



Septo-Optic Dysplasia: A Case Report

Authors

Dr Harshita.H.S, Dr Pravin.G.U, Dr Javaji Ravi Prasad, Dr Parthasarathi.A

ABSTRACT

Septo-optic dysplasia also referred to as de Morsier syndrome and is a disorder of early brain development. Three characteristic features are under development (hypoplasia) of the optic nerve, abnormal formation of structures along the midline of the brain (such as absence of septum pellucidum and corpus callosum dysgenesis) and pituitary hypoplasia.

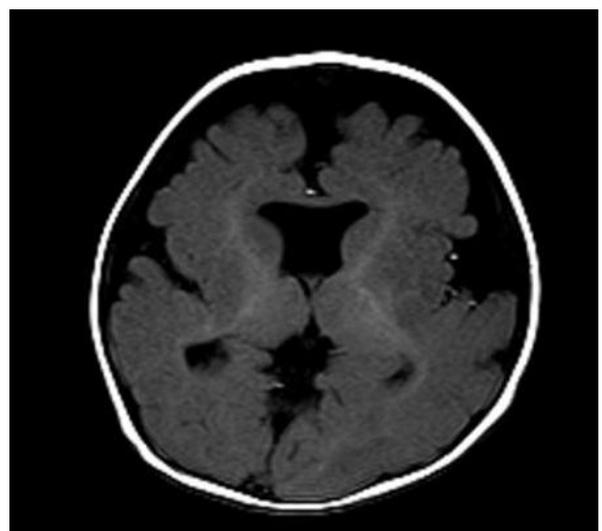
CASE REPORT

Female, born at 40 weeks of gestation, with a weight of 2.8 kg after a normal pregnancy and labor. She was the first child of non-consanguineous parents. The mother was 24-years-old at delivery and denied exposure to alcohol or drugs. The infant had an uncomplicated course in hospital. She was vaccinated appropriately for her age. Her developmental milestones are normal for age.

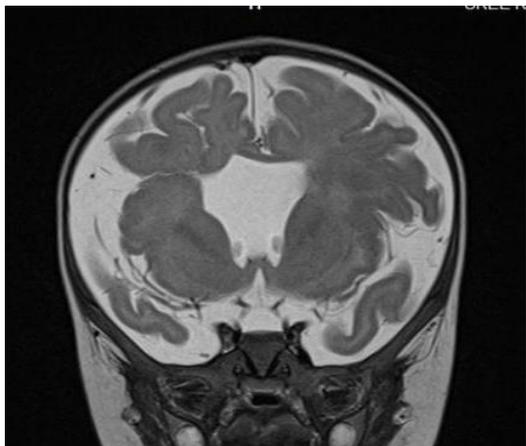
She was referred to our hospital at the age of four months due to complaints of three episodes of seizures. Neurological examination showed revealed decreased tone in limbs and dilated non reactive pupils. Visual evoked response was abnormal. Endocrinological and hepatic function tests were ruled but did not show any abnormalities. Genetic tests (for Hesx1 gene) were not performed in this case.

There was no history of congenital anomalies in the family. MRI was done for a detailed Neuro-Radiological Investigation.

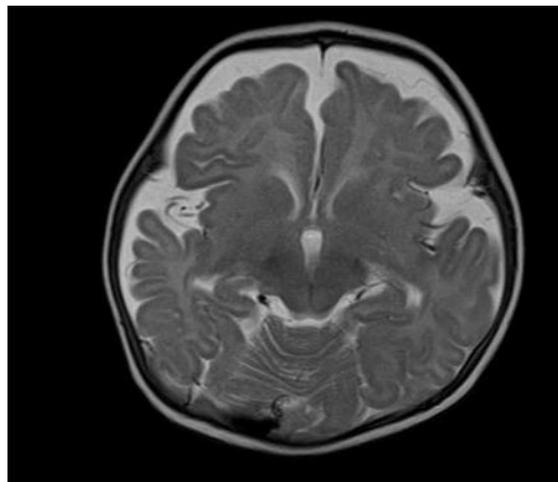
Magnetic resonance imaging (MRI) showed absent septum pellucidum with closed-lip schizencephaly and dysplastic gray matter along the cortical surface, hypoplastic optic chiasm, corpus callosal dysgenesis, diffuse cerebral atrophy and acute infarct in left high parietal lobe.



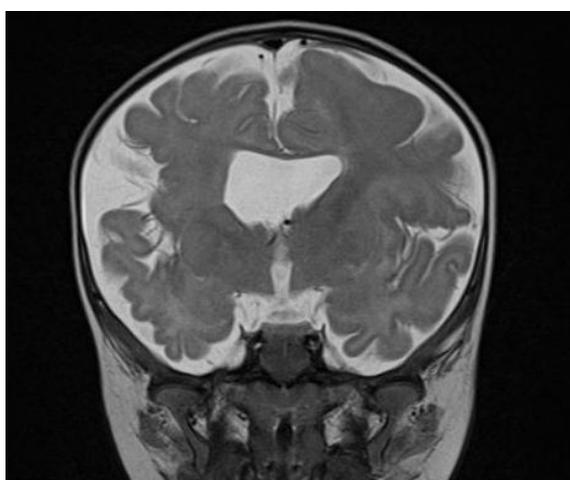
Axial T1 weighted MRI showing complete absence of septum pellucidum.



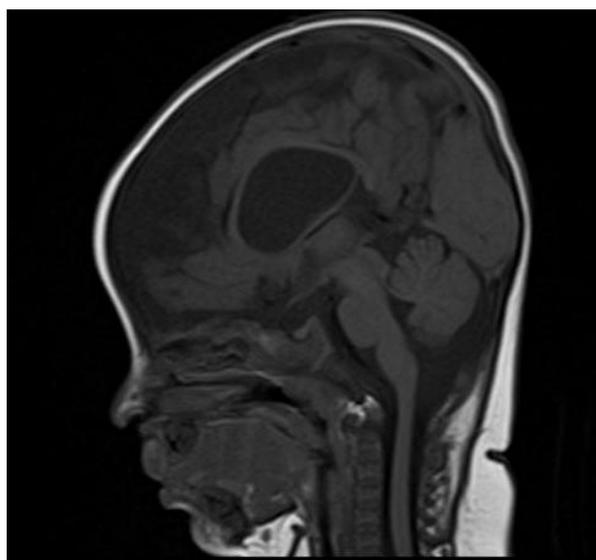
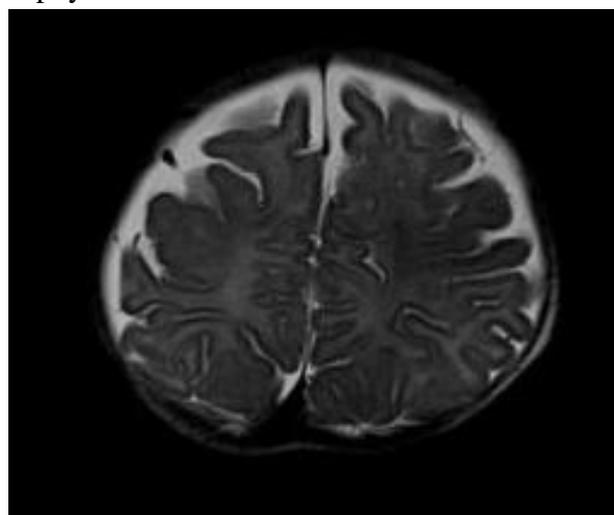
Coronal T2 weighted MRI showing closed lip schizencephaly with dysplastic gray matter along cortical surface.



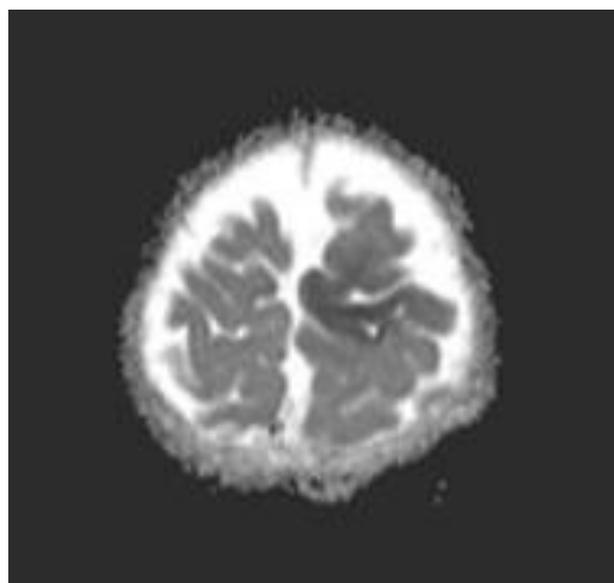
Axial T2 weighted MRI showing diffuse cerebral atrophy

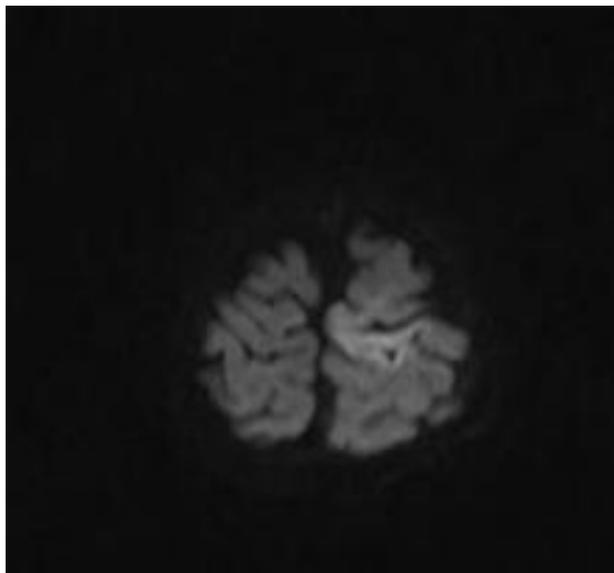


Coronal T2 weighted MRI showing hypoplastic optic chiasm



Sagittal T1 weighted MRI showing corpus callosal dysgenesis.





Axial T2 and diffusion weighted images showing acute infarct in left high parietal lobe.

DISCUSSION

Septo-optic dysplasia has been described as a malformation of the central nervous system characterized by the absence of the septum pellucidum, and hypoplasia of the chiasm and optic nerves^[3-6]. De Morsier first described the necropsy findings of patient with optic nerve hypoplasia with agenesis of septum pellucidum and defined this as “septo-optic dysplasia” in 1956^[10]. Hoyt and co-workers described the association between septo-optic dysplasia and hormonal insufficiency in 1970^[12]. Septo-optic dysplasia has an estimated prevalence of ~1:50,000. There is no recognized gender predilection.

Septo-optic dysplasia is a developmental disorder resulting from a defect of normal embryological development. There is no single cause of septo-optic dysplasia. Septo-optic dysplasia has been linked to young maternal age^[5]. A number of risk factors have been identified^[9, 11] maternal diabetes, quinidine ingestion, anti-epileptics, drug, alcohol abuse and cytomegalovirus infection

Septo-optic dysplasia represents a clinical spectrum rather than a specific entity. The potential complex interaction between genetics and environmental factors in genesis of optic nerve hypoplasia is reflected by the phenotypic variability seen in patients with septo-optic

dysplasia. Clinical presentation of septo-optic dysplasia is varied, and mostly dependent of whether or not it is associated with schizencephaly^[1]. The clinical features include variably partial pituitary insufficiency (from pan-hypopituitarism to isolated GH, ACTH or ADH insufficiency), various degrees of psychomotor retardation, visual impairment, thermoregulatory disturbances, conjugated hyper-bilirubinemia and seizures^[3-8]. Affected patients presents with systemic features including neonatal hypoglycemia, jaundice, seizures, failure to thrive, developmental delay, and microgenitalia. In addition, ophthalmic manifestations such as visual impairment, nystagmus, strabismus, and occasionally refractive errors are seen. The optic nerve hypoplasia is generally manifested by nystagmus and a smaller-than-usual optic disc. The degree of visual impairment is variable, and ranges from normal vision to complete blindness. When nystagmus develops, it typically appears by 1–8 months of age, and usually indicates that there will be a significant degree of visual impairment. Although there are many measures to compensate for visual impairment, there are few treatments available to induce normal optic nerve function^[2]. Barkovitch et al.^[4] divided septo-optic dysplasia into two subsets according to embryogenesis^[4]. The main difference between the two is the presence or not of schizencephaly, which is a congenital brain anomaly characterized by full-thickness clefts spanning the cerebral hemispheres, characterized by an infolding of gray matter along the cleft from the cortex to the ventricles, and a fusion of the cortical pia and ventricular ependyma within the cleft. Schizencephaly is observed in about a half of the patients with septo-optic dysplasia^[3] and both are associated with the absence of the septum pellucidum in 75-100% of the patients^[13]. Gray-matter heterotopias and gyral anomalies (polymicrogyria) are frequently found within and near to the cleft and they may be demonstrated on the MRI but not on the CT scans^[13].

The septo-optic dysplasia type I associated with schizencephaly. These patients have normal-size ventricles, a remnant of the septum pellucidum and normal-appearing optic radiations. The corpus callosum can be focally thinned. Clinically they present with seizures / visual symptoms. The embryological basis have been proposed to be an insult (hypo perfusion or infection) to the brain during the late 7th or 8th week of gestation, when the optic nerve, germinal matrix, and septum are being formed ^[4,12,14]. Some factors such as maternal diabetes or cytomegalovirus infection have been implicated ^[7]. Diffuse calcifications with schizencephaly and absence of the septum pellucidum are often the result of in utero infection with cytomegalovirus.

The septo-optic dysplasia type II not related to schizencephaly and is associated with complete absence of the septum, white-matter hypoplasia, including optic radiations and diffuse callosal thinning, resulting in ventriculomegaly. Clinically they present with symptoms of hypothalamic-pituitary dysfunction. The cause of this abnormality is considered to be a mild lobar holoprosencephaly ^[4]

Patients with unilateral schizencephalies generally have a good prognosis for the development ^[15, 16, 17] with mild development delay and/or motor deficits.

To summarize, despite major advances in neuroimaging modalities and genetic studies, septo-optic dysplasia still represents a diagnostic challenge due to the multifactorial and heterogeneous nature of the disorder. A diagnosis of septo-optic dysplasia should be suspected in patients who have a visual deficiency and congenital nystagmus as well as a fundoscopic examination that reveals a double image of the papilla, an imaging examination showing agenesis of the septum pellucidum, and hypophyseal or hypothalamic hormonal deficiencies.

It is important to note that patients with septo-optic dysplasia need long-term neurological, ophthalmological and endocrinological investigation.

Early detection of this syndrome is essential to reduce disease related morbidity and mortality, as it may prevent life-threatening sequelae. It highlights the importance of MRI in diagnosis of such a condition

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