

# The smallest miracle baby that survived in Oman

\*Zakia Al Lamki<sup>1</sup>, Rafiq Hemani<sup>2</sup>, Mariam Mathew<sup>3</sup>, Asadur Rahman<sup>2</sup>, Radha Kumari<sup>3</sup>

## ولادة أصغر خديج معجزة وأستمراره على قيد الحياة في عمان

زكية اللمكي، رفيق هيمني، مريم ماثيو، أسادور رحمن ورادا كوماري

**المستخلص:** تعتبر ولادة الاطفال الخديج في عمر اقل من ٢٥ أسبوعا، من الاسباب الرئيسية في ازدياد عدد الوفيات والمضاعفات المرضية في هذه الفترة العمرية. لذا فان علاج هؤلاء الاطفال يعتبر تحديا كبيرا يواجهه الاخصائين في هذا المجال. ويشير هذا التقرير الى أصغر طفل خديج في عمان بقى على قيد الحياة.

**ABSTRACT.** Extreme prematurity is a major cause of perinatal morbidity and mortality. Management of such babies is a big challenge to neonatologists. Here we report the smallest baby ever survived in Oman.

**Key words:** extremely low birth weight infant (ELBW), prematurity, intra-ventricular haemorrhage (IVH), retinopathy of prematurity (ROP), adrenal insufficiency of prematurity, bronchopulmonary dysplasia (BPD), reversed end diastolic flow velocity (REDFV).

**W**E REPORT THE SMALLEST BABY THAT EVER survived in Oman at the neonatal unit of the Department of Child health at the Sultan Qaboos University tertiary Hospital. This extremely tiny infant with a birth weight of 570 g survived without long term neurological or pulmonary problems.

Extremely low birth weight (ELBW) is defined as birth weight less than 1,000 g. Very few medical specialties in recent years have enjoyed the extent of progress and success that neonatology has achieved. With centralisation of perinatal care, improved technology, better understanding of pathophysiology and the specific needs of ELBW infants, survival prospects for infants born weighing less than 1,000 g has improved dramatically.<sup>1-9</sup>

The earliest studies on the ELBW infants based on a cohort from late 1960 in Australia reported survival rate of 10-20%.<sup>10-11</sup> A review of more recent literature has indicated a survival of 10-40% for 500-599 g.<sup>12</sup> Studies over the following decade reported an ELBW survival rate of 40-70%,<sup>13</sup> the improved survival being mainly among those weighing >750 g.<sup>13,14</sup> Data from McGill University from April 1993 to March 1997 showed survival rate of 33% at <500 g and 38% at 501-600 g.

### THE CASE

A female infant was born by an emergency caesarean section at 26+3 weeks gestation, with a birth weight of 570 g (0.57 kg) and a head circumference of 22 cm (<10<sup>th</sup> centile). Her mother was a 23-year-old gravida 4, para 0, who had 3 miscarriages, 2 in the second trimester and

one in the first trimester. In this pregnancy she had regular antenatal checkups from 7 weeks of gestation, and upto 15 weeks the serial ultrasound scans were corresponding well to the gestational age. An ultrasound scan at 25 weeks gestation showed severe symmetrical growth retardation with an estimated fetal weight of 500-600 g. Doppler study of umbilical artery revealed reversed end diastolic flow velocity (REDFV). She therefore received two doses of steroid. Follow up doppler study 48 hours later showed the same finding, due to which a decision was made to deliver the baby. (Previously there was a national policy in Oman not to resuscitate babies weighing less than 1,000 g due to the limited resources in managing such small babies.) As this was a precious baby, an expert neonatal team opted to accept the challenge of resuscitation when she was delivered by an emergency lower segment caesarean section. The newborn was morphologically normal at birth.

Following initial resuscitation, the baby was ventilated with 60% oxygen with maximum pressures of 25/5 and rate of 60 per minute. She received two doses of surfactant by an endotracheal tube. At 6 hours of age she became hypotensive requiring inotropic support for 48 hours to maintain her blood pressure. She had a stormy course in the first 2 weeks of life. A variety of ventilatory, conservative and nutritional strategies were adopted on this precious baby in order to maintain satisfactory ventilation, growth and to reduce the risk of complications such as bronchopulmonary dysplasia, intraventricular haemorrhage, necrotising enterocolitis and retinopathy

<sup>1</sup>Department of Child Health, College of Medicine & Health Sciences, Sultan Qaboos University, P O Box 35, Al Khod 123, Sultanate of Oman; <sup>2</sup>Neonatal Unit, Dept of Child Health, <sup>3</sup>Department of Obstetrics & Gynecology, Sultan Qaboos University Hospital, P O Box 38, Al Khod 123, Sultanate of Oman.

\*To whom correspondence should be addressed. Email: zakia@squ.edu.om

of prematurity. We used lowest possible peak inspiratory pressure and ventilatory flow of 3–5 to minimize the risk of BPD. As adrenal insufficiency is known to occur in very ill ELBW which may lead to chronic lung disease, hydrocortisone treatment was given from day 2 to 7 (1 mg/kg/day for 3 days and 0.5 mg/kg/day for 3 days). She was ventilated for 10 days and received nasal continuous positive airway pressure (CPAP) till the 40<sup>th</sup> day of life and was off oxygen on the 43<sup>rd</sup> day.

The infant was nursed in maximum humidification to prevent transepidermal water loss and hypernatraemia which may lead to poor neurological outcome in very low birth weight infants. Nutrition in the form of Total Parenteral Nutrition (TPN) was commenced on day 1 and feeds were commenced on day 4. She was started on 0.5 ml of breast milk (every) 12 hourly and feeds were increased gradually and she reached full enteral feed by day 22 of life.

During her course in NICU, she was closely monitored neurologically. Her serial cranial ultrasounds were normal and eye examination showed retinopathy of prematurity stage II, which regressed on follow-up examinations. She remained extremely well and was discharged at the age of 72 days (corrected age of 36 weeks). Her weight on discharge was 2.2 kg. On follow up at the high risk clinic at 9½ months of corrected age, her neurological parameters were appropriate for the age.

## DISCUSSION

In recent years, survival of infants born weighing less than 1,000 g has improved dramatically. As mortality has much decreased, concern has been expressed as to whether morbidity has followed the same pattern of improvement.

Major morbidity of extremely low birth weight infants are, chronic lung disease, intraventricular haemorrhage, periventricular leucomalacia, neurodevelopmental disability, retinopathy of prematurity and blindness.

Chronic lung disease (CLD) develops frequently in small premature infants and results in increasing health care costs, prolong hospital stay with frequent rehospitalisation and possible deleterious effect on subsequent growth and development.<sup>16,17</sup> A survey from 7 NICU in USA reported oxygen dependent at 28 days in 29% in 751–1,000 g infants and 68% in 500–750 g infants.<sup>18</sup> In New Zealand, population based study in infants born 500–1,500 g showed that the incidence of CLD defined as oxygen therapy at 36 weeks (corrected postnatal gestational age) was 23%.<sup>19</sup> Infants with CLD experiences more central apnoeas<sup>20</sup> and obstructive apnoeas,<sup>21</sup> which

may result in elevation of systemic blood pressures by a mean of 5mmHg<sup>21</sup> and cor pulmonale secondary to pulmonary hypertension.<sup>23</sup> These are strong contributing factors to poor neuro-developmental outcome and retinopathy of prematurity.

Many therapeutic interventions have been tried to prevent chronic lung disease, but with few successes. Exogenous surfactant therapy has improved survival but its long term effect on chronic lung disease has been small or absent.<sup>24</sup> Recently, several studies have reported that the early treatment with dexamethasone can decrease the incidence of CLD,<sup>25</sup> but serious concern has been raised about its long term effect particularly on growth and deleterious effects on brain and neurological development in these young patients.<sup>26</sup>

Many extremely low birth weight infants show biochemical evidence of adrenal insufficiency in the first week of life, correlating with subsequent development of CLD. Kristi and Watterberg have reported an early treatment with low dose of hydrocortisone in this population of extremely low birth weight infants with an increase in the likelihood of survival with out CLD.<sup>27</sup>

Reported incidence of IVH in ELBW is overall 24%. Periventricular Leucomalacia (PVL) has been reported in varying incidence from 4% to 15%. Cystic PVL among premature infants is the single best predictor of adverse long-term neurological outcome.<sup>28</sup> On the other hand data published from McGill University between 1984 to 1996 showed that 15% of survived ELBW infants develop stage III retinopathy of prematurity.

This is the first time in Oman when prophylaxis was attempted against adrenal insufficiency of prematurity to prevent CLD. The baby did not develop CLD and she was off ventilation by day 10 of life. Her serial cranial ultrasounds were normal. Now she is one year of age and doing extremely well neurologically and growth wise. Prophylaxis against early adrenal insufficiency to prevent chronic lung disease in ELBW infants during first week of life is encouraging and further studies are warranted.

## CONCLUSION

We believe that treatment strategies used which contributed to an excellent outcome in this infant were: (1) good perinatal care and timely use of antenatal steroid; (2) readily available resuscitation facilities and their prompt application at the time of birth; (3) early nutritional support; (4) appropriate ventilatory management and (5) aggressive weaning from support.

Further similar outcomes are required to support this evidence in VLBW babies.

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