Changing the physical properties of the local anaesthetic may improve the epidural block quality

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Introduction: Hyperbaric bupivacaine has more density and viscosity than the plain bupivacaine which may slow its diffusion across the epidural space. Solutions injected into the epidural space spreads freely, but not necessarily uniformly, through the epidural space and coats the cylindrical Dural sac while partly leaking from the foramina .

Increasing the density and viscosity of the injected solution may limit this phenomenon and reduce the total injected volume of LA and getting a more prolonged effect.

The present study tested whether the use of hyperbaric bupivacaine would prolong the duration of epidural analgesia and reduce the volume of the infused anaesthetic.

Methods: 100 ASA I-3 patients were randomly allocated to two equal parallel groups; either heavy bupivacaine or plain bupivacaine. Patients received a bolus of 16 ml of either form of the local anaesthetic solution followed by a continuous infusion of 4 ml/hour of bupivacaine 0.5% with fentanyl 100 mcg until the end of the surgery. A 2ml/hour continuous infusion, started on PACU admission and continued for 48 hours, the infusion rate was increased if the patient complained of pain

Results: Hyperbaric Marcaine prolonged the duration of analgesia (13 ± 3 versus 8 ± 3 hours, $P<0.0001$), reduced the pain intensity at 3, 6, 12, 24 and 48 hours postoperatively ($P=0.04$, <0.0001 , <0.0001 , <0.0001 and infused local anaesthetic (65 ± 17 versus 167 ± 62 ml, $P<0.0001$). 0.045 respectively) and substantially reduced the volume of the infused local anaesthetic (65 ± 17 versus 167 ± 62 ml, $P<0.0001$).

Future research: - From the results of the present study it is obvious that increasing the density and viscosity of Bupivacaine resulted in prolongation of the duration of analgesia and reduced the total volume of the infused LA. Adding inert materials of higher density and viscosity to La solution could be of help. Further research is required to replicate this finding in other local anesthetics such as levobupivacaine and using other vehicles of higher density and viscosity.

This figure reveals the volume of 48 hours infusion of LA, values are represented as mean $\pm$ SD. The volume of la infusion was substantially reduced in heavy Marcaine group. $P<0.0001$

The first request for analgesia in hours between the heavy Marcaine and the plain Marcaine groups. Heavy Marcaine substantially delayed the request for analgesia, $P<0.0001$.

Conclusion: The use of hyperbaric Marcaine may be useful to prolong the duration of analgesia, reduce the total volume of LA thus, may reduce chances for Local anaesthetic toxicity.

References
1-Hogan Q: Epidural catheter tip position and distribution of injectate evaluated by computed tomography. ANESTHESIOLOGY 1999; 90:964 –70
2. Hogan Q: Distribution of solution in the epidural space:Examination by cryomicrotome section. Reg Anesth Pain Med 2002; 27:150 – 6
3. Higuchi H, Adachi Y, Kazama T: Effects of epidural salineinjection on cerebrospinal fluid volume and velocity waveform: A magnetic resonance imaging study. ANESTHESIOLOGY 2005; 102:285–92