CASE REPORT

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A Rare Case of Geleophysic Dysplasia: Clinical and Radiological Insights

ABSTRACT

Background: Geleophysic dysplasia (GD) is predominantly a disorder of the musculoskeletal system which also affects the skeletal, cardiovascular, respiratory, otologic, and ophthalmologic systems. A suspicion of GD can arise right from the abnormalities in the obstetric scans of the patients. Further, the diagnostic workup encompasses of a primary skeletal survey, MRI of brain and spine for suspected neurologic problems, 2D echocardiography for congenital heart defects and genetic study. Retrospectively, workup of the parents is also necessary. The management is a multimodality approach with regular visits with a pediatrician who overall monitors the child, an orthopedic surgeon and other specialties depending on the involvement of other systems.

Case Description: The case described by us is a one-month old neonate who had fetal growth restriction and scalloping of the skull bones on obstetric scans. On further workup, the spinal cord was low tethered showing type II diastematomyelia. Multiple cardiac defects were also present along with bilateral cryptorchidism.

Clinical Significance: This case showcases an autosomal recessive variant of GD in a neonate, emphasizing its multisystemic features, diagnosis, and multidisciplinary management. Neurological involvement which is not usually seen in GD, was encountered in our case.

Key words: Neural tube defects, Heart defects Congenital, Skeletal dysplasia.

INTRODUCTION

Geleophysic Dysplasia (GD) is a rare skeletal dysplasia classified under Acromelic Dysplasia in the 2019 Nosology and Classification of Skeletal Disorders.[1] GD follows two genetic inheritance patterns: (i) Autosomal recessive (Type 1) with both parents as carriers of ADAMTSL2 pathogenic variants or (ii) Autosomal dominant (Type 2) with one affected parent carrying pathogenic variants in FBN1 or LTBP3. These mutations disrupt the microfibrillary network and TGF-β bioavailability, leading to multisystemic connective tissue manifestations.[2,3]

GD primarily affects the skeletal system, causing short stature, acromelia, brachydactyly, pseudo-muscular build, hyperextensible skin, joint immobility, and characteristic facial features ('happy face'). Additional symptoms include refractory errors, ear infections, recurrent respiratory infections, and complications like valvulopathy, arteriopathy, laryngotracheal stenosis, and hepatomegaly.[3,5] Less commonly, endocrine (thyroid) and liver involvement occur.[2]

GD shares phenotypic overlap with Weill-Marchesani Syndrome (WMS), Acromicric Dysplasia, and Al-Gazali-type dysplastic cortical hyperostosis.[1,4] This case presents an autosomal recessive GD variant in a neonate, highlighting multisystemic features, diagnosis, and multidisciplinary management.

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CASE REPORT

A one-day-old male neonate born by cesarean delivery in the 39th week of gestation to a mother with a bad obstetric history (Gravida 6 Para 2 Live 1 Neonatal Death 1 Abortions 3) with a low-birth weight of 1.935 kg was admitted in view of skeletal dysplasia to screen for other abnormalities. On examination, the neonate had scalloping of the skull, wrist joint widening, short phalanges, [Figure 1] increased tone in bilateral upper and lower limbs, undescended testes, and a wide-open anterior fontanelle, peripheral cyanosis and a pansystolic murmur in the left lower sternal area.

The term obstetric USG revealed asymmetrical IUGR (intrauterine growth restriction) with scalloping of frontal

bones and decreased pulsatility index of middle cerebral artery and femoral length of 51.9 mm.

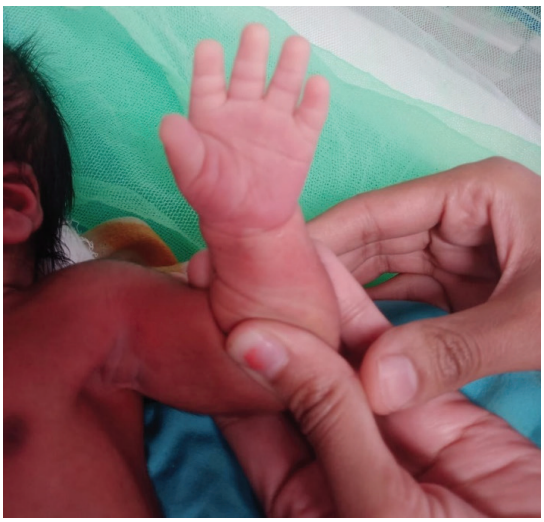

Figure 1: Hand of the neonate showing short digits

The 2D Echocardiography was suggestive of acyanotic heart disease in the form of ostium secundum atrial septal defect (ASD) of 3mm, 2mm patent ductus arteriosus, and a perimembranous ventricular septal defect (VSD) of 3.8m. All shunts were left to right. Mild mitral and tricuspid regurgitation with moderate pulmonary artery hypertension.

The X-Ray skeletal survey showed short proximal and distal parts of the upper and lower limbs suggestive of rhizomelia and acromelia respectively, metaphyseal widening and flaring on both the ends with normal epiphysis of proximal bones in humeri, femora and tibia [Figure 2]. The lumbar vertebral bodies were tapered anteriorly with mild posterior scalloping [Figure 3].

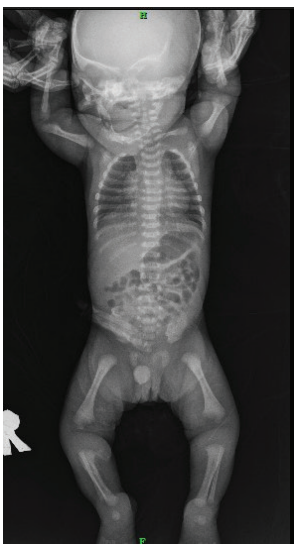

Figure 2: Infantogram of the baby

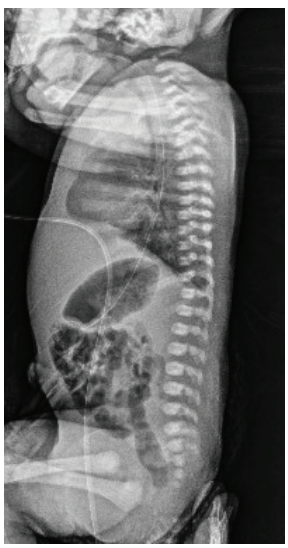

Figure 3: X-ray Spine lateral view

The MRI of the spine confirmed focal splitting of the spinal cord with a thin fibrous septa at L3-L4 level which further reunited to form a single cord surrounded by a single dural sac [Figure 4]. The spinal cord ended at S3 level and showed normal signal intensity and pattern [Figure 5]. A MRI Diagnosis of Type II diastematomyelia with low lying spinal cord was made.

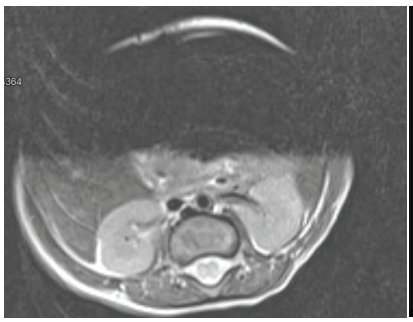

Figure 4: T2W MRI showing splitting of spinal cord at L3-L4 level

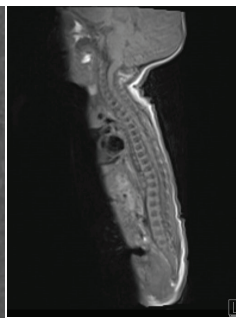

Figure 5: T1W MRI spine in sagittal view showing low lying cord

The USG of the abdomen, pelvis and scrotum showed a 8mm defect in the left inguinal region with bowel loop herniation. Testes were not visualized in the pelvis and the scrotal sacs were empty. The right testis was intra-abdominal proximal to the deep inguinal ring (10X5 mm) and the left testis was at the proximal inguinal ring (7x7mm).

The neonate was stabilized vitally and managed conservatively. A multispeciality management was planned. No active management was recommended by neurosurgery and pediatric surgery for diastematomyelia. The patient is currently on vitamin D3 supplementation (1ml = 400 IU per orally) and followed up in the out-patient setting on a monthly basis.

DISCUSSION

Geleophysic dysplasia is a multisystemic disorder affecting the skeletal, cardiovascular, respiratory, otologic, and ophthalmologic systems. With no definitive diagnostic criteria, clinical suspicion and radiological investigations aid diagnosis, while genetic testing confirms it.[1]

However, genetic testing may not be feasible in all clinical settings or for financially challenged patients, making radiological features crucial.

A clinical suspicion can be raised right from the prenatal period based on antenatal ultrasound. In a study performed by Marzin P, Thierry B, Dancasius A, Cavau A, Michot C, Rondeau S et. al,[3] polyhydramnios in ten patients, shortened long bones in eight patients, and intrauterine growth retardation in six patients were seen out of thirty-eight patients. Our patient showed scalloping of the skull and asymmetric IUGR.

In a case series by Spranger J, Gilbert EF, Arya S, Hoganson GMI, Opitz JM,[6] on radiology no skull, vertebral and pelvic involvement was seen, but just short length of long tubular bones. This differs from our case which showed scalloping of skull and the lumbar verterbrae. Spinal involvement as type II diastematomyelia was also seen. Marzin P, Thierry B, Dancasius A, Cavau A, Michot C, Rondeau S et al[3] have also reported patients developing osteochondritis and hip dysplasia. Madelung deformity and carpel tunnel syndrome were also seen in some patients as reported by Marzin P, Thierry B, Dancasius A, Cavau A, Michot C, Rondeau S et al[3] and Globa E, Zelinska N, Dauber A.[7]

Elhoury ME, Faqeih E, Almoukirish AS, Galal MO[8] in their case series, described the cardiac involvement in GD. All the three siblings had some degree of tricuspid and mitral regurgitation. Two patients also had aortic stenosis and one had patent ductus arteriosus. These findings are consistent with our patient except for the aortic valve involvement. Cardiac involvement greatly influences the prognosis of the patients.

It was seen that all patients with cardiac valve defect developed restrictive lung disease in the study conducted by Marzin P, Thierry B, Dancasius A, Cavau A, Michot C, Rondeau S et al.[3] Obstructive airway disease like asthma were also seen. Monitoring for the same needs to be done.

Neurologic involvement in GD in the form of low lying spinal cord and diastematomyelia were unique to our case, not frequently encountered in GD.

Inguinal hernia and cryptorchidism were other recurrent features seen in patients with GD.

The management of this condition is a multimodality approach involving various specialties. Annual orthopedic assessments till the age of 18, ENT (ear nose throat), ophthalmic, and cardiopulmonary evaluation must be carried out till the age of three and then at specific intervals after that.[2]

CONCLUSION AND CLINICAL SIGNIFICANCE

This case report shows how an early diagnosis of GD was made in a neonate based on the multisystemic features and other investigations. Neurologic involvement is rarely seen in GD, but was seen in this case. It also highlighted the multimodality approach to managing this disorder.

In retrospection, from the first case given by Vanace in 1960 where a five year old boy with similar cardiac and skeletal features was diagnosed as ‘atypical gargoylism’ to the latest molecular studies done by Globa E, Zelinska N, Dauber A.[7] new insights are being gained about the varied presentations of geleophysic dysplasia.[6,8]

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