

Effect of Use of Ropivacaine as Preemptive Local Anesthesia in Laparoscopic Cholecystectomy

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ABSTRACT

Background: Postoperative pain of laparoscopic cholecystectomy is a dilemma. Ropivacaine is reported to have significant control over pain after laparoscopic cholecystectomy.

Aim: To get local evidence as if ropivacaine found to be effective in reducing postoperative pain and less analgesia consumption, then in future we can implement the use of ropivacaine as preemptive local anesthesia

Methods: This randomized controlled trial was done at Ghurki Teaching Trust hospital, Lahore for 6 months. Sample size of 60 patients was included through consecutive sampling. Then patients were randomly divided in two groups. In group R, 30 patients will be given Ropivacaine. In group NS, normal saline was given. After surgery patients were shifted to post-surgical wards and were followed-up there for 24 hours. During 24 hours, pain score and analgesia consumption was noted. Data was analyzed in SPSS 21.

Results: In group R, the mean age of patient was 41.33 ± 10.58 years and in group NS, the mean age of patient was 39.99 ± 12.04 years. In group R, there were 19 (63.3%) males and 11 (36.7%) females. In group NS, there were 21 (70%) males and 9 (30%) females. After 24 hours, the mean pain score was 4.73 ± 1.08 in R group while 5.47 ± 1.17 in NS group ($p < 0.01$) and mean analgesia consumption was 4.00 ± 0.91 mg in R group while 5.90 ± 0.76 mg in NS group. The difference was highly significant on ($p < 0.01$).

Conclusion: Ropivacaine as preemptive local anesthesia in laparoscopic cholecystectomy is effective in reducing pain and analgesia consumption.

Key words: ropivacaine, normal saline, preemptive local anesthesia, laparoscopic cholecystectomy, pain score, analgesia consumption

INTRODUCTION

Laparoscopic cholecystectomy has replaced open cholecystectomy as the gold standard surgical procedure for majority of patients with gallstone disease. Conventional laparoscopic cholecystectomy is done using four ports. With an effort to minimise the number of ports, single-incision laparoscopic surgery has come into practice^{1,2}.

Laparoscopic cholecystectomy is considered as the treatment of choice for symptomatic cholelithiasis³. Laparoscopic surgery has displayed advantages over open surgery, including less post-operative pain, smaller incisions, shorter postoperative ileus, reduced blood loss, reduced length of hospital stay, faster recovery, as well as earlier return to preoperative activity and work^{4,5}.

Immediate postoperative pain and analgesia requirements in the post-anaesthesia care unit varies according to type of surgery, patient characteristics, and the timing and amount of intraoperative analgesia⁶. Laparoscopic cholecystectomy is a surgical procedure that frequently results in significant immediate postoperative pain and the need for rescue analgesia in the post-anaesthesia care unit^{7,8}.

Various local anesthetics such as lignocaine, bupivacaine, ropivacaine, and levo-bupivacaine have been evaluated in many trials^{9,10}. Barczynskiet *al.* evaluated the optimal timing of bupivacaine peritoneal instillation and concluded that peritoneal instillation was much more

effective for pain relief if used before creation of pneumoperitoneum¹¹. Kucuket *al.* have found that intraperitoneal instillation of 150 mg of ropivacaine was significantly more effective than either 100 mg bupivacaine or 100 mg ropivacaine for preventing postoperative pain¹².

So, we planned to conduct this study as to get local evidence in this regard. As if ropivacaine found to be effective in reducing postoperative pain and less analgesia consumption, then in future we can implement the use of ropivacaine as preemptive local anesthesia.

MATERIAL AND METHODS

This randomized controlled trial was done at Ghurki Teaching trust hospital, Lahore for 6 months (from Aug 2018 to Feb 2019). The study was approved by the Institutional Ethical Board. Sample size of 60 patients was calculated with 95% confidence level, 80% power of study and taking magnitude of mean pain score i.e., 0.38 ± 0.66 with ropivacaine and 2.56 ± 0.07 with normal saline. The patients were recruited through wards with complaint of cholelithiasis (on ultrasound). Patients with previous treatment of malignant disease, acute pancreatitis, pregnancy, prolonged administration of NSAIDS or other analgesics, liver disease, abnormal bleeding profile, history of peritonitis, carcinoma gall bladder, splenomegaly, were excluded. Informed consent was obtained and demographics were noted. Then patients were randomly divided in two groups by using lottery method. In group R,

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30 patients will be given 0.5% of 3mg/kg Ropivacaine diluted in 100ml saline. In group NS, 100ml normal saline was given. Instillation was done at intraperitoneal space before creation of pneumoperitoneum. After, surgery patients were shifted to post-surgical wards and were followed-up there for 24 hours. During 24 hours, pain score was noted 6hourly. Pain score was assessed by using visual analogue scale. Paracetamol 1g was given in cases with pain score >4 and total dose was observed during 4 hours. Data was entered & analyzed in SPSS 21.

RESULTS

In group R, the mean age of patient was 41.33±10.58 years and in group NS, the mean age of patient was 39.99±12.04 years. In group R, there were 19 (63.3%) males and 11 (36.7%) females. In group NS, there were 21 (70%) males and 9 (30%) females. The mean duration since diagnosis of cholelithiasis was 5.64±1.28 years in group R and 6.69±3.67 years in group NS. The mean BMI of patients was 29.58±11.32 kg/m² in R group while 28.91±10.22 kg/m² in NS group. The mean duration of surgery was 53.75±6.29 min in R group while 55.89±7.11 min in NS group. Table 1 depicts these.

At baseline (0 hours after surgery), the mean pain score was 0.12±0.08 in R group while 1.01±0.13 in NS group. After 6 hours of surgery, the mean pain score was 0.97±0.81 in R group while 2.10±0.88 in NS group. After 12hours of surgery, the mean pain score was 1.93±0.93 in R group while 2.87±0.82 in NS group. After 18hours of surgery, the mean pain score was 4.43±1.17 in R group while 5.40±1.00 in NS group. After 24hours of surgery, the mean pain score was 4.73±1.08 in R group while 5.47±1.17 in NS group. The difference was highly significant on all points (p<0.01). Table 2

At baseline (0 hours after surgery), the mean analgesia consumption was 0 in R group while 0 in NS group. After 6hours of surgery, the mean analgesia consumption was 0 in R group while 1.50±0.51mg in NS group. After 12hours of surgery, the mean analgesia consumption was 1.97±0.89mg in R group while 3.53±0.51mg in NS group. After 18hours of surgery, the mean analgesia consumption was 2.23±0.77mg in R group while 4.13±0.82mg in NS group. After 24hours of surgery, the mean analgesia consumption was 4.00±0.91mg in R group while 5.90±0.76mg in NS group. The difference was highly significant on all points (p<0.01), except at baseline. Table 3

Table 1: Demographic details of patient

	Group	
	R	NS
n	30	30
Age (years)	41.33±10.58	39.99±12.04
Gender (M / F)	19 / 11	21 / 9
Duration of cholelithiasis (years)	5.64±1.28	6.69±3.67
BMI	29.58±11.32	28.91±10.22
Duration of surgery	53.75±6.29	55.89±7.11
ASA I / II	20 / 10	25 / 5

Table 2: Comparison of pain score in both groups

Postoperative pain score	Group		P value
	R	NS	
0 hour	0.12±0.08	1.01±0.13	<0.0001
6 hour	0.97±0.81	2.10±0.88	<0.0001
12 hour	1.93±0.93	2.87±0.82	0.0001
18 hours	4.43±1.17	5.40±1.00	0.001
24 hour	4.73±1.08	5.47±1.17	0.014

Table 3: Comparison of analgesia consumption in both groups

Analgesia consumption	Group		P value
	R	NS	
0 hour	0	0	NA
6 hour	0	1.50±0.51	<0.0001
12 hour	1.97±0.89	3.53±0.51	<0.0001
18 hours	2.23±0.77	4.13±0.82	<0.0001
24 hour	4.00±0.91	5.90±0.76	<0.0001

DISCUSSION

Laparoscopic cholecystectomy is the preferred surgical technique for cholelithiasis. Severity of postoperative pain and opioid consumption is less with better pulmonary function in laparoscopic procedures compared with open cholecystectomy¹³. Although post-operative pain is less intense as compared to open procedure, patients often complain of considerable pain in the first 24 hours. Post-operative nausea, vomiting and pain are two of common complications seen after ambulatory laparoscopic cholecystectomy¹⁴.

The time to first rescue analgesic was significantly longer with ropivacaine (7.84±1.34h) as compared to NS (1.72±0.67h), p<0.001. Mean tramadol consumption in 48h for each patient was significantly less with ropivacaine (202±33.78mg) as compared to NS (298±22.73mg) p<0.001. Postoperative pain scores were also significantly less with ropivacaine as compared to NS during first 6 hours, p<0.05. Rescue analgesic requirement showed a 32.21% reduction with ropivacaine¹⁵.

Bindra et al., found that mean pain was 2.88±0.82 with ropivacaine and 3.80±1.86 with NS (p=0.001) after 6hours, 2.28±1.17 with ropivacaine and 3.16±1.99 with NS (p=0.001) after 12 hours, 1.46±1.59 with ropivacaine and 3.64±1.97 with NS (p=0.001) after 18 hours and 0.38±0.66with ropivacaine and 2.56±0.07 with NS (p=0.001). The number of rescue analgesic requested was significantly lower with ropivacaine as compared to NS and the difference was highly significant (p values<0.001). The mean paracetamol consumption for 24hrs was 1.3409±0.52gm with ropivacaine and 4.7000±0.97416 gm with NS which was also significantly lower with ropivacaine than with NS (p value<0.001)¹⁶.

While in another trial, Bindra et al., found that mean pain was 2.88±0.82 with ropivacaine and 3.80±1.86 with NS (p=0.001) after 6hours, 2.28±1.17 with ropivacaine and 3.16±1.99 with NS (p=0.001) after 12 hours, 1.46±1.59 with ropivacaine and 1.64±1.67 with NS (p=0.601) after 18 hours and 0.38±0.66 with ropivacaine and 0.56±0.97 with NS (p=0.464) and mean total analgesic was 1340±52.28gram with ropivacaine and 2400±97.42gram with NS (p=0.00012)¹⁷.

The total analgesic requirement was also significantly less in patients who received intraperitoneal instillation of drug before creation of pneumoperitoneum (1.34±0.52g paracetamol) than patients who received after completion of surgery (2.4±0.97g paracetamol)¹⁸. Maestroni et al., also observed a significantly lower total pain intensity and total analgesic requirement during initial 8 h postoperatively in patients who received ropivacaine preemptively¹⁹. Kim et al., also concluded intraperitoneal instillation of ropivacaine at the beginning of laparoscopic cholecystectomy combined with NS infusion is an effective method for reducing pain after laparoscopic cholecystectomy²⁰.

CONCLUSION

Ropivacaine as preemptive local anesthesia in laparoscopic cholecystectomy is effective in reducing pain and analgesia consumption. Now in future, we will recommend to add ropivacaine in anesthesia to decrease the post-operative complications.

REFERENCES

1. Prasad A, Mukherjee KA, Kaul S, Kaur M. Postoperative pain after cholecystectomy: Conventional laparoscopy versus single-incision laparoscopic surgery. *Journal of minimal access surgery* 2011 Jan-Mar;7(1):24-7.
2. Ahmed MU, Aftab A, Seriwala HM, Khan AM, Anis K, Ahmed I, et al. Can single incision laparoscopic cholecystectomy replace the traditional four port laparoscopic approach: a review. *Global journal of health science* 2014;6(6):119-25.
3. Saadati K, Razavi MR, Nazemi Salman D, Izadi S. Postoperative pain relief after laparoscopic cholecystectomy: intraperitoneal sodium bicarbonate versus normal saline. *Gastroenterology and hepatology from bed to bench* 2016 Summer;9(3):189-96.
4. Ahiskalioglu EO, Ahiskalioglu A, Aydin P, Yayik AM, Temiz A. Effects of single-dose preemptive intravenous ibuprofen on postoperative opioid consumption and acute pain after laparoscopic cholecystectomy. *Medicine* 2017;96(8).
5. Ye F, Wu Y, Zhou C. Effect of intravenous ketamine for postoperative analgesia in patients undergoing laparoscopic cholecystectomy: A meta-analysis. *Medicine* 2017;96(51).
6. Campbell A, Webb A, Weeraratne C, Sivakumar H, Leong S, Szentl JA. Postoperative pain after laparoscopic cholecystectomy is not reduced by intraoperative analgesia guided by analgesia nociception index (ANI®) monitoring: a randomized clinical trial. *BJA: British Journal of Anaesthesia* 2014;114(4):640-5.
7. Szentl J, Webb A, Weeraratne C, Campbell A, Sivakumar H, Leong S. Postoperative pain after laparoscopic cholecystectomy is not reduced by intraoperative analgesia guided by analgesia nociception index (ANI®) monitoring: a randomized clinical trial. *British journal of anaesthesia* 2014;114(4):640-5.
8. Bodnar RJ. Endogenous opiates and behavior: 2015. *Peptides* 2017;88:126-88.
9. Honca M, Kose E, Bulus H, Horasanh E. The postoperative analgesic efficacy of intraperitoneal bupivacaine compared with levobupivacaine in laparoscopic cholecystectomy. *Acta chirurgica Belgica* 2014;114(3):174-8.
10. Sozbilen M, Yeniay L, Unalp O, Makay O, Ersin S, Pirim A, et al. Effects of ropivacaine on pain after laparoscopic cholecystectomy: a prospective, randomized study. *Advances in therapy* 2007;24(2):247-57.
11. Barczyński M, Konturek A, Herman R. Superiority of preemptive analgesia with intraperitoneal instillation of bupivacaine before rather than after the creation of pneumoperitoneum for laparoscopic cholecystectomy: a randomized, double-blind, placebo-controlled study. *Surgical Endoscopy And Other Interventional Techniques* 2006;20(7):1088-93.
12. Kucuk C, Kadiogullari N, Canoler O, Savlı S. A placebo-controlled comparison of bupivacaine and ropivacaine instillation for preventing postoperative pain after laparoscopic cholecystectomy. *Surgery today* 2007;37(5):396-400.
13. Sharma CS, Singh M, Rautela RS, Kochhar A, Adlakha N. Comparison of intraperitoneal and periportal bupivacaine and ropivacaine for postoperative pain relief in laparoscopic cholecystectomy: a randomized prospective study. *Anaesthesia, Pain & Intensive Care* 2019:350-4.
14. Gupta A, Thörn SE, Axelsson K, Larsson LG, Ågren G, Holmström B, et al. Postoperative pain relief using intermittent injections of 0.5% ropivacaine through a catheter after laparoscopic cholecystectomy. *Anesthesia & Analgesia* 2002;95(2):450-6.
15. Gupta M, Naithani U, Singariya G, Gupta S. Comparison of 0.25% ropivacaine for intraperitoneal instillation v/s rectus sheath block for postoperative pain relief following laparoscopic cholecystectomy: a prospective study. *Journal of clinical and diagnostic research: JCDR* 2016;10(8):UC10.
16. Bindra TK, Chawla D, Kumar P, Parul. Comparison of intraperitoneal instillation of ropivacaine with normal saline in laparoscopic cholecystectomy. *International Journal of Research in Medical Sciences* 2017;5(11):4924-8.
17. Bindra TK, Kumar P, Rani P, Kumar A, Bariar H. Preemptive analgesia by intraperitoneal instillation of ropivacaine in laparoscopic cholecystectomy. *Anesthesia, essays and researches* 2017;11(3):740.
18. Bindra TK, Kumar P, Rani P, Kumar A, Bariar H. Preemptive Analgesia by Intraperitoneal Instillation of Ropivacaine in Laparoscopic Cholecystectomy. *Anesthesia, essays and researches* 2017 Jul-Sep;11(3):740-4.
19. Maestroni U, Sortini D, Devito C, Brunaldi FPMK, Anania G, Pavanelli L, et al. A new method of preemptive analgesia in laparoscopic cholecystectomy. *Surgical Endoscopy And Other Interventional Techniques* 2002;16(9):1336-40.
20. Kim TH, Kang H, Park JS, Chang IT, Park SG. Intraperitoneal ropivacaine instillation for postoperative pain relief after laparoscopic cholecystectomy. *Journal of the Korean Surgical Society* 2010;79(2):130-6.