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The Bupivacaine Guessing Game?

A study of variances in spinal local anaesthetic volume for preterm caesarean section

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Introduction

Intrathecal spread of local anaesthetic (LA) is increased in pregnant patients. Enhanced neural sensitivity, exaggerated lumbar lordosis and reduced CSF volume, due to venous engorgement and IVC pressure from the gravid uterus, are contributary.[1,2]

Effects are, predictably, reduced in preterm patients, however the *magnitude* of reduction of LA spread is unpredictable. This is identified as an independent risk factor for block failure.[2] This retrospective study aimed to analyse variation in LA dosing for spinal anaesthesia for preterm caesarean delivery.

Methods

Badgernet™ was utilised to search for preterm caesarean deliveries at PRMH, between November 2017 and October 2020. Using a random number generator, case notes for cohorts of patients, refined by their gestation at delivery, between 24 and 36 weeks, were identified.

Notes were reviewed for five patients per gestational week. The dose of LA, level of block and adequacy of anaesthesia for the duration of their operation was recorded.

Results

All gestational weeks contained 5 patients, except the earliest group, where fewer cases under spinal anaesthesia were available. One patient was excluded from the 30-32 week group as spinal block height was not documented.

Fifty seven patients were included. Each patient had 0.3mg (0.3mls) of diamorphine with a variable amount of 0.5% hyperbaric bupivacaine in the intrathecal injection.

Twelve patients had a CSE sited, proportionally mostly in the 24–26 weeks group (n=5). Spinal block was noted as adequate if no supplemental analgesia or CSE epidural top-up was required. Results are displayed in **Table 1**.

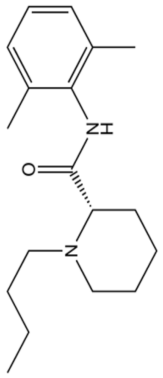


Table 1: LA dose range per week gestation and block adequacy

Gestation (weeks)	LA volume (mls) Median (IQR [range])	Minimum effective LA dose (mls)	Highest LA dose with *inadequate* block (mls)	Median [range] block height	Adequate block %
24 - 26 n=8	3.2 (3.0 - 3.5 [2.7 - 3.5])	2.7	3.5	T3 [T8 – T2]	75
27 - 29 n=15	3.0 (2.5 - 3.2 [2.3 - 3.5])	2.3	3.4	T4 [T4 – T3]	93
30 - 32 n=14	3.0 (2.9 - 3.0 [2.6 - 3.2])	2.7	3	T3 [T4 – C7]	86
33 - 35 n=15	2.7 (2.6 - 3.0 [2.5 - 3.2])	2.5	3	T4 [T4 – T2]	80
36 n=5	2.5 (2.5 - 2.7) [2.2 – 3.0])	2.2	2.5	T3 [T4 – T3]	80

Discussion

Higher volumes of LA are administered at earlier gestations. There was a large variation between LA volume and block adequacy; a higher dose was not always better. The lowest doses of LA in groups 24-26 and 27-29 weeks did *not* correlate with block failure, contrasting with lowest doses in groups 30–32 and 33-35 weeks, which required supplementation. The highest percentage of block failure was in the most premature group.

There were no serious complications noted from patients due to high blocks, the highest of which was C7 after 3.2mls of LA in head-down position.

This study illustrates the unpredictability of spinal anaesthetic dosing for preterm caesarean delivery. However, it provides some useful information about efficacy and safety over a range of doses and gestations which may be useful to anaesthetists.

References

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2. Adesope A.E, Einhorn A.M et al. The impact of gestational age and fetal weight on the risk of failure of spinal anesthesia for caesarean delivery. IJOA: International Journal of Obstetric Anaesthesia. 2016; 26: 8-14