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COMPARATIVE STUDY BETWEEN BUPIVACAINE ALONE VERSUS BUPIVACAINE WITH FENTANYL, AND BUPIVACAINE WITH DEXAMETHASONE IN ULTRASOUND GUIDED ERECTOR SPINAE PLANE BLOCK FOR POSTOPERATIVE PAIN RELIEF IN PATIENTS UNDERGOING LUMBER SPINE SURGERIES

By

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ABSTRACT

Background: Pain after lumbar spine surgery is often difficult to control in the post-operative period. The ultrasound-guided erector spinae plane block (ESP) is relatively safe, simple, and there have been no a lot of controlled studies to evaluating its Efficacy.

Objective: To compare the effect of Bupivacaine alone versus Bupivacaine plus Fentanyl, and Bupivacaine plus Dexamethasone in ultrasound-guided erector spinae plane block in lumbar spine surgeries.

Patients and Methods: Ninety patients of both sexes admitted for lumbar surgery. They were randomly allocated into three equal groups: Group A: Control group received bilateral ultrasound-guided erector spinae plane block (bupivacaine alone), group B received bilateral ultrasound-guided ESPB (Bupivacaine + fentanyl) and group C received bilateral ultrasound-guided ESPB (Bupivacaine + Dexamethasone), The following parameters were assessed in the three groups: Heart rate (HR), mean arterial blood pressure (MAP), oxygen saturation (SpO2), end-tidal CO2, total narcotic need in first 24 hours, visual analog score (VAS), total amount of opioid in first 24 hours, postoperative nausea and vomiting, and duration of pain relief postoperatively. This study was done at Al-Azhar University Hospitals after approval of the medical ethical committee, from August 2020 till January 2021.

Results: This study showed that the addition of dexamethasone to bupivacaine prolonged the time of block and analgesia duration longer than fentanyl. Also, the addition of fentanyl to bupivacaine prolonged the time of block and analgesia duration longer than bupivacaine alone.

Conclusion: Bilateral ultrasound-guided erector spinae plane block in lumbar spine surgeries is one of the most advantageous adjuvant blocks for improving post-operative pain, and a decrease in opioid side effects. The addition of additive to bupivacaine-like fentanyl, and dexamethasone enhanced the duration of post-operative analgesia till the analgesia request and leads to reduction in pain score in 1st 24 hours post-operative.

Keywords: Erector Spinae, Postoperative pain relief after Lumbar Surgery, fentanyl, Bupivacaine, Dexamethasone.

INTRODUCTION

Lumbar surgeries refer to any type of surgery involving any lumbar spine or lower back, between one or more of the L1– S1 level—the type of surgery performed in the spine, including operations for trauma and deformity. The complexity of procedures leads to increase in comorbidities *(Attari et al., 2011).*

Major lumbar spine surgery causes severe post-operative pain, which typically persists for at least three days. Various studies have reported that maximal pain occurs in the first 4 post-operative hours and gradually declines by the third post-operative day *(Calandese and Adduci, 2019).*

Post-operative pain management is a significant problem following spinal surgery. Post- operative pain that cannot be well controlled may lead to delayed mobilization, pulmonary and thromboembolic complications, prolonged hospital stays, and chronic pain syndromes. Effective post- operative pain management can also contribute to better surgical outcomes *(Devin and McGirt, 2015).*

Opioid-based analgesia plays a significant role in the control of postsurgical pain after lumbar surgery; however, use of opioid may lead to significant side effects (e.g., nausea and vomiting) and adverse events (e.g., respiratory depression), which may be associated with significantly longer hospital stays and higher hospital costs in the postsurgical setting *(Hurley and Wu, 2010).*

Since these adverse events occur more often in patients receiving higher doses of opioids, it is important to find ways to reduce opioid use in the post-operative period after lumbar spine surgery. Bilateral Ultrasound-Guided Erector Spinae Plane Block in Lumbar Spine Surgeries is a way to improve post-operative pain control and reduce opioid use *(Ding et al., 2014).*

Erector spinae plane block (ESPB) is an interfascial plane block first described in 2016 by Forero et al. as an effective treatment method for treating thoracic neuropathic pain. Currently, the ESP block is performed as one of the pain management procedures for patients of all generations (newborns, infants, children, adolescents, and adults) undergoing abdominal and thoracic surgeries with minimal complications compared to opioid consumption *(Forero et al., 2016).*

This study aimed to compare the effect of Bupivacaine alone versus Bupivacaine plus Fentanyl, and Bupivacaine plus Dexamethasone in ultrasound-guided erector spinae plane block in lumbar spine surgeries. The primary outcome was evaluation of pain scores, and the total narcotic consumption during the first 24 hours after surgery. Secondary outcomes included number of rescue analgesic use, post-operative nausea and vomiting (PONV), and duration of post-operative pain relief.

PATIENTS AND METHODS

This study was a prospective, double-blinded, and controlled randomization study conducted in the Al-Hussein University Hospital, following approval from the Ethics Committee of the hospital.

Ninety patients at the Department of Anesthesiology and Intensive Care after

approval of the medical ethical committee at Al-Azhar University Hospitals were scheduled according to the American Society of Anesthesiologist (ASA) physical status I, II of either sex, age (21-60) years for lumbar spine surgery under general anesthesia were enrolled in this prospective controlled double- blinded randomized study.

Information about the study was given comprehensively both orally and in written consent form was obtained from every patient.

Inclusion criteria: Adult patients of both sexes with American Society of Anesthesiologists (ASA) physical status I or II aged 21-60 years with BMI less than or equal to 30, The patients have no renal, lung, heart, or liver disorders found on clinical and biochemical tests.

Exclusion criteria: Pregnant females, uncooperative patients with communication difficulties, which might prevent a reliable post-operative assessment, contraindication to regional anesthesia (bleeding disorder, use of any anticoagulants, local infection), known allergy to local anesthetics.

Duration of Study was from August 2020 to January 2021. Patients were randomly divided into three equal groups:

Group (A): Control group received ultrasound guided erector spinae plane (ESP) block with 18 ml of bupivacaine 0.25% and 2ml saline 0.9% per side.

Group (B): Fentanyl group received ultrasound guided ESP block with 18 ml of bupivacaine 0.25% and 50µg fentanyl diluted with saline to reach total volume 20ml per side.

Group (C): Dexamethasone group received ultrasound guided ESP block with 18 ml of bupivacaine 0.25% and 4 mg dexamethasone diluted with saline to reach total volume 20ml per side.

All patients were screened for suitability by history, including assessing cardiorespiratory status, a physical examination for heart and chest. Investigation included CBC, coagulation profile, liver function, kidney function, ECG or specific investigations, monitoring (standard monitoring) by pulse oximetry, blood pressure monitoring, 15min. Interval and capnogram.

Preoxygenation with 100% oxygen was done for 3 min. General anesthesia was induced in these groups by propofol (1mg/kg), fentanyl (2mcg/kg) and atracurium (0.6mg/kg) endotracheal intubation performed after full relaxation. Anesthesia was maintained with isoflurane (1.15%-1.2%) in 100% oxygen and incremental doses of atracurium (0.1-0.2mg/kg) every 20 minutes to achieve muscle relaxation. Minute ventilation was adjusted to maintain normocapnia (end-tidal carbon dioxide; et CO2, between 34 and 38 mm Hg).

Following induction of general anesthesia, the patient was placed in the prone position. After 20 minutes from repositioning for prone position and stabilization of heamodynamics, and sterilization of the skin of the back, ESPB was performed under ultrasonographic guidance using a linear probe (6-13 MH) of ultrasound (Mindray Z5). L4 vertebral level was identified opposite to the supracristal plane (through the highest points of the iliac crest) and the linear ultrasound transducer was placed in a

longitudinal parasagittal orientation (in plane technique) 3 cm lateral to the L4 spinous process, then it was moved cranially to reach L2 spinous process. The erector spinae muscles were identified superficial to the tip of the L2 transverse process and a needle was inserted at the caudal end of the transducer. The needle was advanced through the interfascial plane between the erector spinae and the underlying the tip of transverse process. Thereafter, the local anesthetic was administered into the space. The bilateral ESP blocks was performed by injected on each side : 18 mL of 0.25% bupivacaine and 2ml saline 0.9% in group (A), 18 mL of 0.25% bupivacaine and 50µg fentanyl diluted with saline to reach total volume 20ml in group (B), and 18 ml of bupivacaine 0.25% and 4 mg dexamethasone diluted with saline to reach total volume 20ml in group (C) into the fascial plane between the deep surface of the erector spinae muscle and the transverse processes of the lumbar vertebrae for pain management after lumbar spine surgery.

At the end of the surgery, anesthesia discontinued, and residual neuromuscular blockade was antagonized with neostigmine (0.08 mg/kg) and atropine (0.02 mg/kg), followed by extubation. When the patients became fully awake, patients were transferred to the post anesthesia care unit (PACU). All patients in the study were subjected to paracetamol 1000 mg infusion intravenously every 8 hours. Patients were allowed to receive incremental doses of morphine (0.05 mg/kg) intravenously if VAS was ≥4.

Statistical analysis: Recorded data were analyzed using the statistical package for the social sciences version. 20.0 (SPSS Inc., Chicago, Illinois, USA). ANOVA test was used for comparison among different times in the same group in quantitative data. Quantitative data were expressed as mean± standard deviation (SD) and range. Qualitative data were expressed as frequency and percentage the confidence interval was set to 95% and the margin of error accepted was set to 5%. P-value <0.05 was considered significant. P value was calculated by ANOV of followed by Post-hoc test, orbg Krusaall- Wallis test.

RESULTS

There was no statistically significant difference found between the three studied groups regarding age and sex with p-value =0.111 and 0.162, respectively. Also, the table shows that there was no statistically significant difference found between the three studied groups regarding weight with p-value =0.126. Finally, no statistically significant difference was found between the three studied groups regarding ASA classification **(Table 1)**.

Table (1): Comparison between the three groups regarding age, sex, ASA and body weight variations

Groups / Demographic data	Group A (N=30)	Group B (N=30)	Group C (N=30)	P-value
Age (years)	37.93±8.17	35.03±10.86	40.17±8.93	0.111
Sex				
Female	7(23.3%)	14(46.7%)	10(33.3%)	
Male	23(76.7%)	16(53.3%)	20(66.7%)	0.162
Weight (kg)	77±8.46	80.63±7.69	80.6±7.37	0.126
ASA				
I	21(70%)	23(76.7%)	17(56.7%)	
II	9(30%)	7(23.3%)	13(43.3%)	0.241

There was no statistically significant difference found between the three studied groups regarding heart rate at baseline, 30 min, 60 min, 90 min and 120 min with p-value = 0.516, 0.608, 0.990, 0.587 and 0.919 respectively. Also shows that there was no statistically significant difference found between the three studied groups regarding heart rate post-operatively **(Table 2)**.

Table (2): Comparison between the three groups regarding heart rate at baseline, intra-operative and post-operative.

Groups / Heart rate (beat/min.)	Group A (N=30)		Group B (N=30)		Group C (N=30)		P-value
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Base line	86.73	9.15	84.57	9.74	87.37	10.61	0.516
Intra-operatively							
30 min	79.13	14.34	80.33	4.80	81.57	6.12	0.608
60 min	81.20	5.68	81.00	5.11	81.07	5.95	0.990
90 min	77.37	7.80	79.30	6.65	78.83	8.12	0.587
120 min	70.10	6.12	70.73	5.65	70.33	6.31	0.919
Post-operatively							
1hr	74.93	9.79	75.97	9.67	74.13	8.55	0.749
4hr	80.67	6.83	80.47	6.13	80.73	6.65	0.987
8hr	82.20	4.60	82.03	4.48	83.03	4.57	0.661
12hr	85.03	5.52	86.33	5.76	85.50	6.53	0.694
16hr	91.50	6.05	89.60	6.61	89.17	5.83	0.302
20hr	89.67	6.10	87.43	4.80	88.37	4.92	0.267
24hr	91.57	4.86	89.13	3.97	90.37	3.85	0.092
28hr	92.87	4.92	93.03	4.81	92.30	5.03	0.833

There was no statistically significant difference found between the three studied groups regarding MABP (mmHg) at baseline, 30 min,60 min,90 min and 120 min with p-value =0.475, 0.210, 0.092, 0.959 and 0.203 respectively. Also, there was no statistically significant difference found between the three studied groups regarding mean arterial blood pressure post- operatively **(Table 3)**.

Table (3): Comparison between the three groups regarding MABP at baseline, intra-operative and post-operative

Groups / MABP (mmHg)	Group A (N=30)		Group B (N=30)		Group C (N=30)		P-value
	Mean	SD	Mean	SD	Mean	SD	
Base line	97.23	9.10	96.37	7.48	94.77	7.02	0.475
Intra operatively							
30min.	85.10	7.67	85.50	6.93	82.47	6.85	0.210
60min.	69.53	6.40	69.50	6.18	72.57	5.86	0.092
90min.	63.60	3.79	63.40	3.05	63.33	4.16	0.959
120min.	59.50	1.11	59.27	1.11	60.53	4.77	0.203
Post-operatively							
1hr.	79.87	8.41	77.00	6.28	80.97	7.25	0.104
4hrs.	89.00	5.90	92.50	6.69	89.43	6.37	0.071
8hrs.	86.33	9.20	85.30	6.73	89.50	6.63	0.090
12hrs.	86.70	4.24	87.20	7.10	88.13	4.46	0.585
16hrs.	90.93	5.24	90.43	6.46	92.73	5.86	0.285
20hrs.	91.07	5.32	90.20	6.29	91.80	5.90	0.572
24hrs.	91.13	5.14	90.10	6.33	92.40	6.27	0.328
28hrs.	96.37	4.56	96.67	4.37	96.90	4.50	0.899

There were statistically significant differences found between the three studied groups regarding vas score at 12^{th}, 16^{th}, 20^{th} and 20^{th} hours post-operative with p-value = < 0.001, < 0.001, < 0.001, < 0.001, < 0.01 while at 1^{st}, 4^{th}, 8^{th}, 28^{th} hours post-operative there was no statistically significant difference found between the three studied groups with p-value <0.001 **(Table 4)**.

Table (4): Comparison between the three groups regarding vas score post-operative.

Groups / VAS	Group A (N=30)		Group B (N=30)		Group C (N=30)		P-value			
	Mean	SD	Mean	SD	Mean	SD		A&F	A&D	F&D
1hr.	1.47	1.04	1.67	1.12	1.80	1.03	0.479			
4hrs.	2.40	0.89	2.40	1.04	2.37	1.10	0.989			
8hrs.	3.10	0.80	3.13	0.63	3.10	0.66	0.978			
12hrs.	4.03	0.85	3.53	0.73	3.17	0.83	<0.001	0.048	<0.001**	0.189
16hrs.	5.13	0.86	3.93	0.78	3.07	0.69	<0.001	<0.001**	<0.001**	<0.001**
20hrs.	5.00	0.83	5.00	0.87	3.93	0.87	<0.001	1.000	<0.001**	<0.001**
24hrs.	4.90	0.84	5.20	0.85	4.07	0.83	<0.001	0.354	<0.001**	<0.001**
28hrs.	5.13	0.68	5.03	0.85	5.00	0.79	0.787			

There were statistically significant differences found between the three studied groups regarding number of patient need narcotic post-operative at 12th hour post-operative with p-value <0.05, Also high statistically significant difference between the three groups as regard Total narcotic need at 16th and 20th hour with p-value <0.001 **(Table 5)**.

Table (5): Comparison between the three groups regarding number of patient need narcotic in the first 24 hrs post-operative

Groups / Total narcotic need	Group A (N=30)		Group B (N=30)		Group C (N=30)		P-value
	N	%	N	%	N	%	
1hr.	0	0.0	0	0.0	0	0.0	1.000
4hrs.	0	0.0	0	0.0	0	0.0	1.000
8hrs.	0	0.0	0	0.0	0	0.0	1.000
12hrs.	5	16.7	0	0.0	0	0.0	0.005
16hrs.	10	33.3	0	0.0	0	0.0	<0.001
20hrs.	14	46.7	10	33.3	0	0.0	<0.001
24hrs.	15	50.0	15	50.0	15	50.0	1.000

There was high statistically significant difference found between the three studied groups regarding the Total amount of narcotic use in the first 24 hrs in mg with P-value <0.001 **(Table 6)**.

Table (6): Comparison between the three regarding Total amount of narcotic use in first 24 hrs in mg

Total amount of narcotic in 24h (mg) / Groups	Range			Mean	±	SD	P-value
Group A	2	-	5	4.20	±	0.89	<0.001
Group B	2	-	4	3.20	±	0.85	
Group C	0	-	2	0.40	±	0.72	

Tukey's test		
Group A & Group B	Group A & Group C	Group B & Group C
<0.001	<0.001	<0.00

There were statistically significant differences between the three groups as regard Duration of post-operative pain relief with p-value <0.001 **(Table 7)**.

Table (7): Comparison between the three groups as regard Duration of post-operative pain relief

Duration of post.op. pain relief (hrs) / Groups	Range	Mean ± SD	F	P-value
Group A	10-14	12.23 ± 1.48	357.969	<0.001
Group B	15 - 19	17.00 ± 1.23		
Group C	20 - 26	22.87 ± 1.85		
Tukey's test				
Group A & Group B	Group A & Group C	Group B & Group C		
<0.001	<0.001	<0.001		

There was no statistically significant difference between three groups as regard the nausea and vomiting with p-value >0.05 **(Table 8)**.

Table (8): Comparison between the three groups as regard nausea and vomiting.

Groups / Nausea and vomiting	Group A (N=30)		Group B (N=30)		Group C (N=30)		P-value
	N	%	N	%	N	%	
1hr.	8	26.7	10	33.3	8	26.7	0.805
4hrs.	6	20.0	8	26.7	6	20.0	0.773
8hrs.	5	16.7	5	16.7	4	13.3	0.919
12hrs.	0	0.0	0	0.0	0	0.0	1.000
16hrs.	0	0.0	0	0.0	0	0.0	1.000
20hrs.	0	0.0	0	0.0	0	0.0	1.000
24hrs.	0	0.0	0	0.0	0	0.0	1.000
28hrs.	0	0.0	0	0.0	0	0.0	1.000

DISCUSSION

In this study, statistical analysis of the patients' demographic data did not show any significant differences between the three groups, as regards age, sex, ASA and weight. The present study also show intraoperative statistically insignificant in SPo2, ETCO2, intraoperative and post-operative heart rate, MAPB.

These results agreed with a study done by *Altiparmak et al. (2019)* who studied efficacy of ultrasound-guided erector spinae plane block for analgesia after laparoscopic cholecystectomy and found that variations in heart rates over time were significantly different in the two groups. Also, he found the patients' MAP values differed significantly at different time points.

In the current study, there was a reduction in post-operative pain incidence and severity, which was demonstrated by comparing the visual analog scale (VAS) measurements among the three groups. VAS measurements in group B and C were lower than in group A at 12^{th} and

16th hour. Also, VAS measurements in group B were lower than in group C and A at 20th and 24th hour. The VAS measurements also showed non-statistically significant difference between three groups at the 1st, 4th, 8th, 28th hours. Group A patients had the highest pain scores, and were the first to ask for rescue analgesia, and consumed the highest amount of analgesia. Therefore, they had the highest total analgesic consumption in the first 24 hours postoperatively in comparison to patients of the other B and C groups. On the contrary, the group C patients had the lowest pain scores, were the last to call for intravenous analgesia, and consumed the lowest total systemic analgesia dose.

This current study showed that non-significant reported post-operative nausea and vomiting. The current study agreed with the results of *Ueshima et al. (2019)* who showed no significant difference in the incidence of complications between the two groups, and that erector spinae plane (ESP) block provides effective post-operative analgesic effect for 24 hours in patients undergoing lumbar spinal surgery.

The current study also agreed with the results of *Singh et al. (2020)* found that patient satisfaction was assessed 24 hours after surgery, and post-operative morphine consumption was significantly lower in patients in the ESP group compared with those in the control group. Pain scores were lower in the ESP block group compared with the control group. Patient satisfaction scores were more favorable in the block group. They conclude that US-guided ESP block reduces post-operative opioid requirement and improves patient satisfaction compared with standard analgesia in lumbar spine surgery patients.

The present results agreed with a study done by *Aksu et al. (2019)* who studied the effect of erector spinae plane block on postoperative pain following laparoscopic cholecystectomy and showed post-operative morphine consumption which was significantly lower in patients in the ESP group compared with those in the control group. All patients in the control group required supplemental morphine compared with the ESP block group. Pain scores were lower in the ESP block group than the control.

The present results agreed with a study done by *Karaca and Pınar (2020)* who studied the efficacy of ultrasound-guided erector spinae plane block for postoperative analgesia in laparoscopic cholecystectomy: The control group (Group A) who received only intravenous (IV) patient-controlled analgesia (PCA) and the ESPB Group (Group B) who received bilateral ESPB (bupivacaine 0.25, 50 mL) IV PCA showing that numeric rating scores in Group B were lower in the post anesthesia care unit (PACU) at 1st, 2nd, 4th, 6th hours, and 8th hour. The fentanyl consumption during post-operative period was lower in Group B. PACU, and hospital stay was shorter in Group B. Need for rescue analgesia was lower in Group B. Intraoperative fentanyl requirement was lower in Group B. Unassisted walking time was shorter in Group B and No block related complications were encountered.

Swain et al. (2017) studied that adjuvants or additives are often used with local anesthetics for its synergistic effect by prolonging the duration of sensory-

motor block, limiting the cumulative dose requirement of local anesthetics and prolongation of duration of analgesia. The addition of additive to bupivacaine like fentanyl and dexamethasone enhanced the duration of post-operative analgesia till the analgesia request and leads to reduction in pain score in 1st 24hours post-operative.

CONCLUSION

Ultrasound-guided erector spinae plane block reduced post-operative Narcotic consumption and pain scores in the first 24h after lumbar spine surgeries. The addition of dexamethasone to bupivacaine prolonge the time of block and analgesia duration longer than fentanyl and bupivacaine alone and the addition of fentanyl to bupivacaine prolonged the time of block and analgesia duration longer than bupivacaine alone.

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دراسة مقارنة بين بوبيفاكين وحده مقابل بوبيفاكين مع فنتانيل و بوبيفاكين مع الديكساميثازون في إغلاق مستوي العضلة الناصبة للعمود الفقرى باستخدام الموجات فوق الصوتية في تسكين الآلام ما بعد جراحات الفقرات القطنية

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خلفيــة البحــث: تعتبـر جراحـات الفقـرات القطنيـه مـن الجراحـات الشـائعه جـدا .وتكـون عـادة مصـحوبة بزيـادة حـدوث الألام الحـاده بعـد الجراحـه التـي تبطـئ مـن حركـة المريض مما يزيد نسبة حدوث الكثير من المضاعفات.

الهــدف مــن البحــث: مقارنــة بــين بوبيفــاكين وحــده مقابــل بوبيفــاكين مــع فنتانيــل و بوبيفــاكين مــع الديكســاميثازون فــي إغــلاق مســتوي العضــلة الناصــبة للعمــود الفقــرى باســتخدام الموجــات فــوق الصــوتية فــي تســكين الآلام مــا بعــد جراحــات الفقــرات القطنية.

المرضــي وطــرق البحــث: اجريــت هــذه الدراســه علــي 90 مــريض تتــراوح اعمــارهم مــابين 21 الــي 60 ســنه فــي مستشــفيات جامعــة الازهــرخلال الفتــرة مــن أغســطس 2020 حتــي ينــاير2021 بعــد موافقــة اللجنــة الأخلاقيــة الطبيــة فــي مستشــفيات جامعــة الأزهــر وقســم التخــدير, وبعــد إعطــاء المرضــى موافقــات كتابيــة وقــد تــم تقســيم المرضــي عشــوائيا الــي ثلاثــة مجموعــات متســاوية. المجموعــه الاولــي: إغــلاق مســتوي العضــلة الناصــبة للعمــود الفقــرى عــن طريــق حقــن بوبيفــاكين وحــده بعــد إجــراء التخــدير الكلــي، والمجموعــه الثانيــة : إغــلاق مســتوي العضــلة الناصــبة للعمــود الفقــرى عــن طريــق حقــن بوبيفــاكين مــع فنتانيــل بعــد إجــراء التخــديرالكلي، والمجموعــه الثالثــة : إغــلاق مســتوي العضــلة الناصــبة للعمــود الفقــرى عــن طريــق حقــن بوبيفــاكين مع الديكساميثازون بعد إجراء التخديرالكلي.

نتـــائج البحـــث: قـــدم الإحصـــار لعضـــلات ناصـــبة الفقـــار تســـكينًا مطـــولًا بعـــد العمليـــة الجراحيـــة وخفـــض متطلبـــات المســـكن بعـــد العمليـــة. كمـــا وجـــدنا أن إضـــافة ديكســـاميثازون يطيـــل مـــن مـــدة تخـــدير ومـــدة التســـكين بعـــد العمليـــة أكثـــر مـــن الفنتانيـــل أوالبوبيفـــاكين وحـــده وإضـــافة الفنتانيـــل يطيـــل مـــن مـــدة تخـــدير ومـــدة التســـكين بعـــد العمليـــة أكثر من البوبيفاكين وحده.

الإســـتنتاج: إحصـــار العضـــلات ناصـــبة الفقـــار بالموجـــات الفـــوق صـــوتية فـــي عمليـــات الفقـــرات القطنيـــة طريقـــه آمنـــه وفعالـــه لتســـكين الألـــم بعـــد العمليـــة الجراحيـــة والإســـتهلاك الكلـــى للمســـكن. وإضـــافة ديكســـاميثازون يطيـــل مـــن مـــدة تخـــدير ومـــدة التســـكين بعـــد العمليـــة أكثـــر مـــن الفنتانيـــل والبوبيفـــاكين وحـــده، وإضـــافه الفنتانيـــل يطيـــل مـــن مـــدة تخـــدير ومدة التسكين بعد العملية أكثر من البوبيفاكين وحده.

الكلمـــات الدالـــة: العضـــلة الناصـــبة للعمـــود الفقـــرى، تســـكين الآلام مـــا بعـــد جراحـــات الفقرات القطنية، بوبيفاكين، فنتانيل، الديكساميثازون.