

## Case Report

### **Agensis of the Corpus Callosum with Rare Dymorphic Features**

Chowdareddy N., Anil Kumar Y.C.\*, Chandrashekar, B. Ravi Chander

Department of Pediatrics, MVJ Medical College, Bangalore, India -562114

#### **Corresponding author**

Anil Kumar YC

Email: [anil\\_yc@yahoo.com](mailto:anil_yc@yahoo.com)

**Abstract:** Agensis of corpus callosum is a common congenital or developmental malformation of brain. This is a case report of 13 year old female presented with delayed milestones, mental retardation, refractory hypertension and pallor since childhood. She had dymorphic facies in the form of thick eyebrows, hypertelorism, low anterior hairline, hirsutism, broad nose, thickened lips and low set ears. Upper limbs examination revealed brachydactyly and prominent finger pads. Lower limbs showed hyperkeratotic plaques with rough skin broad feet and short 4<sup>th</sup> & 5<sup>th</sup> toes with generalized hypertrichosis. Dignosis reported association with rare dymorphic features, hypertrichosis and refractory hypertension with normal karyotyping. It is important to be aware of the features of agensis of the corpus callosum, to distinguish it from other syndromes and instigate a search for further, more serious, anomalies with which it may be associated.

**Keywords:** Agensis, corpus callosum, hypertrichosis, refractory hypertension, dilated ventricules.

#### **INTRODUCTION**

Agensis of corpus callosum is a common congenital or developmental malformation of brain [1]. Incidence varies from in the general population, its estimated prevalence is 3-7 per 1000 birth, while in children with developmental disabilities it is 2-3 per 100 [2, 3]. It is often associated with other malformations and genetic syndromes Organ systems other than CNS, particularly the musculoskeletal and genitourinary systems, may be affected [4-7]. Agensis may be complete, partial or atypical. Though it may be seen in asymptomatic individuals, it's generally considered a potential marker for neurological impairment and prognosis is frequently related to other associated abnormalities. Here we present a case of partial agensis of corpus callosum with dymorphic features.

#### **CASE REPORT**

A 13 year old female, second born child of a non-consanguineous marriage, presented with delayed milestones, mental retardation, refractory hypertension and pallor since childhood. She was treated for urinary calculi and hydronephrosis at the age of 7 years. The family and perinatal history was essentially normal.

On examination child had dymorphic facies in the form of thick eyebrows, hypertelorism, low anterior hairline, hirsutism, broad nose, thickened lips and low set ears. Upper limbs examination revealed brachydactyly and prominent finger pads. Lower limbs showed hyperkeratotic plaques with rough skin broad feet and short 4<sup>th</sup> & 5<sup>th</sup> toes with generalized hypertrichosis. Tanners SMR staging revealed pre-pubertal status of the development.

Vitals-Pulse was 82/min, Blood pressure was 180/140mm Hg (Rt upper limb), respiratory rate of 32/min. Anthropometry - head circumference 52 cm, weight- 20 kg, arm span 123 cm, height – 122 cm with US: LS ratio- 0.96.

Investigations revealed hemoglobin-5.2g/dl. TLC-7500 cells/cumm, with Polymorphs -75%. lymphocytes- 22%, Eosinophils – 2%, monocytes 1%. Pheripheral smear showed microcytic hypochromic anemia with relative neutropenia. Urine examination showed albumin (+), urinary calcium 20mg/dl, specific gravity- 1010, blood urea -25mg/dl, serum creatinine - 1mg/dl, uric acid -4.2mg/dl. Calcium–creatinie ratio, serum sodium, potassium, calcium, phosphorus, pre-albumin and thyroid function tests were within normal range.

USG and color Doppler showed right kidney measured 6.6 X 2.9 cm, slightly decreased in size when compared to left, with increased echogenicity and scarring. Left kidney measured 7.3X 3.9 cm with increased echogenicity of cortex. Bilateral renal arteries were not visualized, bilateral intra- renal arteries shows normal color flow. IVU showed right kidney smaller than left with normal excretion of contrast into excretory collecting system.

ECHO showed concentric LVH with dilated LV, moderate LV systolic dysfunction. Fundoscopy revealed grade III hypertensive retinopathy, MR1 brain showed widely separated lateral ventricles with partial agensis of corpus callosum and mild dilatation of the supratentonal ventricular system. Karyotyping was 46 XX. Metabolic screening of urine for mucopolysaccharides and oligosacrides were negative.



**Fig. 1:** Face-showing low anterior hairline, thick eyebrows, hypertelorism, hirsutism, thickened lips, broad nose with low set ears



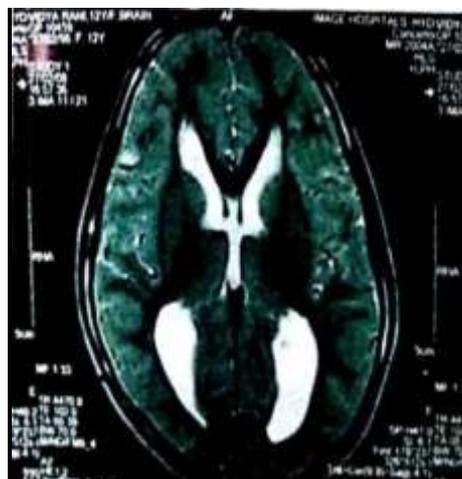
**Fig. 2:** Upper limbs showing brachydactyly & hypertrichosis. Lower limbs with hyperkeratotic plaques with rough skin, broad feet and short 4<sup>th</sup> & 5<sup>th</sup> toes



**Fig. 3:** Hypertrichosis



**Fig. 4:** Partial agenesis of the corpus callosum seen in Sagittal T1-weighted MRI of the brain. The genu and anterior body of the corpus callosum are visualized, whereas the posterior body, splenium, and the rostrum are absent.



**Fig. 5:** Mildly dilated lateral ventricles seen in axial T2-weighted MRI of the brain

Based on clinical findings such as developmental delay, mental retardation, dysmorphic facies and MRI showing partial agenesis of corpus callosum and mildly dilated ventricles with normal karyotyping -a diagnosis of Non -Syndromic partial agenesis of corpus callosum with dysmorphic features was considered.

#### DISCUSSION

The corpus callosum develops from the lamina reunions in the telencephalon. It is the major axonal commissure of the brain connecting the two cerebral hemispheres and providing communication between the cortical and sub cortical neurons connecting one hemisphere with the corresponding part of the other hemisphere. It comprises of four parts: rostrum, genu, splenium and the body. It is essential for learning, discrimination, sensory experience, memory, synchronicity of sleep [8].

A wide range of developmental malformations can affect the corpus callosum, ranging in severity from total absence (agenesis) to lesser degrees of deficiency (hypoplasia) involving only the splenium. It may be complete, partial, or atypical. Embryonic development proceeds in an anterior to posterior direction, so if an injury occurs in a developing brain during the formation of the corpus callosum, the anterior part is usually present but the posterior part is deficient [8].

The clinical manifestations of callosal agenesis may be described under two headings: non-syndromic and syndromic. Non-syndromic forms are the most common. An unknown, though probably small proportion of patients are completely asymptomatic. Commonly, their condition is incidentally discovered during neuroimaging. Patients may present neurological problems, such as seizures (60%), intellectual impairment (70%), psychosis and cerebral palsy [9, 10]. However, these conditions are believed to be caused by abnormalities in associated cerebral anomalies rather than in the corpus callosum per se. Macrocephaly may occur as a result of hydrocephalus and is sometimes associated with interhemispheric cysts [11].

A number of syndromes may be associated with agenesis of corpus callosum. Some of the more common ones include Arnold-Chiari malformation, Dandy-Walker syndrome, Aicardi's syndrome, Andermann syndrome, Acrocallosal syndrome, schizencephaly, and holoprosencephaly and several of the trisomies [11].

So far many cases have been reported worldwide with partial or complete agenesis of corpus callosum associated with syndromic features, chromosomal abnormalities and inheritance pattern in form of autosomal dominant, autosomal recessive or X linked recessive pattern. Most of the cases have manifestations ranging from normal to severe mental retardation, seizures, hydrocephalus and psychomotor delay [12].

This case has been reported because of association with rare dysmorphic features, hypertrichosis and refractory hypertension with normal karyotyping. It is important to be aware of the features of agenesis of the corpus callosum, to distinguish it from other syndromes and instigate a search for further,

more serious, anomalies with which it may be associated.

## REFERENCES

1. Dobyns WB; Absence makes the search grow longer. *Am J Hum Genet.*, 1996; 58(1): 7-16.
2. Grogono JL; Children with agenesis of the corpus callosum. *Dev Med Child Neurol.*, 1968; 10(5): 613-616.
3. Jeret JS, Serur D, Wisniewski K, Fisch C; Frequency of agenesis of the corpus callosum in the developmentally disabled population as determined by computerized tomography. *Pediatr Neurosci.*, 1985; 12(2): 101-103.
4. Paul LK, Brown WS, Adolphs R, Tyszka JM, Richards LJ, Mukherjee P *et al.*; Agenesis of the corpus callosum, genetic, developmental and functional aspects of connectivity, *Nat Rev Neuroscience*, 2007; 8(4): 287-299.
5. Davila-Gutierrez G; Agenesis and dysgenesis of the corpus callosum. *Semin Pediatr Neurol.*, 2002; 9(4): 292-301.
6. Pirola B, Bortotto L, Giglio S, Piovan E, Janes A, Guerrini R *et al.*; Agenesis of the corpus callosum with Probst bundles owing to haploinsufficiency for a gene in an 8 cM region of 6q25. *J Med Genet.*, 1998; 35(12): 1031-1033.
7. Barkovich AJ; *Pediatric Neuroimaging*. 3<sup>rd</sup> edition, Philadelphia: Lippincott Williams & Wilkins, 2000: 254-266.
8. Georgy BA, Hesselink JR, Jernigan TL; *MR Imaging of the Corpus Callosum*. American Roentgen Ray Society, 1993; 160(5): 949-955.
9. Loeser JD, Alvord EC Jr.; Clinicopathological correlations in agenesis of the corpus callosum. *Neurology*, 1968; 18: 745-756.
10. Loeser JD, Alvord EC; Agenesis of the corpus callosum. *Brain*, 1968; 91(3): 553-570.
11. Marszał E, Jamroz E, Pilch J, Kluczevska E, Jabłeczka-Deja H, Krawczyk R; Agenesis of corpus callosum: clinical description and etiology. *J Child Neurology*, 2000; 15(6): 401-405.
12. Bedeschi MF, Bonaglia MC, Grasso R, Pellegrini A, Garghentino RR, Battaglia MA *et al.*; Agenesis of the corpus callosum, Clinical and genetic study in 63 young patients. *J. Pediatric neurology*, 2006; 34: 186-193.