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Original Article

Comparison of Intravenous Lidocaine versus Dexmedetomidine on Postoperative Pain and Analgesic Consumption after Gynecological Abdominal Surgery

Moazzam Ali, Shazia Nayyar*, Maliha Khawar*, Ehsan Zafar, Muhammad Jalil Malik, Sanum Kashif**

Department of Anesthesia, Combined Military Hospital Lahore/National University of Medical Sciences (NUMS) Pakistan, *Department of Gynae & Obs, Combined Military Hospital Lahore/National University of Medical Sciences (NUMS) Pakistan, **Department of Surgery, Combined Military Hospital Lahore/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objectives: To determine the analgesic efficacy of intravenous dexmedetomidine versus lidocaine for post-operative pain in patients undergoing abdominal gynaecological surgeries.

Study Design: Quasi experimental study

Place and Duration of Study: Department of Anesthesia/Pain Medicine, Combined Military Hospital Lahore from May 2023 – October 2023.

Methodology: Sixty patients undergoing gynaecological surgeries under general anaesthesia were included in the study. Patients in Group D were given intraoperative dexmedetomidine while those in Group L were given lidocaine. The primary outcome was the pain score measured by the Visual analogue score at three, six, twelve and twenty fours following the procedure. The secondary outcome was the amount of tramadol in milligrams that was consumed for pain relief.

Results: In both groups, the mean pain score remained 5 or less over 24 hours. Median(IQR) pain score after 3 hour was 3(2) in Group D while it was 3(2) in Group L. After 6 hours it was recorded as 4(2) in Group D and 4(3) in Group L. At 12 hours it was recorded as 3.5(2.25) in Group D and 4(3) in Group L. Last reading was taken 24 hours after the procedure and it showed a mean pain score of 4(2.5) in Group D and 4(3) in Group L. Total mean Tramadol consumption in group D was 121.67±67.83 mg and 132.5±62.68 mg in Group L.

Conclusion: In conclusion, both drugs are equally effective in the management of post-operative pain in the first 24 hours of gynecoloical surgery.

Keywords: Analgesia, Dexmedetomidine, Gynecological surgery, Lidocaine, Post-operative pain,Visual analogue score.

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INTRODUCTION

Adequate postoperative pain control is vital to recovery of patients after abdominal surgeries especially gynaecological surgeries.[1] It improves patient satisfaction level, reduces hospital stay and decreases hospital financial burden.[2] Lack of adequate management for post-operative pain may lead to chronic post surgical pain.[3] Preemptive interventions for pain management like oral or intravenous medications and regional nerve blocks have shown to reduce post surgery analgesic requirements[4] Lidocaine and Dexmedetomidine are two of the numerous medications that have shown promising results for good postoperative pain management when administered during surgery.[5] Lidocaine is a local anaesthetic which blocks sodium channels whereas dexmedetomidine is alpha-2 adrenergic receptors which inhibits the release of norepinephrine leading to blockade of pain signals to the brain.[6-7]

Many studies have been carried out to prove the analgesic efficacy of both these drugs. A recent study by Kranke et al revealed that intravenous lidocaine lowers the need of opioids and enhances pain relief and bowel function after abdominal surgery, without causing any negative effects.[8]

Similarly a study by Basantwani et al showed that intraoperative use of dexmedetomidine as an adjunct to general anaesthesia offered better hemodynamics and postoperative reduced analgesic efficacy.[9]

Another study by Lundorf et al done on dexmedetomidine showed that it had opioid sparing effects in postoperative patients.[10]

We undertook this study as investigation reports are lacking in our part of the world regarding comparison of both techniques. Results achieved with

Correspondence: Dr Moazzam Ali, Department of Anesthesia, Combined Military Hospital, Lahore Pakistan

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the help of this study could help us in improving intra-operative analgesic medications.

We hypothesised that intra-operative lidocaine use could decrease pain scores more than dexmedetomidine for the first 24 hours after surgery.

The objective of our experimental study was to assess the analgesic efficacy of dexmedetomidine and lidocaine for postoperative pain control in patients undergoing gynaecological surgeries. Our secondary objective was to observe total opioid consumption in each group for the first 24 hours.

METHODOLOGY

We conducted this quasi-experimental study at the department of Anesthesia and Pain Medicine, Combined Military Hospital Lahore from February 2023 to July 2023. Sixty subjects were included as per inclusion criteria which were equally divided into two groups. Consent was taken from every patient. The data was recorded on a predesigned proforma. Permission was sought from the ethical review board vide ERB certificate number 219/1/21

The sample size of 60 cases (30 in each group) was calculated using WHO sample size calculator with 95% confidence level, 80% power of test, and taking mean pain score at 12 hours as 2.0±0.75 with lidocaine and 1.0±1.0 with dexmedetomidine.[11]

Inclusion Criteria: All female patients between the ages of 30 to 60 years with American society of anesthesiologist's status 1 to 3, undergoing gynaecological abdominal surgeries.

Exclusion Criteria: All cases that had local anaesthetic allergy, cardiac disease, significant liver or kidney disease, and morbid obesity with BMI more than 35. Patients of chronic pain, drug addiction or having psychiatric or central nervous system disease, chronic use of opioids, steroids, and having communication issues were also not included in the study.

Eligible patients were divided into two groups. All surgeries were carried out under general anaesthesia. Routine monitoring included electrocardiogram, pulse oximeter and noninvasive blood pressure measurement. Premedication was done with ondansetron 4mg and dexamethasone 4mg. Anesthesia was induced with propofol 2 mg per kg. Tracheal intubation was facilitated with atracurium 0.5 mg per kg. Mechanical ventilation was initiated. Anaesthesia was maintained with isoflurane 1.2%. Intraoperatively all patients received analgesia of 0.1 mg/kg nalbuphine intravenously and 1000mg 8 hourly paracetamol postoperatively for 24 hours. Both investigational drugs were started at the time of induction and continued upto the last stitch.

The cases in group D were offered dexmedetomidine infusion. Patients received a bolus dose of 0.6 micrograms per kg over 10 minutes followed by infusion 0.6 micrograms per kg per hr in 50 ml syringe pump at a concentration of 4 microgram per ml.

The cases in group L were offered lidocaine infusion. Bolus dose of 1 mg per kg over 10 min followed by infusion 1 ml per kg per hour in similar syringe pump at a concentration of 2 mg per ml.

Visual analogue score was applied for pain scoring ranging from zero to ten with 0 meaning no pain and 10 meaning worst imaginable pain. Pain score was recorded at three, six, twelve and twenty four hours after the completion of surgery. If at any time after surgery a patient complained of moderate to severe pain (VAS 4 or more), intravenous tramadol 25mg was given with a total of 300 mg in 24 hours. Total dose of tramadol used in each patient in 24 hours was also recorded (Figure).

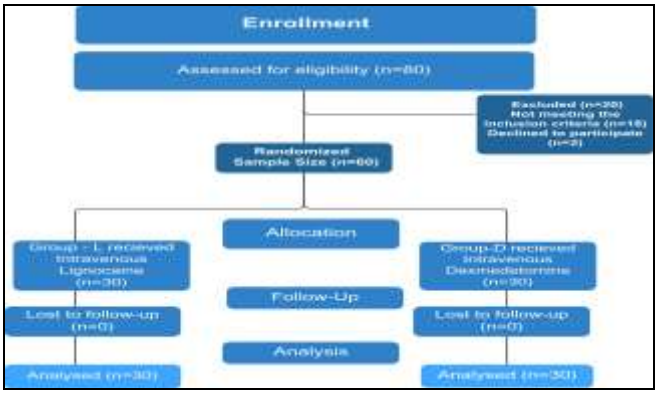

Figure: Patient Flow Diagram

The data analysis was done using Statistical Package for the Social Sciences version 26.0. Quantitative data like age and BMI were presented in the form of means and standard deviations. The frequency and percentages were calculated for ASA status. The Mann-Whitney U was used to compare median and IQR of pain score . The *p*-value of <0.05 was considered as significant.

RESULTS

In our study we enrolled a total of sixty female patients who underwent gynecological surgeries

under general anesthesia. Demographic data and ASA grades are presented in Table I.

Table-I: Comparison of patients statistics on basis of age, BMI and ASA status

Parameter	Group D (n=30)	Group L (n=30)
Age (years)	42.73±11.12	46.77±9.49
BMI (kg/m^2) Mean±SD	22.17±2.26	22.5±2.05
ASA Status: n (%)		
II	13(30)	14(47)
III	17(70)	16(53)

The mean age in Group D was 42.73±11.12 years and 46.77±9.49 years in Group L. BMI was 22.17±2.26 in Group D whereas it was 22.5±2.05 in Group L. Total of 13 patients of ASA II were in Group D and 14 in Group L. ASA III were more as compared to ASA II patients (Group D: 17 versus Group L: 16)

VAS pain scoring did not show significant difference between both groups over the period of 24 hours. At 3 hours after procedure median (IQR) VAS in Group D was 3(2) and 3(2) in Group L. After 6 hours it was 4(2) in Group D versus 4(3) in Group L. At 12 hours it was 3.5(2.25) in Group D whereas it was 4(3) in Group L. At 24 hours pain score remained stable (Group D: 4(2.5) versus Group L: 4(3))(Table-II).

Table-II: Comparison of Median Pain score, Measured at 3, 6, 12 and 24 Hours Between Both Groups

	Group D (n=30)	Group L (n=30)	*p* – value
Visual analogue score at 3 hours Median(IQR)	3(2)	3(2)	0.87
Visual analogue score at 6 hours Median(IQR)	4(2)	4(3)	0.64
Visual analogue score at 12 hours Median(IQR)	3.5(2.25)	4(3)	0.97
Visual analogue score at 24 hours Median(IQR)	4(2.5)	4(3)	0.52

Various doses of tramadol had to be given to patients to keep pain scores less than 4 at any time after the surgery. Total mean tramadol consumption for Group D was 121.67±67.83 mg where as it was 132.5±62.68mg in patients of Group L which was statistically insignificant. (Table-III).

Table-III: Total Tramadol Consumption Between Both Groups Over 24 Hours

	Group D (n=30)	Group L (n=30)	*p* – value
Mean Tramadol consumption (mg) Mean±SD	121.67±67.83	132.5±62.68	0.52

DISCUSSION

We studied the effects of lidocaine and dexmedetomidine on postoperative pain in patients undergoing gynecologic abdominal surgeries. Both drugs have shown good analgesic efficacy according to published literature.[12-13]

Our results showed that patients receiving either dexmedetomidine or lidocaine had similar lower pain scores. Similarly total opioid consumption in both groups was also similar and statistically insignificant. Our results were comparable with other studies.

A study by Guo H et al followed four different groups using lidocaine and dexmedetomidine alone and in combination and found no difference between both groups when used alone but in combination patients had significantly lower pain scores.[14] Similarly another study by Shu et al done on patients undergoing thyroid surgery found no difference in pain score and total opioid consumption in both groups however lidocaine was superior considering it had a longer time to rescue analgesia as compared to dexmedetomidine.[15]

Some of the studies had different results as compared to our findings. This could be due to different patient populations, different doses of the two medications used or study duration. Rekatsina et al studied these two drugs in eighty one females undergoing hysterectomy and myomectomy. Their results showed that the lidocaine group had lowered postoperative morphine consumption as compared to the dexmedetomidine group.[16] Another study by Xu S et al also studied both these drugs and found that pain scores were less in the dexmedetomidine group and in combination with lidocaine.[17] Sivaji P et al studied patients undergoing robotic hysterectomy and saw the effects of different doses of lidocaine and dexmedetomidine. Their study showed that the dexmedetomidine group had better postoperative pain scores and lower fentanyl consumption.11 Xu et al also studied these two medicines in patients undergoing abdominal hysterectomy and found that combination of dexmedetomidine and lidocaine had lower postoperative fentanyl consumption.[18]

Our study was the first of its kind in our country. We used relatively different drugs not used for this purpose in our country. We followed the patient for 24 hours to assess for pain relief. We tried to bridge the gap between the conventional use of both these drugs in our setup.

LIMITATION OF STUDY

Our study had a few limitations, we used a fixed dose in both groups. Increasing or decreasing the dose of drugs may have variable effects. Only gynecologic abdominal surgery patents were considered. We used a limited sample size.

We recommend that more studies be carried out with these medications with increased sample size, and using variety of patients.

Conflict of Interest: None.

Discolure:

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MA & SN: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

MK & EZ: Data acquisition, data analysis, approval of the final version to be published.

MJM & SK: Critical review, concept, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. O'Neill A, Lirk P. Multimodal Analgesia. Anesthesiol Clin. 2022 Sep;40(3):455-468. http://doi: 10.1016/j.anclin.2022.04.002.
2. Lv X, Zhang H, Gao J, Hou A, Ma Y, Zhou Z, Mi W, Zhang H, Liu Y. Intraoperative dexmedetomidine on postoperative pain in gastrointestinal surgery: an observational study. Int J Surg. 2023 Apr 1; 109(4): 887-895. http://doi: 10.1097/JS9.0000000000000360.
3. Shanthanna H. Risk factors and prediction modelling for chronic post-surgical pain after breast cancer surgery. Anaesthesia. 2023 Jul; 78(7): 811-815. http://doi: 10.1111/anae.16011.
4. Xuan C, Yan W, Wang D, Li C, Ma H, Mueller A, Chin V, Houle TT, Wang J. Efficacy of preemptive analgesia treatments for the management of postoperative pain: a network meta-analysis. Br J Anaesth. 2022 Dec; 129(6): 946-958. http://doi: 10.1016/j.bja.2022.08.038.
5. Qin P, Wei K, Yang Q, Zhu Y, Zheng X, Zhang H. Effect of lidocaine or dexmedetomidine on postoperative recovery in elder patients undergoing colorectal surgery. Minerva Anestesiol. 2023 May; 89(5): 405-414. http://doi: 10.23736/S0375-9393.23.17099-4.
6. Yang X, Wei X, Mu Y, Li Q, Liu J. A review of the mechanism of the central analgesic effect of lidocaine. Medicine (Baltimore). 2020 Apr; 99(17): e19898. http://doi: 10.1097/MD.0000000000019898.
7. Tang C, Xia Z. Dexmedetomidine in perioperative acute pain management: a non-opioid adjuvant analgesic. J Pain Res. 2017 Aug 11; 10: 1899-1904. http://doi: 10.2147/JPR.S139387.
8. 8.Kranke P, Jokinen J, Pace NL, Schnabel A, Hollmann MW, Hahnenkamp K, et al. Continuous intravenous perioperative lidocaine infusion for postoperative pain and recovery. Cochrane Database Syst Rev 2015;7:CD00964.
9. Basantwani S, Patil M, Govardhane B, Magar J, Tendolkar B. Effect of dexmedetomidine infusion on hemodynamic responses in microsurgery of larynx. J Anaesthesiol Clin Pharmacol 2018 ;34: 51–7.
10. Lundorf LJ, Nedergaard HK, Møller AM. Perioperative dexmedetomidine for acute pain after abdominal surgery in adults. Cochrane Database of Systematic Reviews. 2016(2).
11. Sivaji P, Agrawal S, Kumar A, Bahadur A. Evaluation of lignocaine, dexmedetomidine, lignocaine-dexmedetomidine infusion on pain and quality of recovery for robotic abdominal hysterectomy: a prospective randomized controlled trial. Brazilian Journal of Anesthesiology. 2022 Oct 10; 72:593-8.
12. Kim DJ, Bengali R, Anderson TA. Opioid-free anesthesia using continuous dexmedetomidine and lidocaine infusions in spine surgery. Korean journal of anesthesiology. 2017 Dec 1; 70(6): 652-3].
13. Modir H, Yazdi B, Talebi H, Eraghi MG, Behrouzi A, Modir A. Analgesic effects of ketorolac/lidocaine compared to dexmedetomidine/lidocaine in intravenous regional anesthesia. Ann Trop Med Public Health. 2017 May 1; 10(3): 1-5.
14. Guo H, Ao T, Wang J, Zhang X, Zheng J, Xiao Y, Xue R, Kalika P, Ran R. Clinical Efficacy of Perioperative Intravenous Dexmedetomidine and Lidocaine Combined Infusion for Thyroidectomy: A Prospective, Randomized, Double-Blind, Placebo-Controlled Trial. Clin J Pain. 2022 Feb 3; 38(4): 264-270. http://doi: 10.1097/AJP.0000000000001027.
15. Shu T, Xu S, Ju X, Hu S, Wang S, Ma L. Effects of Systemic Lidocaine Versus Dexmedetomidine on the Recovery Quality and Analgesia After Thyroid Cancer Surgery: A Randomized Controlled Trial. Pain Ther. 2022 Dec; 11(4): 1403-1414. http://doi: 10.1007/s40122-022-00442-5.
16. Rekatsina M, Theodosopoulou P, Staikou C. Effects of Intravenous Dexmedetomidine Versus Lidocaine on Postoperative Pain, Analgesic Consumption and Functional Recovery After Abdominal Gynecological Surgery: A Randomized Placebo-controlled Double Blind Study. Pain Physician. 2021 Nov; 24(7):
17. Xu S, Hu S, Ju X, Li Y, Li Q, Wang S. Effects of intravenous lidocaine, dexmedetomidine, and their combination on IL-1, IL-6 and TNF-α in patients undergoing laparoscopic hysterectomy: a prospective, randomized controlled trial. BMC anesthesiology. 2021 Dec; 21:1-9.
18. Xu SQ, Li YH, Wang SB, Hu SH, Ju X, Xiao JB. Effects of intravenous lidocaine, dexmedetomidine and their combination on postoperative pain and bowel function recovery after abdominal hysterectomy. Minerva anestesiologica. 2017 Jan 17; 83(7): 685-94.