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To study of MRI finding of Corpus Callosum

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Abstract

Background: The corpus callosum is the largest interhemispheric connective structure in the brain. Anomalies of the corpus callosum are observed in a variety of conditions that disrupt early cerebral development, including chromosomal and metabolic disorders, as well as intrauterine exposure to teratogens and infection.

Methods: Hospital based study conducted on children attending the Pediatric genetics, Pediatric Neurology OPD and admitted to various wards of Department of Pediatrics, PGIMER

Results: CNS examination was found to be clinically abnormal in 56.7% of children in study group. Children in study underwent MRI brain and following observations were made. Corpus callosum agenesis was seen in 13.3% and hypoplasia of corpus callosum in 10% of children in the study group. 76.7% children showed additional brain abnormalities in form of dandy walker malformations in 2 patients, Schizencephaly in 1 patient, Lissencephaly in 1 patient, Polymicrogyria in 1 patient ,CNS cysts in 9 patients and cerebral atrophy in 9 patients

Conclusion: Our study shows that anomalies of corpus callosum are often associated with additional systemic and brain malformations and it is better to screen these patients for the same so that appropriate diagnosis, treatment and prognostication can be done

Keywords: CC, MRI, Children

Introduction

The corpus callosum is the largest commissure consisting of tightly packed white matter tracts connecting the two cerebral hemispheres. It comprises of four parts (from anterior to posterior): (i) rostrum, (ii) genu, (iii) body, and (iv) splenium[1]

Various pathologies that can affect the corpus callosum and their characteristic appearances on magnetic resonance imaging (MRI) are illustrated in this pictorial essay. Pathologies of the corpus callosum result in typical symptoms of interhemispheric discoordination.[2,3]

The etiological spectrum ranges from congenital, demyelinating, inflammatory, trauma to neoplasm and ischemia. Callosal abnormalities developing after ventricular decompression fall under miscellaneous conditions, which have characteristic imaging findings.

Materials and Methods

Study Setting: Hospital based

Children attending the Pediatric genetics, Pediatric Neurology OPD and admitted to various wards of Department of Pediatrics, PGIMER.

Study design: Observational, Cross-sectional

Participant: Patients (Children),Confirmed cases with anomalies of Corpus Callosum, detected by neuroimaging were enrolled for the study .

Duration: 18 months (July 2016 to December 2017).

Inclusion criteria

Children with anomalies of Corpus Callosum diagnosed on neuroimaging.

Exclusion Criteria

Participants / Parents refused to participate or to give consent

Statistical Analysis

The study was an observational / cross sectional study and did not involve detailed statistical analysis .In patients who were tested, variables such as age of the patient, IQ level were recorded and genotype / phenotype correlation was done .

Results

Around 1000 patients from NDC clinic and 400 patients from Genetics clinic were followed up over a study period of 18 months (July 2016 to December 2017) and 40- 45 patients were found to have Corpus callosum anomalies out of which 30 patients were enrolled in the study.

Out of 30 children enrolled in the study 17 were males and 13 were females with varied geographical distribution with maximum (13) number of children coming from Punjab followed by 7 from Haryana, 6 from HP and 2 each from UP and Jammu & Kashmir.

Results

CNS examination was found to be clinically abnormal in 56.7% of children in study group. Children in study underwent MRI brain and following observations were made. Corpus callosum agenesis was seen in 13.3% and hypoplasia of corpus callosum in 10% of children in the study group. 76.7% children showed additional brain abnormalities in form of dandy walker malformations in 2 patients, Schizencephaly in 1 patient, Lissencephaly in 1 patient, Polymicrogyria in 1 patient ,CNS cysts in 9 patients and cerebral atrophy in 9 patients.

Table 1: MRI characteristics of patients in the study (n = 30)

MRI Brain Findings	Frequency	Percentage
Corpus callosum Agenesis	4	13.3
Corpus callosum Hypoplasia	3	10.0
Additional brain abnormalities	23	76.7
Total	30	100

Discussion

Corpus callosum anomalies are one of the most common congenital CNS malformations. Exact incidence is not known because isolated anomalies of corpus callosum may be asymptomatic. The role of Corpus callosum is vital in the coordination of visuomotor, motor and sensory information, along with it plays an important part in higher cognitive functions, for example language and social adaptation. A thorough clinical evaluation, neurological assessment and additional testing and / or database search can help in identification of the underlying syndrome or condition. With the latest advancements more and more of the

genetic syndromes are being identified. This study was also aimed to delineate these genetic syndromes.

In patients with CP in this study, other accompanying CNS and/or somatic anomalies showed worse effects on gross motor function, as measured by GMFCS, compared with isolated callosal anomaly. A previous study by Tang et al. also reported that patients with accompanying abnormal sulcal morphology, cerebellar abnormalities, vermian abnormalities, and brain stem abnormalities showed poor neurodevelopmental outcomes. They analyzed the causal relationship of structural anomaly in fetal MR images with functional impairments, and reported that patients with abnormal sulcal morphology and infratentorial abnormalities had poor outcomes.[4]

Conclusion

Our study shows that anomalies of corpus callosum are often associated with additional systemic and brain malformations and it is better to screen these patients for the same so that appropriate diagnosis, treatment and prognostication can be done

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