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A case of failed spinal in an infant with cystic fibrosis and respiratory failure

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A Case of Failed Spinal in an Infant with Cystic Fibrosis and Respiratory Failure

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Introduction

We describe a case of failed spinal anesthesia in a neonate after satisfactory successful spinal local anesthetic administration. We describe the risk factors for failed spinal anesthesia. Concerns about repeat spinal are also addressed.

Case description

A 4 month old, 4.4 kg female child, with cystic fibrosis and failure to thrive secondary to pancreatic insufficiency presented for laparoscopic assisted gastric tube placement. Her past medical history was significant for recurrent bronchiolitis with acute respiratory failure.

After induction of general anesthesia (GA), an intravenous line was obtained and spinal anesthetic was performed at L5-S1 level with 1mg/kg of hyperbaric bupivacaine. Patient was awakened and there was no block even after 20 min period.

A second spinal injection was administered at L4-L5 level. Second spinal was unsuccessful.

Surgery was successfully completed under GA and perioperative course was uneventful.

Case discussion

Neonatal spinal compared to adult spinal:

- Need larger dose due to large volume of cerebrospinal fluid (CSF) compared to adult
- Short duration of action due to rapid turnover of the CSF
- Spinal cord ends at a lower level compared to an adult. Spinal cord ends at the lower border of L1 in adults; in a newborn it ends at L3 level.

Dose of Neonatal spinal: 1 mg/kg of bupivacaine. Inguinal hernia repair is the most common operation performed under spinal anesthesia in a neonate.

Causes for failure of spinal anesthesia [1,2]

Unsuccessful lumbar puncture due to poor patient positioning or anatomical variability
Inadequate dosage
Loss of injectate
Misplaced injectate due movement of needle during injection
Inadequate intrathecal spread of successfully injected local anesthetic solution due to anatomical variability
Physiochemical incompatibility of adjunct solution due to alteration of pH (addition of vasoconstrictor solution)
Local anesthetic resistance due to mutation of the sodium channel

Management of failed spinal [1,2]

No block	General anesthesia Repeat spinal: Wait for 20 min and confirm that there is no block before attempting a repeat spinal
Patchy block	GA or intravenous sedation
Unilateral block	Postural adjustments, sedation or GA
Inadequate height	Postural adjustments, IV sedation , GA

Repeating the spinal block [1, 2]

Confirm the complete failure of the spinal block and wait for 20 min before attempting a repeat spinal. In the event of patchy block or block with inadequate height, repeat spinal anesthetic block can result in high block and total spinal anesthesia. Total spinal anesthesia can result in respiratory and cardiovascular compromise.

Risk factors for Neurotoxicity following neuraxial blockade

1. Preexisting neuropathy
2. Spinal stenosis
3. Spinal cord compression due to disc herniation
4. Multiple attempts at spinal leading to spinal hematoma
5. Indwelling spinal micro catheters constantly delivering local anesthetic solution at a particular nerve root
6. Higher concentration of spinal local anesthetic (0.75% bupivacaine compared to 0.5% Bupivacaine) [3]
7. Addition of vasoconstrictors [3]

Conclusion

In our case we did a repeat spinal due to patient's respiratory condition which also did not work due to unknown reason.

In the absence of above known risk factors, spinal neurotoxicity is an unlikely event.

The concern of such repeat spinal is a high block, not neurotoxicity.

References:
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3. Verlinde M , Hollmann MW, Stevens MF ,Hermanns H Werdehausen R, Lirk P : Local Anesthetic-Induced Neurotoxicity. International Journal of Molecular Sciences Int J Mol. Sci. 2016; 17 : 339