

Title- Transversus Abdominis Plane (TAP) Block in Abdominal Surgery An Observational Study to Assess the Need for Diclofenac as a Post-Operative Analgesic Drug

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ABSTRACT-

Background- The Transversus Abdominis Plane (TAP) Block is a method used for regional anaesthesia. It offers analgesia during lower abdominal surgery, especially when parietal wall pain is a significant source of discomfort. Through the local anaesthetic deposition between the Transversus Abdominis muscle and internal oblique muscle, it permits sensory blockage of the lower abdominal wall's skin and muscles. In a hospital-based, prospective observational study we assessed the effectiveness of unilateral TAP Block with bupivacaine for postoperative analgesia in hernia repair.

Material & Methods - The following procedure was used on 100 patients having elective unilateral inguinal hernioplasty surgery: TAP Block with bupivacaine (n = 50 in the study group) and without TAP Block (n = 50 in the control group). At the conclusion of the spinal anesthesia-induced surgery, the study group underwent a unilateral TAP Block on the surgical side using 20 ml of 0.25% bupivacaine. In the post-anesthesia care unit, each patient was evaluated 30 minutes, 2, 4, 6, 12, 18, and 24 hours after surgery. The amount of time needed to administer the first dosage of rescue analgesia, the vas score, and the total amount of diclofenac used were evaluated in each group, and comparisons were made using a student t-test.

Result: The difference between the mean analgesia duration in the study group and control group— 669.66 ± 346 min 220.33 ± 139.24 minutes, respectively—was shown to be statistically significant. The VAS score in the control group was consistently higher than in the study group. Diclofenac was consumed in a total dose of 95 mg in the study group and 202.5 mg in the control group, indicating a substantial decrease in diclofenac consumption in the study group.

Conclusions- When utilised in patients undergoing inguinal hernioplasty, TAP Block with 0.25% bupivacaine offered powerful and longer duration of analgesia, with little any need for diclofenac. There were no side effects linked to TAP Block or the medications being tested.

Keywords: TAP-Block, Bupivacaine, Postoperative analgesia, VAS score.

Introduction- Following abdominal surgery, the abdominal wall often causes a lot of pain. If postoperative pain is not treated, even a relatively minor procedure like an inguinal herniorrhaphy may result in a risk of persistent pain in 5 to 10% of patients, with clinically significant consequences on daily activities. An opioid or an NSAID is typically prescribed for postoperative analgesia. The adverse effects of opioids include respiratory depression, emesis, decreased gastrointestinal motility, sedation, and a host of other conditions. Other negative effects of NSAIDs include renal impairment, gastrointestinal bleeding, and altered hemostasis. Although there are less systemic side effects when using a localised analgesic approach because of the medicines' peripheral site of action. As a result, localised analgesic method has become widely recognised as a crucial part of the postoperative analgesia regimen. One of these local blocks, TAP Block, is rising in popularity. The Transversus Abdominis Plane (TAP) Block, which is typically recognised as a defect 1 cm above the iliac crest in midaxillary line, can be performed through the lumbar triangle of Petit, which is formed by the external oblique muscle anteriorly, latissimus dorsi muscle posteriorly, and iliac crest inferiorly. The TAP block was initially described by Rafi et al in 2001 [1] before being improved upon and put to the test by McDonnell et al in 2004[2]. The procedure entails injecting local anaesthetic into the space between the internal oblique and transverse abdominal muscles. It permits local anaesthetic drug deposition above the TAM, sensory blocking the plexus of nerves from T-6 to L-1 supplying lower abdomen wall skin and muscles.

This observational study's objective is to assess the transverse abdominis plane [TAP] block during abdominal surgery based on the amount of diclofenac required as postoperative analgesic medication. We chose inguinal hernia meshplasty as the study subject because it is a lower abdominal incision site that may be blocked using the TAP block and landmark procedure.

Material & Methods- In a prospective, observational analysis, we looked at 100 male ASA physical status I-II patients ages 20 to 65 scheduled for unilateral inguinal hernioplasty with normal liver and kidney functions. Each group had 50 patients. Exclusion criteria included local anaesthetic sensitivity, bad liver function, injection site infection, or abnormal clotting. In the study group (n=50), patients underwent 0.25% Bupivacaine TAP block. Standard monitoring included ECG, non-invasive blood pressure, and arterial oxygen saturation. Intravenous Ranitidine and Ondansetron were given. 15 ml/kg Ringer Lactate was preloaded. post-op Petit's triangle is a deficit between the latissimus dorsi and external oblique muscles over the iliac crest. The block was administered through the Petit triangle with a 23G blunt-tipped 1.5-inch hypodermic needle. After two "POPS" or "give way" sensations, the needle was entered perpendicular to the skin. 20 cc of 0.25% bupivacaine was administered after aspiration. Every 5 ml was aspirated for intravascular infusion. Patient went to post-anesthesia care unit after 15 minutes. At 30, 2, 4, 6, 12, 18, and 24 hours after surgery, the patient's heart rate, blood pressure, breathing rate, pain intensity, and any issues were assessed. Pain was measured on a 0-10 VAS. At VAS 3 the patient received Diclofenac 75 mg as rescue analgesia (i.e. minimal pain). Ankle and knee movement indicated motor block was easing. TAP Block analgesia was estimated from the moment the patient requested postoperative analgesia. Additional postoperative complications were monitored.

Data was collected, tabulated and then analysed. Data was expressed as mean and standard deviation (SD), median and ranges.

Results - This prospective study involved 100 patients with ASA I and II who had inguinal hernia repairs.

Study Group: Patients received TAP block with Bupivacaine (0.25%) 20 ml.

Control Group: Patients not received TAP block and was given injection diclofenac on demand for postoperative analgesia as per institute protocol for routine surgery.

Table 1 shows In both groups, the majority of the patients were between the ages of 30 and 50. Age, weight, and height were similar across the two groups.

Demographic statistics comparing the two groups did not show any discernible difference. It was statistically significant that the first dosage of rescue analgesia needed in the experimental group was administered at 669.66346 min and at 220.33139.24 min in the control group.

Table 1: Demographic Data Time for first dose of rescue analgesia			
Group	Study group	Control group	P Value
Age (years)*	46.43±13.1	50.23±13.44	0.272
Weight (KG)*	63±5.37	61±5.24	0.1497
Height(CM)*	167.76±5.99	167.93±4.17	0.899
First dose of rescue analgesia	669.66±346 min	220.33 ± 139.24 min	P* <.0001

Table -2 demonstrate VAS score was significantly higher in control group as compared to the study group at all the time.

Table- 2 Comparison of VAS score								
Groups	Pre-operative	Post - Operative						
		30 min	2hr	4hr	6hr	12hr	18hr	24hr
Study Group	0	0.4	0.9	1.36	1.9	2.23	1.66	2.2
Control Group	0	1.03	2.3	2.9	2.46	3.8	3.13	3.66

Table -3 demonstrate Total dose of Diclofenac consumption in study group was 95±33.73mg and in control group it was 202.5±44.69mg, which showed that Diclofenac consumption was significantly decreased in study group.

Table- 3 Cumulative Diclofenac Consumption								
Groups	Pre-operative	Post - Operative						
		30 min	2hr	4hr	6hr	12hr	18hr	24hr
Study Group	0	0	0	7.5	22.5	30	7.5	27.5
Control Group	0	0	22.05	35	10	62.5	15	57.5

Table-4 demonstrate Diclofenac requirement in study group was one time in 37 patient and two time in 13 patient which was significantly less as compare to control group in which diclofenac requirement was one time in 4 patient and two time in 11 patient and three time in 35 patient in 24 hour. There were no any complications related to the TAP block technique in both the groups

Table- 4 No. of doses of Diclofenac				
No. of Diclofenac	0	1	2	>2
Study Group	0	37	13	0
Control Group	0	4	11	35

Discussion- Inadequately controlled post-operative pain has undesirable physiological and psychological consequences such as morbidity, delayed recovery and patient dissatisfaction.

As a result, safety and morbidity concerns should be given top priority and continually assessed and improved. Therefore, it is crucial to design safe and well-tolerated analgesic methods that offer the best postoperative pain management. A frequent surgical operation is the correction of inguinal hernias [3]. The incidence is listed as 11/10,000 in people between the ages of 16 and 24, and 200/10,000 in people over 75. After the inguinal hernia repair, 5–10% of patients experience chronic pain, which is a serious issue. Lower intercostal nerves, the iliohypogastric and ilioinguinal nerves (i.e., T11 to L1), and the abdominal wall incision all contribute significantly to post-hernia surgery discomfort [4]. Abdominal surgery patients must control their postoperative discomfort in a difficult way. The frequency of moderate or severe pain is reported to be between 30 and 75 percent, even with excellent pain management techniques. Postoperative pain management involves many procedures and drugs. Multimodal pain treatment combining NSAIDs, opioids, and local anaesthetic is frequent. Opioids alleviate surgical pain but can produce nausea, vomiting, decreased gastrointestinal motility, respiratory depression, and drowsiness, which enhance patient morbidity. Injections don't help deep muscle pain, and NSAIDs are nephrotoxic. Inguinal hernia procedures may involve peripheral nerve blocks with local anaesthetics to alleviate pain. Iliohypogastric (IH) and ilioinguinal (II) nerve blocks are utilised. We used a unilateral TAP block with 0.25% Bupivacaine at the end of surgery to evaluate its efficacy without additional analgesics. Rafi introduced TAP in 2001. Local analgesic is delivered between IOAM and TAM through triangle of Petit (POP) approach. This is the neurovascular facial plane of abdomen musculature through which the 7th to 11th intercostal nerves, subcostal nerve, iliohypogastric and ilioinguinal nerves (T7-L1) run a variable part of their course before supplying the anterior abdominal wall. By injecting local analgesics in this facial plane, we can block the sensory supply of the anterior abdominal wall [1,2]. Rafi's POP technique has problems such colonic puncture, liver injury [5], nerve injury, or uncontrolled local anaesthetic dissemination [6].

Hebbard et al. (posterior TAP block), T. M. Tran (cadaveric study), Dawlathy (Lap cholecystectomy)[6,7,8], Niraj et al (open appendicectomy)[9], Belary et al (caesarean

section delivery)[10], D.J Sandeman (Lapappendicectomy) [11] have all proven that "In plane" USG guidance ensures the exact position of LA between the IOAM. In this study, we opted to deliver TAP block via landmark approach after surgery as spinal anaesthesia wears off in 2 to 3 hours. Our study found that patients who underwent TAP block with local anaesthetic experienced 10 to 12 hours of analgesia, significantly less pain up to 24 hours, a longer time to first dose of rescue analgesic, and a significant reduction in diclofenac intake in 24 hours. Throughout 24 hours, study group VAS scores were lower than control group scores. This was similar to a research by Mc Donnell et al [12] in caesarean section delivery, where VAS at rest and on movement was significantly reduced for 12 hours in TAP block patients. Niraj et al [9] studied open appendicectomy and Neerja Bharti et al [13] studied colorectal surgery. Neha Fuladi et al [14] compared bupivacaine 0.25% and ropivacaine 0.5% for postoperative analgesia in lower abdominal operations. They identified a statistically significant difference between the mean duration of analgesia in the Bupivacaine and Ropivacaine groups. First dosage of rescue analgesia (Diclofenac) was considerably delayed in the study group (669.66 ± 346 minutes) compared to the control group (220.33 ± 139.24 minutes). In investigations by John Carney[15], Mc Donnell et al [12] in total abdominal hysterectomy and D. Belavy et al [10] in caesarean delivery, the time to first analgesic demand was 3-4 hours following surgery. This discrepancy may be due to TAP block administered before surgery versus after. In our study, one-time bolus injections of local anaesthetics provided narcotic-limiting pain relief for 11 hours following surgery. Other investigations have shown that a single shot TAP can provide analgesia for 36-48 hours due to poor vascularization and sluggish drug elimination. [16] Our study measured analgesic efficacy by diclofenac use in the first 24 hours. The study group consumed 53% less diclofenac than the control group in 24 hours. The study group consumed less diclofenac at 2, 4, 12, 18, 24 hours than the control group. Our results are comparable to Dawlatly et al [6], who reported a 55% reduction in painkiller use after USG-guided TAP block in laparoscopic cholecystectomy. Niraj et al [9] found USG-guided TAP block reduced opioid use by 45% in open appendicectomy. John Carney, McDonnell et al [12] found that TAP block reduced opioid use by 47% following complete abdominal hysterectomy. Jumana M Baaj et al [17] showed overall morphine consumption was reduced by 60% following TAP block in spinal anaesthesia caesarean birth. TAP block can be provided for postoperative analgesia when epidural catheter is contraindicated or fails in high-risk patients. Initial findings of TAP block are positive, but its consequences are not well characterised in the literature, including intestine puncture, nerve injury, and liver puncture. One instance of liver harm from landmarking in a short, big woman. By using landmarks, we saw no issues. L/A toxicity is a problem, especially when bilateral blocks are applied, due to high absorption kinetics between fascia layers. If local anaesthetic overflows into neighbouring muscles, TAP block can produce systemic toxicity, according to a research. We didn't encounter this issue because we used a unilateral block and didn't exceed the hazardous dose of bupivacaine. HR, MAP, and RR were constant in both groups. TAP block with bupivacaine revealed steady hemodynamics due to early pain management. Opioid adverse effects such drowsiness, nausea, and vomiting are dose-related; our study did not employ opioids. TAP block provides analgesia to the parietal peritoneum, skin,

and muscle of the anterior abdominal wall, according to this study. It decreases pain (vas score), rescue analgesia and side effects, and patient satisfaction. TAP block by landmark technique is straightforward, cost-effective, requires minimal preparation time, can be utilised at peripheral health centres, may be used in emergency surgery when USG is not available, and can be provided by an anesthesiologist without USG guided block knowledge. Before it can be implemented in routine clinical practise, more well-controlled studies are needed to determine its safety, optimal dose and volume of local anaesthetic, single shot versus catheter, intermittent versus continuous catheter infusion, type of local anaesthetic, use of adjuvant, and efficacy compared to epidural catheter and local infiltration.

Conclusions: When applied in patients having inguinal hernioplasty, TAP Block with 0.25% bupivacaine offered potent and prolonged duration of analgesia, with little to no requirement for the use of diclofenac. There were no adverse effects that were associated with the use of TAP Block or the drugs that were being evaluated.

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