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An Observational Study to Compare the Analgesic Efficacy of Epidural Ropivacaine 0.2% and Bupivacaine 0.2% 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% in postoperative pain relief.

Material & Methods: After obtaining written informed consent, the sample size was calculated using G power software. A routine data based observational study was conducted in the Department of Anaesthesia which involved 200 patients of ASA1 and ASA2 grades, who received Epidural 0.2%Ropivacaine and 200 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 was 72% male and 28% female in Bupivacaine 0.125% group and 70% male and 30% 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. 48% patients required rescue analgesia in Bupivacaine 0.125% group and 60% in ropivacaine 0.2% group. In the present study, 9% 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.

1. INTRODUCTION

Postoperative pain is one of the most common issues following joint replacement surgeries. Although, number of advancements in techniques and pain control modalities have taken place, yet majority of patients experiences extreme pain immediately after the surgery.[1] Poorly controlled pain after surgeries is strongly associated with development of chronic pain.[2] Effective control of postoperative pain blunts autonomic, somatic and endocrine responses and results in early recovery, mobilization and discharge from hospital.

The most important concept of current pain management is the pre-emptive use of multimodal approach. "Pre-emptive" refers to initiate pain management before the surgical stimulus and "multimodal approach" refers more than 2 drugs or modalities with different mechanisms or sites for synergistic effects.[3] Epidural analgesia is one of the important components of the multimodal approach to pain management. Facility of continuous infusion and top-ups of analgesic drugs provide good analgesia, early ambulation and smooth recovery. Compared with general anaesthesia, epidural anaesthesia has reportedly been associated with reduced post-operative mortality, length of stay, and in-hospital complication rates in a large population-based study of lower limb joint replacement surgeries.

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.[6,7] 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.[8,9] 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.

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.[11] 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.[12,13]Tramadol, a synthetic 4-phenyl-piperidine analog of codeine, is a racemic mixture of two enantiomers, with synergistic anti-nociceptive interaction.[14] 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.

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

2. MATERIALS AND METHODS

After obtaining written informed consent, a routine data based observational study was conducted in the Department of Anaesthesia which involved 200 patients of ASA1, ASA2 who received Epidural 0.2% Ropivacaine and 200 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

1. 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 cannulae, Patients were preloaded with crystalloids prior to spinal anaesthesia. All patients received combined spinal-epidural anaesthesia under all aseptic precautions, inL3–4, 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 with0.2%ropivacaine 4-5 ml/hr and was titrated according to patient's 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 anddelayed motor recovery were also recorded. Hypotension was managed by fluid bolus and injection me phentermine 6mg 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).

3. RESULTS

Table 1: Demographic data

Parameters	Bupivacaine0.125%	Ropivacaine 0.2%	p-value
Mean age (years) ±SD	65.35±9.41	66.14±7.43	0.84
Sex			

Male	144 (72)	140 (70)	0.743
Female	56 (28)	60 (30)	

In the present study, there was 72% male and 28% female in Bupivacaine0.125% group and 70% male and 30% female in ropivacaine0.2% group.

Table 2: Visual analogy score

	Bupivacaine0.125%	**Ropivacaine0.2%**	**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 Bupivacaine0.125% group and 2.40 in ropivacaine0.2% group.

Table 3: Requirement of rescue analgesia

Requirement of rescue analgesia	**Bupivacaine 0.125%**	**Ropivacaine 0.2%**
Patients not requiring rescue analgesia	52%	40%
Patients requiring rescue analgesia	48%	60%

48% patients required rescue analgesia in Bupivacaine 0.125% 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	**Bupivacaine 0.125%**	**Ropivacaine 0.2%**	**P value**
Hypotension	18 (9%)	4 (2%)	0.020
Delayed motor block	10 (5%)	6 (3%)	0.045

In the present study, 9% had hypotension adverse effect in Bupivacaine 0.125% group and 2% in ropivacaine 0.2% group.

4. 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.[17] 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.[18]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.

In the present study, there was 72% male and 28% female in Bupivacaine0.125% group and 70% male and 30% female in ropivacaine0.2% group. According to visual analogy score, 2.16 score on day 1 in Bupivacaine0.125% group and 2.40 in ropivacaine0.2% group. 48% patients required rescue analgesia in Bupivacaine0.125% group and 60% in ropivacaine0.2% group. In the present study, 9% had hypotension adverse effect in Bupivacaine0.125% group and 2% in ropivacaine0.2% group. 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.[11] 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.[19]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. 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%.

5. 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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