Osteogenesis Imperfecta

Sally Mary Abraham[1], Shaik Asif Ahamed[2]
[1]Associate Professor (OBG) , [2] Assistant Professor (Paediatrics)
Yenepoya Medical College, Nithayananda Nagar, Derlakatte, Mangalore – 575 018. Karnataka, India.

Abstract

Osteogenesis Imperfecta (OI) also known as brittle bone disease or 'LOBSTEIN SYNDROME" is a genetic connective tissue disorder. It is characterized by fragile bones that fracture easily without a triggering event. The spectrum of OI is extremely broad ranging from forms that are lethal in the perinatal period to a mild form who have a normal life span.This is a case report of term female baby born by caesarean section with Osteogenesis Imperfecta Type II.

Keywords: osteogenesis imperfecta, collagen, fractures

Introduction

Incidence of OI is 1 in 20,000 live births. It is caused by a defect in the gene that produces type I collagen, an important building block of bone. As a genetic disorder it has been commonly viewed as an autosomal dominant disorder of type I collagen. Autosomal recessive forms are also present. Most people with OI receive it from a parent but in 30% cases it is an individual mutation (do novo or sporadic).

Case report

A 35 year old G_5 P_4 L_4 presented for the first antenatal check-up at 29 to 30 weeks gestation – Ultrasonography showed a live single foetus 29 to 30 weeks gestation with shortening and thickening of long bones- features suggestive of campomelic/ Mesomelic dysplasia.Past obstetric history : P_4 L_4
First delivery- lower segment caesarean section (LSCS) for foetal distress 15 years ago followed by 3 full term normal deliveries. Last child birth was 5 years back. All 4 children are normal without any deformity.
Family history: History of nonconsanguineous marriage was present . There was no family history of genetic disorders. Patient underwent lower section caesarean (LSCS) (with sterilization) at term. Indication was previous LSCS with face presentation. Patient was delivered off a live term female baby weighing 2.3Kg. Baby cried immediately. Apgar score.7 at, 1minute,8 at,3 minutes,10 at,10 minutes Heart rate 140 beats/minute Respiratory rate 48/ minute Baby had mild respiratory distress because of multiple (intrauterine) rib fractures and small thorax, Other systems- normalTemperature- normal Eyes – Blue sclera Length of baby -40cm Head circumference – 33cm Chest circumference -28cm The legs held abducted at right angles to the body in the frog leg position. Shortening and bowing of both upper and lower limbs. Eyes-blue sclera, pupils reacting to light, fundus, examination within normal limits.
Hearing – Arousal test was positive. Baby shifted to neonatal intensive case unit (NICU) for warmer care and further management.

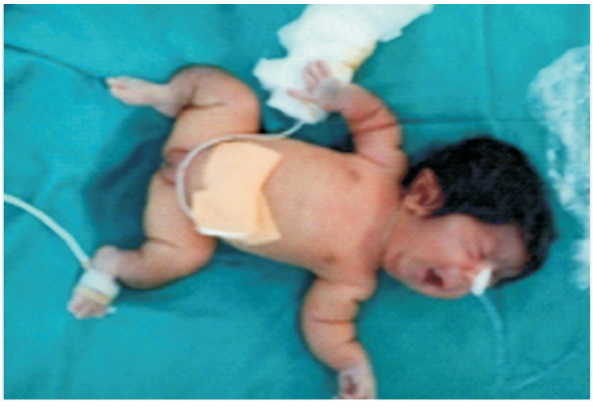

Figure1. New born baby in frog leg position with nasogastric tube and umbilical vein catheterisation

Address for correspondence
Dr. Sally Mary Abraham,
Associate Professor (OBG), Yenepoya Medical College,
Nithyananda Nagar, Deralakatte, Mangalore - 575 018, Karnataka, India
E-mail: drsallymary@gmail.com

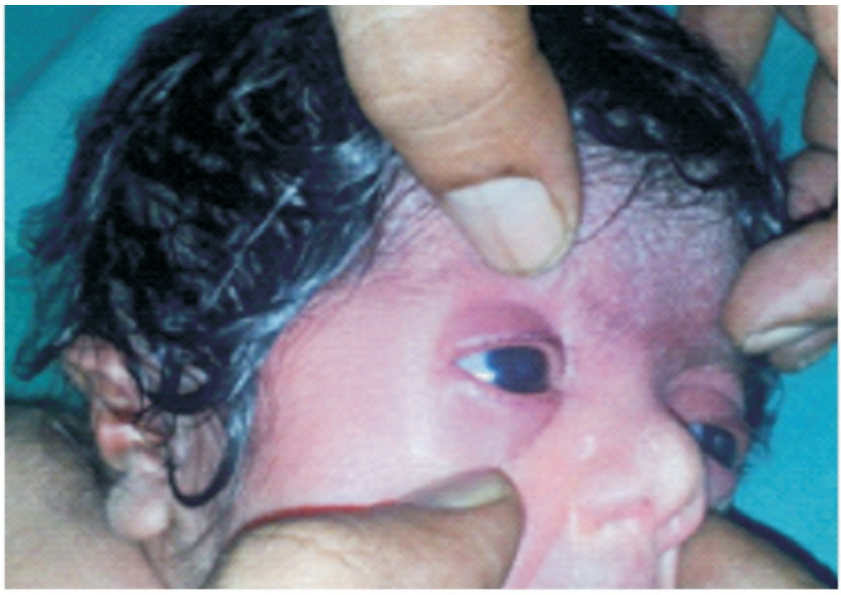

Figure 2. Face of the new born highlighting the blue sclera

Infantogram (figures 1,2,3,4 and 5)

- Elongated skull with high flat forehead
- Reduced angle of mandible
- Ribs show irregularity and beading (signs of fracture)
- Hypoplastic scapula
- Upperlimb: Shortening and angulations seen. Stubbiness and squared appearance of phalanges
- Lower limb: Anterior angulations of proximal femoral shaft with fracture. Hypoplasia and angulation of tibia with fracture

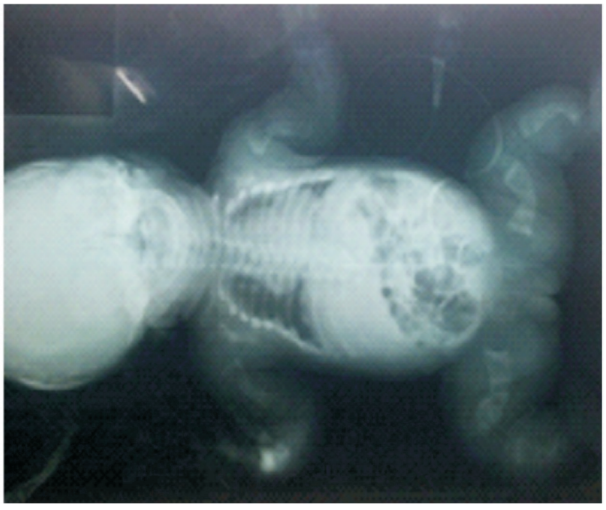

Figure 3

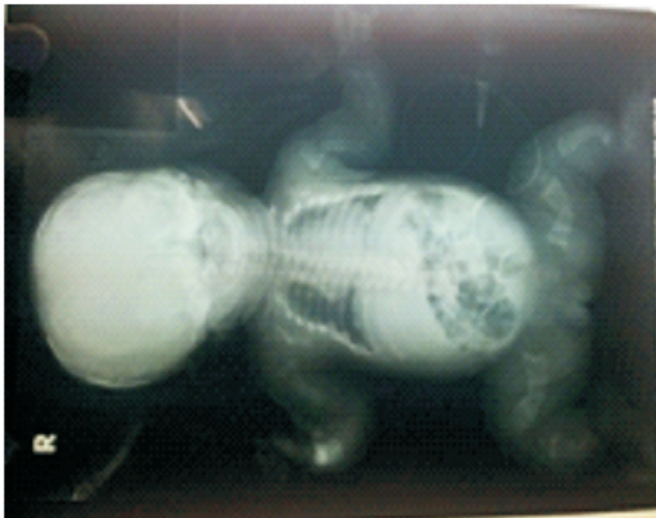

Figure 4

Figure 3 and 4 Infantogram showing elongated skull with high flat forehead. Shorteing and angulation of upper limbs. Anterior angulation of proximal femoral shaft with fracture.

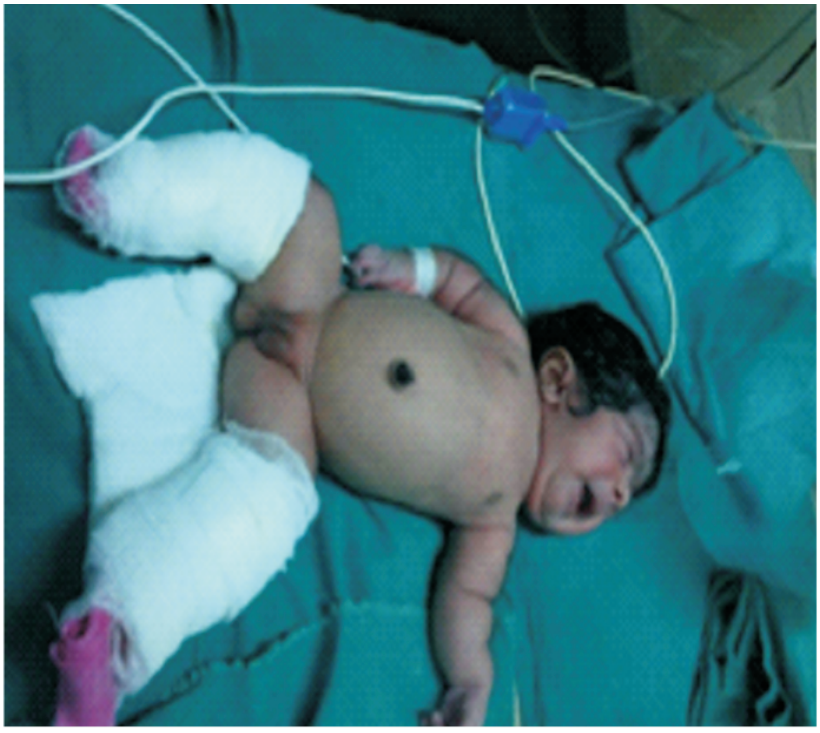

Figure 5. Baby with splinting of limbs

Clinical diagnosis:- Osteogenesis Imperfecta type IIA. orthopaedic opinion was taken and splinting done. Baby shifted to mother's side after a week and discharged at request after 2 weeks. Parents were adviced to bring the baby for review after 2 weeks but lost for follow up.

Discussion

The basic defect in osteogenesis Imperfecta is one of a qualitative or quantitative reduction of type I collagen. The normal COLIAI gene functions as a collagen producing gene. When mutated, the COLIAI gene causes the victim to have a reduced amount of collagen of weak, less effective collagen. As a result, the body may respond by hydrolyzing the improper collagen structure. If the body does not destroy the improper collagen, the relationship between the collagen fibrils and hydroxyapatite crystals to form bone is altered causing brittlensess. The pathological changes are seen in all tissues in which type I collagen is a important constituent (e.g. bone, ligament, dentition and sclera).

- There are 8 types of Osteogenesis Imperfecta
- Types 1-5 caused by dominant mutation.

Type 1: Mildest form and most common. Collagen is of normal quality but is produced in insufficient quantities. Bones fracture easily, slight spinal curavature, loose joints poor muscle tone. Early loss of hearing in some children. Blue gray sclera. This is due to the underlying chorodial veins which show through the thinner than normal sclera. Type IA, Type IB- presence of dentinogenesis imperfecta (opalescent teeth).

Type II: Lethal. Baby is either sill born or death in the first year of life. Collagen is not of sufficient quality or quantity. Multiple intrauterine fractures of long bones because of extreme fragility of skeleton and other connective tissues. Most cases die within the first year of life due to respiratory failure or intracerebral haemorrhage. Severe respiratory problems due to under developed lungs. Severe bone deformity and small stature. Type II can be sub classified into group A,B,C which are distinguished by radiographic evaluation of the long bones and ribs. Type IIA has broad and short long bones with broad and beaded ribs. Type IIB – broad, short long bones with thin ribs that have little or no beading. Type IIC demonstrates thin and longer long bones with thin beaded ribs.

Type III: Collagen improperly formed. Enough

collagen is made but it is defective. Short statured spinal curavature, sometimes barrel- shaped rib cage triangular face with features of type I & II. Type III is progressive deforming type. The new born presents with mild symptoms at birth and develops the aforementioned symptoms through out life. Life span my be normal with severe physical handicap.

Type IV-Moderately severe, normal life expectancy but with need for crutches or braces.

Type V: Same clinical features as type IV. Distinguished histologically by "mesh like" bone appearance

Type VI: Same as type IV. Histologically distinguished by 'fish scale' appearance of bone. Type VII: A recessive form limited to Quebec. Type VIII: Due to recessive mutation in gene LEPRE 1

Testing options:

- Skin biopsy: To measure the collagen levels in skin. This identifies 90% of OI patients.
  -5ml blood for chromosomal analysis.
- Prenatal diagnosis in patients with family history of OI
  - Chorionic Villi sampling (10 to 12 weeks) – to detect genetic mutations
  - Amniocentesis (16 to 18 weeks) – for genetic mutations.
  - Ultrasonography (USG): at 18 to 20 weeks.

  The key features are: micromelia Decreased mineralization and multiple bone fractures. The long bones are angulated bowed and thickened. On USG the bones may appear thickened, as a demineralised bone reflects sound waves to a less degree than a normally ossified bone.

Treatment

At present there is no cure for OI. Physical aids**:** This sling helps families with children who have OI to lift and move their children. Adaptive equipment such as crutches, wheel chairs splints, grabbing arms and or modifications to the home helps the individuals with OI obtain a significant degree of autonomy. Physiotheraphy (in milder forms) helps to strengthen muscles and improve motility in a gentle manner, while minimizing the risk of fractures. This involves hydrotherapy and the use of support cushions to improve posture.

Figure 6. Sling which helps families with children who have osteogenesis imperfect to lift and move their children

Bisphosphonates: Oral e.g alendronate or IV injection/ infusions e.g zoledronic acid, pamidronate are used to increase the bone mass and reduce the incidence fracture.

- Surgery: placement of stainless steel rods into the intramedullary canal of the long bones to stabilize and strengthen the bones. Spinal fusion can be performed to correct scoliosis.

References

1. Venturi G, Tedeschi E, Mottes M, et al, Osteogenesis Imperfecta: clinical, biochemical and molecular findings, clin Genet 2006; 70: 131-139.

2. Rauch F, Glorieux FH, Osteogenesis Imperfecta, current and future medical treatment Am. J. Med. Genet C Semin Med Genet-2005; 139:31-37.

3. Rauch F, Glorieux FH, Osteogenesis Imperfecta Lancet 2004: 363:1377-1385.

4. Cole WG. Advances in Osteogenesis Imperfecta Clin orthop 2002; 401:6-16.

5. Brenner RE, Vetter U. Bollen A- M, Morike M, Eyre DR 1994.

Bone resorption assessed by tients with osteogenises Imperfecta.Journal of Bone and Mineral Research 9:993-997. immunoassay of urinary cross-linked collagen peptides in patients with osteogenises Imperfecta.Journal of Bone and Mineral Research 9:993-997.

6. Di Maio MS, Barth R, Koprivnikar KE et al First Trimester prenatal diagnosis of Osteogenesis Impefecta Type II by DNA analysis and sonography. Prenat Diag 1993:13:589-596.

7. Brenner RE, Schiller B, Vetter U. Ittner J, Teller WM 1993 Serum concentration of procollagen/C – terminal propeptide, osteocalcin and insulin like growth factor -1 in patients with non-lethal osteogenesis Imperfecta. Acta Paediatrica 82:764-767.

8. Munoz C, Filly RA, Golbus M: Osteogenesis Imperfecta type II: Prenatal sonogrphic diagnosis. Radiology 1990; 174:181-185.

9. Brenner RE, Vetter U, Nerlich A, Worsdorfer O, Teller WM 1989 Osteogenesis Imperfecta: insufficient collagen syntheses in early childhood as evidenced by analysis of compact bone and fibroblast cultures. European Journal of Clinical Investigation 19:159-166.

How to cite this article: Abraham SM, Ahamed SA. Osteogenesis imperfecta Med Inn 2013;2: 112-16
Source of funding - Nil
Conflict of interest - None declaredz

Mckusick-Kaufman Syndrome and its Anaesthetic Management

B. Rajendrakumar[1], Ramakanth Baloorkar[2], Asif Mahaldar[3], Satish S. Kallatti[4]

[1]Professor of Anaesthesiology Al-Ameen Medical College Bijapur,

[2]Associate Professor of Surgery BLDEA'S

Medical College, Bijapur, [3] consultant Pediatrician, Dr.Mahaldar's Children Hospital Bijapur ,

[4]Post Graduate, Dept. of Anaeshtesiology, Al-Aṃeen Medical College, Bijapur, Karnataka, India

Abstract

Mckusick-Kaufman Syndrome (MKKS) is a distinct pan-ethnic genetic entity inherited in an autosomal recessive multiple malformation syndromes. The cardinal features are polydactylyandhydrometrocolposin a female and in male glandular hypospadias, prominent scrotal raphe, cryptorchidism, congenital heart defects and polydactyly. This syndrome is diagnosed most frequently in the old order Amish population as an autosomal recessive pattern and reduced penetrance and variable expressivity. So far less than 100 cases have been reported in English literature. Very few cases on anaesthetic management of MMKS is reported from India and none from Karnataka.Thisneonate with a huge abdominopelvic mass for emergency laparotomy carry grave anaesthesia risk. This report is aimed at describing the anaesthetic management adopted for a MKKS.

Key words :hydrometrocolpos, Mckusick-Kaufman Syndrome, polydactyly.

Introduction

McKusick-Kaufman Syndrome was first described by McKusick et al in 1964 in two Amish subships and rapidly confirmed. It is often reported as 'hydrometrocolpos-polydactyly syndrome'. Hydrometrocolpos is present in 80-95% of females and results from either vaginal atresia or imperferate hymen which leads to the development of abdomino-pelvic mass with regional compression of ureters and secondary hydronephrosis. Post axial polydactyly or rarely mesoaxialpolydactyly or syndactyly is present in 90% of cases. Congenital heart defects are seen in 10-20% of cases. A locus for MKKS has recently been mapped to $20p^{12}$ close to the jagged gene [1]. The only differential diagnosis being Bardet-Biedl Syndrome. These neonates have to be evaluated carefully for congenital cardiac anomalies, cardiorespiratory, central nervous system and retinal disorders. These neonates may also present with oesophageal atresia, distal tracheoesophageal fistula, intestinal obstruction, circulatory obstruction, ano-rectal, recto-vaginal fistula, genitourinary and gastrointestinal malformation [2,6]. Hence a detailed preoperative evaluation is done for appropriate anaesthetic management to prevent morbidity and mortality.

Case Report

A 21day old female baby born out of consanguineous marriage weighing 3000 g and 45 cm long presented with h/o fever, urinary obstruction, abdominal distension, nausea and vomiting for last 7 days. On examination polydactyly of all four limbs, tachypnoea, visible veins on the distended abdomen, palpable abdominal mass extending from suprapubic region to epigastrium and vaginal atresia were noted.Airway was normal and no cardiac anomalies were detected clinically.

Baby was further evaluated with digital X-ray of abdomen, pelvis and chest, ultrasound and Computerized Tomography (CT) of abdomen and pelvis.Routine hemogram and urine analysis was done.Despite low urine output blood urea,serum creatinine and serum electrolytes were within normal limits. Sonography showed large abdomino-pelvic cystic mass with significant indentation of bladder base with bilateral moderate to gross hydronephrosis. CT study suggested 10x8x6.9cm sized cystic focal lesion with fluid debris and lesion appearing pear shaped with diagnosis of pyometra and mass effect on bladder and ureter. This baby (figure1) with hydrometrocolpos and polydactyly was diagnosed as

Address for correspondence
Dr. Rajendrakumar Bolabandi. Professor, Dept. of Anaesthesiology
Al-Ameen Medical College, Bijapur-586102,Karnataka, India
E-mail:bolabandisuguna@yahoo.com