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ORIGINAL ARTICLE

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Immediate postpartum neurological deficits in the lower extremity: a prospective observational study

A. Richards,[a] T. McLaren,[a] M.J. Paech,[b,c] E.A. Nathan,[d,e] E. Beattie,[b] N. McDonnell[b,c,e]

[a]*The University of Notre Dame Australia, Fremantle, Western Australia, Australia*
[b]*Department of Anesthesia and Pain Medicine, King Edward Memorial Hospital, Perth, Western Australia, Australia*
[c]*School of Medicine and Pharmacology, The University of Western Australia, Perth, Western Australia, Australia*
[d]*Biostatistics and Research Design Unit, Women and Infants Research Foundation, Perth, Western Australia, Australia*
[e]*School of Women's and Infants Health, The University of Western Australia, Perth, Western Australia, Australia*

ABSTRACT

Background: Neurological deficits noted immediately after childbirth are usually various obstetric neuropathies, but prospective studies are limited. The main study aim was to quantify and describe immediate postpartum neurological deficits of the lower extremity, including the buttocks.

Methods: A prospective observational study of postpartum women delivering in a single maternity hospital during three months of 2016. Among 1147 eligible women, 1019 were screened for symptoms of lower extremity numbness or weakness within eight to 32 hours of delivery. Consent to undergo a detailed neurological evaluation was sought from those reporting symptoms. Risk factors were identified using logistic regression.

Results: Thirty five women (3.4%) reported symptoms, 27 entered the study and 23 (2.0%) had objective signs of a neurological deficit. The most common injuries were mild lumbosacral plexopathies and cluneal nerve compression. Most deficits were sensory, half of these also having a motor deficit that did not impact functionally. Based on analysis of 22 cases involving a likely intrapartum deficit, no association was found with parity, body weight, duration of labour, mode of delivery or neuraxial block. A past history of a neurological condition or a back injury was associated with odds ratios of 7.98 and 4.82 respectively. There were no neurological deficits that were clinically concerning or that were likely a complication of a neuraxial block.

Conclusion: Transient neurological complications after labour and delivery are infrequent, mainly sensory involving multiple lumbosacral nerve roots or specific sacral cutaneous nerves, and they typically resolve within a short time.

Keywords: Neurological deficits; Postpartum; Lower extremity; Neuraxial block

Introduction

Serious neurological deficits after childbirth are rare, but minor and transient sequelae which are mainly sensory rather than motor, have been reported with an incidence of 1 in 100[1] to 1 in 500.[2–5] A large prospective study with good ascertainment reported new injuries within two to three days of delivery in approximately 1% of women[1] and another study reported an incidence of approximately 0.6%.[4] Most deficits were obstetric palsies, involving neuropathies of the lumbar nerve roots and sacral plexus. These injuries are thought to occur as a result of local myelin damage of axons under compression by the fetal head on the pelvic brim or following anatomical stretch or compression, including when women remain in certain positions for long periods during labour and delivery.[1,6–8] Injuries have been associated with nulliparity, prolonged second stage of labour and regional block.[2,4] Peripheral nerves such as the lateral cutaneous nerve of the thigh ("meralgia paraesthetica – incidence 0.4% in pregnancy),[7,8] appear susceptible to injury because of physiological and anatomical changes during pregnancy and nerve roots and nerves may be injured during parturition or operative delivery. Examples are the femoral nerve (incidence 0.4%)[1] and the cluneal (posterior cutaneous sacral) nerves (incidence greater than 1%).[9] Regional analgesic or anaesthetic blocks very rarely cause serious

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Corresponding author. Prof Michael Paech, Department of Anesthesia and Pain Medicine, King Edward Memorial Hospital, 374 Bagot Rd, Subiaco, Western Australia, Australia.
E-mail address: michael.paech@health.wa.gov.au

neuropathies, through a variety of mechanisms.[10–13] Transient symptoms, mainly pain rather than neurological deficit, occur in up to 4% of women receiving spinal anaesthesia.[14] Previous studies demonstrating an association between postpartum sensory deficits and neuraxial blocks[2,4] have been of limited value, due to potential biases such as retrospective data collection and different assessment methods of the study cohorts. In contrast, a large and well-conducted prospective study of all patients, regardless of method of labor analgesia, did not demonstrate an association.[1] Similarly, some deficits are reported to be more common after caesarean than vaginal delivery, although the evidence comes from a case-control study and case series.[4,9]

The aims of this prospective observational study were firstly, to quantify the incidence of postpartum lower extremity neurological deficits presenting in the early postpartum period (within hours to days) and to identify the different types of neuropathy and their clinical impact. Secondarily, we investigated potential risk factors for such deficits.

Methods

This prospective, observational study was conducted in a single tertiary maternity unit between May and July 2016. Study approval (2016036EW) was obtained from the hospital Human Research Ethics Committee of King Edward Memorial Hospital. A convenience sample of 1019 postpartum women was screened for the presence of lower extremity numbness, weakness or altered sensation (Fig. 1). Women who reported symptoms were approached by one of the authors (AR or TM) to provide written informed consent to undergo a comprehensive neurological history and lower extremity (sacrum, buttocks and lower limbs) examination. Exclusion criteria included non-English speaking women and those with an active neurological condition.

All women who had given birth were identified from the hospital birth register and were screened within the period of 8–32 hours from delivery by department nursing and research midwives. Three questions were asked: 1. "Do you have any numb patches or pins-and-needles in your back, buttocks or legs?" 2. "Do one or both of your legs feel weak or abnormal?" 3. "Is light touching (e.g. clothing) on the back, buttocks or legs uncomfortable?" Those women answering any question in the affirmative were invited by the investigators (AR or TM) to give written informed consent to enter the study and undergo a clinical assessment. Demographic data about patient and delivery mode characteristics were obtained from the medical record for all women who were screened. Once study consent had been obtained, the enrolling investigators performed a focussed, structured clinical history and neurological examination. This evaluated the study participants' relevant past medical history and their lower extremity sensory and motor function, including gait and the ability to perform a squat-to-stand exercise and a heel or toe stand. Individual examination findings were reviewed by a consultant obstetric anaesthetist (MP) and a consultant neurologist. Those women with objective signs of a motor or sensory deficit (or both) had their likely injury classified, the final diagnosis being determined by consensus.

Demographic and obstetric information included maternal age, height, weight, smoking status, relevant neurological history, parity, mode of delivery (spontaneous vaginal, assisted vaginal, elective or emergency caesarean), the duration of the stages of labour and the time spent pushing, infant birth weight, type of neuraxial block if used (epidural, spinal or combined spinal-epidural analgesia or anaesthesia), difficulty or pain during insertion of neuraxial block and the duration of epidural catheterisation. Appropriate clinical care was available to any woman with an apparent neurological injury of functional impact. Study participants with objective evidence of neurological changes were contacted by telephone six weeks later, on two occasions if required, to determine whether or not their signs or symptoms had persisted.

Statistical considerations

This convenience sample was sufficient to perform logistic regression to identify risk factors for a new neurological deficit among the 23 women with objective neurological signs. We chose to exclude from logistic regression analysis four study participants who described symptoms that had resolved fully prior to physical examination; and one woman with meralgia paraesthetica, a deficit that may have been present prior to delivery. Continuous data were summarised by median and interquartile range and categorical data using frequency distributions. Univariate comparisons between women having or not having a neuraxial block; and giving birth by caesarean or vaginal delivery; were performed using the Mann–Whitney U-test for continuous outcomes and the Chi-square or Fisher exact test for categorical outcomes. Univariate logistic regression was conducted for possible risk factors such as nulliparity, patient body mass index or height, medical history, infant birthweight (classified low <2500 g, normal 2500–4000 g and high >4000 g), duration of labour (first stage <8 or ≥ 8 hours; second stage <60, 60–120 or >120 minutes), mode of delivery and variables that differed between women receiving or not receiving a neuraxial block or having vaginal versus operative delivery. Covariates with P-values <0.15 on univariate analysis were assessed in a multivariable regression using a forward stepwise method to avoid overfitting. Data were presented as odds ratios with 95% confidence intervals (CI). All tests were two-sided and a P-value