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A comparative study between Continuous Epidural Analgesia versus Ultrasound guided Bilateral Lateral Transversus Abdominis Plane (TAP) block for postoperative analgesia in patients undergoing Abdominal surgeries.

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ABSTRACT:
Introduction: Pain relief in postoperative period plays an important role in the recovery of the patient. Epidural analgesia has been used as gold standard. But it causes significant hypotension due to sympathetic blockade. Therefore, the present study was conducted to compare the analgesic effects of Epidural analgesia with bilateral lateral Transversus abdominis plane (TAP) block in patients undergoing abdominal surgeries.
Materials and method: After obtaining approval from Institutional Ethics Committee and voluntary, written, informed consent, a total of 60 patients were included in the study. They were randomly divided in Group E (Epidural analgesia) and Group T (TAP block). The VAS score and vitals were recorded till 24 hours. Time to first recue analgesia, time to mobilization and duration of hospital stay were noted.
Results: Both the Groups were comparable in terms of baseline demographic characteristics. The VAS score was comparable between the two Groups; P value: more than 0.05. The time to first rescue analgesia was significantly earlier in Group E; P value: 0.001. The time to mobilization and time to discharge were significantly earlier in Group T; P value: less than 0.05. The incidence of side effects was more in Group T; P value: 0.035.
Conclusion: It can be effectively concluded from the present study that TAP block provides analgesia comparable to Epidural with more hemodynamic stability and favorable recovery profile.
Keywords: Abdominal surgery, analgesia, epidural analgesia, postoperative pain, transversus abdominis block.

I. INTRODUCTION

Postoperative pain relief is crucial to the success of the surgical procedure and functional recovery of the patient. Neglected postoperative pain may have detrimental effects on the quality of life[1,2] and long-term effects in terms of hyperalgesia, opioid abuse, chronic pain symptoms.[3]

Traditionally, epidural analgesia has been used as a gold standard for the relief of postoperative pain. In this technique, local anesthetic drug is injected in the epidural space, between the ligamentum flavum and dura mater. However, due to sympathetic blockade, it can lead to significant hypotension [4,5] which can be a contraindication for the administration of continuous epidural analgesia and may result in insufficient pain relief in the postoperative period. Therefore, there was a search for alternative techniques.

Transverse abdominis plane (TAP) block is a recently developed technique for the relief of pain in the postoperative period. There are multiple approaches to TAP block - Subcostal (upper and lower subcostal) Anterior, Lateral and Posteriorand involves injection of local anesthetic drug in between internal oblique muscle and the transversus abdominis muscle.[6] It relieves pain by blocking the 7^{th} to 11^{th} intercostal nerves, subcostal nerve and ilio-inguinal and ilio-hypogastric nerves (T7 to L2).[6] Ultrasound guided approach with a high frequency linear probe (4MHz – 12MHz) improves success and decreases requirement of local anesthetics. But the efficacy of single TAP block is not durable as its analgesic efficacy lasts for less than 24 hours (due to duration of effect of local anesthetics) [7,8] Therefore, continuous TAP block is preferred.

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However, not many studies have been conducted to assess the efficacy of TAP block. Therefore, the present study was conducted to evaluate the analgesic effect of the TAP block with Epidural analgesia and to compare their side effects and recovery profile.

II. MATERIALS AND METHOD

This randomized controlled interventional study was conducted under the Department of Anesthesia, MGM Medical College and Hospital, Kamothe, Navi Mumbai, from August 2023 to March 2024, following approval from the Institutional Ethics Committee.

A total of 60 patients of either gender aged between 18 years to 60 years and undergoing elective abdominal surgeries were included in the study. Patients undergoing emergency surgery or those having any contraindication to Epidural analgesia, TAP block or having allergy to any of the study drugs were excluded from the study. Patients with ASA grade more than IV, significant comorbidities, coagulopathies, infection near site of insertion of catheter, having a history of chronic opioid use and pregnant patientswere excluded from the study, along with those refusing to participate in the study were also excluded. A written informed consent was obtained from all the patients, after explaining the procedure involved.

Demographic details of the patients were recorded. History of present illness and detailed past and personal histories were noted. Routine pre-anaesthetic fitness was done. The patients were randomly allocated to either Group E (Epidural analgesia) or Group T (TAP block). Standard ASA monitors were attached and under all aseptic precautions patients in Group E received Thoracic Epidural pre-surgery with a 17G Epidural kit, tip of the catheter was fixed at T6 level. Meanwhile those in Group T received Ultrasound guided Bilateral Lateral TAP block with a 22G block needle prior to the surgery. Infusion of Ropivacaine 0.2% with 1 mcg/cc Fentanyl was administered with standard Epidural catheter inserted under aseptic precautions in Group E initially at the rate of 4cc/hr and then later on rate was set as per hemodynamic status and VAS score; and with Bilateral lateral TAP block Inj. Ropivacaine 0.2% 40cc with 25mcg Fentanyladministered, 20cc each side in Group T.

The VAS score was recorded. Hemodynamic parameters were recorded at 0 hours, 6 hours, 12 hours and 24 hours. Rescue analgesia was given with infusion of Fentanyl at the rate of 20 to 30 mcg/hour.

Time duration till first mobilization post-surgical procedure was noted. The patients were followed up till discharge.Any incidence of side effects in the postoperative period were recorded. The duration of hospital stay was noted.
All the data was entered in excel and analysed.

III. RESULTS

The mean age was 40.3 ± 11.56 years in Group E and 39.67 ± 12.96 years in Group T. The age and gender distribution were similar in the two Groups; P value: 0.842 and 0.999, respectively. Majority of the cases belonged to ASA Grade II in both the Groups (63.33% in Group E vs 70% in Group T). The distribution was similar in the two Groups; P value: 0.598. The VAS score was similar in the two Groups at all points of time from 0 to 24 hours; P value: more than 0.05. Similarly, the pulse rate was also similar in the two Groups; P value: more than 0.05. The systolic and diastolic BP were similar in the two Groups at baselines. However, at 12 and 24 hours, both systolic and diastolic BP were significantly less in Group E as compared to Group T; P value: less than 0.05.

Rescue analgesia was required in significantly more cases in Group T as compared to Group E; P value: less than 0.001 (Table 1).When assessed according to the duration of requirement of rescue analgesia, it was observed that the recue analgesia was required significantly earlier in Group E as compared to Group T (9.67 ± 6.02 hours vs 17.17 ± 4.95 hours, respectively); P value: 0.001.

Post-operative nausea and vomiting was present in 53.33% in Group T as compared to 26.67% cases in Group E; P value: 0.035.

The time to mobilization was significantly earlier in Group T; P value: less than 0.001. The duration of hospital stay was also significantly less in Group T; p value: less than 0.001 (Table 2).

Table 1: Comparison of the requirement of rescue analgesia in the two Groups

RESCUE ANALGESIA	GROUP E		GROUP T		P VALUE
	N	%	N	%	
NOT REQUIRED	21	70%	7	23.33%	<0.001*
REQUIRED	9	30%	23	76.67%	

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Table 2: Comparison of the time to mobilization and hospital stay in the two Groups

DURATION	GROUP E	GROUP T	P VALUE
TIME TO MOBILIZATION (in hours)	31.07 ± 16.8	15.67 ± 5.71	<0.001*
HOSPITAL STAY (in days)	19.00 ± 3.89	12.20 ± 4.73	<0.001*

IV. DISCUSSION

In the present study, it was observed that patients with TAP analgesia were hemodynamically stable as compared to those with Epidural analgesia. Rescue analgesia was required significantly later in cases with TAP analgesia as compared to Epidural analgesia. Postoperative nausea and vomiting were observed to be more in the cases with TAP analgesia. In terms of recovery profile, the time to mobilization and discharge from hospital were significantly earlier in cases with TAP analgesia as compared to Epidural analgesia.

In the study by Tejedor A. et al,[9] they included 43 cases undergoing radical prostatectomy surgery and compared the efficacy of TAP block and epidural analgesia for postoperative pain relief. They observed that the mean postoperative VAS pain scores were similar in the two Groups at rest and after movement; P value: more than 0.05. They also noted that sitting and ambulation began earlier in TAP Group as compared to the Epidural Group; P value: 0.01. The incidence of postoperative adverse effects was more in Epidural Group. These findings were almost similar to the present study.

In the meta-analysis by Baeriswyl M. et al,[10] they included a total of 10 studies comprising 505 patients and compared TAP block with Epidural analgesia for postoperative pain relief. They observed that the pain relief was comparable with both the techniques. They further observed that the length of hospital stay was significantly shorter with TAP block and the incidence of hypotension was significantly more with Epidural analgesia. These findings are in agreement with the present study.

Similar findings were reported by other studies as well regarding comparable analgesia, [11,12,13,14,15] shorter hospital stay and shorter ambulation time with TAP block [12,13,14,15,16] and less hypotension with TAP block. [12,13,15,16]

The requirement of rescue analgesia was significantly more amongst the cases with TAP block as compared to the cases with Epidural analgesia. This may be due to inadequate coverage of the sensory dermatomes, or due to receding block due clearance of local anesthetics around the surgical site. However, when assessed for the duration, it was observed that the requirement was significantly later in the cases with TAP block. One explanation for this may be that Epidural analgesia caused hypotension due to significant sympathetic blockade which resulted in stoppage of infusion. Thus, the analgesic coverage in the postoperative period was insufficient resulting in earlier requirement of rescue analgesia.

The postoperative nausea and vomiting were proportionately more in cases with TAP block due to more proportion of cases having inadequate blockage of the dermatomes [17] and subsequently requiring rescue analgesia with opioid in the postoperative period. Nausea and vomiting are the inherent side-effects of opioid analgesics. A meta-analysis conducted by Zheng J. et al [18] concluded that TAP block may actually reduce the incidence of postoperative nausea and vomiting but its efficacy is influenced by actors such as administration time, local anesthetic dosage and concentration, types of opioid drugs. TAP block covers the somatic pain and not the visceral pain, and if nausea and vomiting is due to the visceral component it might not help in reduction and prevention. Thus, these side effects may be associated with the technique of administration, local anesthetic drug used, the cause of postoperative nausea and vomiting and opioid administration, rather than being associated with the TAP block itself.

Limitations: The present study was limited by the OPD attendance of the patients. Therefore, the results may not be generalized.

V. CONCLUSION

Epidural analgesia has been the traditional gold standard technique for the relief of pain in the postoperative period. However, due to hemodynamic instability and side effect profile, there has been a recent inclination towards newer methods like the TAP block.

It can be effectively concluded from the present study that analgesia in the postoperative period by TAP block is comparable to Epidural analgesia with better hemodynamic stability with TAP block. The duration of first rescue analgesia is significantly later with TAP block and the recovery profile is also better with TAP block as compared

to Epidural analgesia though side effects of postoperative nausea and vomiting were experienced more with TAP block. Therefore, TAP block may be used as an effective alternative to Epidural analgesia for the pain relief in postoperative period.

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