CASE REPORT

Miracle baby: managing extremely preterm birth in rural Uganda

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Accepted 9 May 2014

SUMMARY

Preterm birth is an important cause of neonatal morbidity and mortality globally. Uganda has one of the highest rates of preterm birth in East Africa but few resources to care for these infants. This case highlights the clinical course of an extremely premature infant born at 26 weeks gestation to a nulliparous 24-year-old woman. Her mother was involved in her care and taught the principles of kangaroo mother care. After initial problems establishing feeds she progressed well and was discharged in the fifth week of life. The case describes some of the low technology conservative and medical measures which can be used to care for neonates, such as antenatal steroids and kangaroo care. The use of antibiotics and aminophylline are also discussed. The approach to the common challenges faced by premature infants such as respiratory disease, sepsis and necrotising enterocolitis in a resource-poor environment are discussed.

CASE PRESENTATION

A 24-year-old primigravida with no known significant medical history and no specific risk factors for preterm birth was admitted to the maternity unit of a hospital in Uganda with a 2-day history of labour-like pain. Her membranes had ruptured 2 days previously. She was admitted to the ward for observation and given three doses of oral dexamethasone.

On examination her os was 7 cm dilated. One day later she gave birth to a live female infant by spontaneous vaginal delivery. The baby was born in a poor condition with an Apgar score of 2 at birth and 4 at 5 min. She was given inflation breaths, began to breathe spontaneously and her condition quickly improved.

According to the mother's last menstrual period, the pregnancy was dated at 26 weeks. The baby was scored according to the expanded New Ballard Score¹ for neuromuscular and physical parameters. A total score of 5 (figure 1) correlated with the mother's menstruation dates and our estimated gestation date of 26 weeks, making the neonate extremely premature.

Respiratory support facilities at the unit were limited with no capacity for ventilation and no surfactant available. The infant was given oxygen via nasal cannulas from an oxygen concentrator maintaining saturations between 88% and 92%. Prophylactic aminophylline was given to decrease the risk of apnoea. The baby fortunately remained stable from a respiratory point of view.

According to the hospital guidelines, premature babies are given 5 days of prophylactic ampicillin

and gentamicin. The baby had an umbilical catheter inserted using aseptic technique which provided good intravenous access for the first 10 days of life.

As an extremely preterm and very low birth weight infant, the baby was at risk of developing necrotising enterocolitis. She was kept nil by mouth for the first 48 h and was maintained on intravenous fluids. On the third day of life the baby was started on 1 mL expressed breast milk every 2 h via nasogastric tube. The feeds were increased by 1 mL every other feed provided that aspirates were minimal. The neonate's observations were monitored, with stool and urine output recorded on a chart. The milk volume was increased very slowly as there were a number of episodes of abdominal distention. Nevertheless the baby was on full oral feeds by day 14 of life.

Throughout the baby's time in the unit her mother was kept up to date and involved in her care. Temperature maintenance was initially problematic. The baby's mother was taught about kangaroo care and encouraged to attend the unit as frequently as possible to provide care. Kangaroo care proved an effective method of stabilising the neonate's temperature.

When the baby was on full oral feeds she was moved to the 'kangaroo room' (figure 2) a warm room where the baby and mother were able to stay together. She was examined daily and her temperature monitored.

The baby was discharged from the unit in the fifth week of life, earlier than desired due to maternal financial constraints. The mother was well educated in the care of her preterm baby and was confident giving the oral aminophylline. She was advised of the symptoms which should prompt her to seek medical attention. The mother and infant returned for weekly weights and examinations until the child was 40 weeks corrected gestational age.

GLOBAL HEALTH PROBLEM LIST

- Preterm birth rates are rising globally, no where more so than in the developing world. Uganda has one of the highest preterm birth rates in East Africa.
- Preterm birth is one of the biggest risk factors for neonatal morbidity and mortality. Multiple complications are associated with preterm birth.
- There is a lack of high-tech medical equipment and medication.
- There is a good evidence base for low-tech and medical interventions but due to lack of knowledge these are often not implemented.

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To cite: Mitchell HK, Thomas R, Hogan M, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-200949

Neuromuscular Maturity

Score	-1	0	1	2	3	4	5
Posture							
Square window (wrist)	 >90°	 90°	 60°	 45°	 30°	 0°	
Arm recoil		 180°	 140°–180°	 110°–140°	 90°–110°	 <90°	
Popliteal angle	 180°	 160°	 140°	 120°	 100°	 90°	 <90°
Scarf sign							
Heel to ear	 180°	 160°	 140°	 120°	 100°	 90°	

Physical Maturity

Skin	Sticky, friable, transparent	Gelatinous, red, translucent	Smooth, pink; visible veins	Superficial peeling and/or rash; few veins	Cracking, pale areas; rare veins	Parchment, deep cracking; no vessels	Leathery, cracked wrinkled
Lanugo	None	Sparse	Abundant	Thinning	Bald areas	Mostly bald	Maturity Rating
Plantar surface	Heel-toe 40-50 mm; -1 <40 mm; -2	>50 mm, no crease	Faint red marks	Anterior transverse crease only	Creases anterior 2/3	Creases over entire sole	
Breast	Imperceptible	Barely perceptible	Flat areola, no bud	Stippled areola, 1-2 mm bud	Raised areola, 3-4 mm bud	Full areola, 5-10 mm bud	Score
Eye/Ear	Lids fused loosely: -1 tightly: -2	Lids open; pinna flat; stays folded	Slightly curved pinna; soft; slow recoil	Well curved pinna; soft but ready recoil	Formed and firm, instant recoil	Thick cartilage, ear stiff	Weeks
Genitals (male)	Scrotum flat, smooth	Scrotum empty, faint rugae	Testes in upper canal, rare rugae	Testes descending, few rugae	Testes down, good rugae	Testes pendulous, deep rugae	0
							24
Genitals (female)	Clitoris prominent, labia flat	Clitoris prominent, small labia minora	Clitoris prominent, enlarging minora	Majora and minora equally prominent	Majora large, minora small	Majora cover clitoris and minora	5
							26
							10
							28
							15
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							34
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							42
							50
							44

Figure 1 New Ballard Score.¹

GLOBAL HEALTH PROBLEM ANALYSIS

Techniques in the management of preterm birth in the developed world have undergone significant advances, with outcomes for neonates born prematurely improving greatly over the past few decades.² However, these advances have not reached the developing world where access to high-tech equipment and drugs is extremely limited.

In 2005, the WHO estimated that globally 9.6% of births are preterm.³ Preterm infants are disproportionately over-represented in neonatal mortality rates with estimates showing that a quarter of perinatal deaths are attributable to complications of prematurity.^{4 5}

Conservative and medical measures are often the only steps possible in a resource-poor environment. There are a number of

pharmacological approaches which have shown demonstrable improvement in neonatal outcomes.

Administration of antenatal steroids to mothers going into preterm labour is routine practice in the developed world. Conversely, in the developing world they are often omitted.⁶ Strong evidence exists for the role of antenatal steroids in reducing the incidence of respiratory distress syndrome, intraventricular haemorrhage, periventricular leukomalacia and necrotising enterocolitis in premature infants.^{7 8} Even incomplete courses of antenatal steroids have been shown to give some benefits to extremely premature infants.⁹ The importance of antenatal steroids cannot be overstated. They are generally widely available, easy to administer, even in the community, and have minimal risk of adverse effects to mother and baby. A recent study

Figure 2 Kangaroo care room.

estimated that 500 000 neonatal lives could be saved annually if antenatal steroids were given appropriately to all mothers going into preterm labour.⁶

Another pharmacological agent used to attempt to counteract some of the problems of prematurity is aminophylline. This drug has been shown to reduce the incidence of idiopathic apnoea in premature infants.¹⁰ Owing to controversy regarding the use of aminophylline, caffeine is generally the preferred option in neonatal units in the UK.¹¹ In this hospital, however, caffeine was not available from the pharmacy. The long-term risk of neurodevelopmental disability associated with aminophylline administration needs to be taken into account. However in the context of providing medical care where respiratory support for these infants is not possible, aminophylline often represents the only available intervention.

Use of prophylactic antibiotics is controversial and guidelines for our institution recommend 5 days of prophylactic ampicillin and gentamicin for all new born infants. Evidence suggests that prophylactic antibiotics can reduce incidence of necrotising enterocolitis in low birthweight infants,¹² however the issue is fraught with difficulty with challenges of antibiotic resistance and antibiotic side effects.

In preterm prolonged rupture of membranes there is some evidence for giving antibiotics to the mother antenatally as this has been shown to prevent 4% of deaths due to complications of prematurity and 8% of deaths due to infection.¹³

There are a number of conservative steps that can be taken in the management of preterm infants which can influence their outcomes. Poor weight gain, dehydration and hypothermia are problems particularly faced by preterm infants. There are challenges of attitudes and awareness both among parents and medical staff; all too often the assumption is made that the infant would not survive and few resources are dedicated to neonatal care.¹⁴ Education of parents is paramount.

In low birthweight infants necrotising enterocolitis is a serious and often fatal problem. Feeding of mother's milk has been shown to significantly reduce the risk of necrotising enterocolitis compared with formula feeding.¹⁵ Monitoring for excessive or blood or bile-stained aspirates from the nasogastric tube can give indications that necrotising enterocolitis is starting to develop.¹⁶ Feeding poses particular challenges in the community setting as nasogastric tubes may not be available and extremely premature infants are unable to breast feed effectively and risk dehydration. Other methods of feeding may need to be found.

'Kangaroo mother care' (KMC) has been estimated to reduce neonatal mortality and morbidity, particularly from infection.¹⁷ In KMC the infant is tied to the front of the mother with a cloth. Skin to skin contact helps to maintain temperature and the mother may be able to recognise earlier when the infant is developing complications so a response can be started. KMC can be a useful tool for mother and baby in conventional neonatal care setting as well as being easily implemented in a community care setting. There is some evidence to support its use when more advanced care facilities are absent.¹⁸ KMC is particularly relevant in the context of hospital care where infants remain in cots without heating facilities and become susceptible to hypothermia which is a significant problem potentially resulting in infant mortality.^{19 20}

The most basic practices such as good cord care, feeding and temperature control represent some of the most important elements and all too often these fundamentals are overlooked.²¹

Patient's perspective

The baby was clinically stable on discharge from our unit. Initially, she returned for weekly weights and examinations and was growing well. When she was discharged from the follow-up of our unit her mother would continue to bring her back to talk to the nurses and midwives and other mothers at the unit.

Learning points

- ▶ Antenatal steroids should always be given to mothers anticipating preterm delivery.
- ▶ When gestational age is in doubt the New Ballard Score is a validated method of estimating maturity of the neonate.
- ▶ Caffeine/aminophylline can help to reduce incidence of apnoea.
- ▶ Kangaroo care can be done in all contexts and has demonstrable benefits.

Parental involvement and maternal education regarding best practice in caring for their infants is of paramount importance.

There are particular challenges in caring for neonates in the developing world. Without the extensive array of equipment we have come to expect in the developed world, expectations can be low and there can be a reluctance to invest energy in caring for these infants. However as this report shows whether in hospital or the community there are still a number of steps that can be taken to help save the lives of these tiny infants.

Acknowledgements The authors thank Wellbeing of Women for sponsoring Hannah Mitchell on her medical elective.

Contributors HKM was involved in conception and design, drafting and final approval of submitted version. RT was involved in conception and design, drafting and revising the article, editing and final approval of submitted version. MH was involved in conception and design, drafting the article. CB was involved in conception and design, drafting and editing the article.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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