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Paraplegia and pregnancy

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Abstract

Pregnancy is becoming increasingly common in women with paraplegia. Improvements in the rehabilitation and quality of life of these individuals have resulted in an increase in their desire to bear children. Numerous difficulties already faced by these women can be worsened by both pregnancy and the added complications of the condition itself. The latter include autonomic dysreflexia and respiratory dysfunction, pressure ulcers, recurrent urinary tract infections, spasms, pelvic contractures, and anaemia. Adequate awareness and training of the medical, nursing, physiotherapy and midwifery teams are key to ensuring that these patients receive optimal care throughout their pregnancy and the puerperium. This article describes the journey of a patient through her pregnancy and the postnatal period, and outlines the importance of the involvement of the multidisciplinary team in providing patient-centred care.

Keywords: multidisciplinary team, paraplegia, patient-centred care, pregnancy.

Introduction

Approximately 40 000 people in the UK suffer from paraplegia, and the majority of females with this condition are of child-bearing age. Women with paraplegia who want to become pregnant can often conceive naturally, given that they are able to maintain sexual function and their fertility has not been compromised (Bérard 1989). Their foetuses are not at any greater risk of early pregnancy losses or congenital abnormalities (Castro *et al.* 2014). However, pregnancy can increase these women's risk of recurrent urinary tract infections (UTIs), pressure ulcers, anaemia, pelvic contractures and spasms. Autonomic dysreflexia (AD) and respiratory dysfunction can occur at higher-level spinal cord transections. These patients are also more prone to silent labours, unattended deliveries, foetal malpresentation and foetal distress during episodes of AD (Dawood *et al.* 2014).

Case presentation

The present authors will describe the case of a 37-year-old woman who was thrown off a

motorcycle at high speed in 2015. She sustained a closed fracture of her T6 vertebra with a cord transection, as well as fractures of her scapula and multiple ribs, a traumatic haemothorax, and fusion of her T4–T7 vertebrae. Following a prolonged recovery and extensive physiotherapy, she was able to self-hoist and mobilize with her manual wheelchair (K-Series, Küschall AG, Witterswil, Switzerland). The subject lived with her partner, and occasionally required a carer to help her with dressing, but was otherwise independent in managing her daily activities. She maintained movement during the night by waking up to turn, and required intermittent catheterization to empty her bladder. The subject regulated her bowel movements through the use of glycerine suppositories and manual evacuation.

She spontaneously conceived her first pregnancy in 2016. Her pregnancy was complicated by recurrent confirmed UTIs – probably as a result of self-contamination – which lessened after judicious care with the catheterization technique. The subject's anomaly scan revealed that her baby had a right aortic arch, which was followed up postnatally. She was able to monitor the foetal movements by watching her abdomen, recognized symptoms of early AD when she

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experienced headaches and hypertension, and self-medicated with nifedipine.

Unfortunately, the subject was the victim of another road traffic accident at week 28 of her gestation, when she drove into a fence at high speed as a result of sudden blurring of her vision. Luckily, she did not sustain any serious injuries, and no cause for the visual disturbance was found other than low blood pressure.

Because of the high risk of AD in labour, and following a multidisciplinary discussion, it was agreed that her baby would be delivered by Caesarean section. The subject was electively admitted to the antenatal ward from 37 weeks because she was beginning to experience AD with increasing Braxton Hicks contractions and felt safer in hospital. This also provided the manual handling and occupational therapy teams with an opportunity to prepare her to use appropriate equipment to care for her child independently. An uncomplicated Caesarean delivery took place at 39 weeks, and the baby was born in good condition.

Postnatally, the subject made a good recovery, and was able to return to her normal level of function shortly after. She was able to breast-feed and care for her baby with the support of her family, community midwives and the physiotherapy team.

Paraplegia and pregnancy

Pre-conception evaluation

It is essential to assess patients' physical abilities and limitations prior to conception. They should also be informed about the increase in difficulty in breathing towards the end of their pregnancy, and possible alterations in bladder care and worsening of mobility, which affect 4.5% of women (Jackson & Wadley 1999). Therefore, patients' baseline respiratory and renal functions should be checked, as well as their risk of AD and any other chronic medical conditions. It is preferred that: their physical and psychological rehabilitation has been completed; they are made aware of the existence of support groups; and they maintain regular physiotherapy, and good bladder and bowel care (ACOG 2002). Patients should be booked in under the care of a consultant who has experience of dealing with paraplegic patients, and managed by a multidisciplinary team of doctors, anaesthetists, physiotherapists, occupational therapists, spinal nurses and specialist midwives.

Urinary tract infections

Pregnancy itself can pose an increased risk of UTIs, with a higher chance of progression to pyelonephritis as a result of smooth muscle relaxation of the urinary tract, most probably secondary to increased levels of progesterone. The weight of the gravid uterus can also lead to incomplete emptying of the bladder, as well as vesico-ureteric reflux, leading to urinary stasis (Matuszkiewicz-Rowińska *et al.* 2015). In patients with paraplegia, this risk is further increased as a result of the disrupted signals between the spinal cord and micturition centre, resulting in a neurogenic urinary tract dysfunction (Adriaansen *et al.* 2017). Incomplete emptying and urinary incontinence, together with regular use of intermittent self-catheterization and indwelling catheters, will put these patients at added risks of UTIs. These infections are not only threatening to the well-being of the women, particularly if ascending, but can also lead to preterm labour in pregnancy.

Therefore, it is crucial that care is taken to avoid UTIs by: educating patients about aseptic catheterization techniques; ensuring that complete bladder emptying occurs; and explaining the signs and symptoms of an infection. The American College of Obstetricians and Gynecologists recommends that frequent urinary cultures are carried out, and that these patients are prescribed prophylactic antibiotics (ACOG 2002). It is also key to ensure that urinary retention is prevented, since this can lead to AD by causing visceral distension.

Respiratory and cardiovascular systems

The abdominal muscles that are involved in respiration receive innervation from the T5 to L1 vertebrae, as well as the lower six intercostal and subcostal nerves (Terson de Paleville *et al.* 2011). Therefore, patients with lesions above the T4 spinal level are at risk of paralysis of the ventilation muscles, increased bronchial secretions, and reduced mobility and, hence, ability to adequately clear their chest, which may lead to pneumonia. Pregnancy can worsen their respiratory abilities, particularly in the third trimester. It is recommended that these women receive regular chest physiotherapy, have their respiratory function assessed at each antenatal visit, and undergo continuous positive airway pressure or mechanical ventilation if their function is sub-optimal (Ohry *et al.* 1978).

Orthostatic hypertension can occur as a result of the lack of sympathetic innervation below

the spinal cord lesion, which can be worsened by reduced systemic vascular resistance secondary to pregnancy (Pereira 2003). Blood pressure and heart rate should also be checked at antenatal visits, and a systolic blood pressure of 20–40 mmHg above that recorded at their booking appointment can suggest AD (CSCM 2002).

Autonomic dysreflexia

Autonomic dysreflexia occurs in 85% of patients with a transection above the T6 spinal level (Castro *et al.* 2014). It is characterized by exaggerated sympathetic activity in response to a stimulus below the lesion as a result of the disconnection of negative feedback, and results in catecholamine release and vasoconstriction (ACOG 2002). Patients will experience the symptoms and signs of hypertension, bradycardia, nausea and sweating, and respiratory distress. The condition can lead to serious consequences, such as haemorrhagic stroke, convulsions and hypertensive encephalopathy (Castro *et al.* 2014). In pregnancy, episodes of AD can also cause uteroplacental vasoconstriction, and lead to foetal distress and foetal bradycardia. Triggers can include any cause of distension or manipulation of the hollow viscus below the spinal cord lesion, such as urinary retention, a vaginal examination, constipation and labour.

Treatment includes removal of the stimulus, or medical management with fast-acting antihypertensive drugs, such as nifedipine (Lindan *et al.* 1986). Patients should be educated about the symptoms and signs that need to be monitored in case an episode occurs in the community, and have a supply of antihypertensive drugs to use when required. During labour, an early epidural anaesthetic is recommended since this will block the stimuli, and any epidural or spinal anaesthesia use should extend up to the T10 spinal level (ACOG 2002).

Other complications

Weight gain, tissue oedema and immobility can lead to an increase in decubitus ulcers during pregnancy (Hambly & Martin 1998). It is advised that patients undergo regular skin checks, change position every 2 h and use a pressure-relieving mattress, and that Waterlow scoring and pressure mapping are used during admissions (ACOG 2002). Anaemia can precipitate the formation of ulcers, a problem that can be avoided by optimizing haemoglobin levels. Patients should also be counselled to avoid excessive weight gain.

The risk of thrombosis increases in the first 6 months following the initial injury, but this reduces thereafter (Dawood *et al.* 2014). Therefore, an assessment of the risk of venous thromboembolism should be performed on an individualized basis, and routine thromboprophylaxis is not recommended.

Because of increased progesterone levels and reduced gut contractility, pregnancy can further worsen the constipation from which many paraplegic patients suffer (Bonapace & Fisher 1998). In severe cases, it can lead to AD. This problem can be ameliorated by maintaining a high-fibre diet, laxative use and manual evacuation (Dawood *et al.* 2014).

Obstetric complications

Women with lesions above the T10 spinal level are unable to feel uterine contractions, and foetal movements are either not perceived or altered. This can put these patients at risk of silent labours, unattended deliveries and the inability to monitor foetal movements to ensure foetal well-being. Such women are often taught the technique of self-palpation of contractions and foetal movements, as well as other signs of labour, such as cramps and spasticity. Some authors recommend elective admission late in the third trimester to avoid an unattended delivery (Hughes *et al.* 1991).

Poor abdominal muscle tone can increase the risk of foetal malpresentation, and may affect pushing during the second stage of labour. Previously, higher rates of preterm births were seen in this patient population; however, these have been reduced by the prevention of UTIs and more-frequent surveillance (Hughes *et al.* 1991).

Labour and delivery

Unless cephalopelvic disproportion is suspected, the preferred method of delivery in this patient population is a vaginal one, particularly in cases of women who suffered pelvic fractures before adulthood (Hughes *et al.* 1991). Patients who are at risk of AD are advised to undergo an early epidural anaesthetic in order to reduce this risk (Cross *et al.* 1991). Water births are not recommended because of the difficulties in hoisting these women out of the pool in the case of an emergency. Pelvic and spinal contractures can affect foetal descent. It may be difficult to place these women in the lithotomy position because of spasticity and altered anatomy. It is also important to avoid forced flexion if spasms are encountered, and to ensure optimal positioning.

Catheterization and vaginal examinations should be performed gently to avoid AD, preferably after the insertion of epidural or spinal anaesthesia.

Patients can often have an increased need for instrumental deliveries because of their poor abdominal muscle tone, and also to shorten the second stage of labour in order to prevent AD. Episiotomies can be repaired under local anaesthesia with absorbable sutures (Dawood *et al.* 2014).

Postnatal care

Following a Caesarean section, patients should be turned every 2 h to avoid pressure ulcers. Physiotherapy and hoisting are recommended from day 5 after giving birth (Dawood *et al.* 2014). It is recommended that epidural needles remain in place postnatally in order to avoid AD, and patients should continue to receive regular analgesia, even if they are not experiencing pain. Thromboprophylaxis should be assessed and given on an individualized basis. Breast-feeding can be done as normal; however, if the lesion is above the T4 spinal level, then extra stimulation may be required to stimulate breast milk production (Cowley 2005). Therefore, it is recommended that patients discuss their options with regard to breast-feeding with a specialist midwife antenatally.

Discussion

The present case outlines some of the complications that can be encountered in paraplegic patients during their pregnancies. The subject suffered from recurrent UTIs, some of which were resistant to multiple antibiotic treatments. This situation was improved with careful catheterization, and following a discussion with the microbiologist, it was not believed that prophylactic antibiotics were necessary. The subject was very aware of the symptoms of AD, and she would check her own blood pressure during these episodes and self-medicate with nifedipine if this was raised. She was able to monitor foetal movements by watching her abdomen, and was taught how to self-palpate for contractions. Having experienced episodes of AD, the subject was well informed about the risks associated with labour, and opted for a Caesarean section. The elective admission prior to her surgery ensured that all the equipment required for manual handling was prepared, and all medical staff had been educated about and were aware of her situation.

Conclusion

Pregnancy worsens many complications in paraplegic patients, and can pose challenges in the management of these individuals through the antenatal, labour and postnatal periods. Through adequate education and training of medical, midwifery and physiotherapy staff, multidisciplinary teams can work together to provide the optimum care for these women. By adopting a patient-centred approach, we can ensure the best possible outcome, and enable paraplegic patients to enjoy motherhood.

References

- Adriaansen J. J. E., van Asbeck F. W. A., Tepper M., *et al.* (2017) Bladder-emptying methods, neurogenic lower urinary tract dysfunction and impact on quality of life in people with long-term spinal cord injury. *The Journal of Spinal Cord Medicine* **40** (1), 43–53.
- American College of Obstetricians and Gynecologists (ACOG) (2002) ACOG Committee Opinion No. 275: Obstetric management of patients with spinal cord injuries. *Obstetrics and Gynecology* **100** (3), 625–627.
- Bérard E. J. J. (1989) The sexuality of spinal cord injured women: physiology and pathophysiology. A review. *Paraplegia* **27** (2), 99–112.
- Bonapace E. S., Jr & Fisher R. S. (1998) Constipation and diarrhea in pregnancy. *Gastroenterology Clinics of North America* **27** (1), 197–211.
- Castro J. S., Lourenço C. & Carrilho M. (2014) Successful pregnancy in a woman with paraplegia. *BMJ Case Reports* **2014**: bcr2013202479. DOI: 10.1136/bcr-2013-202479.
- Consortium for Spinal Cord Medicine (CSCM) (2002) Acute management of autonomic dysreflexia: individuals with spinal cord injury presenting to health-care facilities. *The Journal of Spinal Cord Medicine* **25** (Suppl. 1), S67–S88.
- Cowley K. C. (2005) Psychogenic and pharmacologic induction of the let-down reflex can facilitate breastfeeding by tetraplegic women: a report of 3 cases. *Archives of Physical Medicine and Rehabilitation* **86** (6), 1261–1264.
- Cross L. L., Meythaler J. M., Tuel S. M. & Cross A. L. (1991) Pregnancy following spinal cord injury. *Western Journal of Medicine* **154** (5), 607–611.
- Dawood R., Altanis E., Ribes-Pastor P. & Ashworth F. (2014) Pregnancy and spinal cord injury. *The Obstetrician and Gynaecologist* **16** (2), 99–107.
- Hambly P. R. & Martin B. (1998) Anaesthesia for chronic spinal cord lesions. *Anaesthesia* **53** (3), 273–289.
- Hughes S. J., Short D. J., Usherwood M. M. & Tebbutt H. (1991) Management of the pregnant woman with spinal cord injuries. *British Journal of Obstetrics and Gynaecology* **98** (6), 513–518.
- Jackson A. B. & Wadley V. (1999) A multicenter study of women's self-reported reproductive health after spinal cord injury. *Archives of Physical Medicine and Rehabilitation* **80** (11), 1420–1428.
- Lindan R., Lehler E., Freehafer A., Lyons A. M. & Coletta H. (1986) Further experience with nifedipine in the treatment of autonomic dysreflexia. *ASIA Bulletin* **4**, 10–15.

- Matuszkiewicz-Rowińska J., Małyszko J. & Wieliczko M. (2015) Urinary tract infections in pregnancy: old and new unresolved diagnostic and therapeutic problems. *Archives of Medical Science* **11** (1), 67–77.
- Ohry A., Peleg D., Goldman J., David A. & Rozin R. (1978) Sexual function, pregnancy and delivery in spinal cord injured women. *Gynecologic and Obstetric Investigation* **9** (6), 281–291.
- Pereira L. (2003) Obstetric management of the patient with spinal cord injury. *Obstetrical and Gynecological Survey* **58** (10), 678–687.
- Terson de Paleville D. G. L., McKay W. B., Folz R. J. & Ovechkin A. V. (2011) Respiratory motor control disrupted by spinal cord injury: mechanisms, evaluation, and restoration. *Translational Stroke Research* **2** (4), 463–473.

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