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roidism, such as slow growth, excessive weight gain, hypotonia, impaired mental status and dry skin, are also classic features of Down's syndrome.³

Miss Webb presented with a one year history of lethargy and menorrhagia caused by hypothyroidism. She had surgery for menorrhagia and umbilical hernia, both of which are recognised features of hypothyroidism. Slow recovery and type 2 respiratory failure after general anaesthesia are also features of hypothyroidism. Hypothyroidism affects the neuromuscular system by causing weakness of the diaphragm and other respiratory muscles. Diaphragmatic dysfunction causes a restrictive respiratory pattern that may contribute to hypoxia and hypercapnia.⁴ Hypothyroidism also causes diminished central response to hypoxia and hypercapnia, resulting in respiratory acidosis.⁴ Pericardial effusion is a common complication of hypothyroidism. The incidence in adults with untreated hypothyroidism ranges from 30% to 80% as detected by echocardiography.⁵

Unfortunately, our patient was not diagnosed until she became very unwell with clinically important pericardial and pleural effusions. Because of the high prevalence of hypothyroidism and the possibility of it being missed, we recommend that all patients with Down's syndrome should be tested for hypothyroidism at regular intervals and before any surgical procedure requiring general anaesthesia.

Competing interests: None declared.

- 1 Stotia AK, Chaudhuri A, Muzulu SI, Harling D, Muthusamy R. Postoperative hypoxia in a woman with Down's syndrome: case outcome. *BMJ* 2005;330:1068.
- 2 Poeschel SM, Jackson IM, Giesswein P, Dean MK, Pezzullo JC. Thyroid function in Down syndrome. *Res Dev Disabilities* 1991;12:287-96.
- 3 Bereket A, Yang TF, Dey S, Blethen SL, Biancaniello TM, Wilson TA. Cardiac decompensation due to massive pericardial effusion. A manifestation of hypothyroidism in children with Down's syndrome. *Clin Paediatrics* 1994;33:749-51.
- 4 Behnia M, Clay A, Farber M. Management of myxoedematous respiratory failure: Review of ventilation and weaning principles. *Soc Clin Invest* 2000;320:368-73.
- 5 Kabadi UM, Kumar SP. Pericardial effusion in primary hypothyroidism. *Am Heart J* 1990;120:1393-5.

Lesson of the week

Underwater birth and neonatal respiratory distress

Zainab Kassim, Maria Sellars, Anne Greenough

In 1992 the House of Commons Select Health Committee's report on maternity services recommended that all hospitals should provide women with the "option of a birthing pool where this is practicable."¹ A subsequent surveillance study of all NHS maternity units between 1994 and 1996 found that 0.6% of all deliveries in England and Wales occurred in water.² Rawal and colleagues have suggested that water births have become popular among mothers and midwives because the buoyancy and warmth of the water promotes natural labour while providing a non-invasive safe and effective form of pain management.³ Practitioners and parents should remember, however, that birthing pools pose potential risks for the baby. We report on a newborn baby who developed respiratory distress due to aspiration after an underwater birth.

Case report

A full term male infant weighing 3150 g was born in the birthing pool of the labour ward of our hospital. His mother was a 34 year old, healthy primigravida who had had an uneventful pregnancy. She had gone into spontaneous labour at 40 weeks' gestation and had had no maternal fever during labour; at delivery the membranes had been ruptured for less than 18 hours. The baby was born underwater. He required no resuscitation but, when reviewed at one hour, was grunting. As the grunting persisted, he was admitted to the neonatal intensive care unit at 3 hours of age. He had no fever but was tachypnoeic and had intercostal recession and nasal flaring. He needed supplementary oxygen to maintain his oxygen saturation level at $\geq 92\%$; his need for supplementary oxygen persisted

for nine hours. He was screened for infection and started on antibiotics (benzylpenicillin and gentamicin). In view of his respiratory distress, which persisted for 48 hours, he was designated "nil by mouth" and fluid was administered intravenously until he had recovered. Chest radiography soon after admission showed widespread changes consistent with aspiration of the birthing pool water (figure). Further radiography, on day 3, showed resolution of the abnormalities, and the infection screen was negative. The infant made a full recovery and, when seen as an outpatient at age 3 months, was free of symptoms.

Discussion

Some researchers have suggested that "babies can only drown when submerged, only if they are already severely compromised and literally at their 'last gasp,' as water

Water birth can be associated with adverse effects in the newborn

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Chest radiograph showing widespread bilateral patchy, ill defined air space shadowing consistent with water aspiration

simulates vagal inspiration receptors causing glottic closure.¹⁴ In lambs, however, inhibitory mechanisms that prevent breathing until the lamb is in contact with cold air can be overridden by sustained hypoxia.⁵ Likewise, in a birthing pool, some babies with unrecognised hypoxia may gasp underwater. Indeed, the 1994 to 1996 survey cited two reports of water aspiration,² and similar cases have been documented in the literature.⁶⁻⁸

Our case report emphasises the adverse effects of aspiration of water in birthing pools. Although such events seem uncommon, this may be the result of under-reporting. Respiratory distress immediately after birth is common and has various aetiologies. Thus, unless a careful history is taken, the cause the respiratory distress may be misdiagnosed.⁹ We are confident that the case we report was due to aspiration of water as the infant developed symptoms soon after birth, with resolution by 48 hours. In addition, there were no risk factors for infection or indeed any bacterial infection identified. Infection after water birth has been described.¹⁰⁻¹² The baby in our case report was delivered after spontaneous labour at term, making transient tachypnoea of the newborn unlikely; indeed, the chest radiograph was consistent not with that diagnosis but with aspiration.

A systemic review of randomised trials has shown that immersion during labour is associated with significant reductions in the use of epidural, spinal, or paracervical analgesia and in women's reports of pain, but highlighted there were insufficient data to determine the outcome from randomised trials of birth in water for women or their infants.¹³ In addition to water aspiration and subsequent pulmonary oedema,⁸ however, other adverse neonatal outcomes after water birth have been reported; these include water intoxication, hyponatraemia, hypoxic ischaemic encephalopathy, cord rupture

with neonatal haemorrhage, and pneumonia.^{12 14} Women who have water births are usually considered to be "low risk," and so they and their infants should have an excellent prognosis. Our case report and review of the literature confirm that water birth has risks for the newborn. Practitioners and parents need to be aware of these potential risks so that mothers can make a fully informed decision about place of delivery.

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- House of Commons Health Select Committee. *Maternity services. Second report*. London: HMSO, 1992.
- Ruth E, Gilbert P, Tookey A. Prenatal mortality and morbidity among babies delivered in water: surveillance study and postal survey. *BMJ* 1999;319:483-7.
- Rawal J, Shah A, Stirk F, Mehtar S. Water birth and infection in babies. *BMJ* 1994;309:511-2.
- Kitzinger S. Sheila Kitzinger's letter from Europe: the waterbirth debate up-to-date. *Birth* 2000;27:214-6.
- Johnson P. To breathe or not to breathe. *Br J Obstet Gynaecol* 1996;103:202-3.
- Rosser J. Is water birth safe? The facts behind the controversy. *MIDIRS Midwifery Digest* 1994;4:4-6.
- Barry CN. Water births. Could saline in the pool reduce the potential hazards? *BMJ* 1995;310:1602.
- Nguyen S, Kuschel C, Teele R, Spooner C. Water birth—a near-drowning experience. *Pediatrics* 2002;110:411-3.
- Bowden K, Kessler D, Pinette M, Wilson E. Underwater birth: missing the evidence or missing the point? *Pediatrics* 2003;112:972-3.
- Rawal J, Shah A, Stirk F, Mehtar S. Water birth and infection in babies. *BMJ* 1994;309:511.
- Nagai T, Sobajima H, Iwasa M, Tsuzuki T, Kura F, Amemura-Maekawa J, et al. Neonatal sudden death due to Legionella pneumonia associated with water birth in a domestic spa bath. *J Clin Microbiol* 2003;41:2227-9.
- Pinette MG, Wax J, Wilson E. The risks of underwater birth. *Am J Obstet Gynecol* 2004;190:1211-5.
- Cluett ER, Nikodem VC, McCandlish RE, Burns EE. Immersion in water in pregnancy, labour and birth. *Cochrane Database Syst Rev* 2005;(1):CD000111.
- Schroeter K. Water births: a naked emperor. *Pediatrics* 2004;114:855-8.

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