

Two cases: Situations for artificial surfactant, beyond prematurity

Timothy M. Webner,
MD, FCFP, FRRMS,
Laura Noack, MD,
CCFP, J. Kerry Mac-
Donald, MD, FRCP

Lake of the Woods District
Hospital, Kenora, Ontario,
Canada

Correspondence to:
Timothy M. Webner;
twebner@bell.net

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INTRODUCTION

In rural medicine, we often stretch our limits during foul weather, unavailable transport to tertiary care or unusual circumstances. The following two cases exemplify ingenuity and applying treatment principles to situations outside the standard presentation, with life-saving results. Both cases happened during blizzards with delayed transport potential to tertiary care by more than 12 h.

Artificial surfactant has been conventionally used for premature babies displaying respiratory distress that persists despite the use of nasal continuous positive airway pressure (CPAP).

CASE REPORTS

Case report #1

Our first case was an infant delivered by the lead author on Boxing Day by emergency C-section at 39 weeks 2 days, to a G10P4 woman with 2 prior C-sections. She went into spontaneous labour while awaiting an elective repeat C-section. This occurred at the Lake of the Woods District Hospital in Kenora, Ontario,

200 km away from the closest neonatal intensive care unit in Winnipeg, Manitoba. Our hospital has approximately 200 deliveries annually, with family physicians providing both operative obstetrical care and newborn care. There are no obstetricians or paediatricians in our community. We thankfully have the support of our general practitioners, anaesthesia colleagues and respiratory therapists. The fetus had recurrent, prolonged fetal heart rate decelerations down to 60 bpm. Immediately after the delivery of a meconium-stained infant, there was respiratory distress. Despite nasal CPAP at 5 cmH₂O, oxygen saturation remained at 88% with FiO₂ of 1.0. There was no likelihood of transfer based on poor weather conditions anticipated for a minimum of 12 h. The baby was intubated and ventilated, oxygenation did not improve and ventilation became more difficult over time. The lead author, when the infant was approximately 4 h of age, felt that we needed to alter therapy or face further deterioration and we began researching treatment modalities and discussing them with the closest neonatologist. A decision was made to use bovine lipid extract

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surfactant (BLES), and within hours, the oxygen saturation was 98% on FiO_2 of 0.3 and 5 cm positive end expiratory pressure (PEEP). The baby was transferred to a tertiary care centre after approximately 18 h, and the following day was on room air with nasal CPAP.

Case report #2

Our second case was a 4400 g infant, at 41 + weeks gestation delivered by C-section by the second author for labour dystocia during a post-dates induction (in a blizzard). At C-section, a milky white fluid gushed from the amnion incision. Initially, the baby appeared to do well but by 45 min was found to be dusky and hypoxic, and despite nasal CPAP and FiO_2 of 1.0, oxygen saturation remained 52%. The lead author was asked to come and assist at the resuscitation at this point. There was no significant improvement in oxygenation after intubation. A chest X-ray (CXR) demonstrated a typical ground-glass appearance, worse on the right [Figure 1]. Based on the lead author's previous experience, a decision was made to give BLES. There was transient worsening of hypoxia, as expected, and then improvement. Within hours, the FiO_2 was dialled down to 0.3 while maintaining oxygen saturation in the range of 88%–94% with 7 cmH_2O PEEP. The neonatal transport team arrived approximately 14 h after delivery to take the baby to a tertiary care centre in Winnipeg. The next day, the baby was extubated and was maintaining normal oxygen saturations on room air with nasal CPAP. Before transfer, a

repeat CXR was performed showing the resolution of the ground-glass appearance [Figure 2].

During this resuscitation, the baby was given antibiotics to cover for pneumonia and glucose support. When the orogastric tube was placed to decompress the stomach, milky white fluid was aspirated and sent for culture. Our pathologist later identified the case to us as excessive vernix caseosa syndrome, something he has been waiting for 40 years to see in his career.

DISCUSSION

Artificial surfactant has been recommended for the treatment of babies exhibiting signs of meconium aspiration syndrome, regardless of gestational age, and exhibiting radiological features and persistent requirements for supplemental oxygen.¹⁻³ Meconium is thought to inactivate endogenous surfactant by fatty acids in the meconium.⁴ The specific product, BLES, is considered safe and effective. Possible side effects include transient worsening of hypoxia or bradycardia during administration and a small risk (approximately 1.5%) of pulmonary haemorrhage. The use of BLES has been shown to reduce the requirement for high-frequency ventilation, extracorporeal membrane oxygenation or nitrous oxide,^{4,5} three treatments not available to us or to most rural physicians.

Neonatal aspiration syndrome due to vernix caseosa has been intermittently reported in the literature as a rare condition, hence the dated references.⁶⁻⁸ A clue to excessive vernix caseosa



Figure 1: Case: 2. Initial chest X-ray before administration of bovine lipid extract surfactant.

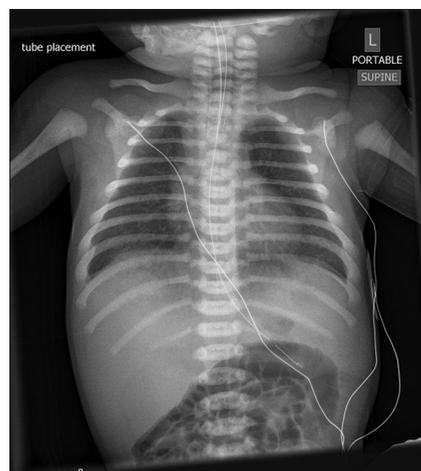


Figure 2: Case 2: Follow-up chest X-ray approximately 12 h after administration of bovine lipid extract surfactant.

antenatally would be a 'snowstorm in the amniotic fluid' on the bedside ultrasound, ironic given the weather conditions outside the womb at the time of birth for this infant.

Our nearest tertiary care centre recommends the use of BLES if the infant has not responded to nasal CPAP of 7 cmH₂O and requires FiO₂ > 0.3 to maintain oxygen saturation of 88%–92% with radiological or clinical evidence of respiratory distress syndrome.⁵ This principle was applied to our second case despite our lack of knowledge of the exact aetiology at the time of resuscitation.

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The SRPC would like to express our support for all of those responding to COVID-19 who are committed to providing safe and quality care to patients across Canada.

We encourage all members to join the RuralMed and or Rural Anesthesia Listservs. A lot of good, detailed COVID-19 information has come from these email lists and has proven to be a great resource.

A working group with representatives from all the provinces and territories that have isolated fly-in communities has been formed to share concerns and offer advice.

We will keep you posted on further initiatives.

Together we can work towards keeping everyone connected, safe, and up to date.

Visit the SRPC.CA home page to find
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