

AnesthesiaDotCalm Newsletter



News You Can Use

September 9, 2007

Single Malt versus Blended Scotch: Which is Better?

I am a purist of sorts. I don't like blended coffees and I hate french roast. I eat only Fuji apples and call me archaic but I like watermelon with seeds although I have to admit it is sort of disgusting watching others trying to expectorate those buggers at a dinner table. I'll drink only imported beers. Call me a snob, but American beers, for the most part, taste like dirty mineral water. I enjoy sipping on a single malt scotch and I prefer the 30 year old type. Unfortunately, I can only dream about relishing the smoothness of this libation since the cost of this liqueur is out of my price range. And when it comes to the practice of anesthesia I try to employ as few agents as possible to achieve the anesthetic state. But I must equivocate when it comes to the practice of obstetric anesthesia, particularly when providing spinal anesthesia to the parturient for a cesarean section. In this particular situation, I believe in better living through chemistry. I commonly combine bupivacaine, fentanyl and morphine to achieve what I think is the optimal anesthetic state. And there are many reasons for this amalgam.

Back in the early 1980s, researchers demonstrated faster onset of conduction blockade (increased sensitivity) in bupivacaine pretreated nerve fibers in pregnant rabbits(1). The reason for this is that opioids and local anesthetics exert their antinociceptive effect in the spinal cord by different yet complementary mechanisms. The mu-agonist, fentanyl, exerts its action by opening K^+ channels and reducing Ca^{++} influx, resulting in inhibition of transmitter release. The mu-agonists also have a direct postsynaptic effect, causing hyperpolarization and a reduction in neuronal activity(2,3). The majority of local anesthetics, on the other hand, act mainly by blocking voltage-gated Na^+ channels in the axonal membrane (4) and some local anesthetics may also interfere with synaptic transmission by a presynaptic inhibition of Ca^{++} channels in addition to their effects on nerve conduction (4).

In clinical practice, I have found that local anesthetics without the addition of one of the diphenylpiperidines (fentanyl or sufentanyl) just don't make the grade. Sensory blockade established through the use of a single local anesthetic often requires supplemental intravenous analgesia to cover visceral discomfort. In fact, the incidence of peritoneal traction pain is quite pronounced when bupivacaine is used *sans* narcotic. Back in 1980s when the safety of bupivacaine was being evaluated, researchers reported the incidence of visceral pain to be as high 70.5% when bupivacaine at doses ranging from 7.5 to 10mg are administered and only when the dose approached 12.5 mg was the incidence reduced to 31.6% (5,6,7). Yet with the addition of as little as 10 to 12.5 mcg fentanyl, the optimal dose of bupivacaine can be reduced to 8 mg while completely abolishing the pain due to peritoneal traction(8,9,10)

The addition of fentanyl to bupivacaine not only significantly shortens the onset of anesthesia/analgesia, it also significantly prolongs the duration of analgesia without increasing motor blockade(9,11). Moreover, there is evidence that the addition of fentanyl significantly reduces the incidence of hypotension when bupivacaine is used for establishing anesthesia for cesarean section (12) not because the narcotic has some magical protective ability but rather because it allows for a reduction in the total dose of bupivacaine. In fact the incidence of hypotension falls to about 25% when 12.5 mcg of fentanyl is combined with 8 mg bupivacaine, a dose normally not effective in controlling visceral pain but when combined with fentanyl mitigates this problem in the majority of patients. By itself, bupivacaine at doses of 12.5 mg is necessary to protect against visceral pain but the incidence of hypotension increase to about 50% (10).

But wait, there's more good news. Small doses of the diphenylpiperidines (fentanyl or sufentanil) when added to bupivacaine not only tend to increase the duration of analgesia in the early postoperative period when compared to bupivacaine by itself but also mitigate the need for intraoperative antiemetic medication (6,7,11,12,13). And the addition of narcotics do not effect neonatal outcome as measured by neonatal Apgar scores, neurological and adaptive capacity scores, umbilical blood gas values (13,14)

So if I'm concerned about reducing the total dose of the local anesthetic while also protecting against visceral pain and extending the duration of the block, why not just use intrathecal morphine and forgo the fentanyl or sufentanyl? The answer is quite evident when you consider that the addition of morphine to bupivacaine, although prolonging the need for postoperative analgesics is not effective in offering immediate analgesia when given intrathecally since the onset of intrathecal morphine is approximately 30 minutes(15). This is not surprising especially when you consider that penetration of intrathecally-administered radiolabeled morphine into deep and superficial layers of the rat spinal cord maximally occurs about 30 minutes after injection - a time which correlates to peak analgesia to the tail flick test (i.e. application of thermal stimuli)(16).

Thus, there is a time to be a purist, but when it comes to providing optimal anesthesia for the parturient requiring a cesarean section, ***the blended scotch provides a better kick than the single malt.***

References:

1. Datta S, Lambert DH, Gregus J, Gissen AJ, Covino BG. Differential sensitivities of mammalian nerve fibers during pregnancy. *Anesth Analg* 1983; 62: 1070-1072
2. Ocana M, Del Pozo E, Barrios M, Robles LI, Baeyens JM. An ATP-dependent potassium channel blocker antagonizes morphine analgesia. *Eur J Pharmacol* 1990; 186:377-8
3. Dickenson AH. Mechanisms of the analgesic actions of opiates and opioids. *Br Med Bull* 1991; 47: 690-702
4. Butterworth JFIV, Strichartz GR Molecular mechanisms of local anesthesia: a review. *Anesthesiology* 1990; 72: 711-34

5. Pedersen H, Santos AC, Steinberg ES, Schapiro HM, Harmon TW, Finster M.. Incidence of visceral pain during cesarean section: the effect of varying doses of spinal bupivacaine. *Anesth Analg*. 1989 Jul;69(1):46-9
6. Obara M, Sawamura S, Satoh Y, Chinzei M, Sekiyama H, Tamai H, Yamamoto H, Hanaoka K. The effect of intrathecal fentanyl added to hyperbaric bupivacaine for caesarean section Masui. 2003 Apr;52(4):378-82
7. Dahlgren G, Hultstrand C, Jakobsson J, Norman M, Eriksson EW, Martin H. Intrathecal sufentanil, fentanyl, or placebo added to bupivacaine for cesarean section. *Anesth Analg*. 1997 Dec;85(6):1288-93
8. Choi DH, Ahn HJ, Kim MH. Bupivacaine-sparing effect of fentanyl in spinal anesthesia for cesarean delivery. *Reg Anesth Pain Med*. 2000 May Jun;25(3):240-245.
9. Shende D, Cooper GM, Bowden MI The influence of intrathecal fentanyl on the characteristics of subarachnoid block for caesarean section. *Anaesthesia*. 1998 Jul;53(7):706-710
10. Bogra J, Arora N, and Srivastava P Synergistic effect of intrathecal fentanyl and bupivacaine in spinal anesthesia for cesarean section *BMC Anesthesiol*. 2005; 5: 5. Published online 2005 May 17. doi:10.1186/1471-2253-5-5
11. Bano F, Sabbar S, Zafar S, Rafeeq N, Iqbal MN, Haider S, Aftab S, Sultan ST Intrathecal fentanyl as adjunct to hyperbaric bupivacaine in spinal anesthesia for caesarean section. *J Coll Physicians Surg Pak*. 2006 Feb;16(2):87-90.
12. Ben-David B, Miller G, Gavriel R, Gurevitch A Low-dose bupivacaine-fentanyl spinal anesthesia for cesarean delivery. *Reg Anesth Pain Med*. 2000 May-Jun;25(3):235-239
13. Sanli S, Yegin A, Kayacan N, Yilmaz M, Coskunfirat N, Karsli B. Effects of hyperbaric spinal ropivacaine for caesarean section: with or without fentanyl. *Eur J Anaesthesiol*. 2005 Jun;22(6):457-461
14. Karaman S, Kocabas S, Uyar M, Hayzaran S, Firat V. The effects of sufentanil or morphine added to hyperbaric bupivacaine in spinal anaesthesia for caesarean section. *Eur J Anaesthesiol*. 2006 Apr;23(4):285-291
15. R. Fournier, E. Van Gessel, M. Macksay, Z. Gamulin (2000) Onset and offset of intrathecal morphine versus nalbuphine for postoperative pain relief after total hip replacement *Acta Anaesthesiologica Scandinavica* 44 (8):940-945
16. Nishio Y, Sinatra RS, Kitahata LM, Collins JG. Spinal cord distribution of 3H-morphine after intrathecal administration: relationship to analgesia. *Anesth Analg*. 1989 Sep;69(3):323-327