COMPARATIVE STUDY BETWEEN ULTRASOUND GUIDED TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK VS. INTRAVENOUS DICLOFENAC FOR POST-OPERATIVE ANALGESIA IN ELECTIVE LSCS
M. Bhanu Lakshmi¹, D. Suresh Chander², G. Vinay Raj³

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ABSTRACT: BACKGROUND: Postoperative pain is a matter of concern for all the patients undergoing surgery irrespective of age. Pain, when poorly controlled increases the post-operative morbidity and their sequelae. The transversus abdominis plane (TAP) block (classical or posterior approach) is a new method of providing postoperative analgesia in patients undergoing lower abdominal wall incisions. OBJECTIVE: To compare the effectiveness and duration of analgesia of TAP block versus intravenous analgesia in patients undergoing caesarean section. PATIENTS AND METHODS: A prospective randomized controlled double blind study was conducted in the department of Anaesthesiology, Gandhi Hospital, Secunderabad over a period of six months. Fifty patients were randomly selected to be enrolled in this study that was scheduled for Caesarean section via pfannenstiel incision. All patients were of ASA I- II physical status. Study group which consisted of 25 patients received TAP block with (bupivacaine 0.25%) (Group T) and the control group were given i.v diclofenac sodium 75mg (Group D). Inj. Tramadol 2mg/kg was given as rescue analgesic on patient’s request. Patients were followed up at 0, 4, 8, 12, 16, 20, 24 hours post-operatively for pain. RESULTS: Our study has shown that 1) Patients in Group–T had good post-operative analgesia while compared to Group–D. 2) Pain scores also were less in Group–T for the next 24 hrs compared to Group–D. 3) Use of opioids was reduced in Group–T than Group–D. Rescue analgesic used in study group was 28% when compared to 100% in control group. CONCLUSION: US guided TAP block is a new technique which can be easily and safely performed in lower abdominal surgeries for post-operative analgesia. TAP block is more effective in the early post-operative period. In the present study there was significant decrease in requirement of opioids and also in pain scores in patients who received TAP block. KEYWORDS: TAP, Parenteral analgesia, Tramadol, Diclofenac sodium, Bupivacaine.

INTRODUCTION: A substantial component of the pain experienced by patients after abdominal surgery is derived from the abdominal wall incision.¹ Uncontrolled postoperative pain may produce detrimental effects in the immediate post-operative period. Perioperative analgesia decreases complications and facilitate early recovery and discharge from the hospital.² According to the definition of IASP, pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. Caesarean delivery is a major surgical procedure, after which substantial postoperative discomfort and pain can be anticipated. The analgesic regimen should aim at providing safe and
effective analgesia, with minimal side effects both for the mother and her child.\(^3\) This pain free status also helps in early feeding for the baby and bonding between them.

Opioid analgesics are often the first line of treatment for many painful conditions and may offer advantages over nonsteroidal anti-inflammatory drugs (NSAIDs). Opioid analgesics bind to a number of different receptors throughout the body—mu, delta, and kappa.\(^4\) Genetic variations in the structure of these receptors can partially explain interindividual responses, including some adverse reactions to these agents.\(^5\)

The use of ultrasound guided TAP block is promising technique in providing analgesia in abdominal surgery. US guided TAP block provides excellent pain relief especially in lower abdominal surgery as proved by Tran et al.\(^6\) The higher the success rate of this technique has been attributed to the accurate identification of the layers of the abdominal wall and the exact placement of the needle tip.\(^7\)

**ANATOMY OF ANTERIOR ABDOMINAL WALL**: The abdominal wall most commonly refers to the layers composing the anterior abdominal wall which, in addition to skin, subcutaneous tissue and fascia, has three layers of muscle: (Fig. 1, Fig. 2).
The principle of TAP block is to deposit sufficient quantity of local anaesthetic in the plane of fascia between internal oblique and transversus abdominis in triangle of petit. The triangle is bounded posteriorly by latissimus dorsi muscle, anteriorly by external oblique and inferiorly by iliac crest. The Ultrasound was introduced to improve the success rate and accuracy of TAP block and to prevent potential complications.

Ultrasound guided TAP block can be performed by two techniques – Landmark (classical/posterior) technique and subcostal technique. Landmark technique was first described by Dr Rafi in 2001 and it provides analgesia for lower abdominal surgeries. In our study we adopted the Landmark technique.

PATIENTS AND METHODS: This is a prospective randomized controlled double blind clinical trial conducted at Gandhi hospital. After obtaining approval from the hospital Ethical committee, fifty patients were randomly selected to be enrolled in this study who were scheduled for Caesarean section via pfannenstiel incision. All patients were of ASA I&II physical status. Exclusion criteria included patients with known allergy to local anaesthetic and diclofenac. Patient’s consent was taken, demographic data including age and weight was recorded in proforma sheet. All patients were given spinal anaesthesia with 2cc hyperbaric bupivacaine (0.5%). Patients were randomly allocated into 2 groups (25 patients each) and analgesia was given immediately after shifting out from the operation theatre.

Group T were given TAP block with 40ml bupivacaine 0.25% bilaterally to a maximum dose of 3mg/kg. After identifying abdominal muscle layers using ultrasound. 18G Touhy needle is passed through the abdominal muscle layer, first the external oblique and the internal oblique. After reaching transversus abdominis plane correct placement of needle tip is confirmed by injecting 2ml of saline. Once the plane is confirmed full dose of local anaesthetic is injected. Local anaesthetic appears as hypoechoic seperating internal oblique and transversus abdominis muscle. Group D were given parenteral analgesia 75mg IV diclofenac sodium 12th hourly.

All patients were scheduled for postoperative monitoring using a numerical rating scale (NRS) from (0-10) at specific times (0, 4, 8, 12, 16, 20, 24) hr postoperatively and the readings were recorded in data collecting sheet. NRS evaluation regarded as following (0: no pain, 1-4: mild pain, 5-7: moderate pain, 8-10: sever pain). Time for rescue analgesics (inj. Tramadol 2mg/kg) was noted. Level of significance in all statistical tests and comparisons was set at P value ≤0.05.

RESULTS: As shown by the statistical analysis, both the groups were demographically comparable with respect to age, height, weight and body mass index (BMI).

The pain scores were statistically lower at 0 and 4hrs period in Group T compared to Group D. Though statistically insignificant, pain was less in group T in the first 24 hrs.

In Group T only 7 out of 25 patients (28%) requested for rescue analgesia whereas in Group D 25 out of 25 patients (100%) required rescue analgesia. p value is highly significant at <0.001 by using Fisher exact test. Also, time for rescue analgesia was on an average 8 hours post-surgery in Group T and 2.5 hours in Group D.
### Table 1: Preoperative patient’s Characteristics

| Characteristic | Group | No. | Mean    | Std. Deviation | P value |
|----------------|-------|-----|---------|----------------|---------|
| Age            | TAP   | 25  | 23.9600 | 1.540563       | > .05   |
| Drug           | 25    |     | 23.7585 | 2.005825       |         |
| Ht. cm         | TAP   | 25  | 158.52  | 2.7586         | > .05   |
| Drug           | 25    |     | 152.76  | 3.971566       |         |
| weight         | TAP   | 25  | 59.20   | 4.941322       | > .05   |
| Drug           | 25    |     | 59.24   | 4.737088       |         |
| BMI            | TAP   | 25  | 23.544  | 2.380315       | > .05   |
| Drug           | 25    |     | 25.356  | 2.042074       |         |

### Table 2: A Comparison of Mean Numerical Rating Scale over the Time

| Time   | Group | No. | Mean    | SD (standard deviation) | P value |
|--------|-------|-----|---------|-------------------------|---------|
| 0 hour | Tap   | 25  | .1200   | .33166                  | < .05   |
|        | Drug  | 25  | .5200   | .50990                  |         |
| 4 hours| Tap   | 25  | .3600   | .48989                  | < .05   |
|        | Drug  | 25  | 2.1600  | .68799                  |         |
| 8 hours| Tap   | 25  | 1.0000  | .64550                  | > .05   |
|        | Drug  | 25  | 3.4000  | .70711                  |         |
| 12 hours| Tap  | 25  | 2.5200  | .50990                  | > .05   |
|       | Drug  | 25  | 3.7200  | .73711                  |         |
| 16 hours| Tap  | 25  | 3.5200  | .58595                  | > .05   |
|       | Drug  | 25  | 4.4800  | .65320                  |         |
| 20 hours| Tap  | 25  | 4.0000  | .57735                  | > .05   |
|       | Drug  | 25  | 4.5600  | .58310                  |         |
| 24 hours| Tap  | 25  | 4.2800  | .67823                  | > .05   |
|       | Drug  | 25  | 4.6000  | .57735                  |         |

### PAIN SCORES:

| Group | Pain (+) | Pain (-) | Total |
|-------|----------|----------|-------|
| D     | 13       | 12       | 25    |
| T     | 3        | 22       | 25    |
| Total | 16       | 34       | 50    |

Fisher exact test – P < 0.0054. P significant at 0.005 at ‘0’ hour.
Fisher exact test – P <0.0001. P highly significant at 0.005 at ‘4’ hour.

Fisher exact test – P <0.1. P not significant.

Also, at 12th, 16th, 20th and 24th hour – p value not significant.
DISCUSSION: This study compares the effectiveness of TAP block versus traditional parenteral analgesia post caesarean section. Pain scores were significantly lower in Group T compared to Group D at 0 and 4 hours. So, TAP block is highly effective in early post-operative period. Diclofenac given in 12 hourly interval could not completely alleviate the pain. In spite of being supplemented by Inj.Tramadol, Group D still had a higher pain score compared to TAP block throughout the first 24 hours.

Post-delivery, early bonding between the mother and child is very crucial. It is possible only when the mother is awake and pain free. TAP block therefore plays an important component of analgesia as it is known to reduce the opioid consumption. Most of the trials published so far, concluded that both pain scores and opioid consumption were reduced using TAP block. This was achieved with a TAP block added to a basic analgesic regimen consisting of paracetamol and NSAIDs, indicating that the block may be an important part of a multimodal analgesic regimen. Usage of TAP block can also be extended to day care surgeries as it has the potential to reduce pain and opioid usage, thereby promoting fast recovery and discharge.

A study done by McDonnell team in 2008 who examined TAP block efficacy after caesarean section delivery. Fifty elective patients for caesarean section (Via spinal anaesthetic and Pfannenstiel incision) were randomized to receive TAP block (landmark method) versus placebo in addition to standard analgesia (paracetamol, diclofenac sodium and intravenous morphine). The TAP block was performed at the end of surgery using 1.5mg/kg ropivacaine (to a maximal dose of 150mg). A blinded investigator assessed patient at specific time intervals between 2 to 48 hours postoperatively. Results showed TAP block reduced visual analogue pain score and mean total morphine requirements in the first 48 hours (18mg versus 66mg in the placebo group).8

Also a meta-analysis on the clinical effectiveness of TAP block has been done by Sddiqui MR and his colleges in UK in 2011. Showed TAP block reduces the need for postoperative opioid use, it increases the time of first request for further analgesia, it provides more effective pain relief and it reduces opioid-associated side effects.9
CONCLUSION:
- US guided TAP block is a new technique which can be easily and safely performed.
- In the present study there was significant decrease in opioid requirement and also in pain scores.
- Single shot TAP block was more superior to traditional doses of diclofenac supplemented with Tramadol.
- TAP block can be an effective alternative analgesic method.

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**AUTHORS:**
1. M. Bhanu Lakshmi
2. D. Suresh Chander
3. G. Vinay Raj

**PARTICULARS OF CONTRIBUTORS:**
1. Assistant Professor, Department of Anesthesiology & Critical Care, Gandhi Medical College, Hyderabad, Telangana, India.
2. Associate Professor, Department of Anesthesiology & Critical Care, Gandhi Medical College, Hyderabad, Telangana, India.
3. Post Graduate, Department of Anesthesiology & Critical Care, Gandhi Medical College, Hyderabad, Telangana, India.

**NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**
Dr. M. Bhanu Lakshmi, Tulip 26, L & T Serene County, Gachibowli, Hyderabad – 500032.
E-mail: sunmoney17rediffmail.com

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