International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Agarwal M et al. Int J Reprod Contracept Obstet Gynecol. 2023 Jun;12(6):1914-1917
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20231582

Case Report

Schizencephaly: a rare case with early diagnosis, management and review of literature

Megha Agarwal[1], Dilpreet K. Pandher[1], Navneet Takkar[1]*, Mohit Satodiya[1], Bhawna Thakur[2]

[1]Department of Obstetrics and Gynaecology, Government Medical College and Hospital, Chandigarh, India
[2]Department of Anatomy, Maharishi Markandeshwar Medical College and Hospital, Solan, Himachal Pradesh, India

Received: 04 April 2023
Accepted: 03 May 2023

***Correspondence:**
Dr. Navneet Takkar,
E-mail: navneettakkar2015@gmail.com

ABSTRACT

Schizencephaly or split brain is an uncommon congenital disorder of cerebral cortical development, belonging to the group of cell migration defects. It is characterized by the presence of a cleft in the brain extending from the surface of the piamater to the cerebral ventricles. A 21-year-old primigravida at 19+2 weeks of gestation was referred to our Outpatient department with a level-2 ultrasound done at 18+2 weeks suggestive of schizencephaly. First trimester genetic screening was not done. Quadruple testing was normal. After genetic consultation and poor prognostication by neonatologist, decision for medical termination of pregnancy was taken. Patient underwent medical termination with mifepristone -misoprostol regimen. A female abortus weighing 200 gm was delivered. Gross examination showed only facial malformation in the form of cleft lip and hypoplastic nose. Infantogram did not reveal any skeletal deformity. On fetal autopsy, findings were consistent with the diagnosis of schizencephaly (type 1). Schizencephaly is a rare disorder in prenatal medicine with grave prognosis. Majority of cases are either diagnosed at late gestation or present in the first decade of life. Hence with periodic surveillance during antenatal care and help of ultrasonography, such rare and serious congenital malformations can be diagnosed and managed at an early stage.

Keywords: Schizencephaly, Prenatal diagnosis, Ultrasonography

INTRODUCTION

Schizencephaly is an extremely rare congenital central nervous system (CNS) malformation belonging to the cell migration disorder, which manifest between 2 and 5 months of gestation. A cleft in the brain that runs from the piamater surface to the cerebral ventricles is the distinguishing feature.[1]

Heterotrophic, dysplastic grey matter lines the cleft's margins. The most frequent sites of the anomaly are the frontal lobe and lateral sulcus region. Wilmarth first identified the anomaly in 1887, while in 1946, Yakovlev and Wadsworth described two forms of schizencephaly. Type I (closed-lip), which does not connect with the ventricular system, and type II (open-lip), manifests with ventricular system communication.[2]

In the field of foetal medicine, schizencephaly is a rare disorder. Majority of the cases are diagnosed in the third trimester of pregnancy or in first decade of life.[3] As foetal schizencephaly typically has a poor prognosis, antenatal ultrasound (US) and magnetic resonance imaging (MRI) are crucial modalities for aiding in the early detection of schizencephaly.[4]

CASE REPORT

A 21-year-old primigravida at 19+2 weeks of gestation was referred to our outpatient department after a prenatal ultrasound performed at 18+2 weeks of gestation with a diagnosis of schizencephaly. The patient was booked at a local health facility for routine antenatal care. It was a non-consanguineous marriage with married life of one and a half year. Her routine prenatal laboratory evaluation was

normal. First trimester genetic screening was not done. She had no history of infection, bleeding during early pregnancy, or exposure to known teratogens. She had no significant obstetric, gynaecological, medical, or surgical history. There was no history suggestive of drug or any substance abuse. She had no known family history of birth defects, or genetic anomalies.

In 2nd trimester, quadruple testing was performed at 18+3 weeks of gestation and reported to be low risk. On her level 2 ultrasound a singleton intrauterine live pregnancy at 18 weeks and 2 days of gestation with adequate liquor was seen. Evaluation of the head anatomy revealed an absence of cavum septum pellucidum along with corpus callosum. Callosal artery was not seen on Doppler. Both lateral ventricles appeared effaced. Infratentorial cyst of size 30×19 mm was seen on seen on left side with septation. Rest of the morphology appeared normal. Diagnosis of schizencephaly was made in light of these findings.

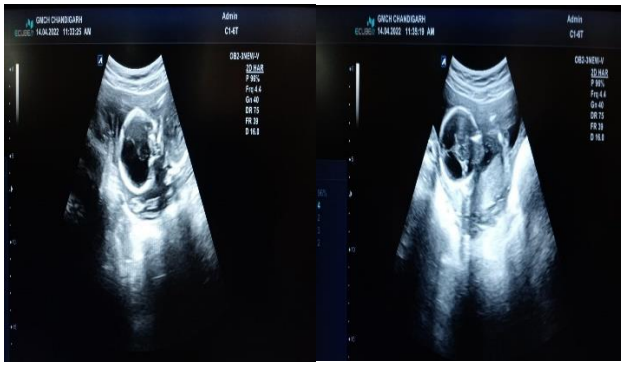

Figure 1: Trans abdominal sonogram revealing foetal head in saggital view showing large posterior fossa cyst filled with CSF. Axial view of foetal head showing intact midline falx, thalami with thin surrounding brain parenchyma.

After genetic consultation and poor prognostication by neonatologist, decision for medical termination of pregnancy was taken. Patient underwent MTP by medical method of abortion. Tablet mifepristone 200 mg PO given on day-01 followed by administration of 2 doses of tablet misoprostol 400 ug per vaginally 6 hours apart on day-03. A female foetus weighing 200 gm was aborted. Gross examination showed only facial malformation in the form of cleft lip and hypoplastic nose (Figure 2). Infantogram did not reveal any skeletal abnormality (Figure 3). The foetus was sent for autopsy after taking written informed consent from the parents. The post-abortal course of the patient was uncomplicated and advised that this disorder has a genetic association and possibility of recurrence. Therefore, in the subsequent pregnancy patient should follow up in a tertiary care centre with ultrasound facility and facilities for genetic diagnosis. Autopsy of the foetus confirmed the presence of cleft lip and hypoplastic nose externally (Figure 4). Brain anatomy revealed fused cleft between the two cerebral hemispheres and a continuous C-shaped sheet of gray matter. The displacement of cerebellar hemispheres superior to the brainstem deviated to the left side was also seen. On autopsy findings, defect appeared to be of type 1. The external features of the brain were in conformity of schizencephaly as diagnosed in level-2 ultrasound.

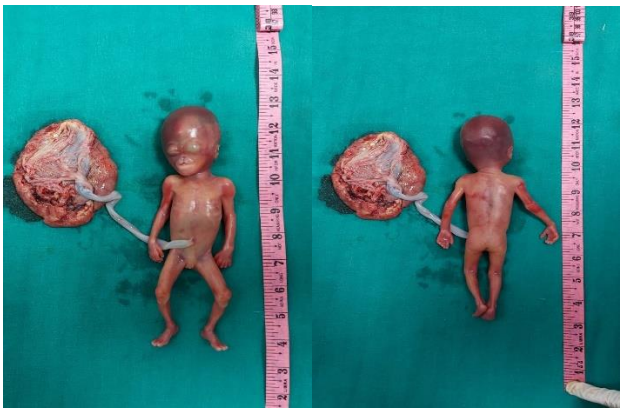

Figure 2: Picture of female abortus with placenta revealing cleft lip and hypoplastic nose as gross facial malformation in supine and prone position respectively.

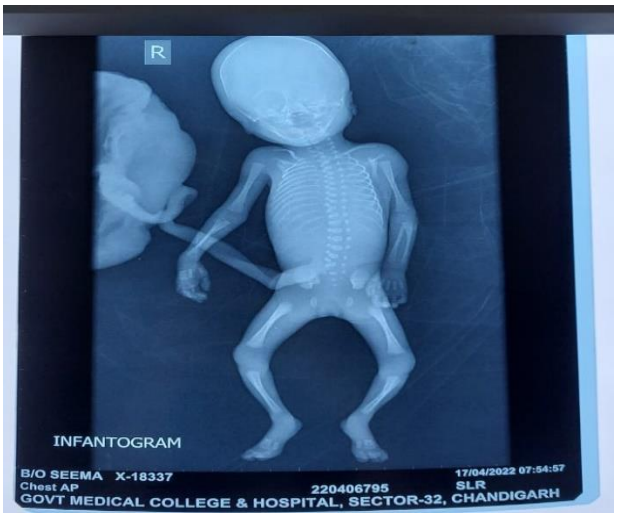

Figure 3: Infantogram revealing no skeletal abnormality.

Figure 4: Autopsy pictures of abortus – anterior and posterior view respectively.

DISCUSSION

Schizencephaly has a worldwide incidence of 1.5 per 1,000,000 live births.[1] The majority of cases are believed to result from either generalised or localised brain ischemia, which causes the distinctive cerebrospinal fluid-filled clefts in the brain. Nevertheless, progressive detrimental mechanisms are also suggested. There have been reported incidences of schizencephaly in families, which raises the possibility of it having a genetic basis. It is also associated with heterozygous mutations in the EMX2 gene. In addition, suggested etiologies could be in-utero infections, cocaine, alcohol, maternal warfarin intake, CMV infection, monozygotic twin interactions, after trauma and amniocentesis, alloimmune thrombocytopenia, and in conjunction with different disorders.[5] None of the above causes of schizencephaly were observed in our case.

Lee et al reported a case of bilateral schizencephaly detected at 24+4 weeks of gestation on ultrasound. Baby was delivered at term weighing 2.8 kg with good APGAR. On follow up at 15 months, child reported with inability to walk and left sided weakness.[6]

Gowda et al highlighted a case of open schizencephaly associated with skeletal and complex cardiac anomalies diagnosed on ultrasound and foetal echocardiography at 28 weeks of gestation. A term baby of 2.8 kg was delivered and expired soon after birth.[3] Bai et al also reported a case of schizencephaly detected at 33 weeks of gestation on ultrasound later confirmed on fetal MRI. A newborn weighing 2.56 kg was delivered at 34+5 weeks of gestation. In postnatal period, neonatal ophisthotonos and abnormal eye contact was observed.[5] In a case series by Kutuk et al, the prenatal diagnosis of schizencephaly was made with ultrasound in two cases and rest three cases were diagnosed with help of MRI. One pregnancy was terminated at 23 weeks. Rest four babies were born out of which three had moderate to severe psychomotor dysfunction and one baby needed repeated ventriculo-peritoneal shunting due to hydrocephaly.[7] Review of literature has been illustrated in Table 1.

Table 1: Review of literature (2005-2022).

Author	Year of publication	Period of gestation or age at diagnosis	Outcome at birth	Postpartum follow-up
Koc et al[9]	2005	18 years old	Uneventful	Severe mental and motor retardation, dysarthric speech, optic atrophy
Lee et al[6]	2009	24 weeks and 4 days of gestation	Uneventful	Inability to walk, left sided weakness
Turamanlar et al[8]	2009	4 months old	Uneventful	Suckling weakness
Gowda et al[3]	2011	28 weeks of gestation	Expired soon after birth	-
Bai et al[5]	2012	33 weeks of gestation	Ophisthotonos and abnormal eye conatct	Data not available
Dyson et al[10]	2015	27 weeks and 2 days of gestation	Uneventful	Postpartum follow up available till the time of discharge i.e., day-02. Uneventful.
Ugboma et al[11]	2016	18 months old	Uneventful	Recurrent seizures and weakness in the left lower limb
Harada et al[12]	2018	30 weeks of gestation	Uneventful	Postpartum follow up available till the time of discharge i.e., day-06. Uneventful.
Gonzalez et al[13]	2019	34 weeks of gestation	Routine care with no resuscitation	Progressive hydrocephalus with tonsillar herniation required ventriculo peritoneal shunting
Baik et al[14]	2020	25 years old	Uneventful	Moderate mental retardation, spasticity and weakness in all extremities
Okunola et al[15]	2022	17 years old	Uneventful	Status epilepticus

Early diagnosis of schizencephaly is crucial for prenatal management and consultation. Our case highlighted the importance of prenatal ultrasonography in identifying foetal schizencephaly. The nature and extent of the cleft can be further described with the help of foetal MRI.[8] In

our case because of early diagnosis, pregnancy was terminated timely. In cases where the diagnosis is made in advanced gestation or in first decade of life, its presentation depends on the size and location of the lesion. Symptoms range from mild to severe and include delayed development, behavioural problems, microcephaly, speech and linguistic impairment, localised or widespread motor retardation, severe cognitive impairment and refractory seizures.[6] The course of the treatment is determined by presentation of the affected child and includes physiotherapy (including the motor system), speech therapy and antiepileptic medications. Other measures like a ventriculo-peritoneal shunt is performed in cases of recurrent seizures made worse by hydrocephalus.[9]

CONCLUSION

Schizencephaly is a rare disorder in prenatal medicine with grave prognosis. Screening for congenital anomalies in first and second trimester of pregnancy helps in early diagnosis and management as observed in our case. Moreover, as MTP was offered, it saved the patient from the agony of carrying an affected child and taking such a pregnancy to term.

ACKNOWLEDGMENTS

Authors would like to thank the whole nursing and medical team who contributed in one way or the other for the efficient management of the client.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Halabuda A, Klasa L, Kwiatkowski S, Wyrobek L, Milczarek O, Gergont A. Schizencephaly-diagnostics and clinical dilemmas. Childs Nerv Syst. 2015;31(4):551-6.
2. Howe DT, Rankin J, Draper ES. Schizencephaly prevalence, prenatal diagnosis and clues to etiology: a register-based study. Ultrasound Obstet Gynecol. 2012;39(1):75-82.
3. Gowda M, Gowri M. Clinical Vignette Fetal Schizencephaly Associated with Complex Cardiac and Limb Defects. 2018;11(2).
4. Edris F, Kielar A, Fung KFK, Avruch L, Walker M. Ultrasound and MRI in the antenatal diagnosis of schizencephaly. J Obstet Gynaecol Can. 2005;27(9):864-8.
5. Bai YR, Tsai PY, Cheng YC, Chang CH, Chang FM. Prenatal Diagnosis of Fetal Schizencephaly by Ultrasonography and Magnetic Resonance Imaging. J Medical Ultrasound. 2012;20(3):162-8.
6. Lee W, Comstock CH, Kazmierczak C, Wilson J, Gonçalves LF, Mody S, Yeo L, Romero R. Prenatal diagnostic challenges and pitfalls for schizencephaly. J Ultrasound Med. 2009;28(10):1379-84
7. Kutuk MS, Gorkem SB, Bayram A, Doganay S, Canpolat M, Basbug M. Prenatal Diagnosis and Postnatal Outcome of Schizencephaly. J Child Neurol. 2015;30(10):1388-94.
8. Turamanlar O, Kirpiko O,Haktanir A, Ozen OA. A case of schizencephaly. Int J Exp Clin Anatomy. 2013;6-7:65-7.
9. Koc A, Bozdemir H, Koç Z, Sönmezler A. A Case of Schizencephaly Associated With Skeletal Deformities and Abnormal Eye Movements. Neurosurgery Quarterly. 2005;15:72-4.
10. Dyson L, Carlan SJ, Busowski J, Rasmussen O. Unilateral Type II Schizencephaly: Prenatal Diagnosis and Review. J Diagnostic Med Sonography. 2012;28(3):128-130
11. Ugboma EW, Agi CE. Schizencephaly: A case report and review of literature. Niger Postgrad Med J. 2016;23:38-40.
12. Harada T, Uegaki T, Arata K, Tsunetou T, Taniguchi F, Harada T. Schizencephaly and Porencephaly Due to Fetal Intracranial Hemorrhage: A Report of Two Cases. Yonago Acta Med. 2018;60(4):241-5.
13. Gonzalez JC, Singhapakdi K, Martino AM, Rimawi BH, Bhat R. Unilateral open-lip schizencephaly with tonsillar herniation in a preterm infant. J Pediatr Neurosci. 2019;14:225-7.
14. Baik SW, Kim GW, Ko MH, Seo JH, Won YH, Park SH. An Unusual, Intermediate-Sized Lesion Affecting Motor Organization in a Patient With Schizencephaly: A Case Report. Front Hum Neurosci. 2020;14:258.
15. Okunola, OP, Olaniyi OK, Oronsaye EJ. Schizencephaly: A Case Report and Review of Literature. Open J Pediatrics. 2022;12:742-8.

Cite this article as: Agarwal M, Pandher DK, Takkar N, Satodiya M, Thakur B. Schizencephaly: a rare case with early diagnosis, management and review of literature. Int J Reprod Contracept Obstet Gynecol 2023;12:1914-7.