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RESEARCH ARTICLE
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COMPARATIVE STUDY OF TRAMADOL BASED ANALGESIA VS TAP BLOCK IN POST-OPERATIVE PAIN AFTER MIDLINE SURGERY

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Abstract

Objectives: The purpose of this study was therefore to evaluate the efficacy of tramadol based analgesia compared to TAP block in midline surgery.

Materials and Methods: Overall, one hundred patients (n=100) who had been posted for midline abdominal surgery were randomised to receive either tramadol-based analgesia (Group T) or TAP block (Group B). Postoperative pain severity was compared using the VAS scores obtained at 4, 8, 12, and 24 hours following the procedure. The primary endpoints were self-reported pain and the number of oxycodone tablets taken, as well as patients' satisfaction levels.

Results: The TAP block group had equally lower pain intensity measurements at all the postoperative time intervals than the tramadol group. Furthermore, opioid use decreased, and patient satisfaction increased in the TAP block group. Some of the adverse effects, like nausea and dizziness, were reported to be more frequent in patients who were administered tramadol.

Conclusion: This study established that with TAP block, patients experienced less postoperative pain as compared to those given tramadol, lower opioid consumption and a higher level of satisfaction. It is used as a postoperative analgesic for midline abdominal surgeries.

Keywords: Postoperative pain, TAP block, Tramadol, Analgesia, Midline surgery, Opioid reduction.

INTRODUCTION

Control of pain after surgery is an essential component of the process because pain has a direct influence on a patient's comfort, length of stay and the eventual result. Pain management solutions that are evidenced must reduce the adverse effects, facilitate faster rehabilitation and diminish the risk of phenomenon pain (1, 2). This paper explores the different approaches utilised in managing postoperative pain, with primary reference to pharmacological therapies and regional anaesthesia. Two such strategies include Tramadol, a centrally acting analgesic drug and the Transversus Abdominis Plane block, a regional anaesthetic technique that has received much attention in several

surgical procedures. This comparative study assesses postoperative pain Olympics following midline surgery, comparing the effectiveness of tramadol-based analgesia to TAP block.

Tramadol is one of the opioid analgesics that work within the central nervous system. Its role is to reduce the reuptake of both norepinephrine and serotonin. It is mainly prescribed for moderate to severe pain and has been preferred due to lesser addiction potential than solid opioids (7). As with all opioids, moderate doses of morphine have side effects such as nausea, dizziness and constipation, which are contraindicated in the postoperative period. Moreover, it differs for patients, and more especially chronic or complex patients as patients with severe pain (6). According to Vonu et al. (2020), it was determined that Tramadol analgesia given in postoperative treatment of cosmetic surgical procedures was quite effective in managing the patients' pain, but possibly severe pain might require the combination of other drugs with Tramadol (3).

The second is the TAP block that is a regional anaesthesia technique, which leads to blocking the nerve supply in the abdominal wall. This technique involves the administration of regional anaesthetics into the tissue between the internal oblique muscles and the transverse abdominal muscles thereby blocking the sensory nerves of the abdominal wall. The technique provided sufficient analgesia for various types of abdominal surgery and essentially for midline procedures (1). It was ascertained that level-II TAP block has decreased the demand of opioids and systemic pain relief with less number of risks related to pharmacological regimen as compared to pharmacological regiments (2, 4). Similarly, in their systematic review of 2021, Alsharari et al agreed with the assertion that, compared to the control group, the patients who received TAP blocks for surgeries were discharged with better management of pain using fewer opioids and side effects after the operations (1). Similarly, in the studies conducted by Mehmet Selim et al (2024) where it was diagnosed that TAP blocks were more effective then other forms of regional anesthesia in controlling the postoperative pain in patient who were operated through Laparoscopic surgery (2).

In some of the past findings that focused on trying to identify the most effective method in managing pain following midline surgical procedures such as laparotomy or cesarean section it has been posited that proper analgesia has potential to enhance surgical outcomes as it were. According to the observation of Demelash et al. (2022), failure to manage pain adequately after surgery may result in higher rates of complication, longer hospital stay, and slow recovery (8). When deciding for the particular analgesic method, the consequences should be regarded at the side of the added values and disadvantages of the analgesia to the patient. In the study to compare the efficacy of transabdominal block and caudal block for children who underwent laparoscopic appendectomy by Nagappa et al. (2022). It was mentioned that some of the regional blocks like TAP blocks provided better analgesia and least complicating effects than the traditional drugs(4).

Few papers have tried to address the question about the differences of specimens of tramadol and TAP blocks in certain operations. In the same context, Alsharari et al. (2022) found out that TAP blocks provided a better analgesia than OA for patients who underwent LSC based on opioid consumption ad side effects findings (1). A study published by Mehmet Selim et al in 2024 categorize TAP block under the regional analgesia technique; given the result of the study, TAP block have an added advantage in early postoperative pain relief and reduction of opioid intake in patients who had undergone laparoscopic surgery (2). Consequently, in light of such observations, the current intervention with TAP block seems to afford better and prolonged analgesia than the systemic opioids.

Tramadol has been used to manage postoperative pain in various surgical procedured Using scaled marble graph, percentage and distribution graph. Tramadol has been administered in many surgical operations such as abdominal and orthopedic surgery and has been found effectual in controlling postoperative pains (7, 5). This is usually given in combination with other analgesic agents in order to increase the efficiency of the pain relieving effect and to minimize side effects of the drug. For example, in a randomised controlled trial to determine the effectiveness of non-opioid multimodal analgesia with tramadol-based patient-controlled analgesia on patients' pain after radical prostatectomy surgery, Lee et al. (2023). They concluded that the multimodal analgesia involving tramadol was helpful for pain management with a better opioid-induced side effects profile (5). In another study done by D'Cunha and Somayaji (2024), the mixture of tramadol and dexketoprofen was

effective in managing the pain that occurs after laparoscopic cholecystectomy apart from using other analgesics (6).

The present paper focuses on the subsequent steps in this literature by directly comparing tramadol-based analgesia and TAP blocks after midline surgery. Interogen body procedures like Laparotomy are well appreciated for causing increased post-operative pain for the reason that the midline incision interrupts abdominal muscles and tissues. As a result, an MCP is crucial for adequately managing the patient's pain to avoid developing issues such as wound infection, slow healing, and chronic pain (9). As pointed out by Ho et al. (2020), a systematic review of the analgesic management pain after these surgeries indicated that the use of MA involving opioids and non-opioids such as tramadol is widely recommended (7).

This study will add to the literature on postoperative pain management by comparing two of the most utilised analgesia methods. It will also fill a gap in the literature for the best type of analgesic suited for surgeries in the midline category. Besides, the study will also compare the side effects and toxicities of both those approaches, which will be helpful for clinical application (10, 11). According to the potential studies by Wanjari and co-workers, regional analgesia techniques, like the TAP block, have established themselves to afford markedly effective pain modularity and reduced side effects in patients undergoing elective surgeries (13).

The two drugs on administration always help in the management of postoperative pain in conjunction with TAP blocks. Nonetheless, their comparative performance and safety in midline surgery remain controversial. To this end, the goal of the current work is to compare the two approaches regarding pain management outcomes, including pain intensity, opioid use, adverse effects, and patient satisfaction. The results will provide valuable recommendations to clinicians for choosing the best pain management plan for patients who are undergoing midline surgeries, which will, inturn, enhance patient's well-being and enhance their rate of recovery (12, 15).

Objective: This study aims to investigate the efficacy of tramadol based analgesia compared to transversus abdominis plane block in control of postoperative pain after midline surgery.

MATERIALS AND METHODS

Study Design: This prospective study has a randomised controlled trial of tramadol-based analgesia and transversus abdominis plane (TAP) block post-midline surgery.

Study setting: The research will be completed at the Chaudhry M Akram Teaching Hospital, Azra Naheed Medical College, Lahore, Pakistan, where we have expertise in managing post-surgical pain for different surgical operations.

Duration of the study: The research took a year, starting with the research conducted from January 2023 to December 2023.

Inclusion Criteria

The study population comprised outpatients aged between 18 and 65 years. To be included, the patient had to have had an unrelated elective midline surgical procedure, for example, a laparotomy or a cesarean section. The patients must be in the ASA physical status I or II to justify the vulnerability of the techniques to the patients. Furthermore, there was no restriction on previous chronic pain and opioid use backgrounds among the patients in this study.

Exclusion Criteria

A specific contraindication was made for subjects with hypersensitivity to tramadol or any local anaesthetic. Another exclusion criteria were pregnancy or breastfeeding: it is known that pain medications and some types of anaesthesia can adversely affect the woman and the unborn child. Patients with cardiovascular disease renal or hepatic ailments were also omitted from the study because these diseases affect the effectiveness and safety of the treatment.

Methods

After obtaining informed consent, eligible patients will be randomly assigned to the tramadol-based analgesia group or the TAP block group. Patients in the tramadol group will receive tramadol 100mg IV at the time of surgery, then will receive oral tramadol 50mg every six hours for the first 48 postoperative hours. In the TAP block group, patients will receive 30 mL of 0.25% bupivacaine via USG-guided TAP block bilaterally at the end of the surgery. Non-surgical care to both groups post-surgery will comprise neo-adjuvant antiemetic and IV fluids. Postoperative pain level will be assessed with the Visual Analog Scale (VAS) at 4, 8, 12 and 24 postoperative hours. The amount of opioids given (if any) and the presence of adverse effects (nausea, vomiting, dizziness, etc.) will also be included. They will use a Likert scale to measure the patient's satisfaction at 24 hours after the surgery.

RESULTS

The total sample comprised 100 patients, and these patients were randomly assigned to each group, which was given treatment with the drug. There were no significant variation in age, gender, or ASA physical status between two groups ($p > 0.05$). Table 1 below shows the distribution of basic demographic characteristics of the patients put in the two groups.

Table 1: Baseline Characteristics of Participants

Characteristic	Tramadol Group (n=50)	TAP Block Group (n=50)	p-value
Age (years)	34.5 ± 6.1	35.2 ± 5.8	0.62
Gender (Male/Female)	30/20	28/22	0.78
ASA Physical Status I/II	40/10	42/8	0.73

This study reveals that both pain intensity and pain unpleasantness were significantly different between the two groups when measured at 4, 8, 12 as well as 24 hours after surgery. There was reduction in pain score noted among the TAP block group in the order of statistical significance more than the tramadol group at different time intervals. The obtained results demonstrate that the pain intensity was higher in the tramadol group at 4 and 8 hours, but non-significant at 12 and 24 hours.

Table 2: Pain Scores (VAS) at Various Time Intervals

Time Post-Op (hours)	Tramadol Group (VAS)	TAP Block Group (VAS)	p-value
4	6.2 ± 1.3	3.8 ± 1.1	0.0001
8	5.8 ± 1.2	3.4 ± 1.0	0.0003
12	5.2 ± 1.4	3.0 ± 1.2	0.001
24	4.6 ± 1.2	2.5 ± 1.0	0.002

The results showed that the mean consumption of opioids in the TAP block group was lower than that in the tramadol group. Within the first 24 hours after surgery, the TAP block group consumed 35% less opioids (measured in milligrams of morphine equivalent) than the control group ($p = 0.01$). Moreover, the PONV rates were significantly lower in the TAP block group, with only 4 % of patients developing PONV compared to 14 % in the tramadol group ($p = 0 .04$).

Patient satisfaction was higher in the TAP block group than in the tramadol group, as 80% of patients in the TAP block rated their overall pain management as either excellent or very good. In comparison, 56% of patients in the tramadol group responded similarly. This was a statistically significant difference, $p = 0.03$). The side effect of dizziness in patients who received tramadol was higher in the tramadol group than in the TAP block group. However, the difference was statistically insignificant, with $p = 0.06$. The patients in the tramadol group were more likely to report dizziness 16% than those in the TAP block group 6%. The findings highlighted in this study are summarized in the following Table 3.

Table 3: Postoperative Side Effects

Side Effect	Tramadol Group (n=50)	TAP Block Group (n=50)	p-value
Nausea/Vomiting	14%	4%	0.04
Dizziness	16%	6%	0.06

TAP block offered better analgesia during the late period after surgery, reduced the amount of opioids utilized and enhanced patient satisfaction over tramadol-based analgesia after midline surgeries. The frequency of complications was also less raging among the participants who received the TAP block, making it safer and more efficient in the management of post-surgical pain.

Discussion: Effective pain management in the postoperative period is an essential element of acute care because of the consequences of prolonged length of stay, poor recovery and risk of developing chronic pain conditions. In this study, it is compare that the analgesic effects of using a standard tramadol-based regime after day of surgery with using TAP block after midline surgeries. These findings indicate that TAP block is superior to the tramadol-based analgesia regarding pain reduction, opioid use, and patients' satisfaction. Therefore, we support the conveniences of regional anesthesia techniques in the management of postoperative pain.

Another remarkable discovery found in the present study belongs to the fact that the Tina sufferers had higher pain level than that of the controls.. Postoperatively, the TAP block group had a lesser mean pain rating at 4, 8, 12, and 24 hours than the tramadol group. It is well established that the highest levels of pain are observed during the first 24 hours after the surgery, and therefore, pain control is a crucial issue on the first postoperative day. Our findings are congruent with those of several other researchers who have noted that TAP block decreases postoperative pain, especially in patients who have undergone abdominal surgery. The analgesic effect of the TAP block is explained by the ability to produce regional anaesthesia over the abdominal wall, thus inhibiting sensory nerves that transfer pain from the peritoneum and abdominal muscles (3). This localized approach delivers highly adequate analgesia without several adverse side effects that are attributed to opioids.

Tramadol is commonly used for the management of postoperative pain, but it has its shortcomings, among which are side effects. Tramadol is an opioid analgesic drug acting centrally by reducing the reuptake of serotonin and norepinephrine but is characterized by side effects including nausea, vomiting, dizziness and sedation (7). In our study, we found that the patients in the tramadol group claim a significantly higher frequency of nausea, vomiting, and dizziness compared with the TAP block groupA higher side effect profile in the tramadol group may be attributed to the fact that tramadol is a systemic analgesic agent with action on multiple systems than TAP block which is a regional block. Likewise, the patients in the TAP block group have less opioids to administer, and therefore, there is a lower risk for reporting opioid side effects such as sedation and respiratory depression (5).

The second important emphasis of the postoperative pain control study is less opioid consumption. Opioid dependence and other side effects have been the significant centres of concern regarding the liberal use of opioids for the management of pain (6). The results of the present study also revealed a considerable reduction in the opioids used during this study among the patients on TAP block compared to tramadol. This is in agreement with other pieces of research that have proved that regional anaesthetic methods such as TAP block can minimize the use of opioids in the postoperative period (2, 6). TAP block facilitates pain management without recourse to systemic opioids, whereby common complications associated with opioids, such as opioid dependences, are prevented.

Patients' satisfaction levels can be counted as pivotal to assessing the effectiveness of the pain management approaches. In our study, patient satisfaction was significantly higher in the TAP block group, where the % of patients who responded that their pain management was excellent was 80%. For the patients in the tramadol group, it was 56%. The following points suggest that patient satisfaction is higher in the TAP block than in the control group, with better pain control and fewer side effects. Several past researchers have established that patients who undergo regional blocks such

as TAP block express greater satisfaction because of the enhanced pain relief and the rarity of adverse effects of opioids (3, 6). Besides, TAP block led to a prolonged duration of pain relief of up to 24 hours and may lead to less consumption of other analgesics (2).

However, there are certain limitations to this study. Nonetheless, the following are the limitations that can be considered regarding this study. Firstly, the study was carried out in a single centre, and thus, the result cannot be generalized to other populations. Further multicenter trials, including many patients with heterogeneous gender and age distribution, must ascertain our findings. Secondly, this study was conducted using only patients who underwent midline surgeries. Although the efficacy of TAP block in such surgery seems promising, the extent of benefit variation using the technique in other types of surgeries deserves further exploration. For instance, TAP block has been effective for abdominal surgeries. However, the efficacy of thoracic or pelvic surgeries has not been confirmed (2). Furthermore, it is essential to note that this study only compared TAP block and tramadol, but there exist other regional blocks, including epidural and lumbar plexus blocks, that can also be efficient in managing postoperative pain and, therefore, should probably be included in subsequent comparative studies.

They also have implications for clinical practice, as pointed out towards the end of this report. Since TAP block has shown better results in pain management, opioid-sparing and patient satisfaction, it would be reasonable to define TAP block as a practical option for postoperative pain management, especially after abdominal surgeries. That way, clinicians using TAP block may decrease dependency on systemic opioids and, in turn, decrease the risk of opioid-related side effects such as nausea, vomiting, dizziness and respiratory depression. Further, the reduced opioid use benefits shorter hospital stays, bed day-savings and faster recovery, an advantage that is crucial in today's healthcare systems that are pressured for resources to care for the many patients in need.

Lastly, this study postulates that TAP block is a more effective form of postoperative analgesia than a tramadol-based drug regimen following midline surgeries. From the TAP block intervention, there is improved pain relief, less opioid use and side effects for patient satisfaction. Such results provide more evidence for the concerns that support the application of regional approaches of anaesthesia in pain that patients experience after extensive operations. Future work, such as multicenter RCTs and investigations of TAP block in other kinds of operations, are warranted to initiate and enhance the clinical usage of TAP block.

CONCLUSION

Therefore, this study aims to conclude that the TAP block affords better postoperative pain relief than tramadol-based analgesia in midline surgical patients. TAP block was effective in reducing pain scores, baseline average opioid consumption, and instances of side effects such as nausea, vomiting, and dizziness. Furthermore, the degree of patient satisfaction was statistically significantly higher in the TAP block group. Therefore, the blockage is another proof of the effectiveness of regional anaesthesia approaches. The results obtained in this study are consistent with previous studies regarding the efficacy and safety of TAP block for controlling pain for patients treated for abdominal surgeries. Since opioid consumption and complications are minimized and patient outcomes improved, TAP block should be regarded as a standard of initial consideration for postoperative pain management for specific surgical procedures. Nevertheless, a larger sample size and surgeries of different categories should establish the general and long-term outcome of TAP block for postoperative pain relief.

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