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STUDY TO EVALUATE THE EFFICACY OF TAP BLOCK USING 0.5% BUPIVACAINE VERSUS ORAL GABAPENTIN FOR POSTOPERATIVE ANALGESIA IN LAPAROSCOPIC SURGERIES

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Abstract

Background: Early discharge and shorter hospital stay is popular in patients undergoing minimally invasive surgery (MIS). Intolerable post-MIS pain may lead to a significant unnecessary increase in analgesia use, slower recovery, longer hospital stays, and rarely, readmission.

Aim: The study aimed to evaluate the efficacy of TAP block using 0.5% Bupivacaine versus oral Gabapentin for postoperative analgesia in laparoscopic surgeries.

Materials and Methods: In a randomised controlled study, 70 patients of ASA class I and II scheduled for laparoscopic surgeries of age 20 to 60 years were enrolled. Patients were randomly allocated into two groups of 35 each. Group I was allocated to patients receiving TAP block and Group II to patients receiving oral Gabapentin.

Results: Patients in both the groups were comparable with respect to age, gender, ASA Class and type of surgery and did not affect the study result at any time interval of the study. MAP and SPO2 did not show significant difference in both the groups at any time interval of study. Heart rate was significantly higher in group II than the group I which corresponds to the onset of pain that is at 6 hours in group II and 8 hours in Group I. NRS score of >4 was seen earlier (6 hours) in Group II patients as compared to group I patients (8hours). Eighteen out of 35

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patients of Group II required rescue analgesia where as in Group I only 9 out of 35 patients required rescue analgesia.

Conclusion: TAP block using 0.5% Bupivacaine is more efficacious than 300 mg oral gabapentin for post-operative analgesia in laparoscopic surgery.

Keywords: laparoscopic surgery, oral gabapentin, TAP block, 0.5% Bupivacaine

1. Introduction

Anaesthesia has helped fields like general surgery to an extent that it has widened its way for modern day laparoscopic surgery also known as minimally invasive surgery (MIS). Early discharge and shorter hospital stay is popular in patients undergoing MIS. Intolerable post-MIS pain may lead to a significant unnecessary increase in analgesia use, slower recovery, longer hospital stays, and rarely, readmission.(1)

Various techniques have been used to minimize the pain after laparoscopic surgery, which includes non-steroidal anti-inflammatory drugs, opioids, peripheral nerve block and epidural block.(2)

The transverse abdominal plane (TAP) block is a peripheral nerve block that anesthetize the nerves supplying the anterior abdominal wall (T6 to L1).(3) Transversus abdominis plane (TAP) block involves infiltration of local anesthetics into the fascial plane between the internal oblique and transversus abdominis muscle, and it has been suggested to be an effective approach for relieving postoperative pain after lower abdominal surgery with minimal adverse effects.(4,5) The commonest used local anaesthetic agent in postoperative pain management is Bupivacaine which is found to be very effective for pain management and has relatively lesser side-effects and is not very expensive.(6)

Gabapentin is a novel drug used for the treatment of postoperative pain with anti-hyperalgesia properties and a unique mechanism of action, which differentiates it from other commonly used drugs. Its mechanism of action as an antiepileptic agent likely involves its inhibition of the alpha 2-delta subunit of voltage-gated calcium channels.(7,8) Gabapentin works by reducing lesion- induced hyperexcitability of posterior horn neurons, which is responsible for central sensitization.(9)

Previous studies have evaluated the effect of either pre-emptive gabapentin or TAP block separately in preventing postoperative pain and decreasing analgesic requirement but comparative studies between the two are lacking, so we propose to compare the effect of both Gabapentin and TAP block for the same.

2. Material and Methods

This is a randomised and comparative study which was conducted on 70 patients. This study was carried out in department of Anaesthesia, MMIMSR, Mullana after getting approval from Institutional ethics committee.

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Inclusion Criteria:

1. Either sex
2. ASA grade 1, grade 2
3. Age group between 20 years and 60 years.

Exclusion Criteria:

1. Patient refusal for the procedure.
2. Patient with cardiovascular disease (Hypertension, Coronary artery disease)
3. Patient with significant coagulopathies.
4. Patient with known or suspected pregnancy.
5. Patient with Hypersensitivity reaction to amino amide anaesthetic or any known drug allergy to gabapentin.
6. Patient with renal or liver disease.
7. Patients on antipsychotic medication.
8. Patients on gabapentin for pain for other reasons.

Patients were randomly allocated to either of two groups based on computer generated random numbers which was kept in an envelope and opened at the end of study.

Group I patients were given TAP Block using 5 ml of 0.5% Bupivacaine with 5 ml of normal saline in same syringe on each side of abdomen. (Before the incision)

Group II patients were given 2 capsules of 300mg gabapentin 1- 2 hours before surgery. Patients were kept Nil per orally at least 8 hrs for solids and 2hrs for clear liquid prior to surgery. In premedication, Tab Alprazolam 0.25mg and Tab Ranitidine 150mg was given to all the patients prior to surgery. In addition, patients in group II were given 2 capsules of 300mg gabapentin 2 hrs prior to surgery along with sips of water.

Technique of Block

Landmark: Inferior lumbar Triangle

It comprises of highest point of iliac spine, latissimus and External Oblique Muscle (EOM). The aim of this procedure is to give the anaesthetic drug in sheath below Internal Oblique Muscle (IOM) & on the upper surface of the Transverse Abdominis Muscle (TAM). This involves following nerves: T7- T11, T12, L1

Two techniques to give TAP block are:

1. **Loss of Resistance (Blind Technique)**
2. **USG Guided Technique**

Pre anaesthetic evaluation was performed before surgery. A written informed consent was taken. During the pre-anaesthetic check-up, the patient was explained about the procedure.

On the day of surgery, in the preoperative room patient's baseline vitals were recorded and intravenous line was secured with 18 G cannula and IV fluid was started. After shifting the patient to OT, patients were taken on the table and the monitors were attached and following parameters were recorded: NIBP, HR, SPO2, RR, ECG.

Inj. midazolam 0.5 mg/kg, Inj. Nalbuphine 0.1 mg/kg was given as premedication. After 3 minutes of preoxygenation, anaesthesia was induced with Inj. Propofol (2 mg/kg), oxygen, nitrogen oxide and isoflurane. Thereafter neuromuscular blockage was achieved with Inj. Suxamethonium (1.5 mg/kg). Ventilation was done with a face mask for 45 to 60 seconds to allow the jaw to fully relax before the insertion of endotracheal tube. Then ETT was inserted

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and fixed. The patients were maintained on O2, N2O, Isoflurane, IPPV and Inj. Atracurium (Initial dose 0.5 mg/kg, maintenance dose 0.1mg/kg) when required intraoperatively.
At the end of surgery, neuromuscular blockade was antagonised with intravenous neostigmine methyl sulphate (0.05 mg/kg) and intravenous glycopyrrolate (0.01 mg/kg), 100% oxygen was provided. After that the patient was extubated once the patient was fully awake. The patients were monitored and shifted to post anesthetic care unit for evaluation thereafter.
Rescue analgesia was given when NRS was more than 4/10 in the form of Inj. Butorphanol 1mg. Time to 1st rescue analgesic as well as NRS score was noted.

PARAMETERS OBSERVED:

1. Number of episodes of pain was recorded at 0-24 hrs.
2. Number of times rescue analgesia was given and at what interval of time was recorded.
3. Adverse reaction was observed.
4. Post-operative sedation score and emergence time was observed.
5.

STATISTICAL ANALYSIS:
Data was entered in Microsoft excel sheet and was statistically analysed using the Statistical package for social sciences (SPSS) version 21. Qualitative variables were expressed as proportions in terms of percentage. Quantitative variables were expressed as mean, standard deviation or median and interquartile range. Association of the dependent and independent variables were established using Chi square test, t- test, mu test depending on variable.

3. Results

This prospective observational study was carried out on 70 patients of age groups 20-60 years at MMIMSR, MULLANA "To Study the efficacy of TAP Block using 0.5% Bupivacaine versus oral Gabapentin for post operative analgesia in laparoscopic surgeries". All the data are expressed as Range, mean and standard deviation, percentage and number of patients were compared.
The difference between the age group and gender was insignificant and was not affecting the study results. Both the groups were comparable and there is no effect of ASA classification on study results [Table 1].
The hemodynamic parameters like mean arterial pressure, SPO2 and heart rate were monitored at regular time interval for initial 24 hours following surgery. The results in our study showed that there is no significant difference in MAP in both the groups [Figure 1]. There was no significant fall in saturation seen in both the groups with respect to the pain score [Figure 2]. In our study we found that Heart Rate was comparably higher in Group II than the Group I which corresponds to 1st breakthrough pain which occurred at the 6th hour in Group II and at 8th hour in Group I [Figure 3].
In our study, we concluded that, onset of pain was earlier (at 6 hrs) in Group II as compared to group I (8 hrs). Nine out of 35 patients required rescue analgesia in Group I and 18 out of 35 patients required rescue analgesia in Group II [Figure 4].

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Patients were observed for any adverse effects such as nausea, vomiting, pain on injection site, hypoxia, sedation in the study. No significant adverse effects were seen in patients in either of the groups at any time interval of the study. No drug related adverse effects like allergic or hypersensitivity reactions were seen in both the groups.

In our study we assessed the post-operative sedation score by using modified Wilson sedation scale. We noted that during our study no patient in both the groups were given score more than 1 on modified Wilson sedation scale.

TABLE 1: DISTRIBUTION OF PATIENTS ACCORDING TO AGE, GENDER AND ASA CLASS

Parameters		Group I	Group II
Age (years)	≤30	8.6%	11.4%
	30-40	22.9%	20.0%
	41-50	51.4%	40.0%
	51-60	17.1%	28.6%
Gender	Male	42.9%	62.9%
	Female	57.1%	37.1%
ASA Grade	1	42.9%	45.7%
	2	57.1%	54.3%

FIGURE 1: COMPARISON BETWEEN BOTH GROUPS BASED ON MEAN ARTERIAL PRESSURE

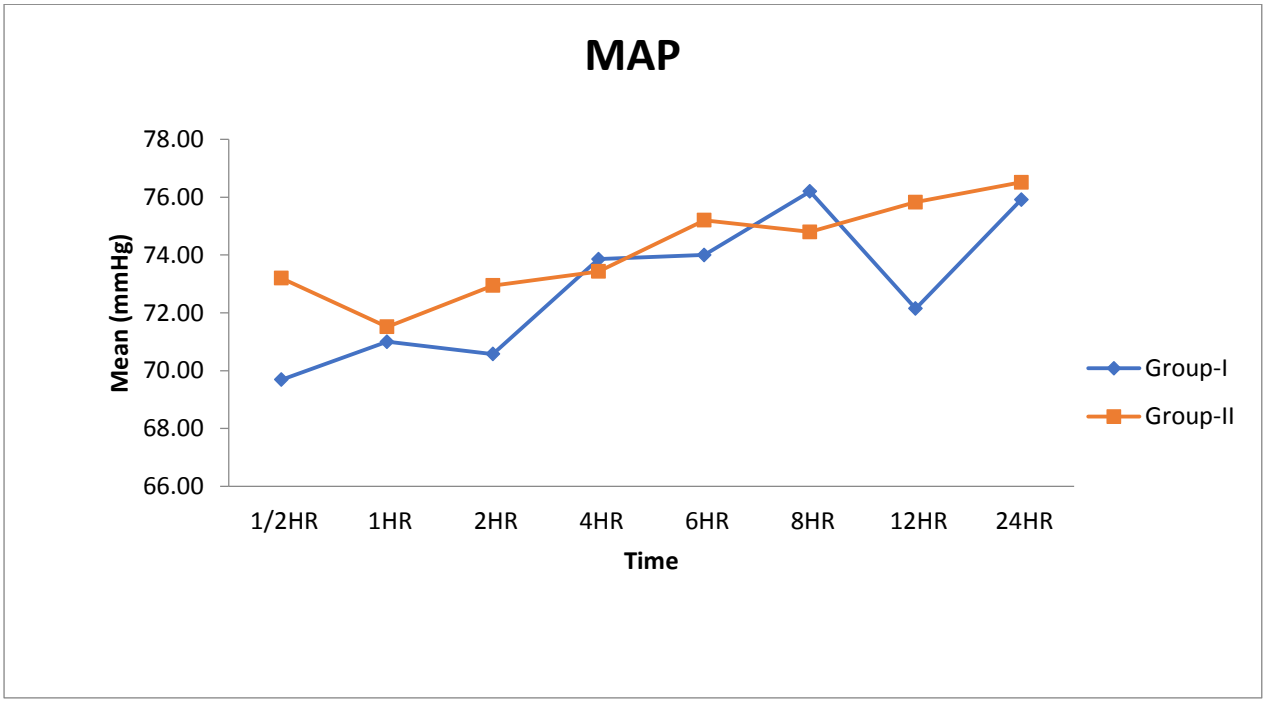

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FIGURE 2: COMPARISON BETWEEN BOTH GROUPS BASED ON SPO2

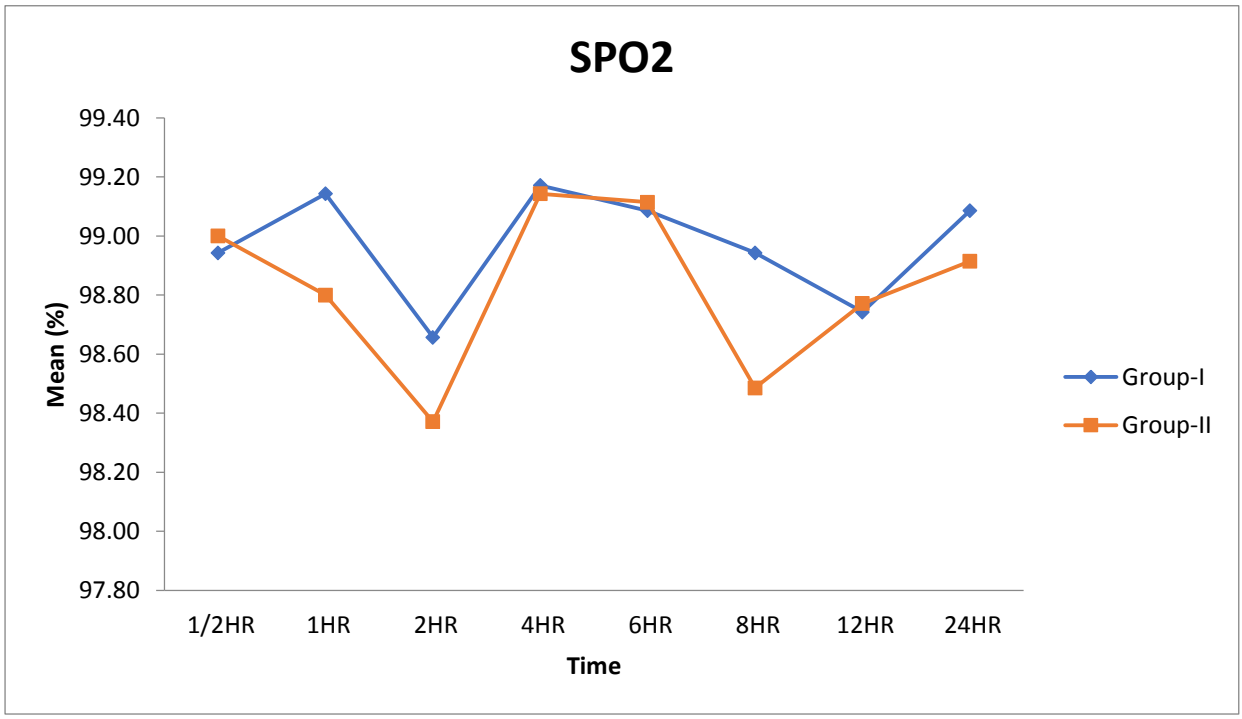

FIGURE 3: COMPARISON BETWEEN BOTH GROUPS BASED ON HEART RATE

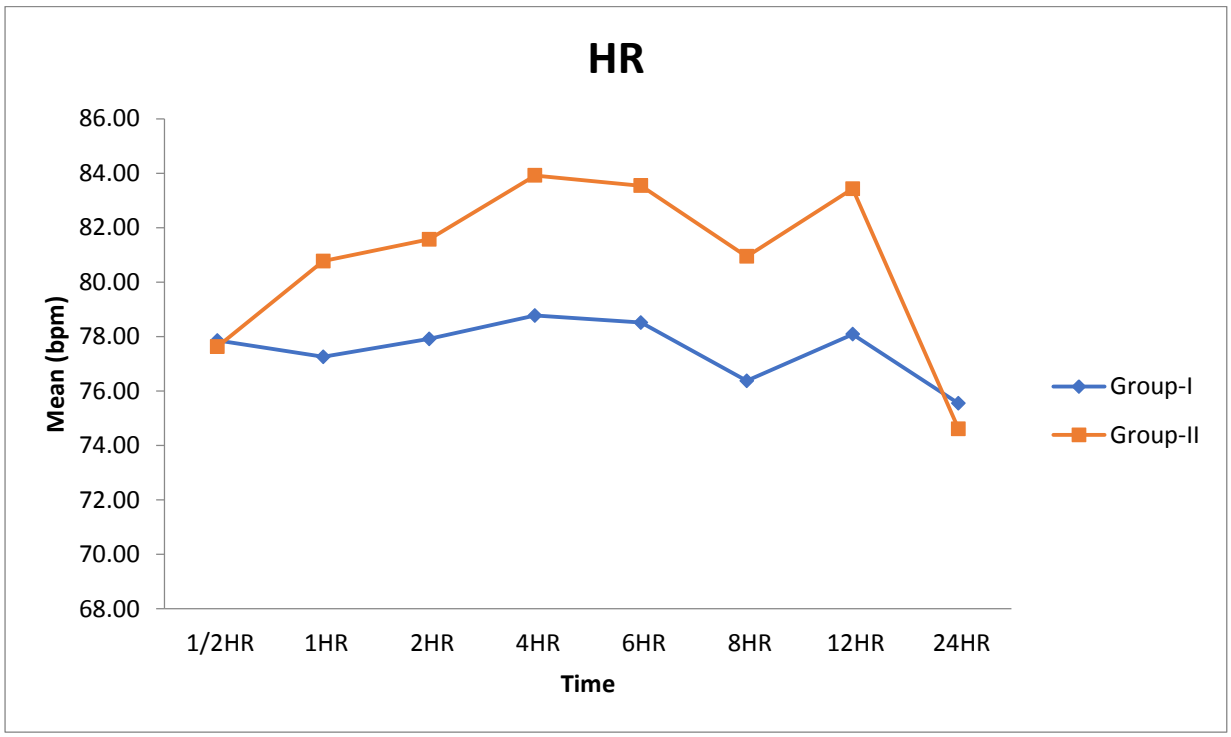

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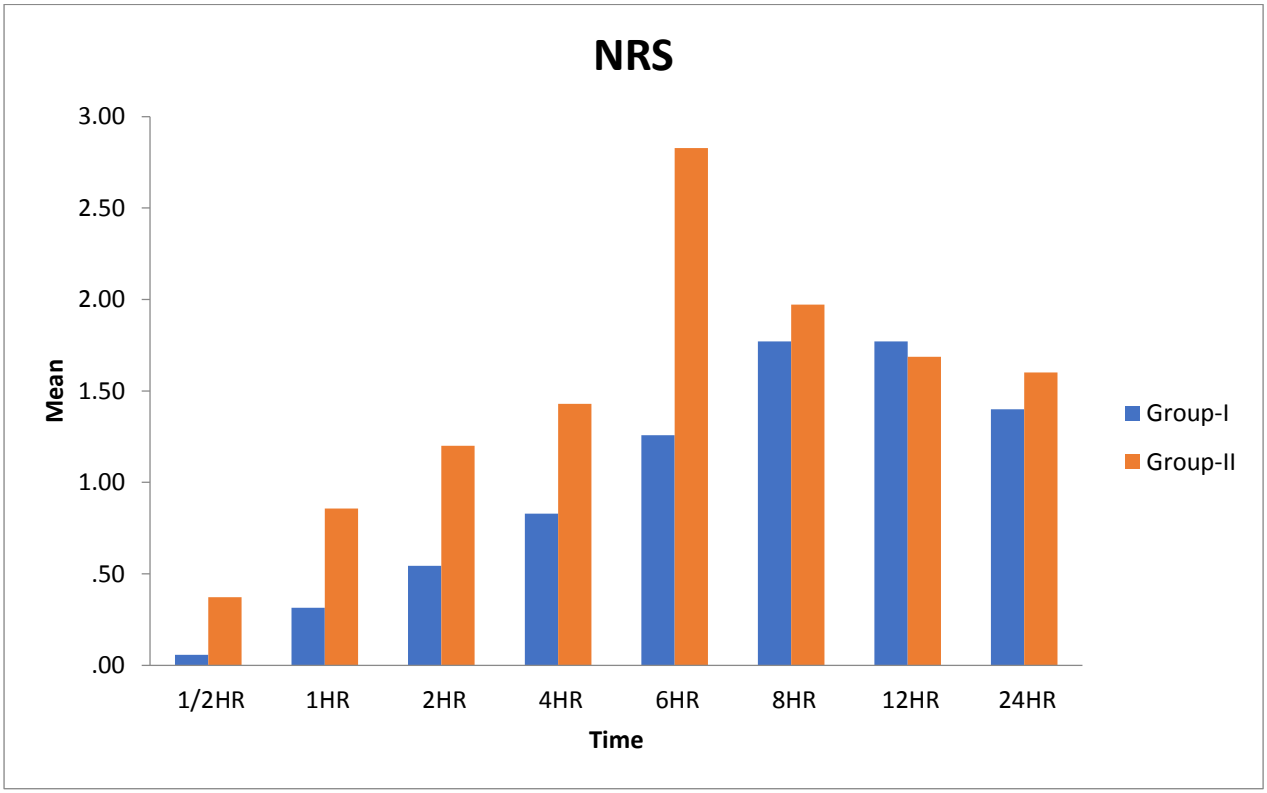
FIGURE 4: COMPARISON OF BOTH GROUPS BASED UPON NRS SCORING



4. Discussion

The incidence of post-operative pain, although less severe and frequent than in open surgery, but may affect length of hospital stay and early return to normal activity in some patients undergoing laparoscopic surgeries. Early discharge reduces burden on both patients as well as heath care facilities.

As evident from the results, the duration of pain free period was longer in Group I as compared to Group II. Nine out of 35 patients in Group I required rescue analgesia in 24 hr period as compared to 18 patients out of 35 in Group II. Most patients in Group I were pain free for 8 hours while in Group II pain free period for most patients was significantly less (6 hours).

In our study we found out that both the groups were comparable with respect to age and gender of the patient. No significant difference was found in NRS value in both the groups. In our study we took 37 patients who were ASA 1 and 33 patients who were ASA 2, irrespective of the group allocation. We concluded that both the groups were comparable with respect to ASA grading. No significant difference was seen. In our study we took patients of different Laparoscopic surgeries (Cholecystectomy, Hernia, Hysterectomy and Appendicectomy). We found that both the groups were comparable with respect to the kind of laparoscopic surgery. No significant difference was seen in NRS scoring in both the groups.

In our study we found out that there was no significant difference seen among the mean arterial pressure in both the groups. Hence both the groups were found comparable with respect to the mean arterial pressure.

There was significant difference with respect to the heart rate among the two groups. Variation was seen in heart rate in Group II which was significant and correlates with Pain

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score (NRS) of > 4 at 6 hrs postoperatively whereas in Group I no such variation was seen in Heart rate, which may be due to better post-operative analgesia.

In our study no significant Hypoxia was seen in both the groups. SPO2 remained 99 ± 2 in both the groups at all time period of study. We concluded that both the groups were comparable with respect to SPO2. No significant difference was noted in both the groups during the entire period of study.

NRS score in Group I remained significantly lower than Group II at all time period. Breakthrough pain (NRS SCORE >4) was noted earlier in the 12 out of 35 patients allocated to Group II as compared to the patients allocated to Group I.

As studied by Tihan D et al. (2016) that TAP block is an efficient method of providing post-operative analgesia for laparoscopic surgery found to be consistent with our study.[10]

Efficacy of TAP block was also studied by McDonnell JG et al. (2007) and found that TAP block is much effective in reducing post-operative pain in laparoscopic surgeries and no major complication were observed after the TAP block. These observations were consistent with our study.[11]

Ultrasound guided TAP block was studied by Dawlatly et al. (2009) and found out that USG enables the exact placement of the needle and the drug without major or any minor complications. These results were found to be consistent with our study.[12]

Gildasio S De Oliveira Jr et al. (2014) studied Transversus abdominis plane block to reduce postoperative pain outcomes after laparoscopic surgery and found that TAP block reduces rescue analgesic requirement and early discharge from the hospital. These results found to be consistent with our study.[13]

Based on the observation in our study we concluded that patients receiving TAP block using 0.5% Bupivacaine for post-operative pain in laparoscopic surgeries required less rescue analgesia and were pain free for longer duration as compared to the group receiving Oral Gabapentin.

5. Conclusion

The present study concluded that TAP block using 0.5% Bupivacaine is more efficacious than 300 mg oral gabapentin for post-operative analgesia in laparoscopic surgery.

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