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Intrathecal dexmedetomidine versus morphine as adjuvant to bupivacaine in elective LSCS: a comparative study

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Abstract

Introduction: Postoperative analgesia is very essential for the postpartum women as it enables faster rehabilitation and initiation of breastfeeding. Spinal anaesthesia is most commonly used anaesthetic technique. So, we tried to compare the efficacy of dexmedetomidine and morphine as adjuvant to bupivacaine in lower segment caesarean section.

Methods: This prospective comparative study was conducted on sixty parturients of ASA grade I and II scheduled for elective lower segment caesarean section under spinal anaesthesia. Cases were randomly divide into two groups: Group D received 12.5 mg of 0.5% hyperbaric bupivacaine with 5 µgdexmedetomidine and Group M received 12.5 mg of 0.5% hyperbaric bupivacaine with 125 µg morphine. Parameters recorded were the duration of time to achieve T8 sensory blockade, the time to S1 level sensory regression, the time of motor regression to Bromage 0, the time to first rescue analgesia and incidence of side effects.

Results: The mean time of sensory block to reach T8 dermatome was significantly faster in group D ($p=0.00004$). The mean time of sensory regression to S1 and motor regression to reach modified Bromage 0 was significantly longer in group D ($p<0.05$). Both 1 & 5 min APGAR were similar in both the groups. Although the time to first rescue analgesia was longer in group D, it was statistically not significant. Side effects were more in group M.

Conclusion: Prolong postoperative analgesia with minimal side effects makes 5 µg dexmedetomidine as an alternative to125 µg morphine as adjuvant to spinal bupivacaine in caesarean section.

Keywords: Bupivacaine, Dexmedetomidine, Intrathecal, LSCS, Morphine

Introduction

Postoperative analgesia is very essential for the postpartum women as it enables faster rehabilitation and initiation of breastfeeding. Also, endocrine changes and stress response because of pain may interfere with lactation.(1) Pain relief after caesarean section varies from a single suppository to high tech invasive analgesia techniques for 48 hours.(1) Spinal anaesthesia is most commonly used anaesthetic technique. Various additives are used with hyperbaric bupivacaine to enhance intraoperative and postoperative analgesia.

Dexmedetomidine, a highly selective α_2 adrenergic agonist is being used in the perioperative, critical care settings and also as an adjunct to regional anaesthesia.(2,3) In view of previous studies showing dexmedetomidine efficacy as an adjunct to heavy bupivacaine, our study aimed to compare the intrathecal morphine with dexmedetomidine as an adjuvant in caesarean patients scheduled under spinal anaesthesia.(4,5,6)

Materials and Methods

Ours was a prospective, randomized and double blinded controlled study. The study was conducted after obtaining the ethical committee clearance and informed consent from the parturients. Sixty parturients at term of ASA grade I and II scheduled for elective lower segment caesarean section under spinal anaesthesia were selected. Exclusion criteria were patient's refusal, history of chronic drug abuse, bleeding disorders, local infection, known allergies to the study drug and patients not fit for spinal anaesthesia.

Preoperative evaluation was done the day before surgery for all the patients. Nil per orally was advised for 6 hours. All the parturients received tablet ranitidine 150 mg the night before and 150 mg on the morning of surgery.

Baseline vitals were recorded in the operation theatre. Injection ondansetron 8mg intravenously was given as aspiration prophylaxis and preloading with 500ml of Lactated Ringer's solution was done prior to the procedure.

Spinal anaesthesia was administered with under aseptic technique using 25 gauge quincke's needle at L_3-L_4 intervertebral space. Patients were randomly divided into two groups by sealed envelope technique:

Group D receiving 12.5 mg of 0.5% hyperbaric bupivacaine and 5 µg dexmedetomidine Group M receiving 12.5 mg of 0.5% hyperbaric bupivacaine and 125 µg morphine.

The patients were made to lie in supine position immediately after the completion of spinal injection. When the pulse oximeter decreased below 94%, oxygen(4L/min) was administered via face mask. Hypotension, defined as a decrease of systolic blood pressure by more than 30% from baseline or a fall below 90 mm Hg, was treated with incremental IV doses of ephedrine 5mg and intravenous fluid as required. Bradycardia, defined as heart rate below 50/min, was treated with 0.3 or 0.6 mg IV atropine. The incidence of

adverse effects such as nausea, vomiting, shivering, pruritus, respiratory depression and hypotension were recorded.

Sensory testing was assessed by loss of pinprick to dermatome levels every two minutes until the highest level had achieved. Surgery was allowed after achieving T8 sensory blockade level. Further testing was performed at 20 minute intervals until recovery of S1 dermatome.

The motor level was assessed by modified Bromage score:

0 – Able to move the hip, knee and ankle;

1 – Unable to move the hip but is able to move the knee and ankle.

2 – Unable to move the hip and knee but is able to move the ankle.

3 – Unable to move the hip, knee and ankle.

Complete motor block recovery was assumed when modified Bromage score was 0.

Parameters recorded were the duration of time to achieve T8 sensory blockade, the time to S1 level sensory regression, the time of motor regression to Bromage 0, the time to first rescue analgesia and incidence of side effects.

All durations were calculated considering the time of spinal injection as zero. Vitals were recorded 5 minutes before then 5, 10, 15, 20 and 25 minutes after the intrathecal injection and subsequently every 15 minutes.

Pain scores using Visual analogue scale (VAS) was assessed in the postoperative period. Any patient showing VAS more than or equal to 4 or requesting for analgesia was administered a supplemental dose of intravenous tramadol 50mg.

Statistical analysis: Statistical analysis was done using the SPSS version 17. Sample size was calculated based on previous studies according to time to first rescue analgesia with mean difference of 155min and standard deviation of 153 min.[7,8] A sample size of 21 patients in each group were needed for 90% power of study with 5% significance level. Data was expressed as mean and standard deviation number and percentage. Quantitative data are calculated using unpaired students t- test and qualitative data by Chi- square test. P<0.05 was considered to be statistically significant.

Results

There was no significant difference in patient's demographic profile or duration of surgery (Table 1). All the patients completed the study.

The mean time of sensory block to reach T8 dermatome was 5.4±2.4 min in group D and 5.8±3.8 min in group M. The mean time of sensory regression to S1 was significantly longer in dexmedetomidine group (414±25 min) as compared to morphine group (376±12 min). Also the mean time of motor regression to reach modified Bromage 0 was 372±20 min in group D and 325±30 min ($p < 0.05$). Although the time to first rescue analgesia was longer with dexmedetomidine but it was not statistically significant.

Nausea/vomiting was more in group M than group D. There was significant value of pruritus in group M as compared to group D. Shivering was more common with morphine (p=0.02).

Table 1: Demographic profile

Characteristics	Group D (n=30)	Group M (n=30)	p value
Age in years *(Mean ± SD)*	25.10±2.08	25.22±2.04	0.91
Weight in Kg *(Mean ± SD)*	68.16±4.68	68.46±4.56	0.88
ASA I: II *(Ratio)*	24: 6	25:5	0.75
Duration of LSCS in minutes *(Mean ± SD)*	45±15.6	43.6±16.5	0.76

Table 2: Comparison of efficacy of both the drugs

Parameters	Group D (n=30)	Group M (n=30)	p value
Time to achieve T8 sensory blockade in minutes *(Mean ± SD)*	8.4±2.4	9.59±5.38	0.00004
Time of sensory regression to S1 in minutes *(Mean ± SD)*	414±25	376±12	0.00016
Time of motor regression to Bromage 0 in minutes *(Mean ± SD)*	372±20	325±30	0.001
Time to first rescue analgesia in hours *(Mean ± SD)*	8.9±2.89	7.7±2.32	0.0 8
Median APGAR Score 1 min 5 min	 8 9	 8 9	

Table 3: Side Effects

Side effects	Group D (n=30)	Group M (n=30)	p Value
Nausea/ Vomiting *n(%)*	3(10%)	7(23.3%)	0.09
Pruritus *n(%)*	0	9(30%)	0.0032
Hypotension *n(%)*	6(20%)	4(13.3%)	0.25
Bradycardia *n(%)*	2(6.6%)	1(3.33%)	0.30
Shivering *n(%)*	2(6.6%)	8(26.6%)	0.02

Discussion

Spinal anaesthesia is the most favourable technique for caesarean section.[9] Mostly opioids are used as spinal adjuvants in caesarean cases but it has adverse effects like emesis, pruritus and the possibility of respiratory depression secondary to rostral spread.[10] Intrathecal α_2 adrenoreceptor agonist acts by binding to the presynaptic C-fibers and postsynaptic dorsal horn neurons. They produce analgesia by depressing release of C-fibre transmitters and by hyperpolarization of postsynaptic dorsal horn neurons.[11,12] Intrathecal α_2-

receptor have anti-nociceptive action for both somatic and visceral pain.[13] It also inhibits the release of the nociceptive neurotransmitter substance P.[14] As per previous studies, 5µg intrathecal dexmedetomidine would produce better postoperative analgesia with hyperbaric bupivacaine in spinal anaesthesia with minimal side effects.[5,11,15]

Girgin et al have concluded that the dose 0.1mg intrathecal morphine produces analgesia comparable with doses as high as 0.4 mg, with significantly less pruritus when combined with low-dose bupivacainein caesarean patients.[17] So we preferred 125µg intrathecal morphine for the study to avoid the side effects.

Our study has shown that both sensory and motor block is prolonged significantly with 5µg dexmedetomidine than 125 µg morphine with hyperbaric bupivacaine. Gupta et al has concluded that 5µg dexmedetomidine seems to be a better alternative to 25µg fentanyl as adjuvant to spinal bupivacaine in surgical procedures.[4] The time to request for first rescue analgesia was longer with dexmedetomidine, though statistically not significant.[4,5,16]

APGAR score was similar at 1 and 5 minutes among both the groups. Previousstudies that described the use of dexmedetomidine in parturients have mentioned that babies delivered were with normal APGAR scores which proves that even if there is any uteroplacental transfer, it doesn't affect the fetal well-being.[18,19,20] Dexmedetomidine has a high placental retention (0.77 maternal/foetal index) and does not cross placenta significantly.[18]

In our study, the incidence of pruritus was significantly high with intrathecal morphine as shown by previous studies.[21,22] Shivering was more common in morphine group. Dexmedetomidine has anti-shivering property as observed by Talke et al.[23] More incidence of nausea/vomiting was seen in the patients receiving intrathecal morphine as in previous studies.[24,25,26] No incidence of respiratory depression was seen in both the group.

To conclude, prolong postoperative analgesia with minimal side effects makes 5 µg dexmedetomidine as an alternative to 125 µg morphine as adjuvant to spinal bupivacaine in caesarean section.

Limitations

Patients were followed till the time to first rescue analgesia instead of 24hr postoperatively.

There is no of a control group (only intrathecal bupivacaine) to compare the effect of drugs separately in our study.

References

1. Perez-Escamilla R, Maulen-Radovan I, Dewey KG. The association between caesarean delivery and breast-feeding outcomes among Mexican women. Am J Public Health.1996;86(6):832-6.
2. Vercauteren M. Analgesia after Caesarean section: are neuraxial techniques outdated? J Rom Anest Terap Int. 2009;16(2):129-130.
3. Grewal A. Dexmedetomidine: New avenues. J Anaesthesiol Clin Pharmacol. 2001;27(3):297-302
4. Mantz J, Josserand J, Hamada S. Dexmedetomidine: New insights. Eur J Anaesthesiol. 2011;28(1):3-6.
5. Gupta R, Verma R, Bogra J et al. A comparative study of intrathecal dexmedetomidine and fentanyl as adjuvants to Bupivacaine. J Anaesthesiol Clin Pharmacol. 2011;27(3):339-43.
6. Al-Mustafa MM, Abu-Halaweh SA, Aloweidi AS et al. Effect of dexmedetomidine added to spinal bupivacaine for urological procedures. Saudi Med J. 2009;30(3):365-70.
7. Raval DL, Chaudhary M. A clinical comparative study between dexmedetomidine v/s clonidine with bupivacaine intrathecally in major orthopaedic lower limb surgery. J Res Med Dent Sci. 2014;2:77–82.
8. Singh SN, Subedi A, Prasad JN, Regmi MC. A comparative study to assess the effect of intrathecal bupivacaine with morphine or butorphanol on post-operative pain relief following abdominal and vaginal hysterectomy. Health Renaissance. 2013;11:246–9.
9. Mahendru V, TiwariA, Katyal S et al. A comparison of intrathecal dexmedetomidine, clonidine, and fentanyl as adjuvants to hyperbaric bupivacaine for lower limb surgery: A double blind controlled study. J Anaesthesiol Clin Pharmacol. 2013;29(4):496-502.
10. Carvalho B, Drover DR, Ginosar Y et al. Intrathecal fentanyl added to bupivacaine andmorphine for cesarean delivery may induce a subtle acute opioid tolerance. Int J Obstet Anesth. 2012;21(1):29–34.
11. Carvalho F Amaral Egydio de, Tenorio SB. Comparative study between doses of intrathecal morphine for analgesia after caesarean. Brazilian J Anesthesiol. 2013;63(6):492–9.
12. Kanazi GE, Aouad MT, Jabbour-Khoury SI et al. Effect of low-dose dexmedetomidine or clonidine on the characteristics of bupivacaine spinal block. Acta Anaesthesiol Scand. 2006; 50(2):222-7.
13. Shah A, Patel I, Gandhi R. Haemodynamic effects of intrathecal dexmedetomidine added to ropivacaine intraoperatively and for postoperative analgesia. Int J Basic Clin Pharmacol. 2013;2:26-29.
14. Al-Ghanem SM, Massad IM, Al-Mustafa, Al-Zaben KR et al. Effect of Adding Dexmedetomidine versus Fentanyl to Intrathecal Bupivacaine on Spinal Block Characteristics in Gynecological procedures: A Double Blind Controlled Study. Am J Appl Sci. 2009;6(5):882-7.
15. Candiotti KA, Bergese SD, Bokesch PM et al. Monitored anaesthesia care with dexmedetomidine: A prospective, randomized, double-blind, multicentre trial. Anesth Analg. 2010;110(1):47-56.
16. Samal S, Rani P, Chandrasekhar LJ, Jena SK. Intrathecal Buprenorphine or intrathecal Dexmedetomidine for postoperative analgesia: A comparative study. The Health Agenda. 2014;2(1):1-5.
17. Girgin NK, GorbetA, Turker G et al. Intrathecal morphine in anesthesia for cesarean delivery: dose-response relationship for combinations of low-dose intrathecal morphine and spinal bupivacaine. J Clin Anesth. 2008;20(3):180-5.
18. Eid HE, Shafie MA, Youssef H. Dose related prolongation of hyperbaric bupivacaine spinal anaesthesia by dexmedetomidine. Ain Shams J Anesthesiol. 2011;4:83-95.
19. Nair AS, Sriprakash K. Dexmedetomidine in pregnancy:

Review of literature and possible use. J Obstet Anaesth Crit Care. 2013;3(1):3-6.
20. Palanisamy A, Klickovich RJ, Ramsay M et al. Intravenous dexmedetomidine as an adjunct for labor analgesia and caesarean delivery anaesthesiaina parturient with a tethered spinal cord. Int J Obstet Anesth. 2009;18(3):258-61.
21. Abu -Halaweh SA, Al Oweidi AK, Abu-Malooh H et al. Intravenous dexmedetomidine infusion for labour analgesia in patient with preeclampsia. Eur J Anaesthesiol. 2009;26(1):86-7.
22. Charuluxananan S, Somboonviboon W, Kyokong O, Nimcharoendee K. Ondansetron for treatment of intrathecal morphine -induced pruritus after cesarean delivery. Reg Anesth Pain Med. 2000;25:535-9.
23. Dahl JA, Jeppesen IS, Jorgensen H et al. Intraoperative and postoperative analgesic efficacy and adverse effects on intrathecal opioids in patients undergoing caesarean section with spinal anesthesia. Anesthesiology. 1999;91(6):1919-27.
24. Talke P, Tayefeh F, Sessler Dl et al. Dexmedetomidine does not alter the sweating threshold, but comparably and linearly reduces the vasoconstriction and shivering thresholds. Anaesthesiology. 1997;87(4):835-41.
25. Gadsden J, Hart S, Santos AC. Post-cesarean delivery analgesia. Anesth Analg. 2005;101:S62-9.
26. Palmer CM, Emerson S, Volgoropolous D, Alves D. Dose – response relationship of intrathecal morphine for postcesarean analgesia. Anesthesiology. 1999;90(2):437-44.