delay with a clinically estimated IQ of 70, while bedside olfactory testing with standard odours (coffee, peppermint) confirmed normal olfaction. A detailed genital examination revealed a normal vaginal canal. Pelvic ultrasonography identified a rudimentary uterus. Neuroimaging demonstrated partial corpus callosum dysgenesis, in which the rostrum, genu, and body were not seen. The patient responded favourably to supportive care, including intravenous fluids, antiemetics, empiric antibiotics, and a basal-bolus insulin regimen, achieving clinical improvement. Genetic testing was initiated to evaluate this complex presentation comprehensively. The patient's chromosomes were 46, XX. The patient was then referred to higher centres for hormone replacement therapy. This case underscores the necessity of investigating “silent” neurological and reproductive anomalies in adolescents with uncontrolled metabolic disease and developmental delay. It highlights a multidisciplinary approach involving endocrinology, neurology, and gynaecology to address the multifaceted health needs of these patients.

Keywords: Amenorrhoea, Cleft lip, Hypertelorism, Mayer-rokitansky-küster-hauser syndrome, Medicine, Radiology

CASE REPORT

A phenotypically female 26-year-old patient presented to the Department of General Medicine with chief complaints of fever, non-bilious vomiting (2-3 episodes), decreased appetite for three days, and a history of amenorrhoea. The patient's fever was insidious in onset, continuous, and relieved on medication. The patient had a history of type 1 diabetes mellitus (diagnosed 8 years ago) on irregular treatment with a random blood sugar of 245 mg/dL. The patient's relative gave a history that the patient never had menstruation before, and it had also never been evaluated for the same, i.e., primary amenorrhoea. Family history was not significant, with no consanguineous marriages or diabetes. The patient cried immediately after the birth.

The patient was admitted to the medicine ward. On admission, the patient's vitals were stable, except for a higher body temperature of 101°F; general examination revealed developmental delay and a low Intellectual Quotient (IQ). Global developmental delay was retrospectively established based on a detailed parental history of delayed milestones, including the patient not walking until age three and delayed speech acquisition. The patient's IQ was formally assessed by the department of paediatrics using the Wechsler Adult Intelligence Scale, yielding an IQ of 70 [1]. The patient also had hypertelorism facies, a left-sided unilateral complete cleft lip, and a complete cleft palate involving both the hard and soft palate. No anosmia was detected by bedside olfactory testing with standard odours (coffee, peppermint), effectively ruling out anosmia. Visual acuity and fields were clinically normal, extraocular movements were full without nystagmus, and pupillary reflexes were preserved.

There were no signs of facial asymmetry, hearing loss, or lower cranial nerve palsies. Motor system examination showed normal muscle bulk, tone, and Grade 5/5 power in all extremities. Sensory modalities, including crude touch, pain, temperature, vibration, and proprioception, were intact bilaterally. Deep tendon reflexes were normal with bilateral flexor plantar responses. Cerebellar signs were absent, and there were no signs of meningeal irritation. Sexual Maturity Rating (SMR) was consistent with Tanner Stage II for breast development. Other systemic examination findings were normal. An obstetrics and gynaecology opinion was obtained to rule out anatomical defects, such as an imperforate hymen and cryptomenorrhea. A detailed genital examination revealed normal external genitalia. Laboratory studies showed severely elevated HbA1c of 10.6% (reference range: 4.0-5.9%) and average estimated glucose of 257.5 mg/dL (reference range: 90-120 mg/dL). Other laboratory levels included a normal advanced thyroid profile, FSH, and LH, with estrogen levels below those of normal men. Karyotyping was performed using G-banding (Giemsa staining), which was suggestive of a 46, XX karyotype. Initial laboratory investigations were shown in [Table/Fig-1].

Parameter	Patient value	Reference range
Haemoglobin A1c (HbA1c)	10.6%	4.0-5.9%
Random blood glucose (admission)	257.5 mg/dL	<140 mg/dL
Fasting blood glucose (day 2)	145 mg/dL	70-100 mg/dL
Follicle Stimulating Hormone (FSH)	0.300	3.5-12.5 mIU/mL
Luteinising Hormone (LH)	0.100	2.4-12.6 mIU/mL

LHX1 is also expressed in the anterior neural plate and is required for the guidance of midline-crossing commissural axons; thus, its loss provides a specific embryological mechanism to explain the partial dysgenesis of the corpus callosum observed in this patient [7,8]. This rare triad of endocrine, reproductive, and neurological deficits strongly supports a diagnosis of a 17q12 microdeletion, necessitating a shift in management to include renal surveillance and genetic counseling for potential MODY5 rather than classic autoimmune diabetes [9].

The constellation of partially dysgenetic corpus callosum, rudimentary uterus, and type I diabetes mellitus represents a unique presentation, with limited medical literature availability. Partial dysgenesis of the corpus callosum can occur in isolation or as a part of a syndromic presentation with associated anomalies reported in 39.6% to 86.5% of cases at birth [10]. MRKH syndrome affects reproductive tract development during embryogenesis and is classified into type I (Isolated) and type II (with associated anomalies). Type II contributes to approximately 43.5% of cases [11]. Type I diabetes mellitus in adolescent individuals presents typical management challenges due to increasing insulin resistance by 30-50% during puberty, thereby disrupting glycaemic control, which can cause growth failure and retard pubertal progression also [12]. The multidisciplinary model used in this case is supported by the current evidence-based literature for managing complex disorders in such age groups.

CONCLUSION(S)

This case report is presented to highlight the diagnostic and therapeutic challenges encountered in a patient with an unusual constellation of findings. The authors emphasise that the clinical presentation extends beyond what is currently described in the literature and underscore the importance of incorporating neurological evaluation in cases of primary amenorrhoea, a consideration frequently overlooked in routine practice. To the best of current knowledge, this may represent the first reported case describing the co-existence of partial corpus callosum agenesis,

primary amenorrhoea with abnormal laboratory parameters, a uterine anomaly, and Type 1 diabetes mellitus.

REFERENCES

- [1] Koriakin TA, McCurdy MD, Papazoglou A, Pritchard AE, Zabel TA, Mahone EM, et al. Classification of intellectual disability using the Wechsler Intelligence Scale for Children: Full scale IQ or general abilities index? *Dev Med Child Neurol*. 2013;55(9):840-45. Doi: 10.1111/dmcn.12201.
- [2] Reyes-Muñoz E, Vitale SG, Alvarado-Rosales D, Ilyune-Cojab E, Vitagliano A, Lohmeyer FM, et al. Müllerian anomalies prevalence diagnosed by hysteroscopy and laparoscopy in Mexican infertile women: Results from a cohort study. *Diagnostics (Basel)*. 2019;9(4):149. Doi: 10.3390/diagnostics9040149.
- [3] Khadilkar A, Oza C, Mondkar SA. Insulin resistance in adolescents and youth with type 1 diabetes: A review of problems and solutions. *Clin Pediatr Endocrinol*. 2023;32(1):49-59. Doi: 10.1177/11795514231206730.
- [4] Morcel K, Camborieux L, Guerrier D. Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome. *Orphanet J Rare Dis*. 2007;2:13. Doi: 10.1186/1750-1172-2-13.
- [5] Lasileiou G, Hoyer J, Thiel CT, Schaefer J, Zapke M, Krumbiegel M, et al. Prenatal diagnosis of HNF1B-associated renal cysts: Is there a need to differentiate intragenic variants from 17q12 microdeletion syndrome? *Prenat Diagn*. 2019;39:1136-47. Doi: 10.1002/pd.5556.
- [6] Clissold RL, Hamilton AJ, Hattersley AT, Ellard S, Bingham C. HNF1B-associated renal and extra-renal disease: An expanding clinical spectrum. *Nat Rev Nephrol*. 2015;11:102-12. Doi: 10.1038/nrneph.2014.239.
- [7] Ledig S, Schippert C, Strick R, Beckmann MW, Oppelt PG, Wieacker P. Recurrent aberrations identified by array-CGH in patients with Mayer-Rokitansky-Küster-Hauser syndrome. *Fertil Steril*. 2011;95:1589-94. Doi: 10.1016/j.fertnstert.2010.07.1062.
- [8] Hobert O, Westphal H. Functions of LIM-homeobox genes. *Trends Genet*. 2000;16:75-83. Doi: 10.1016/s0168-9525(99)01883-1.
- [9] Mitchel MW, Moreno-De-Luca D, Myers SM, Levy RV, Turner S, Ledbetter DH, et al. 17q12 recurrent deletion syndrome. In: Adam MP, Bick S, Mirzaa GM, Pagon RA, Wallace SE, Amemiya A, editors. *GeneReviews* [Internet]. Seattle (WA): University of Washington; 1993-2026 [updated 2025 Aug 14; cited 2026 Feb 4]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK401562/>.
- [10] Herlin MK, Petersen MB, Brännström M. Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome: A comprehensive update. *Orphanet J Rare Dis*. 2020;15:214. Doi: 10.1186/s13023-020-01491-9.
- [11] Ledig S, Wieacker P. Clinical and genetic aspects of Mayer-Rokitansky-Küster-Hauser syndrome. *Med Genet*. 2018;30(1):03-11. Doi: 10.1007/s11825-018-0173-7.
- [12] Amiel SA, Sherwin RS, Simonson DC, Lauritano AA, Tamborlane WV. Impaired insulin action in puberty: A contributing factor to poor glycemic control in adolescents with diabetes. *N Engl J Med*. 1986;315(4):215-19. Doi: 10.1056/NEJM198607243150402.

PARTICULARS OF CONTRIBUTORS:

1. DNB Medicine Resident PGY1, Department of General Medicine, Jai Prakash Hospital and Research Centre, Dayanand Nagar, Rourkela, Odisha, India.
2. DNB Radiology Resident PGY1, Department of Radiology, Jai Prakash Hospital and Research Centre, Dayanand Nagar, Rourkela, Odisha, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Yuganshu Tirtharaj Bisen,
DNB Radiology Resident PGY1, Department of Radiology, Jai Prakash Hospital
and Research Centre, Dayanand Nagar, Rourkela-769004, Odisha, India.
E-mail: bisenyuganshu1234@gmail.com

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jan 07, 2026
- Manual Googling: Feb 12, 2026
- iThenticate Software: Feb 14, 2026 (1%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

Date of Submission: Dec 18, 2025

Date of Peer Review: Jan 20, 2026

Date of Acceptance: Feb 16, 2026

Date of Publishing: Jun 01, 2026