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Review Article

TO COMPARE THE EFFICACY OF AN ANALGESIC EFFECT OF 0.25% BUPIVACAINE AND 0.25% BUPIVACAINE PLUS DEXAMETHASONE 8MG IN POST OPERATIVE TRANSVERSE ABDOMINIS PLANE BLOCK IN PATIENT UNDERGOING LOWER ABDOMEN SURGERIES

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ABSTRACT

Objective: To compare the efficacy of an Analgesic Effect of 0.25% Bupivacaine and 0.25% Bupivacaine Plus Dexamethasone 8mg in Post Operative Transverse Abdominis Plane Block in Patient Undergoing Lower Abdomen Surgeries
Background: Postoperative analgesia is vital after lower abdominal surgery as it facilitates early ambulation, recovery rate and overall patient satisfaction. Our study pioneers the use of TAP block for postoperative analgesia thus positively influencing patient's outcome following lower abdominal surgeries.
Method: Prospective randomised prospective study, patients undergoing lower abdominal surgery were randomised into 2 groups to receive PNS guided TAP block, Group A- TAP block with 0.25% Bupivacaine (20ml), Group B with 20ml 0.25% Bupivacaine plus 8mg(2ml) Dexamethasone. The primary objective was to compare duration of analgesia. Secondary objectives were to compare the total number of rescue analgesia doses required with visual analogue scale (VAS) score up to 24 hours postoperatively. Data was compared using the Standard deviation, Pearson's chi-square test and paired t-test. **Results:** Duration of analgesia was higher in the Group B than Group A (mean±SD: 1494 ± 88.11 minutes vs 864 ± 61.19 minutes)($P < 0.05$). Number of rescue analgesia requirement was less in group B (1.27 ± 0.44 doses, mean ± SD) than group A (3.40 ± 0.49 doses). VAS score was much lesser in Group B than Group A at 12 hrs,16 hrs, 20 hrs and 24 hrs. **Conclusion:** Group B patients showed significantly prolonged and effective analgesia than Group A. Reason being addition of an additive dexamethasone in group B that has potentiated the action of local anaesthetic through their anti-inflamatory and immunosuppressive effects.

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INTRODUCTION

"PAIN IS SUFFERING , SUFFERING IS PAIN!"
-Dr Sandip Baheti

Pain is suffering, suffering is pain. Pain is defined as "an unpleasant, sensory and emotional experience which a person encounters, facilitated by existing or potential tissue damage or characterised in terms of such damage".[1][2]

To alleviate suffering of mankind due to pain, is one of the greatest and fundamental task of an anaesthesiologist.

Local tissue damage during surgical interventions induces the release of mediators such as prostaglandins, histamine, serotonin, bradykinin, substance P, and others, as well as the creation of noxious stimuli and stimulation of free nerve terminals and nociceptors, results in nociceptive pain. Modern anaesthesia relieves pain not only during surgery, but also during the postoperative period. In order to prevent various side effects such as respiratory complications, venous thromboembolism and increased hospital stay, post-operative analgesia is of vital importance[3]. Multimodal analgesic regimen is needed to control postoperative pain and discomfort after abdominal surgeries thus assuring efficient and safe anodynia[4].

Systemic or neuraxial opioids are frequently used to manage postoperative pain, but due to their associated side effects like nausea, vomiting and pruritus, it reduces overall patient satisfaction.[5,6] The usage of opioids and their negative effects can be reduced by using regional anaesthesia using local anaesthetics.

TAP block is an novel anaesthetic technique that provides analgesia to the skin and musculature of the anterior abdominal wall, as well as to the parietal peritoneum following abdominal surgery. It was first used ten years ago in Ireland, where there were few facilities and inadequate staff to manage acute postoperative pain, and it has since grown in popularity throughout the world due to its relative ease and effectiveness. Before the introduction of ultrasonography, the peripheral nerve stimulator (PNS) was the "gold standard" for executing peripheral nerve blocks and was proven to be a very efficient

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way for identifying exact needle placement. [7] Despite the fact that PNS-guided ilioinguinal and iliohypogastric blocks are prevalent, there is little research on the use of PNS for TAP blocks. In earlier studies, most of the TAP blocks were given via blind technique, localizing the triangle of petit for needle of insertion. In our study, we have used PNS guidance to effectively locate the exact needle placement while using the blind technique as in the developing and developed worlds, anaesthesiologists may not have easy access to intraoperative ultrasonography.[8,9] This is our novel study, where we are using PNS to guide the blind needle placement approach. In earlier study, only Vadhanan *et al described* subcostal nerve as the target for nerve stimulator guided transverse abdominis plane blocks in 2019.[10]

Previously TAP block studies were done using local anaesthetic like bupivacaine, levo-bupivacaine and ropivacaine as a sole study group while control group remaining as a placebo. In our study we have used bupivacaine in both groups as a multimodal analgesic technique providing effective analgesia and reducing analgesic requirements in both groups. Adding dexamethasone as an additive in the study group was done in order to see the analgesic effect between both the groups.

METHODS

This prospective randomised study was carried out in our hospital after Institutional Ethics Sub-Committee approval. Patients with ASA grade I or II status, ages 18 to 65 years, heamodynamically stable, with availability of informed consent, undergoing abdominal procedures under spinal anaesthesia were selected. Exclusion criteria were patients below 18 years and above 65 years of age, ASA III or more, major neurological, cardiac, respiratory, metabolic, renal, hepatic diseases or with coagulation abnormalities, contraindication for spinal anesthesia and known allergies to the study drug. Sample size (n) calculation by WINPEPI application was 60 (group A =30, Group B=30).

Patients were randomly allocated into two groups. Postoperatively, group A patients received TAP block with Bupivacaine 0.25% 20ml whereas group B patients received TAP block with Bupivacaine 0.25% 20ml plus Dexamethasone (2ml)8 mg. Preoperatively all patients received intravenous(IV) 40mg pantoprazole, IV 4mg ondenseteron. Spinal anaesthesia was given to all patients with 0.5% bupivacaine heavy, titrating the dose with height of patient. At the end of surgery, PNS guided TAP was given under aseptic precautions as per the group allocation.

Stimuplex A needle was inserted in the lumbar triangle of petit keeping the voltage of PNS at 1amp. Anterior abdominal muscle contractions were seen when the needle was in the transverse abdominis plane, drug was injected according to the group allocated. Cessation of the contractions confirms the spread of the drug in the right plane. Post-operative pain was recorded using VAS score (0 = no pain and 10 = worst possible pain) 2hourly for first 12 hours and then 4hourly for next 12 hours . When VAS score was ≥4-5, rescue analgesia of IV tramadol 2mg/kg was given, time was noted. Total consumption of analgesic drug in terms of the number of doses in 24 hours was calculated. Primary aim was to measure duration of analgesia and secondary aims were total number of rescue analgesia doses required over a period of 24 hours and post-operative pain assessment via VAS score. Statistical analysis was done using software SPSS version 16, with an alpha level of 5. $p < 0.05$ was considered significant. Paired t test was used for comparison.

RESULTS

Table 1 Comparison of demographic parameters between study groups

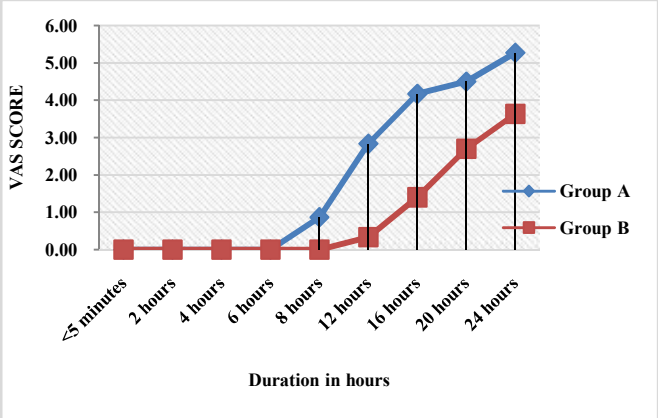
	Group A		Group B		P value
	Mean	SD	Mean	SD	
Age(years)	28.13	10.05	29.07	7.21	0.9943
Weight (Kg)	66.77	6.09	66.83	7.09	0.9721
Height (cms)	150.60	11.99	151.80	10.86	0.6860

As $p>0.05$ for all the above variables, both groups were comparable.

Visual Analogue Scale Score

Table 2 Comparison of mean VAS score according to time

VAS	Group A		Group B		P value
	Mean	SD	Mean	SD	
<5 minutes	0.00	0.00	0.00	0.00	-
2 hours	0.00	0.00	0.00	0.00	-
4 hours	0.00	0.00	0.00	0.00	-
6 hours	0.00	0.00	0.00	0.00	-
8 hours	0.87	0.34	0.00	0.00	-
12 hours	2.83	0.64	0.33	0.47	<0.0001
16 hours	4.17	0.37	1.40	0.61	<0.0001
20 hours	4.50	0.56	2.7	1.0	<0.0001
24 hours	5.27	0.44	3.63	0.66	<0.0001

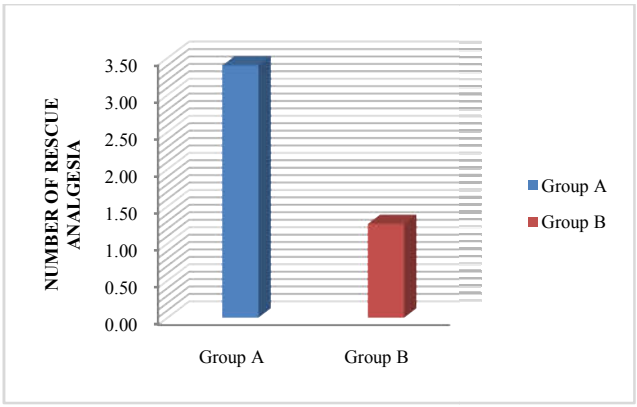


Graph 1 Comparison of mean VAS score according to time

Rescue Analgesia

Table 3 Comparison of number of rescue analgesia between Group A and Group B

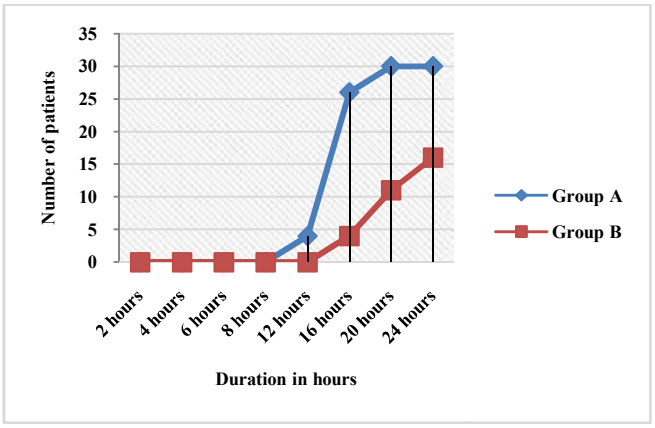
	Group A		Group B		P value
	Mean	SD	Mean	SD	
Number of Rescue Analgesia	3.40	0.49	1.27	0.44	<0.0001



Graph 2 Comparison of number of rescue analgesia between Group A and Group B

Table 4 Distribution of number of patients requiring rescue analgesia at various intervals

Time (Hours)	Group A		Group B		P value
	N	%	N	%	
2	0	0	0	0.00	-
4	0	0	0	0.00	-
6	0	0	0	0.00	-
8	0	0	0	0.00	-
12	4	13.33	0	0.00	-
16	26	86.67	4	13.33	< 0.0001*
20	30	100.00	11	36.67	< 0.0001*
24	30	100.00	16	53.33	0.0001*

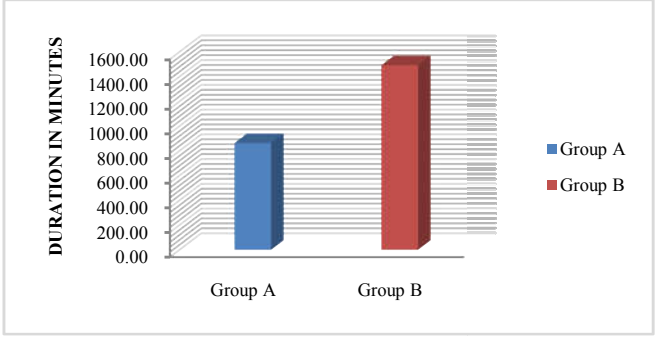


Graph 3 Distribution of number of patients requiring rescue analgesia at various intervals

Duration of Analgesia

Table 5 Duration of analgesia between Group A and Group B

	Group A		Group B		P value
	Mean	SD	Mean	SD	
Duration of Analgesia (mins)	864.00	61.19	1494.00	88.11	<0.0001



Graph 4 Duration of analgesia between Group A and Group B

DISCUSSION

Effective pain management reduces postoperative stress, reduces postoperative morbidity, simplifies rehabilitation, and speeds up recovery following surgery. Intravenous, intrathecal, and epidural opioids, which are routinely used for postoperative analgesia, have been associated with side effects like nausea, vomiting, itching, and respiratory depression.[11,12,13] Epidural technique is associated with chances of dural and vascular puncture and sometimes difficulty in identifying spaces in situations like pregnancy.

TAP block, which blocks the thoracolumbar nerves T10 to L1, is a promising alternative and efficient analgesic method that is ideal for surgical procedures when significant aspect of post-operative pain is somatic discomfort. Surgeries involving opening up of rectus sheath like in laparotomy, colonic excision procedure, appendectomy, inguinal hernia surgery, and caesarean section, TAP block has been shown to provide effective analgesia from pain arising from the skin and muscles of anterior abdominal region. TAP block shows prolong duration of analgesia might be because of its less vascularized plane thereby slowing the drug clearance.[14] Furthermore, certain individuals who are extremely obese or suffer from obstructive sleep apnea would benefit the most from TAP block since it has opioid sparing benefits. It could be relatively safer option to neuraxial blockade for intra-operative and post-operative analgesia.

The reason we chose dexamethasone as an additive because it enhances the action of local anesthetic agents. Analgesia is induced by corticosteroids due to their anti-inflammatory or immuno-suppressive properties.[15,16] Steroid analgesic impact might be related to nuclear transcription regulation.[15] Furthermore, steroids may enhance the effects of topical anaesthetics by altering the activity of K+ channels in excitable cells.[17]

The Visual analogue scale (VAS) of all patients was recorded at different time intervals depicted in table no.2 and presented as mean ± SD (standard deviation), and the means were compared between the study groups. The mean values of VAS score at 12 hours, 16 hours, 20 hours and 24 hours were significantly less in group B compared to group A. Number of rescue analgesia requirement as depicted in table no.3 was less in group B (1.27 ± 0.44, mean ± SD) than group A (3.40 ± 0.49) and was statistically significant (p value <0.0001). Number of patients requiring rescue analgesia as depicted in table no.4 was less in Group B than Group A at 16, 20 hours and 24 hours and was statistically significant (p value <0.0001). Duration of Analgesia as depicted in table no.5 was significantly higher in Group B (1494 ± 88.11, mean ±SD) than Group A (864 ± 61.19) and was statistically significant (p value <0.0001).

Our study results were in line with the previous conducted studies:

In 2019, Anie Gupta and Alok Gupta[18] conducted a study of "Transversus abdominis plane block under ultrasound-guidance using bupivacaine with dexamethasone to determine the duration and quality of analgesia in patients undergoing lower segment cesarean section" reported that mean VAS score was significant on 8 hrs, 12 hrs and 24 hrs post-operative period in dexamethasone group. Tramadol consumed in 24 h

was significantly higher in control group (86.67 ± 30.55 mg) than dexamethasone group (35.56 ± 39.54 mg). Duration of analgesia was significantly less in control group (11.62 ± 3.80 h) compared to dexamethasone group (19.04 ± 4.13 h) ($P <$ 0.001).

In 2017, Jyoti P. Deshpande**,** Poonam S. Ghodki *et al*[19], conducted a study of " Transversus Abdominis Plane Block using Ropivacaine with Dexamethasone in patients undergoing total abdominal hysterectomy under Spinal anaesthesia, prospective randomized study" reported that Study Group had lower postoperative VAS pain levels at 4 hrs, 6 hrs and 12 hrs than Control Group (*p value* < 0.05). Tramadol demand in the first 24 hours was less in study group than control group(50.2 34 mg vs. 94 35 mg, p value< 0.05). Duration of analgesia was significantly more in study group than control group (13.2 7.6 hrs vs 7.1 4.6 hrs, p value < 0.05).

CONCLUSION

On the basis of our study, we can conclude that-
Patients receiving TAP block in group B provided longer duration of analgesia, reduced VAS score, required less quantity of rescue analgesia, along with better haemodynamics as compare to group A patients.

Reason being addition of an additive dexamethasone in group B that has potentiated the action of local anaesthetic through their anti-inflamatory and immunosuppressive effects. Analgesic action of dexamethasone might be due to modulation of nuclear transcription and modulation of fuction of potassium channels in excitable cells.

LIMITATION

This study was carried out in patients undergoing lower abdominal surgeries. As the intensity of pain varies with extent and type of surgery, more studies are required in various other surgeries including major surgery.

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