 DOI: 10.18231/2393-9087.2017.0009

Efficacy of wound infiltration with ropivacaine, lornoxicam or their combination in total abdominal hysterectomy

Mallika Datta[1], Suman Chattopadhyay[2,*]

[1]Assistant Professor, Dept. of Gynaecology & Obstetrics, Medical College & Hospital, Kolkata, [2]Associate Professor, Dept. of Anaesthesia, Midnapore Medical College & Hospital, Midnapore, West Bengal

***Corresponding Author:**
Email: sumanc24@gmail.com

Abstract

Wound infiltration with local anaesthetics with or without adjuvant is an alternative and acceptable method for the management of postoperative pain. In this study wound infiltration with two newer drugs ropivacaine and lornoxicam (a well tolerated injectable NSAID) either alone or in combination were performed regarding analgesic efficacy and patient outcome.

Materials and Methods: 90 women of ASA I and II, undergoing elective total abdominal hysterectomy underwent this prospective, randomized, double-blinded trial. A standardized general endotracheal anaesthesia was performed on all patients. After hysterectomy and during closure, wound infiltration was performed by the surgeon using either: (Group R; 30 patients) 18 mL of ropivacaine 0.5% with 2 mL of normal saline; (Group L; 30 patients) 2 mL (8 mg) of lornoxicam (4 mg/ml) with 18 mL of normal saline; (Group RL; 30 patients) 18 mL of ropivacaine 0.5% with 2 mL (8 mg) of lornoxicam. Patients were observed for postoperative VAS scores, duration of analgesia and bowel functions over the first 24 hours.

Results: All three groups had comparable demographics and operative duration. Pain scores were significantly lower in the Group RL during the first four hours postoperatively ($P < 0.01$). The time to first analgesic requirement (duration of analgesia) was also prolonged in RL group ($P < 0.05$). However, the supplemental postoperative pethidine requirement was similar between the groups ($P > 0.05$). Return of bowel functions were also similar ($P > 0.05$). No patients complained of any severe adverse effects.

Conclusion: Wound infiltration with either ropivacaine or lornoxicam or their combination is ineffective in providing prolonged postoperative analgesia after abdominal hysterectomy.

Keywords: Rovivacaine; Lornoxicam; Wound infiltration; Postoperative analgesia.

Introduction

Nonsteroidal anti-inflammatory drugs (NSAID's) provide effective analgesia for acute pain after minor and major surgery as a substitute for or as an adjunct to opioid analgesia.(1) Lornoxicam is a new NSAID of the oxicam class with analgesic, anti-inflammatory and antipyretic properties available in oral and parenteral form. It is rapidly eliminated, having a short plasma elimination half-life of 3–5 h, which suggests its suitability in early postoperative period.(2,3) Lornoxicam is also as effective as morphine but better tolerated when administered intravenously by patient-controlled analgesia in the treatment of moderate postoperative pain after laminectomy or discectomy.(4)

Wound infiltration with local anesthetics is an alternative and acceptable method for the management of postoperative pain.(5) Wound infiltration with a combination of local anaesthetics plus lornoxicam improved postoperative pain control and patient comfort, and decreased the need for opioids as compared with the use of either drug alone suggesting a local effect.(6,7)

There is dearth of literature regarding the efficacy of wound infiltration with ropivacaine enriched with lornoxicam on acute pain in different postoperative pain models. We have designed this study to compare the effect of wound infiltration with ropivacaine, lornoxicam or their combination on analgesic efficacy and patient outcome in total abdominal hysterectomy.

Methods

After approval from the ethical committee of Medical College & Hospital, Kolkata, and obtaining written informed consent, ninety (90) women aged between 35 and 60 years, of American Society of Anaesthesiologists (ASA) physical status I and II, undergoing elective total abdominal hysterectomy were randomly chosen for this prospective, randomized, double-blinded trial. Patients having contraindications for, or were allergic to NSAIDs, and/or local anaesthetics, or having a history of renal or liver dysfunction, peptic ulcer, asthma, or clotting disorder were excluded from this study. Surgical exclusion criteria included patients with previous abdominal operations, gynaecological malignancies, presence of endometriosis or tubo-ovarian masses in the preoperative ultrasound.

All patients were premedicated with tablet midazolam orally 7.5 mg on the night before and 2 hours before scheduled operation. Before anaesthesia all patients received injection fentanyl 1.5 µg/kg and injection glycopyrrolate 4 µg/kg intravenously and pre-oxygenated with 100% oxygen for 3 minutes after monitors were attached. All patients underwent total abdominal hysterectomy under a standardized general

endotracheal anaesthesia technique using 2mg/kg of 1% propofol and 0.6 mg/kg rocuronium intravenously (i.v.) for intubation, and maintained on 1 to 2.5% sevoflurane in 40/60 oxygen/nitrous oxide and 0.2 mg/kg rocuronium i.v. adjusted to maintain end-tidal carbon dioxide concentration ($EtCO_2$) at round 35 to 40 mm Hg. Boluses of fentanyl 1µg/kg i.v. were given in all the patients at the time of rectus sheath dissection and every 30 minutes thereafter till the end of surgery.

After hysterectomy and during closure, wound infiltration was performed by the surgeon, who was blinded to the applied drug solution. The rectus muscle, rectus sheath and subcutaneous tissue were infiltrated by the study solutions made in identical covered syringes by an anaesthesiologist not involved in this study. Patients were randomly allocated into three groups of thirty patients each using a computer-generated random number table by the principal investigator. After recruitment, the enrolling investigators opened sealed, opaque envelopes that concealed the group allocation. The patients received either of the three preparations for wound infiltration: (Group R; 30 patients) 18 mL of ropivacaine 0.5% with 2 mL of normal saline; (Group L; 30 patients) 2 mL (8 mg) of lornoxicam (4 mg/ml) with 18 mL of normal saline; (Group RL; 30 patients) 18 mL of ropivacaine 0.5% with 2 mL (8 mg) of lornoxicam. At the completion of the surgery, neostigmine 2.5mg and glycopyrolate 0.5 mg were administered intravenously for reversal of the residual paralysis, and the trachea was extubated.

SpO_2, NIBP, $EtCO_2$ values were noted at the start of operation and at 5 minute intervals throughout the intraoperative period. Postoperatively the patients were assessed for blood pressure, pulse rate and respiration at every 15 minute intervals, while pain was assessed using the 10 point VAS (visual analogue scale; where 0 = no pain and 10 = worst pain imaginable) at one, two, three, four, six, eight, 12, and 24 hr after surgery. Injection pethidine 1.5mg/kg slow i.v was administered whenever the patient complained of pain in the postoperative period. The duration of analgesia was taken from the time of wound infiltration to the requirement of the first supplemental analgesic. Total supplemental analgesic consumption of pethidine (in mg) was noted over the first 24 postoperative hours. Injection ondansetron 8 mg i.v. was given whenever patient complained of postoperative nausea and vomiting (PONV).

Patients were assessed for return of gastrointestinal function twice daily by a physician who systematically questioned the patients and consulted nurse observations until return of bowel sounds, time of the first flatus and time of the oral intake. In addition, patients were questioned about the occurrence of any adverse effects during the first 24 hr, and all adverse effects were recorded. All data were recorded by the same anaesthesia resident who was blinded to the study drugs administered.

Statistical analysis: One way ANOVA was used for comparisons of data which are commonly expected to be normally distributed, e.g. demographics, intra and postoperative haemodynamic data, duration of analgesia, and intraoperative and postoperative analgesic use. Chi- square and Kruskal–Wallis tests were used for postoperative VAS scoring. Complications were compared with Fischer's exact test. A P-value of < 0.05 was considered significant. All values were expressed as mean ± S.D. range or number %. According to a power analysis for VAS scores in patients, we calculated that 23 patients in each group would be required to demonstrate a maximum difference of 1.6 (SD = 1.7) among groups ($\alpha = 0.05$, $ß = 0.2$). We undertook 30 patients per group to include any dropouts that may occur and also to improve the power of the current study.

Results

The current study was performed on 90 women undergoing total abdominal hysterectomy under general anaesthesia, divided into three equal groups of 30 each. All the recruited patients completed the study and there were no dropouts. The three groups were comparable with respect to demographic data as well as duration of surgery and anaesthesia (Table 1). There were no differences in blood pressure, pulse and respiratory rate between the groups either intra or postoperatively (data not shown).

Table 1: Demographic and operative characteristics

	Group R (no. = 30)	**Group L (no. = 30)**	**Group RL (no. = 30)**
Age	48.4 ± 8.5	51.1 ± 9.1	49.4 ± 8.2
Weight	54.6 ± 8.5	52 ± 6.7	53 ± 7.6
ASA physical status (I/II)	15/15	14/16	16/14
Duration of anaesthesia (min)	104.6 ± 26.5	108.7 ± 29.8	11.50 ± 30.0
Duration of surgery (min)	93.6 ± 23.8	96.7 ± 24.5	98.3 ± 25.2

P>0.05

Table 2 shows that pain scores were significantly lower in the Group RL compared with the Groups R and L during the first four hours postoperatively (2.5 ± 0.5 vs. 5.3 ± 1.2 and 5.6 ± 0.8 respectively*; P* < 0.01). The time to first analgesic requirement (duration of analgesia) was also prolonged in group RL compared to the other groups (178.5 ± 25.7 min vs. 100.4 ± 10.6 and 93.5±14.4 min respectively; *P* < 0.05). However, the supplemental pethidine requirement over the first 24 hours postoperative period was similar between the groups (*P* > 0.05).

Table 2: Analgesic characteristics

	Group R (no. = 30)	**Group L (no. = 30)**	**Group RL (no. = 30)**
VAS score (0-4 hours postop.)	5.3 ± 1.2	5.6 ± 0.8	2.5 ± 0.5**
VAS score (5-24 hours postop.)	5.7 ± 0.6	6.0 ± 0.7	5.5 ± 0.5
Duration of analgesia (min)	100.4 ± 10.6	93.5 ± 14.4	178.5 ± 25.7*
Meperidine consumption over first 24 hours (mg)	180.4 ± 30.6	176.5 ± 23.9	171.1 ± 24.7

**P < 0.01, *P < 0.05

Table 3 shows that the return of bowel functions were similar between the groups (*P* >0.05). No patients complained of any severe adverse effects. Incidences of PONV in the three groups were similar.

Table 3: Postoperative characteristics over the first 24 hours

	Group R (no. = 30)	**Group L (no. = 30)**	**Group RL (no. = 30)**
Return of bowel sound (hr)	12.4 ± 1.5	13.6 ± 1.7	12.1 ± 1.4
Time to first flatus (hr)	16.7 ± 1.6	17.1 ± 1.8	16.1 ± 1.5
PONV episodes	2.4 ± 0.4	2.5 ± 0.6	2.2 ± 0.2
Headache/Dizziness	10 (33.3%)	12 (40%)	11(36.6%)
Urinary retention	4 (13.3%)	5 (16.6%)	4 (13.3%)

P>0.05

Discussion

Some studies have stated that infiltration anaesthesia (either preoperative, or at the end of operation, or by continuous technique) cannot be recommended on a routine basis for abdominal hysterectomy procedures.[9] However, other studies have come to conclude that infiltration anaesthesia is indeed beneficial.[10,11] A review article also concluded that wound infiltration with local anaesthetics is a simple, effective and inexpensive means of providing good analgesia for a variety of surgical procedures without any major side-effects.[12] In this scenario, our study was conducted to find out the efficacy of two newer drugs (ropivacaine and lornoxicam) for wound infiltration individually and in combination.

Abdominal peritoneum has a diffuse innervation that includes the vagus nerve, sympathetic afferents from T5 to S5 roots and somatic nerves from T6 to L1, and it seems unlikely that wound infiltration alone will be effective as a sole postoperative analgesic technique. For this reason we have used the potent opioid fentanyl repeatedly throughout the intraoperative period to decrease the tremendous painful stimuli of total abdominal hysterectomy.

Some recent studies have concluded that infiltration with local anaesthetic at operative sites improved postoperative analgesia and reduced opioid requirements after different surgical procedures.[5,6] However, our study showed that overall opioid requirement over first 24 hours were similar in all groups of wound infiltration using either ropivacaine, lornoxicam or the combination of these two drugs; and there was no particular opioid sparing effect. This was similar to previous studies of Cobby et al[13] using plain bupivacaine and Visalyaputra et al[14] using lornoxicam with or without ropivacaine.

However, in our study wound infiltration with combination of lornoxicam and ropivacaine was significantly better in the first four hours postoperative period regarding both decrease in pain scores and duration of analgesia compared to either drugs used alone. This finding was similar to Visalyaputra et al[14] in similar surgical contexts. Another study using similar doses of lornoxicam but lesser amount of ropivacaine for wound infiltration after thyroid surgery found the combination to be effective for the first 12 postoperative hours with opioid sparing effect[6]. This point to the fact that surgical stimuli vary depending on

the site and extent of surgical excision and one size does not fit all.

The study also shows that the return of bowel functions and oral intake were similar between the groups. There was also absence of any adverse drug effects. The incidences of side-effects like PONV were similar. Lornoxicam is well tolerated peri-operatively with most frequent adverse effects being dizziness, abdominal pain and headache.[15] In our study the incidences of headache or dizziness were similar between the groups.

There are however a few limitations in our study. Considering the widespread innervations of abdominal viscera and previous concerns regarding effectiveness of wound infiltration, another background analgesic with a long duration of action could have been used. Also there are studies which use 16 mg of lornoxicam,[14] whereas we have opted for 8 mg of lornoxicam as in most studies. A dose fixing pilot study using both 8 and 16 mg of lornoxicam may have been more appropriate before undertaking the current study. However the LEAP (Lornoxicam Efficacy in Acute Pain) trial proves the efficacy of 8 mg of lornoxicam in the Indian perspective.[16]

In conclusion, wound infiltration with either ropivacaine or lornoxicam or their combination is ineffective in providing prolonged postoperative analgesia after abdominal hysterectomy.

References

1. Cashman J, McAnulty G. Nonsteroidal anti-inflammatory drugs in perisurgical pain management. Mechanisms of action and rationale for optimum use. Drugs 1995;49:51-70.
2. Rosenow DE, Albrechtsen M, Stolke D. A comparison of patient controlled analgesia with lornoxicarn versus morphine in patients undergoing lumber disk surgery. Anesth Analg 1998; 86: 1045–50.
3. Bias W, Jansen M. Pain control after hysterectomy: an observer blind, randomized trial of lornoxicam versus tramadol. Br J Clin Pract 1996; 50: 197–202.
4. Thienthong S, Jirarattanaphochai K, Krisanaprakornkit W, Simajareuk S, Tantanatewin W, Sathitkarnmanee A. Treatment of pain after spinal surgery in the recovery room by single dose lornoxicam: a randomized, double blind, placebo-controlled trial. J Med Assoc Thai. 2004 Jun;87(6):650-5.
5. Bianconi M, Ferraro L, Ricci R, et al. The pharmacokinetics and efficacy of ropivacaine continuous wound instillation after spine fusion surgery. Anesth Analg 2004; 98: 166–72.
6. Karamanlioglu B, Turan A, Memis D, Kaya G, Ozata S, Ture M. Infiltration with ropivacaine plus lornoxicam reduces postoperative pain and opioid consumption. Can J Anaesth 2005; 52: 1047–53.
7. Georgiadou TH, Sfyra E, Georgiou M, Foulidou A, Papaioannou V, Kanakoudis F. Postoperative wound infiltration with chirocaine plus lornoxicam for pain relief after cholecystectomy. Eur J Anaesthesiol 2003;20 (Suppl 30): A–689.
8. Varrassi G, Marinangeli F, Agrò F, Aloe L, De Cillis P, De Nicola A, et al. A double-blinded evaluation of propacetamol versus ketorolac in combination with patient-controlled analgesia morphine: analgesic efficacy and tolerability after gynecologic surgery. Anesth Analg 1999;88:611-22.
9. Dahl JB, Møiniche S. Relief of postoperative pain by local anaesthetic infiltration: Efficacy for major abdominal and orthopedic surgery. Pain 2009;143:7-11.
10. Russell SL, Frohlich E, Du Plessis P. The effects of incisional bupivacaine infusions on postoperative opioid consumption and pain scores after total abdominal hysterectomy. South Afr J Anaesth Analg 2011;17(3):250-3.
11. Vigneau A, Salengro A, Berger J, Rouzier R, Barranger E, Marret E, Bonnet F. A double blind randomized trial of wound infiltration with ropivacaine after breast cancer surgery with axillary nodes dissection. BMC Anesthesiology 2011: 11-23.
12. Scott NB. Wound infiltration for surgery. Anaesthesia 2010; 65 (Suppl. 1): 67–75.
13. Cobby TF, Reid MF. Wound infiltration with local anaesthetic after abdominal hysterectomy. Br J Anaesth 1997;78:431–2.
14. Visalyaputra S, Sanansilp V, Pechpaisit N, Choavarartana R, Sritisarn S, Ungpinitpong W, Permpolprasert L, Apidechakul P. Postoperative analgesic effects of intravenous lornoxicam and morphine with pre-emptive ropivacaine skin infiltration and preperitoneal instillation after transabdominal hysterectomy. J Med Assoc Thai 2002:85:1010-6.
15. Radhofer-Welte S, Rabasseda X. Lornoxicam, a new potent NSAID with an improved tolerability profile. Drugs Today 2000;36:55–76.
16. Sharma A, Pingle A, Baliga VP. Lornoxicam Efficacy in Acute Pain (LEAP) trial. J Indian Med Assoc. 2008;106(12):811-3.