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Original Research Article

Comparison of clonidine and dexmedetomidine as adjuvants for ropivacaine in ultrasound guided transversus abdominis plane block for post caesarean analgesia

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ABSTRACT

Background: Transversus abdominis plane block is an important regional anaesthesia technique for postoperative analgesia after caesarean section. Addition of adjuvants to local anaesthetic in TAP block helps in improving the duration of analgesia. Objective of current study was to compare clonidine and dexmedetomidine as adjuvants to 0.2% ropivacaine in USG guided TAP block for duration of postoperative analgesia in caesarean section under spinal anaesthesia.
Methods: A total of 75 pregnant patients belonging to ASA I-II scheduled for caesarean section were included and divided into three groups; Group I-0.2% Ropivacaine plus normal saline, Group II-0.2% Ropivacaine plus 50 mcg clonidine and Group III-0.2% ropivacaine plus 50 mcg dexmedetomidine. The patients were compared for duration of analgesia, total number and amount of rescue analgesia utilized in 24 hours.
Results: The mean duration of analgesia was found to be more (statistically significant $p<0.05$) and number as well as amount of rescue analgesic doses were reduced in group III as compared to group I and group II.
Conclusions: Dexmedetomidine is a better alternative to clonidine as adjuvant for 0.2% ropivacaine in USG guided TAP block to extend the duration of postoperative analgesia and decreased 24-hour analgesic requirement in caesarean section.

Keywords: Transversus abdominis plane, Caeserean section, Ropivacaine, Clonidine, Dexmedetomidine

INTRODUCTION

Postoperative pain management after caesarean section is an important aspect of obstetric anaesthesia because in addition to maternal agony it affects the nursing of newborn child. In recent times, c (TAP) block has been the frequently studied mode of regional analgesia as a part of multimodal analgesia for lower abdominal surgeries like lower segment caesarean section (LSCS), urological surgery etc.[1] It involves injection of drug between plane of internal oblique and transversus abdominis muscle.[2] The use of ultrasonography in performing the transversus abdominis plane (TAP) block gives the advantage of precision due to visualization of abdominal planes, observing direct drug injection and hence improves the success and outcome of TAP block.[3] Long acting local anesthetics have advantage of longer duration of block and prolonged postoperative analgesia

decreasing postoperative analgesic requirement. Ropivacaine, one of the newer long-acting amide local anaesthetic, is the stereoisomer of bupivacaine and has been shown into be less toxic than bupivacaine.[4] The addition of an adjuvant to ropivacaine can further have advantage in prolonging the duration of block and postoperative analgesia.[5] In this regard alfa-2 agonists, previously used as antihypertensive agents, have been utilized for the role of adjuvants to local anaesthetics in nerve blocks. Clonidine, an imidazole, with selective partial agonist activity at alpha 2 adrenergic receptors, is being used to prolong the duration of analgesia when used in combination with local anaesthetic agents.[6] Dexmedetomidine, a highly selective alpha 2 adrenoreceptor agonist (1600 folds more selective for alpha 2 receptors) with sedative, sympatholytic and analgesic properties have been found to be safe and effective in various neuraxial blocks and regional anaesthesia and has been shown to improve the quality of anaesthesia and reduce postoperative analgesia requirement.[7,8] The presentstudy was undertaken to compare the efficacy of clonidine and dexmedetomidine as adjuvants to ropivacaine in USG guided TAP block for duration of pain relief in post-caesarian patients done under spinal anaesthesia.

METHODS

TAP block

At the end of surgery, a linear high frequency USG probe was placed transversely in midaxillary line between iliac crest and sub-costal margin to visualise three abdominal muscle layers- transverses abdominis muscle (TAM), internal oblique muscle (IOM) and external oblique muscle (EOM). A 22-G needle was inserted medially in plane (in plane technique) under the probe and advanced so that needle tip reached upto the plane between internal oblique muscle and transversus abdominis muscle in midaxillary line. 1-2 ml of saline was injected first after negative aspiration to ensure correct needle placement (Transversus abdominis plane is seen expanding by the injected saline in pic-A).

The prefilled syringes of local anaesthetic mixtures were injected on both sides (20 ml on either side). Patients as well as the anaesthesiologist who was performing TAP block were unaware of the allocated group. External oblique, internal oblique and transverses abdominis muscle and hypo-echoic area of TAP by injected drug solution into transverses abdominis plane is depicted in (Figure 1). Right side of (Figure 1) also exhibits external oblique muscle (EOM) internal oblique muscle (IOM) and transversalis abdominis muscle (TAM). Patients were shifted to PACU where an anaesthesia resident and nurse were assessing and managing the post-operative pain (who were blinded to group allocation), by visual analogue scale (VAS) of 0-10 mm (0=no pain, 10=worst pain imaginable) at every 2 hours for first 12 hours and 6hourly thereafter till 24 hours. Duration of analgesia was calculated from the time of giving block at the end of surgery to the time when VAS was more than or equal to 4 (moderate pain). At this time rescue analgesia was given with tramadol (TMD) 50 mg iv in 100 ml normal saline. Time and number of doses of TMD were noted on separate record sheet.

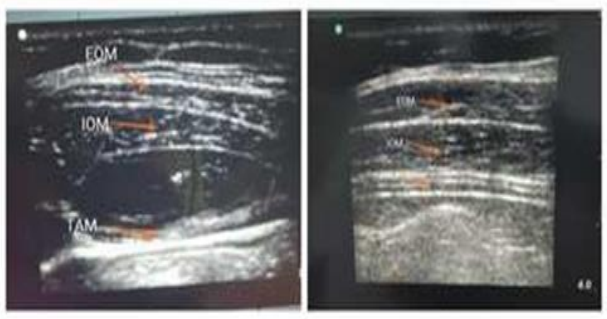

Figure 1: External oblique muscle, internal oblique muscle and transversalis abdominis muscle and hypoechoic area of TAP by injected solution into transversalis abdominis plane.

Sample size

Based on pilot study and taking mean pain free duration as the parameter, minimum of patients was required in each group to give significant difference in duration of analgesia with a power of 80% at an alpha level of 0.05. To cover up for dropout 25 patients were allocated in each group.

Data analysis

Statistical analysis was performed by the SPSS program for Windows, version 17.0. Continuous variables were presented as mean±SD, and categorical variables as absolute numbers and percentages. Normally distributed continuous variables were compared using ANOVA. VAS pain scores were reported as a mean±standard deviation (SD). Categorical variables were analyzed using the chi-square test. For all statistical tests, a p value less than 0.05 were taken to indicate a statistically significant difference.

RESULTS

Patient characteristics in preoperative period are given in the (Table 1). The three groups did not differ preoperatively with respect to mean age, weight, duration of surgery, ASA grade distribution with $p>0.05$. As shown in (Table 2) time for first rescue analgesia was more in group III compared to group II and group I, the total amount of tramadol used in group III was 130.1±22.2 mg was least compared to group II and group I (statistically significant $p<0.001$). Mean VAS scores at different time intervals is depicted in (Figure 2). Lower VAS scores in group II and group II upto 18 hours but at 24 hours VAS scores are similar.

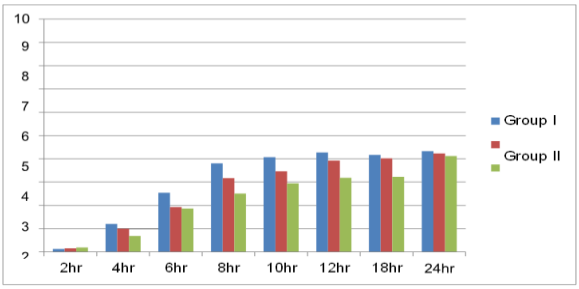

Figure 2: Mean VAS scores at different time intervals.

DISCUSSION

Postoperative analgesia after caesarean section is a challenging aspect because it not only demands adequate maternal pain relief (who is expected to perform nursing of newborn) but also should be safe enough for both mother and child.[9] Pain in caesarean section has both somatic (from the lower abdominal incision) and visceral components (from the uterus and adjacent structures) and hence demands multimodal analgesia for treatment.

Table 1: Demographic data and duration of surgery as (mean±SD).

Demographic data/parameters	Group I ropivacaine	Group II ropivacaine and clonidine	Group III ropivacaine and dexmedetomidine	P value
Age (years)	26.85±3.2	24.74±4.4	25.14±3.1	0.81
Weight (kg)	57.25±6.3	59.72±6.2	59.72±7.3	0.7
Duration of surgery (min)	57.1±5.9	59.04±4.8	55.04±5.8	0.19
ASA I/II	14/11	12/13	15/10	0.25

Table 2: Duration of post operative analgesia and rescue analgesic doses utilized.

Demographic data/parameters	Group I ropivacaine	Group II ropivacaine and clonidine	Group III ropivacaine and dexmedetomidine	P value
Time of first rescue analgesic (hrs)	6.18±1.6	7.9±0.8	10.8±0.56	<0.05
Total amount of TMD required (mg)	130.1±22.2	84±17.5	43±18.3	<0.001
Total number of TMD doses required	1.57±0.74	0.7±0.49	0.5±0.24	<0.001

The regional anaesthesia techniques like TAP block are required to manage somatic pain carried by nerve fibres fromT-10 to L-1.[10] The systemic analgesics are required in addition to regional blocks to cover up for visceral pain.[11] TAP block was first performed by Rafi AN in 2001 and later has gained popularity as postoperative regional analgesia, with its performance under USG guidance having advantage of real time visualisation of structures and local anaesthesia infiltration.[1,12]

TAP block has been frequently studied block in post-caesarean analgesia because of the minimal side effects of drugs used. However, the duration of analgesia provided by a single shot TAP block is usually inadequate to cover up time of postoperative pain and hence there is need for additional supplemental opiods. Hence various adjuvants have been added to local anaesthesia mixtures to increase the duration of analgesia.[13] The use of alfa 2 agonists as adjuvants to LA in other nerve blocks have resulted in increasing the duration of analgesia to significant level with reduction in postoperative consumption. In the studies conducted previously, ropivacaine and dexmedetomidine in TAP block for various abdominal surgeries have shown reduced VAS score upto 12 hours postoperatively and less requirement of supplemental analgesia as compared to ropivacaine alone.[14-16] A similar efficacy in prolonging the duration of analgesia has been seen with use of clonidine as adjuvant to local anesthesia in TAP block for caesarean section.[17] USG guided TAB block has shown to decrease the postoperative opioid requirement after general anaesthesia in caesarean section however when compared to intrathecal long acting opiods TAP block did not show additional benefits in pain score.[18,19]

There was significant increase in duration of analgesia in group III as compared to group II and group I, the time for first rescue analgesia was 6.18±1.4 hrs in group I, 7.9±0.8 hours in group II and 10.8±.0.56 hours in group III. The total numbers of rescue analgesic doses in 24 hours were significantly less in group III compared to II and I. The mean total amount of tramadol required in group III was 43±18.3 mg, was significantly (<0.001) less compared to other two groups. The VAS score in first 12 hours was less in group III as compared to II and I but after hours there was statistically insignificant difference in the VAS scores.

A similar observation has been done on VAS score in postoperative period with dexmedetomidine as adjuvant to bupivacaine in TAP block.[20,21] Lower pain scores in early postoperative period helps in early ambulation and

better nursing of newborn by mother. Therefore, in our present study, we have found that addition of 50 microgram dexmedetomidine to 0.2% ropivacaine in USG guided TAP block for patients undergoing caesarean section prolonged the duration of analgesia, decreased the amount and number of rescue analgesia in first 24 hours. The VAS scores in first 12 hours were less and effect was significantly more than clonidine and control group.

Limitations

Need of multimodal analgesia for caesarean section due to visceral and somatic component of pain. Period of overlap between regression of spinal anaesthesia and TAP block during early postoperative period.

CONCLUSION

Therefore, in present study, we found that dexmedetomidine and ropivacaine combination is better than clonidine and ropivacaine combination or ropivacaine alone for USG guided TAP block in patients undergoing caesarean section under spinal anaesthesia resulting in prolonging the duration of analgesia, decreasing the amount and number of rescue analgesics in first 24 hours.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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