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***Research Paper***

**BRUCK SYNDROME: A RARE CASE REPORT WITH DEXTROCARDIA AND MENINGOMYELOCELE**

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**Abstract**

Bruck syndrome is characterised by combination of osteogenesis imperfecta & arthrogyrosis multiplex congenital, the exact prevalence of the disease is unknown, only 40 cases have been reported in literature so far & only 2 cases are reported in India. It occurs both sporadically and as autosomal recessive manner, type 1 includes mutations in terminal lysyl hydroxylase 1 in chromosome 17q, in type 2 mutation is not demonstrated, clinically they present with congenital contractures, pterygia & multiple fractures postnatally, these individuals will have white sclera, normal hearing & vision & normal developmental milestones. Although the genotypic and phenotypic features of Bruck syndrome are heterogeneous, we report a baby boy having bilateral talipes equinovarus deformity in addition to multiple bone fractures and joint contractures, his urine contained high amounts of hydroxyproline but low amounts of collagen crosslinks degradation products which supported the diagnosis of Bruck syndrome. After surgical procedures for bilateral talipes equinovarus deformity the fractures were treated with splints, and cyclic pamidronate treatment was started. On postoperative day 27, the patient was discharged without any complications. He is now seven months of age, gaining weight and has had no additional fractures with the ongoing pamidronate treatment. Although the baby was prematurely born and of low birth weight musculoskeletal anomalies have not been reported until now, and thus the case is unique. Additionally, cyclic pamidronate administration is a good treatment choice for bone fragility in Bruck syndrome to reduce the number of fractures, and it may be beneficial for the subsequent clinical deterioration of the patients.

Key words: lysyl hydroxylase; osteogenesis imperfecta; meningocele; talipes equinovarus deformity; collagen type I; pterygia; pamidronate.

## INTRODUCTION

Arthrogryposis multiplex congenital is a syndrome characterized by the presence of congenital contractures of multiple joints usually with flexion deformities, with or without pterygia or webbing at the joints involved[1]. Osteogenesis imperfecta or brittle bone disease is a rare disorder of connective tissue involving the bones, ligaments, tendons, skin & sclera, and characterized by bone fragility and pathological fractures of long bones, blue sclera, thin skin, joint laxity, hernias, wormian bones, and secondary skeletal deformities [2]. The disease is heritable and characterized by abnormality in synthesis of Type I collagen[3], which is present in the bone matrix.

The combination of arthrogryposis multiplex congenital and Osteogenesis imperfecta is extremely rare[4]. This combination is named Bruck Syndrome after the discovery of the first case noticed in 1897. The aim of this report is to sensitize the readers about this rare disorder and to also help them in managing these children so as to prevent them from developing serious disability. We report on the clinical, radiographic, and biochemical findings of a child with Bruck Syndrome in order to facilitate recognition and diagnosis of this syndrome that can develop serious disability.

## CASE REPORT

A 35 week preterm 1<sup>st</sup> order male baby (Fig-1) born out of non consanguineous marriage to a 26 year old third gravida mother delivered by normal vaginal delivery in breech presentation, the antenatal period was uneventful, birth weight was 1.8kg (<25<sup>th</sup> percentile), was noted to have white sclera, multiple contractures in limbs, b/l talipes equinovarus deformity, b/l deformity of mid-thigh with abnormal mobility & the baby also (Fig-1) had meningocele (Fig-2) closed type. An initial diagnosis of arthrogryposis multiplex congenital was made. After three days of hospitalisation in our NICU one of our interns noticed multiple swellings over hands and legs, followed which X-ray chest, abdomen, limbs were done & diagnosis of pathological fractures (b/l limbs) with callus formation was made (Fig-3). The baby was treated with splints, plaster casts for fractures & operated for b/l talipes equinovarus deformity, discharged on 27<sup>th</sup> post-op day after giving cyclic pamidronate infusion. An additional diagnosis of osteogenesis imperfecta was made basing (Fig-2) on the white sclera. A bone, skin biopsy & cDNA study was declined by the father of the child. No abnormalities of other internal organs were detected. No family history of similar disease process was documented. On investigations routine hemogram was normal, serum calcium normal, serum alkaline (Fig-3) phosphatase decreased, his urine contained high amounts of hydroxyproline but low amounts of collagen crosslinks degradation products. Chest x-ray revealed dextrocardia in (Fig-3). USG abdomen was normal. He is now seven months of age, gaining weight & no additional fractures; with the cyclic pamidronate treatment. Though the baby was born prematurely and of low birth weight there is no musculoskeletal anomalies detected till date and so the case is unique.



Fig-1



Fig-2



**Fig-3**

## DISCUSSIONS

Bruck syndrome is a very rare disorder characterized by the association osteogenesis imperfecta and arthrogyriposis multiplex congenita. The first case was described by Bruck 1897[5]. The second case reported of this syndrome from India by Sharma and Anand in 1964[6], next case from India in 2005 by Datta & Sinha out of total fourty cases reported world wide till date. The present case is the third case from India. The disease occurs both sporadically as well as in an autosomal recessive manner. As there is no family history suggestive of a similar disorder, the mode of inheritance seems most likely due to a sporadic mutation in this case. Bruck syndrome has been classified in the Third International Nomenclature of Constitutional Disorders of the Skeleton 1998[7].

However, it is important to note that molecular diagnosis, at present not available in most of the centres and is of little help to characterize clinical severity and prognosticate evolution. Hence, a good clinical evolution remains of utmost importance to delineate the basic abnormalities associated with this disorder. Clinically most of the patients present with congenital contractures/pterygia. They mostly have white sclera as in this case and normal hearing and vision. The presence of meningocele in this case may be the cause of arthrogyriposis. Dextrocardia in this child could not be explained due to lack of evidence, which needs further evaluation. The fractures occur postnatally and the contractures are the primary abnormality and not a complication of the fractures. We were not able to examine the bone specimen from this patient due to refusal of consent for bone biopsy from the parents. Brenner *et al*[8] performed the electron microscopy of the bone specimen of affected patient and showed the presence of osteoblasts with swollen mitochondria and dilated endoplasmic reticulum.

The disease on chronicity leads to severe limb deformities, short stature, progressive kyphoscoliosis and multiple fractures. While meticulous orthopaedic care with fracture management and rehabilitation remain the cornerstones in the management of all types of OI, cyclic intravenous pamidronate (biphosphonates) is now the gold standard of treatment of Bruck syndrome[7]. Side effects are rare and include first dose fever and occasional nephrocalcinosis. Response to therapy can be monitored *via* bone densitometric studies. The patient is presently seven months old and has been thriving well, continues to be in regular orthopedic care.

The main purpose of this case report, besides reporting a very rare entity was to make the reader aware that whenever a neonate with features suggestive of arthrogyriposis multiplex congenita, an immediate radiological assessment should be done to rule out underlying osteogenesis imperfecta. This would not only aid in promptly identifying this rare disorder but also help in instituting early preventive modalities to prevent further fractures. Early orthopedic consultation would be routinely required for most of these patients for rehabilitation and recovery.

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