

Successful Resuscitation of an Extremely Low Birth Weight Premature Infant in Delma Island Community Hospital, United Arab Emirates

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عملية إنعاش ناجحة لطفل خديج ذي وزن ولادي شديد الانخفاض في مستشفى جزيرة دلما المجتمعي، دولة الإمارات العربية المتحدة

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المخلص: تعد عملية إنعاش الأطفال الخدج ذوي الأوزان الولادية شديدة الانخفاض معضلة كبيرة تواجه ذوي الاختصاص بهذا المجال في أي مستشفى. وقد تضيف عملية الإنعاش هذه تحدياً آخر لمانح الرعاية الطبية فيما لو أُجريت في مستشفى مجتمعي بعيد، محدود من حيث الإمكانيات التقنية والبشرية والكوادر الصحية. نعرض هنا حالة إنعاش ناجحة لطفل خديج مولود في الأسبوع 23 من الحياة الجنينية ووزن ولادي 650 غرام، بمستشفى جزيرة دلما المجتمعي في دولة الإمارات العربية المتحدة. وعلى الرغم من المحدودية النسبية في الإمكانيات لإجراء عملية إنعاش كهذه، فإن القرارات الأخلاقية السريعة التي تم اتخاذها عند النظر في إنعاش هذا الخديج الذي كان في حالة حرجة، كانت هي الحل الأمثل لتجنب المشاكل العصبية والرئوية التي من الممكن أن تحدث على المدى البعيد، كما ساهمت في الحصول على طفل يتمتع بالصحة.

مفتاح الكلمات: رضيع، وزن ولادي شديد الانخفاض، متلازمة ضيق التنفس، طفل ولید، لاشيء عن طريق الفم، تقرير حالة، دولة الإمارات العربية المتحدة.

ABSTRACT: Because of their physical size and physiological immaturity, resuscitation of extremely very low birth weight premature infants is a big dilemma for neonatologists in any hospital. The resuscitation may present an additional challenge to the caregiver if it is undertaken in a remote community hospital with limited technical facilities and health personnel. We present the case of successful resuscitation of a 23-week-old premature infant, with a birth weight of 650 g, at Delma Island Community Hospital, United Arab Emirates. Despite the comparatively limited facilities for such a resuscitation, the rapid ethical decisions made when considering the resuscitation of such a borderline viable fetus, were key in avoiding long term neurological and pulmonary problems and contributed to the outcome of a healthy infant.

Keywords: Infant, extremely low birth weight; Infant, very low birth weight; Respiratory distress syndrome, newborn.

THE DECISION TO RESUSCITATE EXTREMELY low birth weight (ELBW) infants (birth weight of less than 1 kg) and extremely premature infants (born between 22 and 25 weeks gestation) presents difficult ethical issues for caregivers and parents.

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

of improvement.¹

Adequate care for newborn with ELBW is essential so as to prevent asphyxial lesions, which cause neonatal death, and neurological sequelae in those who survive, impairing both their quality of life and that of their families.

Delma is a small island, belonging to the Abu Dhabi Emirate, in the extreme west of the United Arab Emirates (UAE). It is about 210 km distant from Abu Dhabi. The island has a population of around 6,000–7,000 people.² There is only one



Figure 1: Photograph of the baby taken at birth in March 2010.

hospital on the island, with a capacity of 29 beds. It provides emergency services as well as specialised medical care.³

We report the survival of an ELBW premature infant (23 weeks gestational age, birth weight 650 g) at Delma Hospital. It was the youngest and smallest infant ever resuscitated there which survived. This was due to quick decision making and the strict resuscitation action in the initial hours of the infant's life. In spite of the relatively limited facilities, these rapid actions, taken before transferring the infant to a tertiary hospital, contributed to the outcome of a healthy infant.

At present time, the procedures carried out during neonatal resuscitation include: maintaining the body temperature by way of heat treatment; maintaining airway permeability through correct head and neck positioning; aspiration of the mouth, nose, pharynx and, if necessary, of the trachea; mechanical ventilation using positive airway pressure with a balloon and mask, or balloon and tracheal tube; maintaining circulation by applying cardiopulmonary resuscitation and administering drugs or fluids. All these procedures are performed based on integrated evaluation of three signs: breathing, heart rate and colour.^{4,5}

The use of antenatal steroids and the administration of exogenous surfactant to infants with respiratory distress syndrome (RDS) have had a significant impact on overall survival rates in very low birth weight (VLBW) infants. Reports suggest improved survival in ELBW infants ≤ 750 g birth weight in the postsurfactant era.⁶ The minimum age of viability has been proposed to be 23 weeks' gestation.⁷



Figure 2: Photograph of the baby taken at 8 months old.

Case Report

A 28-year-old primigravida, with a history of infertility for more than 12 years, was admitted to the delivery room at 23 weeks gestation, with lower abdominal pain (which had started 9 hours prior to admission), suspected rupture of membranes and uterine contractions. A cardiotocography (CTG) was done to monitor the uterine contractions and fetal heart rate. A vaginal examination revealed 6 cm cervical dilatation which was also fully effaced and a cephalic presentation. The patient was confirmed to be in preterm labour. She was administered 12 mg betamethasone by intramuscular injection (IM) and was instructed for nothing by mouth. Blood and urine investigations were requested and the results were normal.

Informed consent for resuscitation of the neonate was obtained from the parents after discussion of the possible complications. The patient was moved to the operating theatre for spontaneous normal vaginal delivery, which was followed by placental curettage under general anaesthesia. The amniotic fluid was meconium-stained.

A male neonate with ELBW (650 g) was thus born by a normal vaginal delivery. He had no congenital anomalies, but was apnoeic, cyanotic, and heart rate was below 100/minute. The Apgar score was 4 at 1 and 5 minutes of life [Figure 1]. He was intubated with a no. 2.5 endotracheal tube, cardiopulmonary resuscitation (CPR) was started with controlled manual ventilation with 60%

oxygen by Ambu bag, and adrenaline 0.1 mg/kg with 1/1000 concentration was administered through the endotracheal tube. Then he received 100 mg/kg (2.5 ml) surfactant endotracheally. Intravenous umbilical catheterisation was done. The patient developed severe bradycardia and cyanosis twice for which CPR was resumed with assisted ventilation, external cardiac massage and adrenaline 0.01 mg/kg of 1/10,000 concentration was administered intravenously. He was transferred to the neonatal intensive care unit (NICU) by portable incubator.

The parents were informed about the patient's condition and the necessity of transferring the neonate to a tertiary hospital for further management. A nasogastric tube was inserted to deflate the patient's stomach, a portable chest X-ray showed findings concomitant with RDS. Body warming measures were also undertaken.

A dramatic improvement in the patient's condition was noticed about 15 mins after the administration of the second dose of surfactant given in a dose of 100 mg/kg endotracheally 12 hours after the first dose. Oxygen saturation (SpO₂) started to increase gradually reaching levels ranging from 91–100% on 2 L/min. The heart rate was 125–148/min, blood pressure (BP) 48/20–51/21, and body temperature between 34.7° C and 35.9° C. Random blood sugar (RBS) was between 140 and 200 mg/dl. Such ranges continued for more than 3 hours until the patient was transferred by the helicopter to a tertiary hospital, on manual ventilation by Ambu bag with 2 L/min, oxygen flow, and in the incubator. All these primary resuscitation measures were carried out at the remote Delma Island Hospital for over 15 hours until the infant's transfer. The efforts of doctors and the available nursing staff were able to keep the infant alive during that critical period.

Discussion

The decision as to whether an ELBW neonate should be resuscitated or not is one of the most distressing situations that pediatric care providers have to face. The decision is multifaceted taking into account the ethical, moral, religious and legal views of the parents, the resuscitation team, and the community.

In our case study, the resuscitation of this ELBW infant was accomplished successfully in a community hospital. Given that the technical and

personal facilities were relatively limited for such a type of resuscitation, and that the infant's weight was 650 g and he was 23 weeks gestational age, the decision to resuscitate was a great dilemma. The decision was taken and informed consent obtained from the parents before delivery and after discussion of the possible potential complications, taking into consideration that the baby was precious since the mother had been infertile for 12 years.

Ethically, physicians have a duty to inform the parents of newborns about resuscitation procedures and the potential outcomes for their preterm infants as well as to obtain their consent to proceed with resuscitation and treatment. The process of informing is inherently flawed by the uncertainty of predicting outcomes and is often flawed by the urgency and tension of the potential parents' situation.⁸

The other point of critical importance in the decision is that resuscitation should be undertaken urgently and aggressively second by second, because the care administered in the first critical hours of life can have a direct effect on the lifelong outcomes of the ELBW infant. There may be a 'golden hour' (GH) of care for ELBW infants that begins with delivery until admission to the NICU.⁶ The GH initiative goes beyond looking to change one clinical outcome. Instead, it looks at a process for providing care to implement multiple evidence-based practice initiative "bundles" that could improve short and long term outcomes for ELBW infants. During these initial hours, the clinician is faced with complex decisions based on multiple systems that require attention—knowing that a lack of care in these first minutes of life can translate into life-long medical problems.

The promise of the GH in neonatal care lies not only in evidence-based treatment, but also in team structure, communication, and proficiency. Health care providers are faced with a multitude of tasks (cognitive, procedural, communicative, and managerial) that must be completed in a relatively short time. Neonatal resuscitation is complex and takes place in an extremely dynamic and complex environment.⁶

The pediatric profession has widely acknowledged that there exists a certain 'grey zone' of gestational ages, wherein it is not clear whether resuscitation should be attempted, because of the high likelihood of death or disability. Within that

grey zone, it has been recommended that informed parents be permitted to choose. There is some variation in opinion regarding the exact location of the margins of the grey zone, but in the United States and the United Kingdom, at least, 23 weeks generally falls within it.^{9,10} Literature data confirm that resuscitation should not be indicated for patients aged less than 23 weeks or weighing less than 400 g.^{4,7,11} After this period, if time allows, parents should be informed about the implications of resuscitation procedures, including the possibility of sequelae from diseases associated with a specific gestational age.⁵ Moreover, the previous outcome of newborns in the neonatal unit should also be included in resuscitation decisions.¹² Each clinical case must be analysed separately, always trying to establish adequate communication between parents, obstetricians and paediatricians in order to decide whether resuscitation is appropriate.

Most physicians agree that the delivery room is the proper place for life and death decision.¹³ Some surveys of parents have indicated that the vast majority of parents prefer resuscitation to be initiated even when there is great uncertainty about the outcome.¹⁴ A recent survey of New England neonatologists sought to describe current practices of delivery room decision making and prenatal consultation at the border of viability. Given a hypothetical scenario of impending delivery of a 23.5 to 24.5 week preterm infant of appropriate weight for gestational age, more than three-quarters of neonatologists believed that they and the parents should make the final decision together.⁶

It seems advisable to recommend that resuscitation should be performed if the diagnosis of gestational age has not been previously established. The “wait and see” strategy before starting resuscitation should be eliminated, since a delay in the procedures can cause cold stress injury, hypoglycemia, hypotension and hypoxaemia in newborn infants, increasing mortality and morbidity.¹³

The body temperature of premature infants drops precipitously after birth. Hypothermia after admission is a risk factor for mortality in preterm infants and is associated with acid–base abnormalities, respiratory distress, necrotising enterocolitis, and intraventricular haemorrhages. Cold stress in ELBW infants, who are at increased risk for hypothermia, can be significantly reduced

by controlling environmental temperature and using wraps.

An early complication of extreme prematurity is respiratory distress caused by surfactant deficiency. The incidence of chronic lung disease can be significantly reduced by standardising practice, ensuring early administration of surfactant, and developing a ventilation protocol.¹⁵

Another ethical aspect that should be considered is the time for discontinuation of resuscitation procedures in the delivery room. Literature data reveal that the resuscitation of a newborn after 10 minutes of asystolic cardiac arrest resulting in survival, or survival without severe sequelae, is quite improbable.^{15,16} Resuscitation should be suspended after 15 minutes of absent heart rate despite the appropriate use of all resuscitation procedures available.^{7,11}

Most clinicians agree that some infants are so immature that initiating resuscitation is futile, whereas others think that not initiating resuscitation is unacceptable. Uncertainty exists, however, for infants between these 2 extremes, when it is unclear whether resuscitation is in the infant’s best interest.¹⁷ For these infants, selective resuscitation on the basis of parental preference is often considered to be an appropriate option, and general guidelines for decision-making are commonly based on estimated gestational age.^{7,18} A recent summary of international guidelines concluded that an individual approach consistent with parents’ wishes should be considered for infants born at 23 to 24 weeks’ gestation.^{15,19} Circumstances are important, of course, e.g. additional morbidity, in particular severe malformations.

Conclusion

In our case study we were able to prove that the rapid decision and action is very important to keep ELBW infants alive, without long life neurological or pulmonary problems, even with relatively limited medical facilities.

Standardising care to ensure consistency in practice improves care to ELBW infants. It is essential that we continue to work as health care teams to decrease morbidity and mortality among such infants.

We should also take into consideration the importance of the golden initial hour of ELBW

infant resuscitation which should be undertaken aggressively and without delay. It provides a framework for training and team development that improves outcomes and care to some of our most vulnerable babies.

The infant reported here is now over a year and a half old [Figure 2]. He is developing normally without obvious neurological deficits.

CONSENT

Informed consent had been obtained from the parents to publish this article and the photographs.

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