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Original Article

# Bilateral congenital sensorineural deafness, structural brain anomalies and fibroid uterus in two sisters: a new autosomal recessive syndrome?

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**ABSTRACT**

We describe two sisters (ages 35 and 30 years, respectively) from a small village in India born out of nonconsanguinous parentage with a unique combination of bilateral congenital sensorineural hearing loss, structural brain anomalies and fibroid uterus. Both had normal psychomotor development and were phenotypically normal. Brain imaging revealed communicating hydrocephalous in one sister and meningioma in the other. While the elder sister had a hearing loss greater than 115dB in the right ear and 120dB in the left, the loss in the younger one was 117.5dB in both ears at 500, 1000 and 2000Hz. Both had in addition had primary infertility and gynaecological evaluation revealed fibroid uterus. The parents and a brother were normal; and had normal brain imaging. The pattern of inheritance is probably autosomal recessive.



## Introduction

Herein we describe two sisters with a unique combination of profound congenital bilateral sensorineural deafness; structural brain anomalies in the form of hydrocephalous and meningioma; and fibroid uterus. To the best our knowledge this combination has not been described before and hence we report this case on account of its rarity.

### Case 1:

This 35-year-old lady was born to healthy nonconsanguinous parents in a small village in Karnataka, India. Her mother had an unremarkable antenatal period and no history to suggest intrauterine infections. She was born by spontaneous vaginal delivery in a primary health center, with an uneventful postnatal course. She had a normal psychomotor development and had no distinct physical abnormalities (Figure 1). She was diagnosed of profound sensorineural deafness at the age of two years. She had a hearing loss of greater than 115dB in the right ear and greater than 120dB in the left ear at 500, 1000 and 2000Hz. Above 2000Hz no neural reactions were seen. Bilateral distortion product otoacoustic emissions (DPOAEs) were absent on audiometry suggestive of outer hair cells dysfunction. However no further medical attention was sought for the hearing loss and the cause of the deafness was unknown. Magnetic Resonance imaging of the brain revealed communicating hydrocephalous (Figure 2). She had been married for ten years and had primary infertility. She reported history of menorrhagia on and off for six years. An abdominal ultrasonogram revealed a fibroid measuring 8.4 cm × 7.2 cm in the fundus of the uterus, with no other distinct intraabdominal or genitourinary anomalies. Laboratory tests done such as complete hemogram; liver and renal function tests; urine examination; and thyroid profile was within normal limits. Hormonal profile including serum luteinizing hormone (LH), follicular stimulating hormone (FSH) and serum prolactin was normal. An electrocardiogram (ECG) and echocardiogram done for cardiac evaluation revealed no abnormality. Eye checkup revealed a normal fundus study. Chromosomal analysis showed a normal karyotype and no numerical or structural chromosomal abnormality was noted.

### Case 2:

She is the younger sister of case 1. Like her elder sister, she also had an uneventful birth history with normal psychomotor development and no peculiar physical abnormalities. She was diagnosed of bilateral sensorineural deafness at one year of age. She had a hearing loss of greater than 117.5dB in both the ears and had DPOAEs absent bilaterally on audiometry. Magnetic resonance brain imaging revealed well-defined T1 isointense and T2 iso to hypointense extra axial dural based mass lesion in the right posterior frontal regionmeasuring 1.9×1.3×2.1 cm showing homogenous post contrast enhancement suggestive of meningioma (Figure 3). Abdominal ultrasonography revealed a fibroid in the fundus of the uterus measuring 8.2cm× 6.8 cm. She had been married for eight years and had primary infertility like the elder sister. Fundus examination, ECG, echocardiogram and all other laboratory tests including hormonal assays were within normal limits. Chromosomal analysis revealed a normal female karyotype.

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Brain imaging of the parents and a brother revealed no abnormality. All of them had a normal audiogram and no distinct physical abnormalities. Chromosomal analysis of the parents and brother was normal.

## ILLUSTRATIONS

### Figure

**Figure 1: Photograph of the two sisters, the older one being on the left. Both of them have no distinct physical abnormalities.**

**Figure 2:Magnetic Resonance imaging of the brain showing communicating hydrocephalous.**

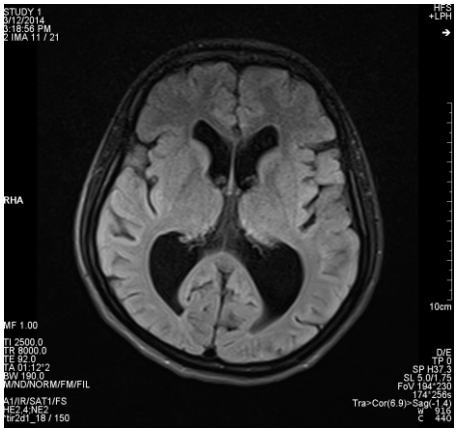
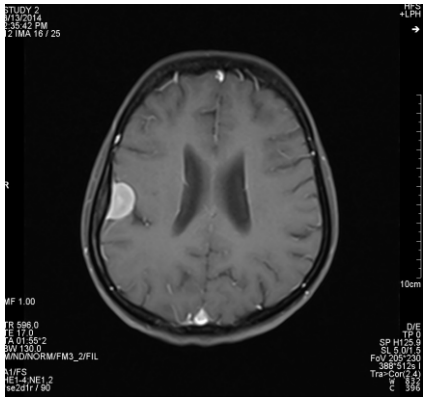


**Figure 3:Magnetic resonance imaging of the brain showing uniform moderately enhancing broad based lesion with dural tails in the right posterior frontal region suggestive of a meningioma.**



## DISCUSSION

The case study herein described depicts that of an Indian family in which two sisters have bilateral congenital sensorineural deafness; structural brain anomalies (in the form of communicating hydrocephalous and meningioma); and fibroid uterus. The above mentioned unique combination could probably represent a new autosomal recessive syndrome. We have reviewed similar cases in the literature and discuss these in the context of our case.

Our literature search revealed many case studies describing siblings with syndromic combination of sensorineural deafness and structural brain anomalies. A Canadian- Mennonite family was described in which a brother and sister had hydrocephalus due to obstruction at the foramen of Monro and profound bilateral sensorineural deafness.[1]This syndrome came to be known as the Chudley-McCullough syndrome (CMS) and is one of the rare causes of syndromic sensorineural hearing loss. Autosomal-recessive inheritance, severe to profound sensorineural hearing loss, and partial agenesis of the corpus callosum are hallmarks of the clinically well-established Chudley-McCullough syndrome.[2] CMS in addition to hydrocephalous may be characterized also by other brain anomalies such as agenesis of the corpus callosum, interhemispheric cyst, cerebral and cerebellar cortical dysplasia.[3]Though hydrocephalous can be a component of CMS as seen in one of the siblings in our case study, the other sibling had a meningioma which has not been described as the features of CMS. Furthermore the sisters had fibroid uterus which again has never been reported with CMS.

We came across another similar case study in which bilateral sensorineural deafness in combination with partial agenesis of the corpus callosum and arachnoid cysts has been described in two sisters.[4] This also seems to be an unlikely possibility in our case given the absence of arachnoid cysts and agenesis of corpus callosum.

Genetic alterations that involve the inner ear and other systems may present well-defined clinical features. Perrault's syndrome is one such condition characterized by recessive autosomal genetic alteration, sensorineural hearing loss with XX gonadal dysgenesis.[5, 6] Another case study of two siblings with Perrault's has been described in which neurological features have been reported in addition to the cardinal features. Magnetic resonance imaging in one sister showed high intensity signals in the periventricular and subcortical white substance and in the central ovale, suggestive of cerebral leucodystrophy.[7] Possibility of Perrault's was unlikely in our case as no gonadal dysgenesis was noted in our patients. We reviewed few other cases, but could find features similar to the context of our case study.[8]

A peculiar feature of our case study is the combination of inner ear, central nervous system and gonadal involvement. A study of central nervous system findings by magnetic resonance in children with profound sensorineural hearing loss showed that twenty percent of the subjects had significant brain abnormalities by magnetic resonance imaging ranging from myelination delays to migrational anomalies, suggesting a central origin of hearing loss.9

## CONCLUSION

To the best of our knowledge this is the first case study with a unique clinical picture of profound sensorineural hearing loss; structural brain anomalies; and fibroid uterus. Though the siblings were born out of nonconsanguinous parentage, the parents belonged to the same village. In the absence of evidence for intrauterine infections or other adverse perinatal events, the inheritance is most likely of autosomal recessive fashion. The discovery of the causal genes may allow better understanding of the biomolecular mechanisms involved in brain, gonadal and sensorineural differentiation.

## ACKNOWLEDEMENT

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