Volume : 5 | Issue : 4 | April 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Research Paper

Comparison of Pre-Emptive and Intra-Operative Administration Of Epidural Ketamine or Dexamethasone With 0.2% Ropivacaine For Post-Operative Analgesia In Lower Abdominal Surgery

Medical Science

KEYWORDS : postoperative analgesia, Epidural Ketamine and dexamethasone, Lower abdominal surgery.

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ABSTRACT

Aim : To test whether a better reduction in post-operative pain and analgesic consumption could be achieved by pre-emptive and intra-operative administration of epidural dexamethasone or ketamine with ropivacaine, in patients undergoing lower abdominal surgery.

Material and Method : Patients were random divided into three groups, GROUP C (Control):Patient receiving preemptive and intraoperative epidural 0.2% ropivacaine (10ml), GROUP D: Patient receiving preemptive and intraoperative epidural 0.2% ropivacaine (10ml) + 5mg dexamethasone, GROUP K: Patient receiving preemptive and intraoperative epidural 0.2% ropivacaine (10ml) + 50mg ketamine.

Results : Postoperative pain was observed for 24 hrs with Visual Analogue Scale. Longer Duration of post-operative analgesia and lesser requirement of rescue analgesics were observed in group K than group D.

Conclusion : Pre-emptive and intraoperative epidural administration of ketamine 50 mg as adjuvant with 0.2% ropivacaine causes better post-operative analgesia and less requirement of analgesics in post-operative period than preemptive and intra-operative epidural administration of dexamethasone 5 mg without increasing side effects.

INTRODUCTION

Effective pain management is an integral part of modern anaesthetic practice. Adequate post-operative pain control can improve recovery and reduce morbidity. A multimodal approach with different drugs reduce the amount of each single drug used and gives better result. Epidural analgesia is highly effective for postoperative pain management[1]. Following drugs can be used in a variety of combinations-NSAIDS, opioids, local anaesthetics alone or with combination of adjuvant like ketamine, clonidine and dexamethasone. Ketamine, a N-methyl-D-aspartate receptor antagonist inhibits central sensitisation due to peripheral nociception thus potentiating the analgesic effect[2]. ***Kanawa Y et al***[3] studied the role of epidural ketamine for postoperative pain relief after gynecological operation in a double blind manner and compared with epidural morphine. ***Youm Yi Jo et al***[4] studied that corticosteroids have a powerful anti-inflammatory action and have demonstrated reduced pain and swelling fater various surgeries[5]. Steroids are also known to inhibit phospholipase A_2 and the expression of cyclooxygenase-2 during inflammation. Thus, reduced prostaglandin synthesis suppresses hyperalgesia associated with acute nociception during surgery. The steroids given epidurally were effective in the treatment of lower back pain, in addition to reducing postoperative pain and analgesic requirement[6]. The concept of preemptive analgesia was first introduced in 1983 by Woolf[7]. An evolving clinical concept, involve the introduction of an analgesic regimen before the onset of noxious stimuli, with the goal of preventing central (secondary) sensitization of nervous system to subsequent stimuli that could amplify pain. Surgery offers the most promising setting for preemptive analgesia because the timing of noxious stimuli is known.

Our study assessed the postoperative analgesic effect of preemptive and intraoperatively administered epidural ketamine and dexamethasone when used with 0.2% ropivacaine. At the same time the unwanted side effects, if any were also recorded and compared.

MATERIAL AND METHOD :

After approval from ethical Committee, the Study was conducted at S. R. N. Hospital Associated with M. L. N. Medical College, Allahabad over a period of one year. This prospective study was conducted on 90 adult patients of ASA physical status 1 and 2, aged 30 to 60 years, scheduled for elective lower abdominal surgery (Total abdominal hysterectomy, inguinal hernia, incisional hernia). Average duration of surgery was 90 to 120 minutes. Patients were explained the purpose of the study along with the procedure and thereafter a valid, informed and written consent was taken from all the patients undergoing study. Patients were randomly divided into three groups, using a "Slips of paper in a box" technique consisting 30 patients in each group. Double blinding was assured as both patient as well as performer were unaware of type of drug solution used.

GROUP C (Control): Patient receiving preemptive and intraoperative epidural 0.2% ropivacaine (10ml) + Normal saline.

GROUP D: Patient receiving preemptive and intraoperative epidural 0.2% ropivacaine (10ml) + 5mg dexamethasone.

GROUP K: Patient receiving preemptive and intraoperative epidural 0.2% ropivacaine (10ml) + 50mg ketamine. Smaller volumes were taken with insulin syringe and made equal by adding saline.In the holding area, patients were familiarized before operation on visual analogue scales (VAS);0-10 with 0=no pain and 10= worst pain imaginable. After intravenous access had been established the patients in the study were premedicated with 2-3mg midazolam. The epidural space was identified at L3-4 interspace an epidural catheter inserted into the epidural space, and fixed. A test dose of 3 ml of lignocaine 2% with adrenaline

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1:200000 was given. In the operating room pulse rate, blood pressure, oxygen saturation and electrocardiography was started. The study drug was given through epidural catheter, 15 minutes before induction of general anaesthesia and also 25 minutes before closure.

Patient was preoxygenated for 3 min and general anaesthesia was induced with thiopentone 3-5mg/kg. Fentanyl was given in the dose of 1-2 mcg/kg for analgesic purpose 2-3 min before induction. Laryngoscopy and intubation was facilitated by vecuronium 0.08mg/kg. Anaesthesia was maintained with 0_2 and N_20, isoflurane 1-1.5% with maintenance dose of vecuronium.

Observation and recordings of changes in pulse rate and mean arterial blood pressure (pre-induction, post-intubation, 5min 15 min 30 min, 60 min and 10 min before extubation) were done. Average duration of surgery was 90 to 120 minutes. After extubation, patients were shifted to post-anaesthesia care unit with monitoring of pulse rate, arterial blood pressure respiratory rate, SpO2 and side effects. VAS score for pain was recorded at 1hr, 4hr, 8hr, 12hr, 24hr postoperatively, Diclofenac 1.5 mg/kg body weight intramuscular was given as analgesic supplement if VAS > 4. Duration of postoperative was defined the time interval between end of surgery and need of first analgesic.

Observations :

Table 1 : Comparison of Age and Weight in three groups

Demographic Profile	Group C	Group D	Group K	p value (ANOVA)
Age(yrs) (Mean±SD) Range (Yrs)	45.10±6.57 34 - 58	46.27±5.69 35 – 56	45.93±6.35 36 - 58	0.755
WT.(kg) (Mean±SD) Range(kg)	53.23±4.49 45 - 63	52.77±4.97 45 – 64	52.93±5.91 46 - 62	0.940

Table 2: Comparison and analysis of baseline vital parameters

	Group C	Group D	Group K	p-value (ANOVA)
Pulse Rate (Bpm) (Mean±SD) Range (Bpm)	75.87±10.97 54 – 100	76.27±10.41 59 - 96	76.57±10.38 58 – 97	0.968
M.A.P.* (mm Hg) (Mean±SD) Range(mm Hg)	93.87±5.19 82 – 104	93.57±5.57 82 - 103	94.27±4.65 86 - 103	0.870

*M.A.P.=Mean Arterial Pressure

Table 3: Comparison of duration of Analgesia in three groups

N = 30	Group C	Group D	Group K
Mean ± SD(min)	288 ± 47.66	465.67 ± 48.12	664.67 ± 60.61
Range (min)	210 – 420	360 – 540	540 – 750

Table 4: Comparison of Total no. of Rescue Analgesics in 24 hrs in three groups

N = 30	Group C	Group D	Group K
Mean ± SD	2.97 ± 0.56	2.37 ± 0.56	2.07 ± 0.52
Range	2 – 4	1 – 3	1 – 3

RESULT :

Demographic data were comparable in respect to age, weight, baseline vital parameters and duration of surgery (**Table 1,2**). All the parametric data of three groups were analysed using student t-test and one way ANOVA. Duration of analgesia was longer in both- group D (Dexamethasone + Ropivacainemins) and group K (Ketamine + Ropivacaine) in comparison to control (465.67±48.12 mins Vs 288±47.66) & (664.67±60.61 mins Vs 288±47.66 mins) (**Table 3**). Total number of rescue analgesics required in 24 hours was lesser in both- group D and group K in comparison to control group. Group K required minimum rescue analgesia (**Table 4**). Addition of Dexamethasone or Ketamine to epidural Ropivacaine did not produce any significant haemodynamic changes, sedation, or any other side effects like hallucination and disorientation etc.

DISCUSSION :

Epidural analgesia is highly effective for controlling acute pain after surgery or trauma to the chest, abdomen, pelvis or lower limbs. It has potential to provide excellent pain relief, minimal side-effects and high patient satisfaction when compared with other methods of analgesia controlling acute pain.

Duration of epidural analgesia has been reported to be improved by the addition of opioids (such as morphine, fentanyl and sufentanil) and other drugs as dexmedetomidine, clonidine, dexamethasone, neostigmine, and ketamine. ***Choe et al***[8] found that epidural ketamine, when compared to epidural morphine, appears to be associated with less sedation and a smaller risk of PONV, but necessitates more frequent or continuous administration to achieve comparable analgesia. ***Thomas et al***[9] reported that the duration of postoperative analgesia was longer in epidural dexamethasone 5mg with 0.2% ropivacaine as compare to plain ropivacaine in laproscopic cholecsytectomy. In the present study we used ketamine and dexamethasone with ropivacaine to prolong the duration of postoperative analgesia. Both these adjuvants prolonged the duration of analgesia after lower abdominal surgery. Dexamethasone has analgesic, anti inflammatory and anti emetic effect. It has high potency, is long acting glucocorticoid with little mineralocorticoid effect. Preoperative epidural administration of dexamethasone was found to reduce postoperative pain and opioid consumption following abdominal operations. ***Jehan et al***[10] found that a reduction in postoperative pain and analgesic consumption could be achieved by preoperative administration of epidural dexamethasone or magnesium with local anaesthetic 0.25% bupivacaine in patients undergoing major abdominal cancer surgery under combined general- epidural anesthesia. ***Abdis, Datta et al***[11] found that the use epidural steroids were very useful for chronic spinal pain management. In present study we also found that epidural administration of ketamine along with local anaesthetic agent can provide better postoperative analgesia. In our study prolonged duration of postoperative analgesia was observed in both study groups in comparison control group.

CONCLUSION

Duration was longer in group K than in group D. Total number of rescue analgesics required in 24 hours postoperatively were also calculated and found that total number of rescue analgesics were less in group D and group K in comparison to control group. None patient in any group showed significant nausea, vomiting, haemodynamic changes, sedation and other side effects. To conclude, duration of post-operative analgesia and need for rescue analgesia was reduced considerably when dexamethasone or Ketamine was used as adjunct to epidural anaesthesia when given pre-emptively as well as intraoperatively compared to placebo. Ketamine seemed better than dexamethasone in this respect.

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