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Original Research Article

A Comparative Clinical Assessment of the Analgesic Efficacy of Epidural 0.2% Ropivacaine and 0.125% Bupivacaine in Postoperative Pain Relief

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Abstract

Aim: The aim of the present study was to evaluate the analgesic efficacy of Epidural ropivacaine 0.2% and 0.125% bupivacaine in postoperative pain relief.

Material & methods: After obtaining written informed consent, a routine data based observational study was conducted at department of Anesthesiology, AIIMS, Patna, Bihar, India for eight months. which involved 100 patients of ASA1, ASA2 who received Epidural 0.2% Ropivacaine and 100 patients who received Epidural 0.125%bupivacaine postoperatively. All patients were monitored for postoperative pain by the visual analogy scale (VAS), requirement of rescue analgesia, hemodynamic parameters and adverse effects.

Results: In the present study, there were 70% male and 30% female in Bupivacaine 0.125% group and 65% male and 35% female in ropivacaine 0.2% group. According to visual analogy score, 2.16 score on day 1 in Bupivacaine 0.125% group and 2.40 in ropivacaine 0.2% group. 46% patients required rescue analgesia in Bupivacaine 0.125% group and 60% in ropivacaine 0.2% group. In the present study, 8% had hypotension adverse effect in Bupivacaine 0.125% group and 2% in ropivacaine 0.2% group.

Conclusion: Ropivacaine 0.2% and bupivacaine 0.125% were equally efficacious in terms of VAS pain scores, rescue analgesic requirement, but ropivacaine had a better safety profile in terms of less hypotension and lesser motor block.

Keywords: Bupivacaine, epidural, ropivacaine, postoperative pain.

Introduction

Effective pain control is essential for the optimum care of patients in the intraoperative and postoperative period. Epidural anesthesia is a safe and inexpensive technique with the advantage of providing surgical anesthesia and prolonged postoperative pain relief. The aim of postoperative analgesia is to provide subjective comfort with minimum side-effects, with early ambulation and restoration of function. [1] Regional analgesia with the local anesthetic drug via epidural catheter is established method of satisfactory postoperative pain management. Today, among local anesthetic drugs, ropivacaine is preferred due to its favorable sensory block profile and lower cardiovascular toxicity compared to others. [2] Since it is less

lipophilic than bupivacaine, its penetration is more selective for thin unmyelinated pain-transmitting nerve fibers compared to larger motor nerve fibers. [3,4]

Patients undergoing gynecological surgery experience significant postoperative pain that may persist for several days after surgery. Despite current pain management guidelines, postoperative pain often remains under‐treated. [5,6] Effective postoperative pain management leads to earlier mobilization and reduction in the immediate complications: infectious, neurological, cardiovascular, and thrombo ‐embolic sequelae caused by immobility. This shortens hospital stay, reduces hospital costs, increases patient satisfaction, and leads to early postoperative rehabilitation. [7,8] The primary measure of efficacy of any analgesic regimen is pain relief. It is important to realize that pain scores are commonly measured at rest and this result in failure to identify those techniques that allow patients to move and cough effectively, that is, techniques that provide dynamic pain relief. [9]

Regional analgesia with the local anesthetic drug via epidural catheter is established method of satisfactory postoperative pain management. Today, among local anesthetic drugs, ropivacaine is preferred due to its favorable sensory block profile and lower cardiovascular toxicity compared to others. [10] Since it is less lipophilic than bupivacaine, its penetration is more selective for thin unmyelinated pain-transmitting nerve fibers compared to larger motor nerve fibers. [11,12] Tramadol, a synthetic 4-phenyl-piperidine analog of codeine, is a racemic mixture of two enantiomers, with synergistic anti-nociceptive interaction. [13] The (+) enantiomer has moderate affinity for the opioids μ receptor and inhibits serotonin uptake, and the (−) enantiomer is a potent norepinephrine synaptic release inhibitor. The result is an opioid with a lack of respiratory depressant effects despite an analgesic potency that has been shown to be approximately equal to that of pethidine in some studies. [14,15]

The aim of the present study was to evaluate the analgesic efficacy of Epidural ropivacaine 0.2% and 0.125% bupivacaine in postoperative pain relief.

Materials and Methods

After obtaining written informed consent, a routine data based observational study was conducted at department of Anesthesiology, AIIMS, Patna, Bihar, India for eight months. which involved 100 patients of ASA1, ASA2 who received Epidural 0.2% Ropivacaine and 100 patients who received Epidural 0.125%bupivacaine postoperatively. All patients were monitored for postoperative pain by the visual analogy scale (VAS), requirement of rescue analgesia, hemodynamic parameters and adverse effects.

Inclusion Criteria: Patients of ASA grades I to II of both Sexes.

Exclusion Criteria: Patients having severe cardiorespiratory illness, coagulation disorders, chronic liver disease, chronic kidney disease, infection at the local site, and with allergies, to amide, local Anaesthetics.

All patients were preoperatively assessed as per standard ASA guidelines/ASRA guidelines with routine laboratory blood investigations, chest X-ray, 12-lead electrocardiogram (ECG) expert specialist consultation for indicated patients. Patients were kept fasting for 8 hours for solids Monitoring Standard ASA monitors were used. All patients were continuously monitored for Heart rate (HR), Respiratory rate (RR), and oxygen saturation, Non-invasive blood pressure and ECG. On the day of surgery, IV access was secured with two wide bore cannula, Patients were preloaded with crystalloids prior to spinal anaesthesia. All patients received

combined spinal-epidural anaesthesia under all aseptic precautions, in L3–4, L4-5 space. Epidural catheter was placed under strict asepsis by loss of resistance to air technique, hanging drop test and by meniscal level fall test in epidural catheter. Postoperatively epidural infusion was started with 0.2%ropivacaine 4-5 ml/hr and was titrated according to patients pain score. Rescue analgesia was given with IV paracetamol. Visual analog scale (VAS) pain scores were assessed and recorded every 4 hr. Other related adverse effects such as hypotension and delayed motor recovery were also recorded. Hypotension was managed by fluid bolus and injection me phentermine 6 mg boluses if required. Requirement of rescue analgesia (IV paracetamol/opioids) was also noted.

Statistical analysis

Unpaired t-test for comparison between two groups (for comparison of means between two groups, numerical data which are normally distributed). Mann–Whitney U-test for comparison between two groups (for comparison of means between two groups, numerical data which are not normally distributed).Chi-square test (for comparison of proportions between two groups, categorical data).

Results

Table 1: Demographic data

Parameters	Bupivacaine 0.125%	Ropivacaine 0.2%	P value
Mean age (years) ± SD	64.36±8.32	64.16±8.40	0.90
Sex			
Male	70 (70)	65 (65)	0.750
Female	30 (30)	35 (35)	

In the present study, there were 70% male and 30% female in Bupivacaine0.125% group and 65% male and 35% female in ropivacaine0.2% group.

Table 2: Visual analogy score

	Bupivacaine 0.125%	Ropivacaine 0.2%	P value
Day 0	3.40	3.6	0.120
Day 1	2.16	2.40	0.090

According to visual analogy score, 2.16 score on day 1 in Bupivacaine 0.125% group and 2.40 in ropivacaine0.2% group.

Table 3: Requirement of rescue analgesia

	Bupivacaine0.125%	Ropivacaine0.2%
Patients not requiring rescue analgesia	54%	40%
Patients requiring rescue analgesia	46%	60%

46% patients required rescue analgesia in Bupivacaine0.125% group and 60% in ropivacaine 0.2% group.

Table 4: Incidence of hypotension, delayed motor block was much less with 0.2% Ropivacaine

Adverse effect	Bupivacaine0.125%	Ropivacaine 0.2%	P value
Hypotension	8 (8%)	2(2%)	0.020
Delayed motor block	6 (6%)	3(3%)	0.045

In the present study, 8% had hypotension adverse effect in Bupivacaine 0.125% group and 2% in ropivacaine0.2% group.

Discussion

The primary measure of efficacy of any analgesic regimen is pain relief. Many studies of postoperative analgesia rely on the measurement of pain scores at rest and surrogate measures, such as respiratory spirometry. [16] However, instead of high‐quality postoperative analgesia at rest, a more important postoperative outcome measure is the ability to breathe deeply and to tolerate physiotherapy with minimum discomfort, which is dynamic pain relief. [17] Optimum pain management should start before surgery. All patients should undergo a preoperative assessment that includes a section on pain management. This allows planning of optimal pain management techniques and facilitates early discussions to help alleviate fear of postoperative pain. Discussion of postoperative pain management at preoperative assessment aims to optimize patient satisfaction and reduce adverse effects. Effective pain management is underpinned by assessment and timely response.

We selected epidural ropivacaine in this study due to its relative better sensory than motor block profile and lower risk of cardiovascular toxicity compared to previous local anesthetics. [10] Concentration was kept at 0.2% because Scott et al. in a dose-finding study with 0.1%, 0.2%, and 0.3% ropivacaine in patients undergoing abdominal surgery demonstrated that 0.2% ropivacaine 10 ml/h provided the best balance between analgesia and motor block. [18] Our study emphasises on epidural analgesia for postoperative pain relief. Postoperative epidural analgesia is usually administered via a continuous infusion to maintain a level of analgesia and to minimize the cardiovascular and respiratory effects of bolus doses of local anaesthetics and opioid respectively. [19] We have compared the rescue analgesic requirement while using 0.2% ropivacaine when compared to 0.125% bupivacaine. Epidural analgesia can be delivered as intermittent bolus doses, continuous infusion, and patient controlled infusion. Bupivacaine has been used successfully for many years for this purpose, in concentrations ranging from 0.0625% to 0.25%.

Conclusion

Ropivacaine 0.2% and bupivacaine 0.125% were equally efficacious in terms of VAS pain scores, rescue analgesic requirement, but ropivacaine had a better safety profile in terms of less hypotension and lesser motor block.

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