

CASE REPORT

Obstetric outcomes in women who sustained a spinal cord injury during pregnancy

S Engel¹ and G Ferrara²**Study design:** Case report.**Setting:** Prince of Wales Spinal Cord Injuries Unit, Sydney, Australia.**Methods:** Interrogation of our unit database identified only two women who became spinal cord injured while pregnant; their medical records were reviewed and an unstructured follow-up telephone interview conducted 6 years after discharge. *Case 1:* CC sustained a fracture dislocation with paraplegia at the sixth thoracic level (T6) in a motorbike accident while she was pregnant, 12-week gestational age (GA). Profound shock and hypoxia complicated the injury and recurrent urinary tract infections complicated the rest of her pregnancy. A baby with arthrogryposis multiplex congenita was delivered at full term. Severe cerebral palsy (CP) and deafness were present at follow-up 6 years later. *Case 2:* A 33-year-old multigravida, 27 weeks GA, developed sudden, spontaneous onset of paraplegia (T3 ASIA B) due to an extradural haematoma, which was evacuated on the day of admission. Systolic blood pressure was maintained above 90 mm Hg during and after surgery. A normal, healthy boy was delivered by caesarean section at 40 weeks GA and remained so at 6 years.**Conclusion:** Traumatic spinal cord injury (SCI) with its attendant multiple potential insults to the developing foetus results in a high risk of foetal loss and malformation particularly in the first trimester. However, if the injury occurs later in pregnancy and if blood pressure and oxygenation are maintained, the risk of foetal loss and abnormality may be substantially reduced.*Spinal Cord* (2013) 51, 170–171; doi:10.1038/sc.2012.125; published online 18 December 2012**Keywords:** spinal cord injury; obstetric outcomes; complications of pregnancy; trauma

INTRODUCTION

Although pregnancy outcomes among women with spinal cord injury (SCI) are generally favourable,¹ there are few reports of outcomes in women who sustain a SCI during pregnancy.² Trauma is a major cause of maternal and foetal death, prematurity and low birth weight and the risk of foetal complications is higher in the more severe injuries and before 24 weeks' gestation.³ Hypoxia and hypotension can disrupt foetal structural development and cause neural damage and radiation exposure over 5 rads has been associated with foetal loss but uncomplicated spinal surgery may be safe during pregnancy.⁴

PATIENTS AND METHODS

Interrogation of a database of all admissions to our unit for the last 8 years, showed only two women who sustained SCI during pregnancy. Their medical records were reviewed and an unstructured telephone follow-up interview conducted. The reproductive risk of medications administered to both women before delivery was checked in MICROMEDEX⁵ (Shepard's and TERIS data bases). We report their obstetric outcome and 6-year follow-up.

Case report 1

In 2005, CC, a 28-year-old primigravida, 12 weeks gestational age (GA), sustained multiple thoracic spine fractures in a motorbike accident resulting in T6 ASIA A paraplegia and a haemothorax due to fractures of the ribs and sternum. She was profoundly shocked and required multiple blood transfusions, intercostal drainage and ventilatory support. Posterior pedicle screw fixation (T4–T7) and screw plate fixation of the sternum were performed the

following day and a T5/T6 vertebrectomy with iliac crest graft a week later. She was transferred by air from the United Kingdom to Australia.

Vaginal bleeding was not detected after injury. The uterus was shielded during radiological imaging. Indwelling catheterisation was required until after delivery. Thromboembolic disease prophylaxis consisted of enoxaparin 40 mg twice daily for 8 weeks after injury, then sodium heparin 5000 U three times per day for 3 weeks before delivery and enoxaparin for 6 weeks after. She also required ranitidine for prophylaxis of gastrointestinal bleeding, analgesics (narcotics and paracetamol), fluconazole for recurrent vaginal candidiasis, oral and intravenous antibiotics (cephalexin, amoxicillin, ampicillin, ceftriaxone, meropenem and gentamicin) for multiple urinary tract infections.

Uterine ultrasounds showed a vital foetus with normal heart beat (at weeks 13, 19 and 36 GA) but left talipes was first noted at week 13 GA and shortened femurs at week 36. Rupture of membranes and fever (39.4°C) occurred at week 37 GA and a 2.65-kg boy was delivered by emergency caesarean section (epidural anaesthesia). Autonomic dysreflexia did not occur before or during delivery.

At birth, Apgar was 7 at 1 and 9 at 5 min and arthrogryposis multiplex congenita (AMC) (hypotonic paralysis of the lower limbs, subluxed right hip, bilateral fixed knee contractures and talipes) was evident. Ultrasound of his spine and head, electroencephalograph, thyroid function tests, urine metabolic screen and liver function tests were within normal limits. Magnetic resonance imaging of his brain was normal at 2 months but showed symmetrical enlargement of the lateral ventricles suggestive of white matter damage at 2 years. Genetic review failed to detect any hereditary risk factors.

At follow-up in 2011, CC remained a T6 ASIA A paraplegic and had no other children. Her son had severe cerebral palsy and hearing tests showed a conductive hearing loss associated with episodes of otitis media.

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Case report 2

AL, a 33-year-old multigravida, week 27 GA, presented in 2005 with sudden, spontaneous onset of severe back pain, urinary retention, hypotension (90/30 mmHg) and T3 ASIA B paraplegia. An epidural mass from C7 to T3 and 70–80% canal narrowing were seen on magnetic resonance imaging. Removal of an extradural haematoma through C7 and T1 laminectomies was carried out on the same day. Systolic blood pressure was maintained above 90 mmHg during and after surgery by intravenous fluids and blood transfusion. Only calf compressors and stockings were used for thromboembolic disease prophylaxis. Other medications included oxycodone, paracetamol, ranitidine and docusate sodium.

She recovered sufficient sensory and motor function to walk unaided 1 week after surgery but urgency of micturition and defecation persisted and still does in 2011.

Ultrasound before and after spinal decompression indicated normal foetal development and there was no evidence of foetal distress on cardiotocographic monitoring. A normal, healthy boy was delivered by caesarean section at week 40 GA. In 2011, he was reported to be healthy and was developing normally.

DISCUSSION

AMC is a syndrome, evident at birth and characterised by two or more joint contractures in multiple body areas, which develop due to the inability of the foetus to move (akinesia) *in utero*. Foetal neurologic abnormality such as cerebral palsy (CP) is the aetiology in 80% of cases.⁶ Multiple causes are associated with AMC, including intrauterine vascular compromise (for example, severe blood loss), maternal teratogenic exposure (hyperthermia, infection, medications, alcohol, cocaine), maternal illness (for example, multiple sclerosis), genetic disorder of the foetus (for example, skeletal dysplasia) or extrinsic factors (for example, oligohydramnios).⁷ Reduced foetal movement and contractures (for example, talipes) seen on prenatal ultrasound are suggestive of AMC.⁶

Profound hypotension at the time of the SCI was probably the major cause of CP in case 1, as talipes were noted on ultrasound at 13 weeks, however, the fever at the time of delivery may have been an additional insult. Foetal cerebral ischaemia associated with maternal traumatic injury during pregnancy⁸ and maternal fever and infection at delivery have been reported to increase the risk of occurrence of CP and multiple risk factors compound the risk.⁹

The Micromedex data bases did not report an association between the medications administered and an increased risk of CP or other causes of AMC, however, there is a paucity of data on the teratogenic potential of some medications. Maternal exposure to gentamicin during pregnancy does carry a theoretical risk of sensorineural hearing loss but we were not able to find reports of foetal ototoxicity and otitis media is the more likely cause of the conductive hearing loss reported in case 1.

Traumatic SCI, with its attendant multiple potential insults to the developing foetus, results in a high risk of foetal loss and malformation, however if hypoxia, hypotension and fever can be controlled and the injury occurs later in pregnancy, the risk of foetal loss and abnormality may be substantially reduced. When managing a pregnant woman who sustains an acute SCI, maintenance of blood pressure and volume is important and the appropriateness of imaging, therapeutic interventions and nursing must be carefully considered. Close co-operation between the SCI service and a high risk obstetric unit is desirable.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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