Comparative Study of Patients Outcomes by Using Dexmedetomidine with Bupivacaine versus Bupivacaine Alone in Ultrasound-Guided Thoracolumbar Interfacial Plane Block for Spine Surgeries.

Abstract

Background Thoracolumbar interfacial plane block (TLIP) is effective and safe method used with general anesthesia to achieve the optimum analgesia. This study evaluates theanalgesic effect, hemodynamic changes, consumption of inhalational anesthesia and stress response by measuring cortisol level when adding dexmedetomidine to bupivacaine in the ultrasound-guided thoracolumbar interfacial plane block in spine surgeries (lumber and lower thoracic T11-T12).

Patients and methods: sixty adult patients of both sexes aged (21-60) years with ASA physical status I/II scheduled for elective spine surgeries (laminectomy and spinal fixation) at the level of lower thoracic (T11-T12) and lumber vertebra. Patients divided into two groups, group A of thirty patients were given 20 ml of 0.25% bupivacaine with 1ml normal saline, at each side injected between multifidus muscle and longissimus muscle and group B of thirty patients were given 20ml of 0.25% bupivacaine with dexmedetomidine 1 mic/kg in a volume of 1 ml, at each side between multifidus muscle and longissimus muscle.The ethical committee of Faculty

of Medicine Tanta University (chief of ethics committee; prof. Mona El-Gohary) provided ethical approval for this study with unique identification number 33213 on July 2019.

Results:there was significantly decrease in NRSas a primary outcome in group B compared to group A, and according to the secondary outcomes there were significantly decrease in serum cortisol level, consumption of isoflurane, MAP, heart rate, number of total doses of rescue analgesia andnumber of patients received analgesiaand delay in 1st dose of rescue analgesia ingroupB compared to group A and there was insignificant difference in time of extubating between both groups.

ConclusionWe concluded that adding dexmedetomidine in a total dose 2 mic/kg as we added 1 mic/kg in a volume of 1 ml to 20ml of 0.25% bupivacaine for each side in TLIP block decreases stress response to surgery, total consumption of inhalational anesthesia (isoflurane), number of patients need rescue analgesia and total doses of rescue analgesia, and delayed 1st dose of rescue analgesia.

Keywords: Dexmedetomidine, Bupivacaine,Thoracolumbar Interfacial Plane Block, Spine Surgeries.

Introduction

Spine surgeries have many complications related to the surgery itself like major blood loss, infection, cord injury and pain. Various nociceptors and mechanoreceptors are in different tissues such as vertebrae, intervertebral discs, ligaments, dura, nerve root sleeves, facet joint capsules, fascia, and muscles; they elicit pain sensations that last for 3 days. [1]

The optimum anesthetic technique for spine surgeriesis needed to decrease blood in turn decrease the need for blood transfusion, reduce postoperative pain and early ambulation after surgery.[2]

Thoracolumbar interfascial plane block (TLIP)is done byinjecting a local anesthetic drug into the fascial plane between the multifidus and longissimus muscles where the nerves pass through the paraspinal musculature at the level of the corresponding vertebra at which the surgery will be done as the local anesthesia will spread two levels above and two levels belowthat block dorsal rami of the thoracolumbar nerves. [3]

The use of ultrasound guidance for regional anesthesia became popular owing to the detection of anatomical variants, painless performance, and more accurate needle placement. [4]

Bupivacaine is the most commonly used local anesthetic for nerve blocks, however, its duration of action is a major limiting factor so

adding adjuvants like epinephrine, dexamethasone, midazolam, ketamine, and dexmedetomidine. [5]

Dexmedetomidine is a selective α-2 agonist that can provide analgesia by decreasing the availability of epinephrine and norepinephrine on post-synaptic α-2 receptors. This is done by a negative feedback mechanism produced by its central action on presynaptic α-2 receptors. [6] It provides its analgesic and hemodynamic action by its systemic absorption when used in regional blocks [7]

The surgical insult activates adaptive changes in the neurohormonal system and the inflammation response.[8] Afferent nerve signals derived from the surgical site stimulate the hypothalamus to release corticotropin-releasing hormone then stimulates the secretion of adrenocorticotropic hormone from the anterior pituitary finally stimulates cortisol secretion by the adrenal cortex.[9] this study used dexmedetomidine to block this pathway.[6]

Patients and method

This study was approved by Institutional ethical committee of Faculty of Medicine Tanta Universitywith unique identification number33213 (chief of ethics committee; prof. Mona El-Gohary)for one year from September 2019 to September 2020, andthis prospective randomized double-blind studywas registered in Pan African Clinical Trial Registry inaccordance with WHO and ICMJE standards in 04 NOV 2019 with unique identification number PACTR201911745756018 before patients enrollment, written informed consent was obtained and every patient had received an explanation of the purpose of the study and had a secret code number and the photos applied only to the part of the body linked to the research to ensure privacy to participants and confidentiality of data.

This study was obtained 80 adult patients of both sexes, 20 patients were excluded as 5 patients refused, 3 patients their age were more than 60 years, 2 patients were on corticosteroid therapy, 4 patients were with past history of spine surgeries, 4 patients were underwent spine surgery above the level of T11 and 2 patients; the duration of their operation exceeded 180 min, the remaining 60 patients were fulfilled the inclusion criteria as male and female patients aged (21-60years) with ASA physical statusI/II, BMI of the patients < 40, scheduled for elective spine surgeries(laminectomy and spinal

fixation) at the level of lower thoracic (T11-T12) and lumber vertebra with a duration not exceeded 180 min.[**Figure 1]**

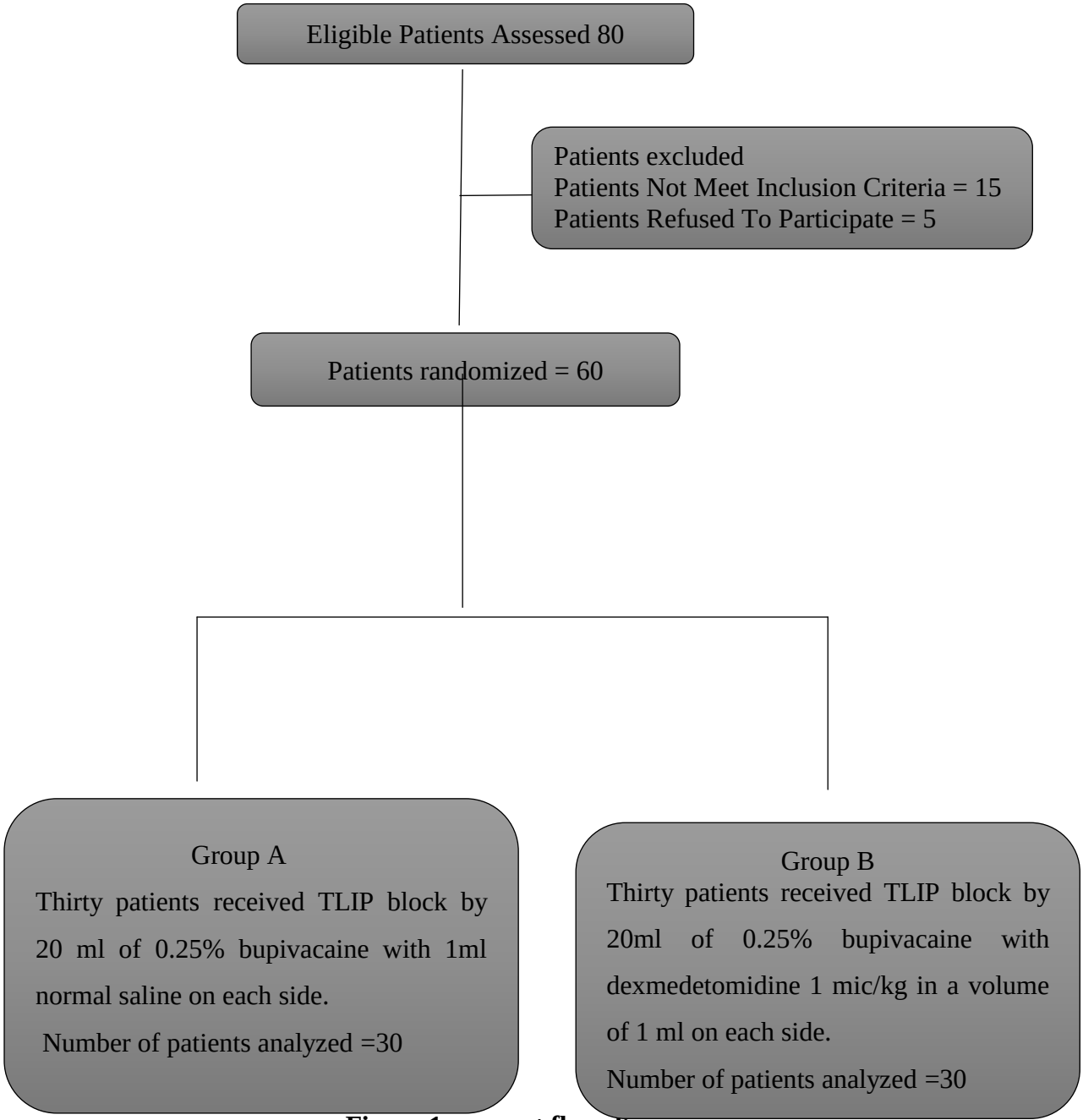

Figure 1: consort flow diagram

Patients with previous spinal surgery,surgeries above the level of T11 and involving more than four levels, history ofcorticosteroid therapy, cushing's syndrome or addison's disease, bleeding disorders or patients on anticoagulant therapy, intellectual dysfunctions, hypersensitivity to local anesthetics or any of the study drugs , pregnant or lactating patients and patients refused this technique were excluded from the study.

Computer-generated randomization numbers were used to allocate patients into two groups each group contained 30 patients and kept the original random allocation sequences in an inaccessible third place and worked with a copy, coding of A and B for each group then printed out and put each of the sheets one by one into each envelope.The patient's ID, date, time and other information were recorded on each envelope.The inside of the envelope wasn't visible from the outside, and it was printed out for each one and put in an envelope after being folded several times.

Evaluation of patients was carried out through proper history taking of smoking, alcohol addiction, analgesic drugs used to control the back pain, and diseases like diabetes mellitus (DM), hypertension, and respiratory diseases.

The patients were allowed to fast 6 hrs. for solids, 4 hrs. for semisolid and 2 hrs. for clear fluid.

Sedation was given intravenously in the form of midazolam 0.02mg/kg through a 20 G peripheral IV cannula. Electrocardiogram (ECG), noninvasive mean arterial blood pressure(MAP), and peripheral oxygen saturation was monitored, we prepared atropine ampule (1mg) to be given in a dose of it 0.01-0.02 mg /kg when the heart rate is less than 50 beats/min with unstable vital signs, and ephedrine ampule (30 mg) to be given in a dose 8mg when hypotension with systolic blood pressure values <90 mm Hg and diastolic blood pressure <60 mmHg.

After preoxygenation, anesthesia with IV propofol 2 mg/ kg and fentanyl 1 µg/kg was administered for analgesia and atracurium 0.5 mg/ kg was given intravenously to facilitate endotracheal intubation. The patients were mechanically ventilated using low flow anesthesia and maintained on isoflurane and incremental doses of atracurium 0.1 mg/kg guided by Train of Four count zero.as to achieve deep neuromuscular block.

After completion of the procedure, isoflurane agent was turned off, and the consumption of it was calculated by the anesthesia machine, we used low flow anesthesia, residual neuromuscular block was

reversed with neostigmine 0.05mg/kg and atropine 0.01mg/kg then patients were extubated and transferred to the post-anesthesia care unit(PACU) after recovery, patients were ready for discharge from PACU to ward when achieved The Modified Aldrete score ≥ 9, by the evaluation of the patients' consciousness, circulation, activity (able to move voluntarily or on command), respiration, and oxygen saturation.

The patients were trained to use the Numerical Rating Scale to evaluate the degree of pain that ranged from (0 = no pain) to (10 = intolerable pain). When the score was >3 analgesia was given in the form of morphine 0.05 mg/kg till NRS decreased to ≤3.

NRS (primary outcome)was assessed and recorded on arrival to PACU, 4, 8,12,18,24 h after the operation, and the secondary outcomes in the form of consumption of isoflurane, stress response by measuring serum cortisol level which was measured preoperatively, at time of skin incision, 30 min after skin incision, after skin closure, 6h, and 24h postoperatively, hemodynamics (mean arterial blood pressure and heart rate) were recorded preoperatively, 5 min after induction of general anesthesia, 5 min after thoracolumbar interfacial plane block, every 30 min till the end of the surgery, at discharge to PACU, 2 h ,4 h, 8 h, 10h, 12 h., 18 h, and 24

h postoperatively, time of extubation,, time of the first dose of rescue analgesia (morphine)., number of patients who received rescue analgesia, total doses of consumption of rescue analgesia.

Complications likeLocal anesthetic toxicity,(it is important to note that patients under general anesthesia would typically present with cardiotoxicity as the first sign in the form of prolonged PR intervals, widened QRS complexes, sinus brady/arrest., and ventricular arrhythmias, including fibrillation), hematoma, bradycardia, and hypotension were recorded and managed.

Statistical analysis: -

The trial was designed as a prospective clinical trial; the sample size calculation was performed using G. power 3.1.9.2. Thirty patients were allocated in each group.

The sample size (N ≥26 in each group) was calculated based on the following considerations:

1) Confidence limit: 95 %.
2) Power of the study: 90%.
3) Group to group ratio 1:1

Results: Comparing the mean values of demographic data between both group, showed non significant change as regard to age , sex , BMI , ASA , and duration of operation in min**.**

Comparing of the mean value of NRS showed significant decrease of NRS in group B compared to group A at Arrival to PACU, 4 h, 8 h, 12 h, 18 h and 24 h postoperatively with ($p < 0.0001$, $p < 0.0001$, $p < 0.0001$, $p < 0.0001$, $p = 0.0001$ and $p = 0.0004$) respectively. **(Table 1).Table (1)**

	Group A (n=30)		Group B (n=30)		P-value
	Median	Range	Median	Range	
Arrival to PACU	1	1-2	0	0-1	< 0.0001*
4 h	2	1-3	1	0-3	< 0.0001*
8 h	3	1-5	1	1-2	< 0.0001*
12 h	3	2-5	1	1-3	< 0.0001*
18 h	3	2-5	2	1-4	0.0001*
24 h	2	1-4	2	1-4	0.0004*

Table (1) Mean values of NRS in standard group

* P-value is significant when its value <0.05.

Comparing of the mean value of mean arterial blood pressure showed significant decrease in mean arterial blood pressure in group B compared to group A intraoperatively after injection of local anesthesia at 30 min, 60 min, 90 min and 120 min ($p = 0.0207$, $p = 0.0177$, $p < 0.0001$, and $p < 0.0001$) respectively, and postoperatively at 8 h ($p = 0.0009$).**(Table 2).**

	Group A Mean ± SD (n=30)	Group B Mean ± SD (n=30)	Unpaired T-test	P-value
Preoperative	88.16±9.184	89.93±7.501	0.8176	0.4169
5 min after induction	83.63±8.672	86.13±7.32	1.207	0.2325
5 min after injection	78.07±7.741	75.27± 9.044	1.288	0.2028
30 min after injection	79.27±7.061	73.83±10.35	2.378	0.0207*
60 min after injection	87.03±9.141	82.37± 5.129	2.435	0.0180*
90 min after injection	86.63 ± 8.68	74.93± 7.98	5.435	< 0.0001*
120 min after injection	85.8 ± 4.84	78.6± 4.304	6.089	< 0.0001*
PACU	86.77±7.403	88± 4.127	0.7949	0.4299
2h	86.03±8.096	83.27±3.991	1.675	0.0994
4h	83.93±5.521	82.1± 5.081	1.336	0.1868
8h	86.67±3.241	82.63± 5.455	4.017	0.0002*
10 h	84.47 ± 4.77	83.7±4.669	0.6319	0.5300
12h	85.47±2.662	85.27± 7.172	0.1432	0.8866
18 h	84.77±2.738	83.1± 6.294	1.333	0.1879
24h	84.97±5.684	83.57± 5.042	1.009	0.3171

Table 1: Mean values of mean arterial blood pressure in studied groups

* P-value is significant when its value < 0.05.

Comparing of the mean values of heart rate showed significant decrease in heart rate between both groups intraoperatively after injection of local anesthesia at 5 min, 30 min, 60 min, 90 min and 120 min ($p = 0.0158$, $p = 0.0002$, $p < 0.0001$, $p < 0.0001$ and $p < 0.0001$) respectively, and postoperatively at PACU, 4h, 8 h and 10 h ($p = 0.0009$, $p = 0.0115$, $p < 0.0001$ and $p < 0.0001$) respectively.**(Table 3).**

Table (3) Mean values of heart rate in studied groups

	Group A Mean ± SD (n=30)	Group B Mean ± SD (n=30)	Unpaired T-test	P-value
Preoperative	86.33±13.239	84.63±9.59	0.570	0.5712
5 min after induction	81.23±14.96	80.4±9.86	0.254	0.8006

5 min after injection	77.97±15.97	68.8±12.29	2.492	0.0156*
30 min after injection	77.83±12.402	66.43±9.035	4.069	0.0001*
60 min after injection	80.83±8.74	64.77±6.77	7.957	<0.0001*
90 min after injection	83.77±7.214	63.97±4.67	12.620	<0.0001*
120 min after injection	88.67±7.721	66.3±4.14	13.985	<0.0001*
PACU	90.4±9.95	82.8±6.16	3.557	0.0008*
2h	80.36±13.11	77.57±5.59	1.072	0.2881
4h	80.8± 8.15	76±5.86	2.619	0.0112*
8h	90.77±9.069	77.03±9.197	5.827	<0.0001*
10h	86.4±4.53	78.37±8.88	4.412	<0.0001*
12h	84.53±3.159	82.07±8.88	1.43	0.1582
18h	84.47±3.213	81.9±9.95	1.346	0.1835
24h	86.4± 3.719	84.2±10.16	1.114	0.2700

* P-value is significant when its value < 0.05.

Comparing of the mean values of serum cortisol levels showed significant decrease at 30 minutes after skin incision ($p < 0.0001$) and non- significant difference between both groups preoperative, at time of skin incision, after skin closure, at 6h and at 24 h ($p = 0.0544$, $p = 0.5168$, $p = 0.0742$, $p = 0.8903$ and $p = 0.5904$).**(Table 4).**

Table (4) Mean values of cortisol level measurements in studied groups

	Group A Mean ± SD (n=30)	Group B Mean ± SD (n=30)	Un paired T-test	P-value
Preoperative	12.54 ± 5.82	15.027± 3.73	1.971	0.0544
At time of skin incision	12.16 ± 3.54	11.53 ± 3.93	0.6524	0.5168
30 min after skin incision	15.834 ±6.318	9.49 ± 2.83	5.019	< 0.0001*

After skin closure	18.92 ± 8.48	22.69 ± 7.55	1.819	0.0742
6h	14.69 ±6.27	14.47 ± 6.033	0.1385	0.8903
24h	11.34 ± 4.802	10.79 ± 2.798	0.5420	0.5904

* P-value is significant when its value < 0.05.

The mean value of consumption of isoflurane was 17.07 ± 3.342 ml in group A, while in group B it was 13.87 ± 2.92ml., the consumption of inhalational anesthesia was significantly decreased in group B (p= 0.0005).The mean value of time of extubation was 5.77 ± 0.7279 minutes in group A, while in group B it was 5.8 ± 0.7144 minutes, there was non-significant change between both groups (p= 0.8272).

There was significant delay of 1st dose of rescue analgesia in group B with mean (21 ± 4.243) hrs. Compared to group A with mean (11 ± 4.830) hrs. (p =0.0222)

The mean value of total doses of morphine as rescue analgesia (0.05mg/kg) was 9.6 ± 2.989 mg in group A, while in group B it was 4.5 ± 0.7071 mg, there was significant decrease of total doses of rescue analgesia in group B compared to group A (p= 0.0432).

Comparing number of patients need rescue analgesia there were ten patients in group A received rescue analgesia compared to two patients in group B (p= 0.0239). **(Table 5)**

	Consumption of isoflurane		Time of extubation		Onset of 1st dose of analgesia		Total doses of morphine in mg	
Groups	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
Mean± SD	17.07 ± 3.342	13.87 ± 2.92	5.77 ± 0.7279	5.8 ± 0.7144	11 ± 4.830	21 ± 4.243	9.6 ± 2.989	4.5 ± 0.7071
Unpaired T test	3.951		0.1617		2.704		2.315	
P-value	0.0005*		0.8727		0.0222*		0.0432*	

In-group A; 3 patients received 3 doses of morphine, 6 patients received 2 doses of morphine and 1 patient received one dose of morphine while in group B ; 2 patients received 1 dose of morphine as rescue analgesia

There was no hematoma as we avoided injection in patients with coagulopathy. There was bradycardia in 3 patients in group B (10%) who needed atropine and there was transient hypotension in 4 patients in group B which was controlled by ephedrine effect (13.33%).

Discussion: -

Severe pain after spine surgeries is due to affection of various nociceptors and mechanoreceptors by the damage of different tissues such as vertebrae, intervertebral discs, ligaments, dura, nerve root sleeves, facet joint capsules, fascia, and muscles,[10]

In 2015, interfascial plane blocks was first described by **Hand WR** et al**;**[11]who found that this block provided long-lasting postoperative analgesia, decrease opioid consumption and minimize the motor block associated with neuraxial block. [12]

Hand WR et al;[11] reported that the efficacy of the TLIP block was restricted to the lumbar region, and then in 2017 another studythat was done by **Ueshima H** et al; [13], determined that the TLIP block affected the dorsalrami of the thoracic nerves.

The TLIP block in 2019 used for more invasive spine surgery by**Chen K** et al; [14] who found significantly reduction of opioid consumption intraoperatively and postoperatively used it for lumbar spinal fusion and reduction of the consumption of anesthetic drugs infused allover the time of the surgeries. In 2017; **Ahiskalioglu A** et al; [15] studied modified technique for thoracolumbar interfascial plane blockas local anesthesia was injected between the iliocostalis and longissimus muscles.

Previous studies have indicated that various doses of dexmedetomidine (20 to 150 µg) can be added to local anesthesia. [16]

Our study was one of the clinical trials, which studied the thoracolumbar interfascial plane block. Most of these trials studied

the effect of the block on postoperative pain, 1st dose of rescue analgesia, consumption of the rescue analgesia and the effect of the block on hemodynamics. We added further measurements like the number of patients received recue analgesia , the effectiveness of the block on the reduction of the stress response by measuring the serum cortisol level ,the ability of the block to decrease the intraoperative consumption of inhalational anesthesia (isoflurane), time of extubation and also our study was not limited to one level or minimal invasive procedures but also it included multi-level ≤ 4 levels for lumber vertebra and lower thoracic vertebra (T11-T12) and showed its effectiveness for laminectomy and spinal fusion surgery.

Our result showed significant decrease in NRS in group B, our results are in agreement with **Paul A** et al;[19], **Cai X** et al;[18], **Cheung CW** et al; [19]**Jung HS** et al [20], and **Zeng Y** et al; [21], this can be explained by the analgesic effect which is mediated by two mechanisms the first is the activation of a2B- adrenoceptors at the level of the dorsal horn of the spinal cord and inhibition of substance P release,and the second by its blocking of I_h current (an inward current activated by hyperpolarization from the resting potential and is an important modulator of action potential firing frequency in many excitable cells) that results in prolonged hyperpolarisation of

the nerve, which seems to be more pronounced in unmyelinated C fibres (pain) than in Aα fibres (motor). [22]

Consumption of isoflurane as inhalational anesthesia in group B showed significant decrease as the MAC used to achieve adequate depth of anesthesia was 0.6 (MAC awake), this result was in accordance with the reports made by **Abd El-Hamid HM** et al ; [23], **Muniyappa RB** et al **;**[24], and**Preeti S** et al**;** [25]. All these studies used dexmedetomidine by intravenous infusion, but according to our study we used dexmedetomidine as adjuvant for TLIP block, the decrease of the consumption of inhalational anesthesia may be explained by its systemic absorption, this is mediated by its action on central receptors results in a decreased catecholamine release and an overall reduction in the sympathetic outflow from the locus ceruleus of the brainstem and influence endogenous sleep-promoting pathways. [26]

Also there was significant decrease in serum cortisol level in-group B, **Bakr MA** et al ;[27], and **Bi YH** et al ;[28]were in agreement to our results. The release of catecholamine and reduction in the sympathetic outflow are done by activation of central α 2A and imidazoline type 1 receptors lead to attenuation of the sympathetic stress response.[29]

Our results showed significant decrease in the perioperative MAP and heart rate in group B, these findings went in hand with **Agarwal S** et al [30], but in contrast **Bisui B** et al; [31]and **khondzadeh R** et al;[32] showed no significant change as both studies used lower dose of dexmedetomidine (0.75 μg/kg and 1 μg/kg) respectively while our study depended on 2 μg/kg as a total doses, as dexmedetomidine activates central α 2A and imidazoline type 1 receptors lead to decrease catecholamine release and an overall reduction in the sympathetic outflow from the locus ceruleus of the brainstem and this negative feedback loop produces reduction in heart rate and blood pressure as it is well absorbed systemically after extravascular injection with linear dose-related plasma concentration. [29]

According to the time of extubation, which is defined as a time from the end of surgery to airway extubation it showed non-significant difference between both groups, **Cheung CW** et al; [19] was in agreement to our results while **Zeng Y** et al; [21]and**Liu H** et al; [33]disagreed with our result .Our explanation to this result inspite of using a total dose of dexmedetomidine (2 μg/kg) we also maintained isoflurane on MAC awake (0.6) guided by maintaining the entropy between 40-60 to provide adequate depth of anesthesia, so there was no prolongation of time of extubation with dexmedetomidine group

after cessation of isoflurane and there were no awareness that return to the sedative effect of dexmedetomidine which was achieved after local injection due to its systemic absorption.[29]

The delay of the 1st dose of rescue analgesia went in hand with the results of **Agarwal S** et al [30], **Bisui B** et al [31], and **khondzadeh R** et al [32], this may be due to the synergistic interactions of dexmedetomidine with LA that lead to prolongation the duration of blockade [25], and also dexmedetomidine induces vasoconstriction via α2 adrenoceptors around the site of injection so delaying the absorption of local anesthetic and hence prolonging its effect.[34]

As regard total number of patients who received rescue analgesia there was significant decrease in number of patients needed rescue analgesia in group B, and this was coincided with the study of **Zeng Y** et al; [21], while in contrast to our result **Amin M** et al ;[35] found there were no significant differences as regards number of patients required rescue analgesia between both groups.

Our study was in accordance with, **Bharti N** et al;[36] and **Packiasabapathy SK** et al; [37] found reducing the number of total doses of rescue analgesia, this may be explained by the enhancement of the analgesic and anesthetic properties of local anesthesia when used with dexmedetomidine. [25]

The incidence of bradycardia and hypotension which were observed in group B were in agreement to **Jung HS** et al [20] , **Zeng Y** et al; [21] , **Vorobeichik L** et al; [38]and **Ping Y** et al ; [39], as all of these studies showed hypotension and bradycardia in dexmedetomidine group as it is absorbed systemically after extravascular injection with linear dose-related plasma concentration, in contrast**Bharti N** et al ; [36]showed neither bradycardia nor hypotension, this may be due to the use of adrenalin in the mixture of local anesthesia as well as the total dose of dexmedetomidine used was 1 μg/kg compared to our study which was 2 μg/kg (1 μg/kg for each injected site).

According to the results of our study there was no incidence of local anesthetic toxicity (LAST), as the incidence of LAST currently estimated to be 0.03%, or 0.27 episodes per 1,000 peripheral nerve blocks, and differs according to the techniques of LA administration as LA infiltration were most commonly implicated, accounting for 20% of events, followed by central neuraxial blocks (epidural and caudal) in 15% and continuous infusion of LA in 13% of events.

We avoided the risk factors for developing LAST by using appropriate lowest dose that achieves the desired duration and extent of analgesia and anesthesia, [40] and we excluded the patients who are at high risk for LAST like old age patients, pregnant, patients

with unstable cardiac diseases, renal impairment and liver impairment. [40]

Possible factors that may have influenced these results to include the dose of LA typically administered and the vascularity of the site involved, [40] and according to our study, dexmedetomidine induces vasoconstriction via α2 adrenoceptors around the site of injection so delaying the absorption of local anesthetic that lead to prolong the time of analgesia and also decrease the incidence of toxicity from bupivacaine. [34]

There were some limitations of this study, as we could not evaluate the role of TLIP block in patients with revision lumbar laminectomies as there was a distortion of the anatomy and it was difficult to distinguish the site of injection. We could not detect the lost sensory area in all enrolled patients after the block procedures as the block was done after induction of general anesthesia.

Conclusion: -

We concluded that the hemodynamic stability, the decrease of (serum cortisol level, consumption of inhalational anesthesia, number of patients need rescue analgesia and number of total doses of rescue analgesia), and delayed 1st dose of rescue analgesia were due to the

effect of adding of dexmedetomidine 1 mic/kg to bupivacaine 0.25% in TLIP block

Recommendation: -

- Usage of dexmedetomidine as adjuvant to bupivacaine for TLIP block in spine surgeries (laminectomy and spine fixation) as it doesn't only provide optimum postoperative analgesia but also:-

- It decreases the stress response during surgery by decreasing the cortisol level and this may provide proper healing of the tissue and decreases the incidence of hyperglycemia with diabetic patients.

- It decreases consumption of the total doses of narcotics as it provides an excellent perioperative analgesia, so this limits the side effects of narcotic especially with susceptible patients.

- It has economic impact as it decreases the consumption of inhalational anesthesia so decreasing pollution from waste anesthetic gas.

- Further studies are recommended with more numbers of participant's patients to monitor the amount of blood loss and amount of blood transfusion as this technique decreased the heart rate and blood pressure with acceptable levels that may help in decreasing the blood loss during spine surgeries, as well as to evaluate if the addition of dexmedetomidine to bupivacaine in TLIP block is

sufficient to perform minimal invasive procedure (laminoplasty) at one level without the need of general anesthesia or not.

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Figure (1) consort flow diagram