

## Meckel Gruber Syndrome – A Case Report

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**Abstract:** Meckel Gruber Syndrome (MGS) is a rare autosomal recessive disorder. MGS has a classical triad of occipital encephalocele, large polycystic kidneys, and postaxial polydactyly. It is also associated with multiple anomalies. Its incidence is high in Gujarati Indians, affecting 1 in 1300 live births. This is a case report of a 22yrs old primi gravida, non Gujarati Indian, at 13wks of gestation, during her NT scan, incidentally diagnosed to have a MGS in fetus. Termination was done following parents' consent. The vital role in this case is to educate the family regarding the risk of recurrence of MGS (i.e., 25%) in subsequent pregnancies

**Keyword:** Meckel Gruber Syndrome (MGS), anomalies, recurrence.

### I. Introduction

Meckel Gruber Syndrome (MGS) is a rare autosomal recessive disorder. MGS is classically characterized by the triad of occipital encephalocele, large polycystic kidneys, and postaxial polydactyly. It is also associated with multiple anomalies such as oral clefting, genital anomalies, central nervous system (CNS) malformations, including DandyWalker and Arnold-Chiari malformations, and liver fibrosis. Cardiac lesions are also identified, like atrial septal defect, coarctation of the aorta and pulmonary stenosis. The mortality is 100% and most babies die in utero or shortly after birth. Pulmonary hypoplasia is the leading cause of death and the other causes includes liver and renal failure

### II. Case Report

A 22yr old primi gravida, with second degree consanguinity, with no significant family history, at 13wks of gestation came for her routine antenatal check-up. Her dating scan, done previously, was normal. Her nuchal translucency(NT) scan was done, which showed, a single live intrauterine gestation corresponding to 13wks, NT – 2.2mm, occipital encephalocele noted, acromelic shortening of limbs seen, bilateral polycystic kidneys seen, hypoplastic vermis noted, dilated ventricles with Viking sign noted and agenesis of corpus callosum noted. Features suggestive of Meckel Gruber Syndrome.

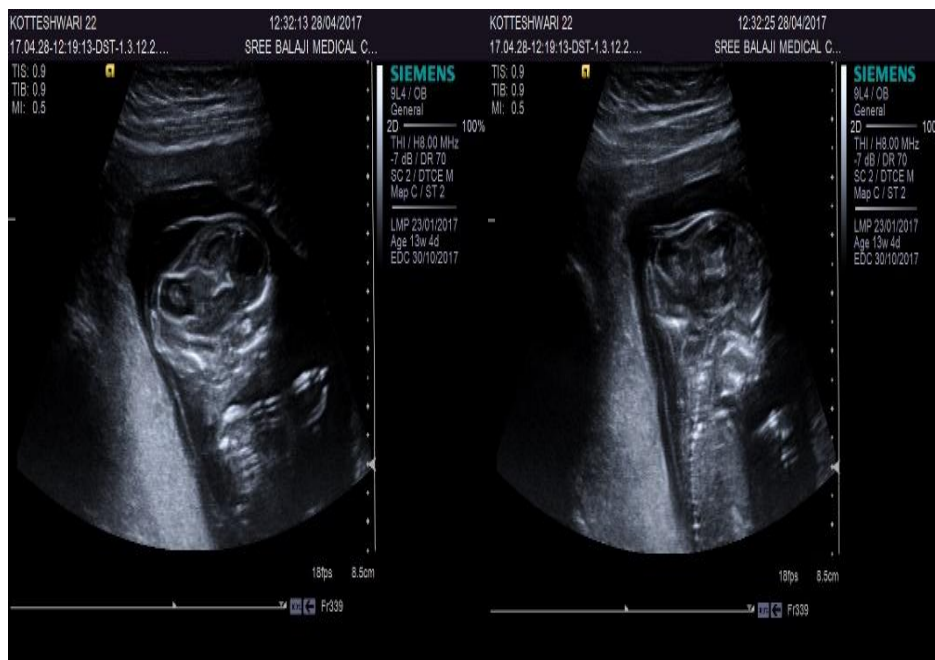


Figure 1: Occipital encephalocele

Figure 2: Occipital encephalocele



**Figure 3:** Polycystic kidney

**Figure 4:** Bilateral polycystic kidneys

Parents were explained about the syndrome and its mortality rate following which counselling was done for termination of pregnancy. Termination was done after getting consent from the parents.



**Figure 5:** Postaxial polydactyly seen

A dead male fetus expelled. Fetal karyotyping was done to rule out trisomy 13 and was found to be normal. Fetal autopsy was not done since parents refused. Family members were well educated regarding the risk of recurrence of MGS in subsequent pregnancy is about 25%.

### III. Discussion

Johann Friedrich Meckel is the one who first published the report of MGS in 1822. Later in 1934, G.B. Gruber published reports on individuals with Meckel syndrome and named the disorder as dysencephaliasplanchnocystica. MGS was named after them. Around the globe, the incidence of Meckel-Gruber syndrome is 1 in 13,250–140,000 live births. In Finland the incidence is higher, 1 in 9000 live births, 1 in 50 is a carrier. The incidence is also higher among Belgians and Bedouins in Kuwait, with 1 in 3,500 live births (carrier rate is 1 in 30). The highest incidence is reported in the Gujarati Indians, with 1 in 1,300 (carrier rate is 1 in 18) MGS is mapped to 6 different loci in different chromosomes 17q21-24 (MGS1), 11q13 (MGS2), 8q21.3-q22.1 (MGS3), 12q21.31-q21.33 (MGS4), 16q12.2 (MGS5), and 4p15.3 (MGS6). This mapping suggests genetic heterogeneity.

MGS is a condition characterised by ciliopathies, a category of diseases thought to be caused by dysfunction of cilia and flagella. Polycystic liver and kidney disease, Bardet-Biedl syndrome, Alstrom syndrome, and Joubert syndrome also belong to the same group. The anomalies observed in Meckel Gruber syndrome are as follows; in central nervous system: occipital encephalocele, hydrocephalus, microcephaly, anencephaly, absence of olfactory lobes and tract, holoprosencephaly, cerebellar hypoplasia, Dandy Walker malformation, Arnold Chiari malformation, schizencephaly and agenesis of corpus callosum, Face: cleft lip and cleft palate, microphthalmia, micrognathia, epicanthal folds, hypo/hypertelorism nasal anomalies, Mouth: Lobulated tongue, cleft epiglottis, neonatal teeth, Skeletal: polydactyly, short limbs, talipes, bell shaped thorax, syndactyly, club foot, clinodactyly, Cardiovascular system: Atrial septal defect, coarctation of aorta, pulmonary stenosis, Respiratory system: hypoplasia of lungs, Renal system: polycystic kidneys, cystic dysplasia, renal hypoplasia, horse shoe kidney, double ureter, Liver: hepatic fibrosis, ductal agenesis, portal fibrosis, Genital system: hypoplasia, ambiguous genitalia, hermaphroditism, cryptorchidism, Others: malrotation of the gut, accessory spleen, omphalocele, imperforate anus, adrenal agenesis, enlarged placenta and single umbilical artery.

Antenatal ultrasound is the best method to diagnose MGS. Diagnostic criteria for MGS is the presence of at least two features of the classical triad (occipital encephalocele, large polycystic kidneys, postaxial polydactyly). Fetal karyotyping is essential to exclude trisomy 13 because it mimics MGS. It is important because trisomy 13 has 1% recurrence rate whereas MGS has 25% recurrence rate. Alpha-fetoprotein (AFP) level from either maternal blood or amniotic fluid may help in detecting encephalocele but most encephaloceles are closed and do not elevate AFP levels. Autopsy provides valuable information regarding the diagnosis and genetic counseling for future pregnancies.

The mortality is 100% and most babies die in utero or shortly after birth. Pulmonary hypoplasia is the leading cause of death and the other causes include liver and renal failure. According to Ramadani, there is one report of a long survivor who died at the age of 28 months.

#### IV. Conclusion

This is a case report of MGS, a very rare condition and it is an incidental diagnosis by antenatal ultrasound. Counselling forms a major part in the management of MGS, especially for recurrence risk in subsequent pregnancies. The purpose of this case report is to enhance knowledge and create awareness about this rare and lethal anomaly.

#### Reference

- [1]. Bindu NH, Vavilala S, Geetha. Meckel Gruber syndrome associated with CNS malformation: a case report. *Int J Pharm Biosci.* 2011; 2:484-91.
- [2]. Opitz JM, Schultka R, Gobel L. Meckel on developmental pathology. *Am J Med Genet A.* 2006; 140:115-28.
- [3]. Young ID, Rickett AB, Clerke M. High incidence of Meckel's syndrome in Gujarati Indians. *J Med Genet.* 1985; 22:301-4.
- [4]. Dawe HR, Smith UM, Cullinane AR, Gerrello D, Cox P, Badano JL, et al. The Meckel Gruber Syndrome proteins MKS1 and Meckelin interact and are required for primary cilium formation. *Hum Mol Genet.* 2007; 16:173-86.
- [5]. Paavola P, Salonen R, Baumel A, Schinzel A, Boyd PA, Gould S, et al. Clinical and genetic heterogeneity in Meckel syndrome. *Hum Genet.* 1997; 101:88-92.
- [6]. Baala L, Audollent S, Martinovic J, Ozilou C, Babron MC, Sivanandamoorthy S. Pleiotropic effects of CEP290 (NPHP6) mutations extend to Meckel syndrome. *Am J Hum Genet.* 2007; 81(1): 170-9. [PMC free article] [PubMed]
- [7]. Paavola P, Salonen R, Weissenbach J. The locus for Meckel syndrome with multiple congenital anomalies maps to chromosome 17q21-q24. *Nat Genet.* 1995; 11(2): 213-5. [PubMed]
- [8]. Meckel JF. Beschreibung zweier durchschränkte Bildungsabweichungen entstellter Geschwister. *Dtsch Arch Physiol* 1822;7:99-172.
- [9]. Salonen R, Norio R. The Meckel syndrome in Finland: epidemiologic and genetic aspects. *Am J Med Genet* 1984; 18:691-8.