



EFFICACY OF CLONIDINE VERSUS DEXMEDETOMIDINE AS ADJUVANTS TO 0.25% LEVOBUPIVACAINE IN ULTRASOUND GUIDED TRANSVERSALIS FASCIAL PLANE BLOCK FOR LOWER SEGMENT CAESAREAN SECTION.

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ABSTRACT:

Background: Lower segment caesarean section [LSCS] is associated with significant post-operative pain which may delay recovery and adversely affect maternal wellbeing. Ultrasound guided transversalis fascial plane block [TFPB] is an effective component of multimodal analgesia within enhanced recovery after surgery [ERAS] protocols.

Aim: To compare the efficacy of clonidine versus dexmedetomidine as adjuvants to 0.25% levobupivacaine in TFPB for postoperative analgesia following LSCS.

Methods: This prospective, randomized, double-blinded controlled clinical study included 60 parturients undergoing LSCS, allocated into two groups [n=30 each]. Group TFP-C received 0.5 mcg/kg clonidine and Group TFP-D received 0.5 mcg/kg dexmedetomidine as adjuvants to 0.25 % levobupivacaine ‘

Primary outcomes were time for first rescue analgesia and number of rescue analgesic doses. Secondary outcomes included Visual analogue scale [VAS] scores, Bruggeman comfort scale [B.C.S] scores, hemodynamic parameters and adverse effects.

Results: The dexmedetomidine group [Group- TFP-D] significantly prolonged the time to first rescue analgesia [6.05 + 1.00 vs 4.10 + 0.85 hours; $p < 0.001$] and reduced the number of rescue analgesic doses [1.60 + 0.60 vs 2.30 + 0.70; $p = 0.001$]. VAS scores were significantly lower and comfort scores were higher in the Group TFP-D [$p < 0.05$]. Hemodynamic parameters were better controlled without significant increase in adverse effects.

Conclusion: Dexmedetomidine is a superior adjuvant to levobupivacaine compared to clonidine in TFPB for LSCS, providing prolonged analgesia, improved patient comfort, and stable hemodynamics with a comparable safety profile.

Key words: Lower segment cesarian section, Transversalis fascial plane block, clonidine, dexmedetomidine, levobupivacaine

1.INTRODUCTION:

Lower segment cesarian delivery is most commonly performed obstetric surgical procedure and pain is leading anticipated problem in the postoperative period . Poor postoperative pain control is associated with significant morbidity, poor wound healing, psychological stress, delayed functional recovery that leads to impaired mother baby interaction.¹

Multimodal analgesia forms the corner stone of postoperative pain management, particularly within Enhanced recovery after surgery [ERAS] protocols.² Regional anesthetic techniques especially fascial plane blocks, have gained increasing popularity due to their efficacy, safety profile, opioid sparing effects.³ Among this transversalis fascial plane block is an emerging technique that provides safe and effective analgesia for lower abdominal surgeries including LSCS by targeting the nerves in the transversalis fascial plane.⁴

Levobupivacaine a long-acting amide local anesthetic, is commonly used in fascial plane blocks due to its favorable safety profile⁵. However, the duration of analgesia with local anesthetics alone may be limited. The addition of adjuvants such as alpha 2 agonists like clonidine or dexmedetomidine enhances its effect in terms of analgesia duration and quality of block.⁶ Several studies have demonstrated the efficacy of these agents in various regional blocks including transversus abdominis plane [TAP] block.⁷

However, limited data exist comparing clonidine and dexmedetomidine specially in TFPB for cesarean section. Therefore, the present study was undertaken to compare the efficacy clonidine versus dexmedetomidine as adjuvants to 0.25% Levobupivacaine in bilateral TFP block for postoperative pain management in LSCS.

Materials and methods: This prospective randomized double blinded controlled clinical study was conducted in department of Anaesthesiology, Narayana Medical College & Hospital, Nellore, Andhra Pradesh. This study was conducted from July 2025 to November 2025 with the approval of Institutional Ethics committee [IEC]

IEC number: IEC/NMC/10th JULY 2025/11.

Inclusion criteria: Parturients who underwent elective or emergency lower segment cesarean section and are able to consent.

Exclusion criteria: Parturients who refused to participate, parturients of American society of anesthesia [ASA] Class III and IV, individuals allergic to local anesthetic agents, those with local skin infections & bleeding diathesis

Base line characteristics included demographical distribution. Primary outcome measure included time to first rescue analgesia and number of rescue analgesic doses required, postoperative 24 hrs. mean Visual analogue scale [VAS] scores, Bruggeman Comfort scores. Secondary outcomes were hemodynamic parameters like Heart rate [H.R], Mean arterial pressure [MAP], and adverse effects like bradycardia, hypotension, drowsiness and dry mouth.

Study procedure: The preanesthetic checkup included assessment of history, general condition of patient according to ASA classification, general physical examination and base line vitals.

After wheeling in the patient to the operating theatre, ASA standard monitors were attached and intravenous cannula is secured. Using closed envelope model, they were randomized into two groups of 30 each namely group TFP-C and group TFP-D. Baseline heart rate, non-invasive blood pressure, SpO₂ were recorded and noted during surgery. Standard Spinal anesthesia protocol was followed in every patient and further these patients were randomized into two groups of 30 each.

Group TFP- C: received 0.25% 0.3ML/Kg of Levobupivacaine +0.5 mcg/kg of Clonidine .

Group TFP- D -received 0.25% 0.3ML/Kg of Levobupivacaine+0.5 mcg/kg of Dexmedetomidine .

Technique: A high frequency Sono site M turbo linear Ultrasound [USG] probe [13-6MHz] was placed on mid axillary line just cephalad to the iliac crest ,scanning anteriorly identifying the three muscles of anterior abdominal wall till postero- laterally. The 20G needle is then inserted anterior to USG probe using an in plane approach between the transversus abdominis muscle and the transversalis fascia , and local anesthetic [0.25% levobupivacaine] be injected under the transversalis fascia after negative aspiration and spread of local anesthetic along fascial plane is noted. After block

was performed, patients were shifted to post anesthesia care unit. Time to first rescue analgesia, number of rescue analgesic doses, Haemodynamic parameters like H.R and M.A,P and VAS scores, Bruggemann comfort scale scores at 0 hr ,2hr, 4hr, 6hr,12 hr,24 hr intervals were assessed. Injection Tramadol 100mg was taken as rescue analgesic and was given when VAS scores were more than three

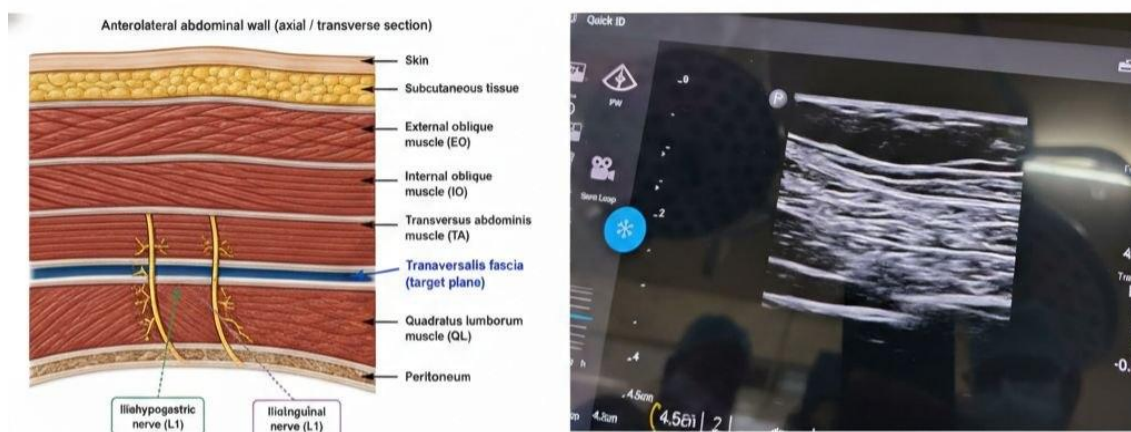
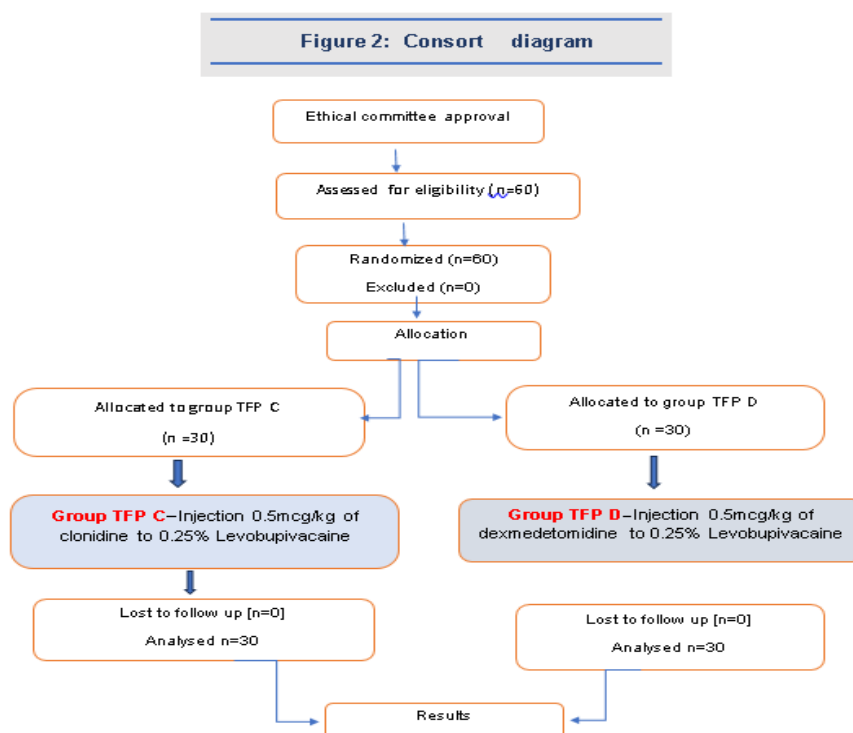


Figure 1 : Transversalis Fascial plane Anatomy and ultrasound image



Statistical Analysis:

All the recorded data was entered using MS excel software and analyzed using IBM-SPSS statistics software v.26.0 [IBM Corp, Armonk, NY, USA] . Categorical variables expressed as frequencies and percentages, and continuous variables as mean + standard deviation. Categorical variables were compared using Chi square test and continuous variables were assessed using unpaired Student's t-test. P value of <0.05 was considered statistically significant.

RESULTS:

Table 1: Demographic details

Characteristics	Group-C [n=30] Mean + S.D	Group-D [n=30] Mean + S.D	p-value
Age [years]	32.63+ 7.96	31.06 + 8.63	0.47
Weight[kg]	64.20 +8.50	63.10 + 7.90	0.62
Height [cms]	158.40 + 5.60	157.80+ 5.90	0.68
ASA I /II [n, %]	18 [60%],12[40%]	17[56.7%],13[43.3%]	0.79

There was no statistically significant difference between the two groups with respect to age, weight, height, and ASA physical status [$p>0.05$], indicating that the groups were comparable.

Table 2 : Comparision of Analgesic profile between groups

Variable	Group TFP-C Mean $\pm$ SD	Group TFP-D Mean $\pm$ SD	p-value
Time to first rescue analgesia[hrs]	4.10 + 0.85	6.05 + 1.00	<0.001
Number of rescue analgesic doses	2.30+ 0.70	1.60+ 0.60	0.001

The time to first rescue analgesia was significantly longer in the dexmedetomidine group compared to the clonidine group (6.05 ± 1.00 vs 4.10 ± 0.85 hours; $p < 0.001$), while the number of rescue analgesic doses was significantly lower (1.60 ± 0.60 vs 2.30 ± 0.70 ; $p = 0.001$) indicating superior analgesic efficacy of dexmedetomidine.

GRAPH 1 : Comparison of analgesic profile between two groups

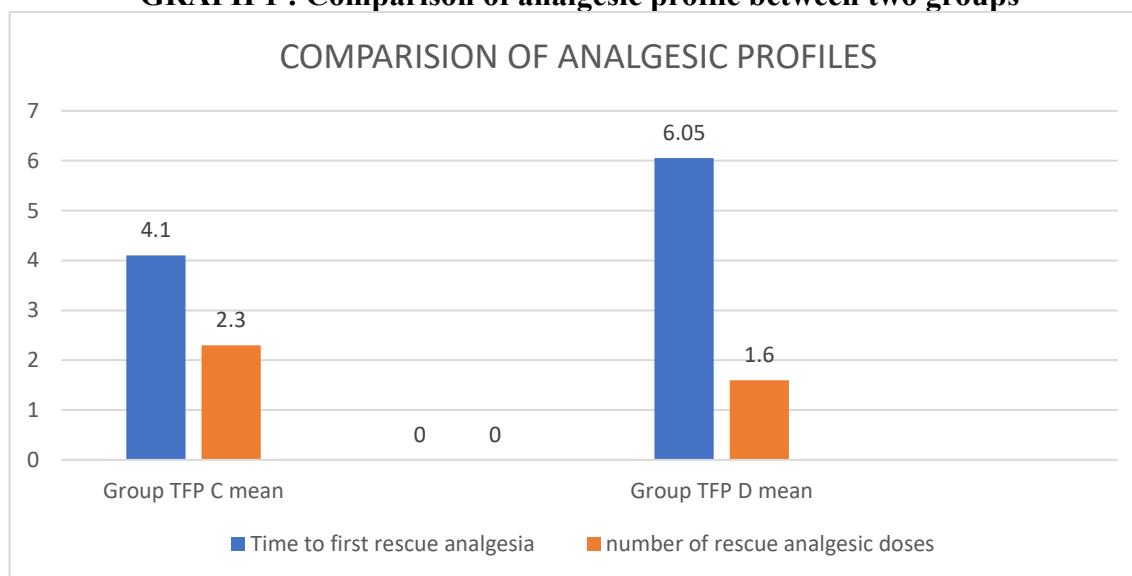


Table 3: COMPARISON OF VAS SCORES AT DIFFERENT TIME POINTS

Time point	Group TFP-C Mean $\pm$ SD	Group TFP-D Mean $\pm$ SD	P-value
0 hrs	1.20+0.40	1.10 + 0.30	0.28
2 hrs	2.80+ 0.60	2.10 +0.50	0.001
4 hrs	3.90+ 0.70	2.80 + 0.60	<0.001
6 hrs	4.80+ 0.80	3.40+ 0.70	<0.001
12 hrs	3.70 +0.90	2.90 +0.80	0.002
24 hrs	2.60+0.70	2.20+ 0.60	0.03

Mean VAS scores were comparable between the groups at 0 hour [$p>0.05$]. However, at 2,4,6, 12 and 24 hrs, VAS scores were significantly lower in Group TFP-D compared to Group TFP-C [$p<0.05$], indicating superior postoperative analgesia.

Table 4 : Comparison Of Bruggeman Comfort Scale between groups

Time intervals	Group TFP-C Mean $\pm$ SD	Group TFP-D Mean $\pm$ SD	P-value
0hr	4.60 $\pm$ 0.50	4.70 $\pm$ 0.40	0.32
2hr	3.80 $\pm$ 0.60	4.30 $\pm$ 0.50	0.002
4hr	3.10 $\pm$ 0.70	4.00 $\pm$ 0.60	<0.001
6hr	2.60 $\pm$ 0.80	3.60 $\pm$ 0.70	<0.001
12hr	3.20 $\pm$ 0.70	3.90 $\pm$ 0.60	0.001
24hr	3.80 $\pm$ 0.60	4.10 $\pm$ 0.50	0.03

BCS scores were comparable between the groups at 0 hour ($p > 0.05$). However, at 2, 4, 6, 12, and 24 hours, Group TFP- D demonstrated significantly higher comfort scores compared to the Group TFP- C group ($p < 0.05$), indicating superior postoperative analgesia and patient comfort.

Table 5: Comparison of Heart rate [beats/minute]

Time Interval	Group TFP-C Mean $\pm$ SD	Group TFP-D Mean $\pm$ SD	P-value
0hr	86.4 $\pm$ 6.5	84.8 $\pm$ 6.2	0.28
2hr	88.2 $\pm$ 6.8	80.6 $\pm$ 6.4	0.001
4hr	90.5 $\pm$ 7.0	78.9 $\pm$ 6.1	<0.001
6hr	92.1 $\pm$ 7.3	77.5 $\pm$ 6.0	<0.001
12hr	88.7 $\pm$ 6.9	79.8 $\pm$ 6.3	<0.001
24 hr	84.9 $\pm$ 6.4	81.5 $\pm$ 6.1	0.02

Table 6: Comparison of Mean Arterial pressure [mmHg]

Time intervals	Group TFP-C Mean $\pm$ SD	Group TFP-D Mean $\pm$ SD	P-value
0hr	92.6 $\pm$ 5.8	91.4 $\pm$ 5.6	0.35
2hr	94.2 $\pm$ 6.0	86.8 $\pm$ 5.7	0.001
4hr	96.5 $\pm$ 6.3	85.2 $\pm$ 5.5	<0.001
6hr	98.1 $\pm$ 6.6	84.6 $\pm$ 5.4	<0.001
12hr	95.3 $\pm$ 6.2	86.9 $\pm$ 5.8	<0.001
24hr	92.8 $\pm$ 5.9	89.7 $\pm$ 5.6	0.03

Heart rate and mean arterial pressure were comparable between the two groups at baseline (0 hour) ($p > 0.05$). However, at 2, 4, 6, 12, and 24 hours postoperatively, both heart rate and mean arterial pressure were significantly lower in Group TFP-D when compared to the Group TFP-C. The difference was statistically significant at all these time intervals ($p < 0.05$), with the maximum reduction observed at 4–6 hours, corresponding to peak effect of study drug. These findings indicate better attenuation of sympathetic response and improve haemodynamic stability with dexmedetomidine.

Table 7 : Adverse effects

Side effect	Group TFP-C [n=30]	Group TFP-D [n=30]	P-value
Bradycardia	1 [3.3%]	3 [10%]	0.30

Hypotension	2 [6.7%]	3 [10%]	0.64
Nausea/Vomiting	5 [16.7%]	3 [10%]	0.44
Sedation	2 [6.7%]	6 [20%]	0.12
Dry mouth	3 [10%]	4 [13.3%]	0.69

The incidence of side effects such as bradycardia, hypotension, nausea/vomiting, sedation, and dry mouth were comparable between the two groups, with no statistically significant difference observed ($p > 0.05$). Although a slightly higher incidence of sedation and bradycardia was noted in Group TFP-D, these differences were not statistically significant.

DISCUSSION

The present study evaluated the efficacy of clonidine and dexmedetomidine as adjuvants to 0.25% levobupivacaine in TFP block for postoperative analgesia following LSCS. Fascial plane blocks, including TFPB, are increasingly used as part of multimodal analgesia strategies within ERAS protocols to improve postoperative outcomes and reduce opioid consumption.⁸

In the present study, the time to first rescue analgesia was significantly prolonged in the Group TFP-D compared to the group TFP-C (6.05 ± 1.00 vs 4.10 ± 0.85 hours; $p < 0.001$), indicating a longer duration of postoperative analgesia with dexmedetomidine. Study by This is consistent with previous studies demonstrating that alpha-2 adrenergic agonists prolong the duration of local anaesthetic action by causing vasoconstriction and inhibiting nociceptive transmission.⁹

This was further supported by significantly lower VAS scores at 2, 4, 6, 12, and 24 hours in group TFP-D ($p < 0.05$), reflecting better pain control across the postoperative period. In addition, the number of rescue analgesic doses was significantly reduced in the dexmedetomidine group (1.60 ± 0.60 vs 2.30 ± 0.70 ; $p = 0.001$), demonstrating an opioid-sparing effect which is clinically beneficial, particularly in obstetric patients thereby enhancing recovery. Similar findings have been reported in previous studies evaluating the role of dexmedetomidine as an adjuvant in fascial plane blocks.^{7,10}

The Bruggemann comfort scale scores were significantly higher in the group TFP-D ($p < 0.05$), at most postoperative intervals, indicating improved patient comfort. These findings correlate well with the lower pain scores and reduced need for rescue analgesia, suggesting a consistent analgesic advantage with dexmedetomidine.¹¹ Previous studies on Transversus abdominal plane [TAP] block have also demonstrated improved patient satisfaction and analgesic quality with addition of dexmedetomidine.^{1,12} Hemodynamic parameters showed that both heart rate and mean arterial pressure were significantly lower in the dexmedetomidine group at multiple time intervals ($p < 0.05$), with the maximum effect observed at 4–6 hours [$p < 0.001$]. This reflects the greater sympatholytic action of dexmedetomidine compared to clonidine¹³. Despite this, the incidence of clinically significant bradycardia or hypotension was not increased, indicating an acceptable safety profile at the studied dose. These findings of the current study were consistent with those of **Nazir et al [2022]**¹², who compared clonidine [group- II] and dexmedetomidine [Group- III] as adjuvants to 0.2% ropivacaine in USG guided TAP block for post caesarean analgesia. The results demonstrated that the time for first rescue analgesia was more in group III [10.8 ± 0.56] compared to group II [7.9 ± 0.8 hours]. Total amount of tramadol used in group III was 130.1 ± 22.2 mg was least compared to group II. The VAS score in first 12 hours was less in group III as compared to II but at 24 hrs VAS scores were similar. Similarly, **Gupta et al [2019]**¹⁴ demonstrated that VAS scores and total number of demand doses in 24 hours were significantly less in dexmedetomidine [1.00 ± 0.00] compared to clonidine [2.03 ± 0.18] as adjuvants to levobupivacaine in TAP block in patients undergoing

hysterectomies. Furthermore, a meta-analysis by **Bajpai V et al [2019]¹⁵**, reported that dexmedetomidine provides a significantly longer duration of analgesia [MD:203.92] and less rescue analgesic requirements [SMD=-1.40] compared to clonidine when used as adjuvants to local anaesthetics in regional blocks. These findings support the superiority of dexmedetomidine over clonidine in enhancing the efficacy of peripheral nerve blocks ,thereby supporting its use in ERAS protocols for caesarean section. ²In the present study, TFPB was found to be superior. This effect may be attributed to blockade of ilioinguinal and iliohypogastric nerves[T12-L1] ⁴. Additionally, the injection of a higher volume of local anaesthetic into the transversalis fascial plane facilitates its spread beneath the thoracolumbar fascia into the paravertebral space, thereby providing both somatic and visceral analgesia. In contrast, anterior abdominal wall blocks typically produce only somatic analgesia.

Limitations : The relatively small sample size and single -centre design may limit the generalisability of the findings. Long term analgesic effects and serum drug level measurements were not performed. Additionally, variations in individual pain perception and surgical factors could have influenced analgesic requirements.

CONCLUSION: This study concludes that both are effective adjuvants to levobupivacaine in transversalis fascial plane block for post caesarean analgesia but dexmedetomidine as a adjuvant has significantly more analgesic duration, less hemodynamic variation and provided more effective quality of block as compared to clonidine and can be considered as preferred adjuvant as per strategies under ERAS protocols.

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