

Comparison of Intravenous Dexamethasone Adjunctive to Bupivacaine with Perineural Dexamethasone Adjunctive to Bupivacaine in Ultra Sound Guided Interscalene Brachial Plexus Block

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IV
Dexamethasone
with Perineural
Dexamethasone
Adjunctive to
Bupivacaine

ABSTRACT

Objective: To compare intravenous dexamethasone with perineural dexamethasone as adjunctive in bupivacaine in ultrasound guided interscalene block.

Study Design: Randomized control trial study.

Place and Duration of Study: This study was conducted at the Operation theatres of Sahara Medical College from 01-08-2019 to 01-06-2020.

Materials and Methods: In randomized control trial 135 patients divided in Group X,Y,Z and received bupivacaine, intravenous Dexamethasone 0.25 mg/kg, perineural dexamethasone 0.15mg/kg as adjunctive in interscalene block.

Results: Mean onset of sensory block in minutes was 9.17+1.34, 9.48+1.42 and 8.3+1.01 consecutively in groups X, Y and Z. Time to onset of sensory block was lowest in group Z and highest in group X with significant level of 0.001. Onset of motor block in minutes 10.4+1.03, 10.28+1.19, 9.31+0.96 consecutively in groups X, Y and Z. Time of onset of motor block was significantly low in group Z and highest in group X with significance level of 0.001. Mean time of analgesia in minutes was 820.08+64.01, 901.96+48.01, 972+27.8 consecutively in groups X, Y and Z. Time of analgesia was highest in group Z and was lowest in group X with significance level of 0.001.

Conclusion: Higher doses of I/V dexamethasone can prolong analgesia and shorten onset of motor and sensory block when compared with bupivacaine alone but not superior to perineural dexamethasone in conjunction with bupivacaine in interscalene block.

Key Words: Dexmethasone intravenous, Bupivacaine, interscalene block

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INTRODUCTION

In recent decades practice of general anesthesia for upper extremity surgery had been shifted to peripheral nerve blocks. Regional anesthesia is better in many aspects from general anesthesia like lesser PONV, shivering, sore throat, cough, DVT, Bleeding and better analgesia, cognitive recovery.¹ Interestingly peripheral nerve blocks are not absolute risk free, they can be complicated like nerve injuries, local anesthesia

toxicity, patient discomfort, total spinal, horner syndrome, pneumothorax etc.²

Interscalene block is preferably used for shoulder and upper 2/3 of arm for number of procedures varying from fracture, tendon repair, debridements to dislocations.³ perineural dexamethasone significantly prolongs postoperative analgesia in brachial plexus block.^{4,5}

When Chong MA compared intravenous dexamethasone with perineural dexamethasone in brachial plexuses block he advocated significant prolongation in perineural dexamethasone group ^{6,7,8}. On the other hand Rony M advocated that both intravenous and perineural dexamethasone as adjunctive to bupivacaine equally prolonged the analgesia.⁹ David H and others admits the fact that perineural dexamethasone has pronged analgesia but at the same time they points the under dose of intravenous dexamethasone and suggested further studies especially with higher doses.¹⁰

For further clarification in the Data and still no clear outcome we suggested a higher dose of intravenous

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dexamethasone (0.25mg/kg) and compared with perineural dexamethasone(0.15mg/Kg)

MATERIALS AND METHODS

This double blind randomized control trial study was conducted at the Operation theatres of Sahara Medical College from 01-08-2019 to 01-06-2020.

Sample size and technique: total number of 135 patients included in the study and randomly divided into three groups, Group X (45 patients) received only bupivacaine 2mg/kg, Group Y (45 patients) received intravenous Dexamethasone 0.25 mg/kg as adjunctive, Group Z (45 patients) received perineural dexamethasone 0.15mg/kg as adjunctive in interscalene block.

Primary outcome: duration of analgesia, time in minutes from start of the surgery till the demand of rescue analgesia by the patient verified by VAS >5

Secondary outcome:

Onset of sensorial block, time in minutes from performance of block to no feel of pinprick

Onset of motor block, time in minutes from performance of block to no movement of forearm.

Side effects

Blood pressure measured by NIBP monitor and considered raised when >140/90 mmHg or increase of 25 from base line

BSF measured with gluco meter and considered raised >110

Inclusion criteria

- Age between 20-60 years
- Both sex
- ASA 1,2
- Elective procedures of shoulder and upper 2/3 of arm

Exclusion criteria

- Patient refusal
- Bleeding disorder
- Preexisting neurological deficit of surgical limb
- Infection of injection site
- Carotid artery aneurysm

Data collection procedure: After ethical committee permission and informed consent from patients 135 patients included in the study randomly divided into 3 groups by slips in box, Group X (45 patients) received only bupivacaine 2mg/kg, Group Y (45 patients) received intravenous Dexamethasone 0.25 mg/kg as adjunctive, Group Z (45 patients) received perineural dexamethasone 0.15mg/kg as adjunctive in interscalene block. Ultrasound Interscalene blocks performed by experienced anesthetists who were blind to the group of patients under strict antiseptic measures. Monitoring according to standard 1, standard 2 continued. Time to onset of sensory block, motor block and total duration of analgesia recorded in performa. BSR monitored once at 30 minutes after the block performed and entered in

performa. Three consecutive reading of increased Blood pressure with interval of 3 minutes considered was raised.

Data analysis procedure: Data collected in Performa was entered into SPSS Version 16. Descriptive statistics calculated for quantitative data like age, onset of sensory and motor block, time of analgesia presented as mean and standard deviation. Frequency of gender distribution was elaborated in all groups. ANNOVA test was done to determine significance between different variables

RESULTS

Total 135 patients randomly and equally divided into three groups X, Y and Z, 45 patients in each group. Gender distribution of females was 18, 12, 15 and of males was 27, 33, 30, in X, Y, Z groups consecutively. Mean age was 40.2+ 10.63, 39.22+8.90 and 40.73+9.93 years in groups X,Y and Z consecutively. Mean onset of sensory block in minutes was 9.17+1.34, 9.48+1.42 and 8.3+1.01 consecutively in groups X, Y and Z. Time to onset of sensory block was lowest in group Z and highest in group X with significant level of 0.001. Onset of motor block in minutes 10.4+1.03, 10.28+1.19, 9.31+0.96 consecutively in groups X, Y and Z. Time of onset of motor block was significantly low in group Z and highest in group X with significance level of 0.001. Mean time of analgesia in minutes was 820.08+64.01, 901.96+48.01, 972+27.8 consecutively in groups X, Y and Z. Time of analgesia was highest in group Z and was lowest in group X with significance level of 0.001. Increase in blood pressure was noticed significantly higher in group Y when compared with group X, Y with significance level of 0.001. Mean blood sugar fasting was 89.09+6.57, 94.6+7.73, 88.8+5.72 mg/dl was significantly higher in group Y when compared with group X and Z with significance level of 0.001.

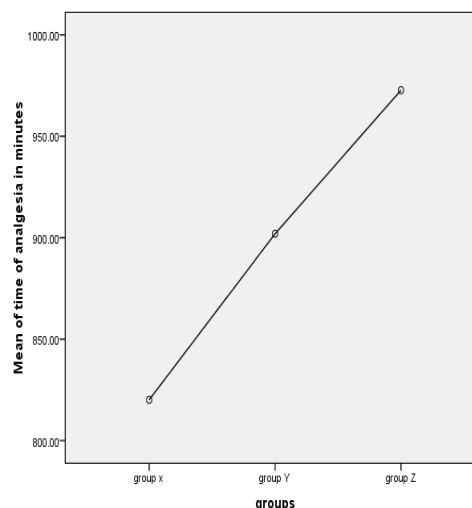


Figure No.1: Comparison

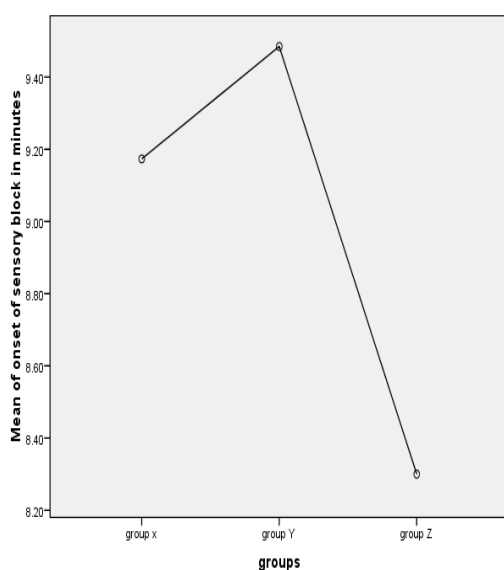


Figure No.2: Comparison

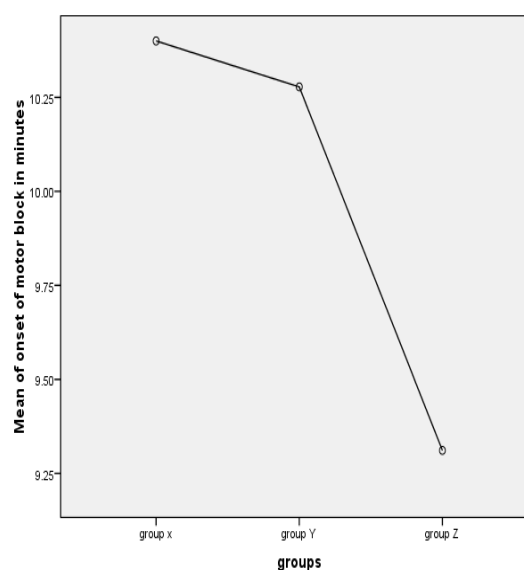


Figure No.3: Comparison

Table No.1: Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
onset of sensory block in minutes	group x	45	9.1733	1.33866	.19956	8.7712	9.5755	7.00	13.00
	group Y	45	9.4844	1.42270	.21208	9.0570	9.9119	7.00	14.00
	group Z	45	8.3000	1.00792	.15025	7.9972	8.6028	7.00	10.50
	Total	135	8.9859	1.35642	.11674	8.7550	9.2168	7.00	14.00
onset of motor block in minutes	group x	45	10.4000	1.02580	.15292	10.0918	10.7082	9.00	13.00
	group Y	45	10.2778	1.18971	.17735	9.9204	10.6352	8.00	13.00
	group Z	45	9.3111	.95518	.14239	9.0241	9.5981	7.00	11.00
	Total	135	9.9963	1.16141	.09996	9.7986	10.1940	7.00	13.00
time of analgesia in minutes	group x	45	8.2009E2	64.00313	9.54102	800.8602	839.3176	703.00	944.00
	group Y	45	9.0196E2	48.01418	7.15753	887.5305	916.3806	810.00	981.00
	group Z	45	9.7276E2	27.80546	4.14499	964.4019	981.1092	930.00	1035.00
	Total	135	8.9827E2	79.22311	6.81844	884.7810	911.7524	703.00	1035.00
increase in blood pressure	group x	45	2.0222	.14907	.02222	1.9774	2.0670	2.00	3.00
	group Y	45	2.0667	.25226	.03761	1.9909	2.1425	2.00	3.00
	group Z	45	2.0222	.14907	.02222	1.9774	2.0670	2.00	3.00
	Total	135	2.0370	.18956	.01631	2.0048	2.0693	2.00	3.00
blood sugar fasting	group x	45	89.0889	6.57413	.98001	87.1138	91.0640	74.00	103.00
	group Y	45	94.6000	7.73540	1.15312	92.2760	96.9240	79.00	122.00
	group Z	45	88.8000	5.72713	.85375	87.0794	90.5206	77.00	101.00
	Total	135	90.8296	7.19612	.61934	89.6047	92.0546	74.00	122.00

Table No.2: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
onset of sensory block in minutes	Between Groups	33.936	2	16.968	10.535	.000
	Within Groups	212.607	132	1.611		
	Total	246.543	134			
onset of motor block in minutes	Between Groups	32.026	2	16.013	14.212	.000
	Within Groups	148.722	132	1.127		
	Total	180.748	134			
time of analgesia in minutes	Between Groups	525328.533	2	262664.267	109.826	.000
	Within Groups	315695.867	132	2391.635		
	Total	841024.400	134			
increase in blood pressure	Between Groups	.059	2	.030	.822	.442
	Within Groups	4.756	132	.036		
	Total	4.815	134			
blood sugar fasting	Between Groups	961.437	2	480.719	10.615	.000
	Within Groups	5977.644	132	45.285		
	Total	6939.081	134			

DISCUSSION

In our study we observed that dexamethasone intravenous in conjunction to bupivacaine can increase duration of analgesia and shortens the time of onset of sensory block and motor block when compared with bupivacaine alone but at the same time there are increased chances of raised blood pressure and blood sugar in interscelene block. When we compared perineural dexamethasone in conjunction to bupivacaine with I/V dexamethasone in conjunction to bupivacaine there was significant prolongation of analgesia and less time to achieve sensory and motor block in interscelene block and significantly less side effects.

Rony M, advocated that both intravenous and perineural dexamethasone as adjunctive to bupivacaine equally prolonged the analgesia. in his study mean of analgesia time in minutes for perineural dexamethasone was 817.2 ± 88.011 in comparison to intravenous dexamethasone 858.00 ± 86.168 , ($P = 0.104$). He also concluded that onset of sensory block and motor block

was earlier in perineural dexamethasone group with $P = 0.001$, $P = 0.02$ consecutively. He did not observed any significant side effects.⁹ His sample size was of 50 patients which could be insufficient and inconclusive and required more studies to reveal the fact.

Abdallah FW, took 50 patients and concluded that intravenous dexamethasone is equipotent to perineural dexamethasone when given as conjunctive to long acting local anesthesia ($P < 0.001$)¹¹

Eric D Bolin, Sylvia Wilson also added confusion to literature by article in favour of both intravenous and perineural dexamethasone as conjunctive to local anesthesia for regional blocks.¹²

Desmet M et al. also concluded that I/V and perineural dexamethasone as conjunctive to ropivacaine equally increases analgesia time when compared to ropivacaine alone. $p < 0.0001$, he used comparatively higher doses of dexamethasone 10 mg I/V as compare to earlier authors and reported that 10mg of dexamethasone was safe dose for single use.

Heesen M, et al in ten randomized controlled double blind trials with confidence level of 95% he analyzed that perineural dexamethasone is superior in analgesia when compared with intravenous dexamethasone for peripheral nerve blocks as conjunctive to local anesthetics.¹⁴

Matthew A conducted a meta-analysis to establish the fact whether perineural or I/V dexamethasone as adjunctive to local anesthesia prolong the duration of analgesia, they included 11 clinical trial in the meta analysis and reported that perineural dexamethasone increases the duration of analgesia by 3.37 hours when compared to I/V dexamethasone as adjuvant to local anesthesia.⁸

David H in a review article compared several meta-analysis to establish superiority of either intravenous dexamethasone or perineural dexamethasone in brachial plexuses block he advocated significant prolongation in perineural dexamethasone group, but at the same time they points the under dose of intravenous dexamethasone and suggested further studies especially with higher doses.¹⁰

We observed controversy in literature which made us to think for a new study with different interventions, as in all studies maximum dose of dexamethasone was used 10 mg, we used a higher dose to clear the objection of lower dose of dexamethasone, and we used 0.25mg/kg dexamethasone which was safe in single shot dose.¹⁵ In these higher doses no life threatening side effects observed and we observed prolongation of analgesia when compared to bupivacaine alone but there were mild to moderate increase in blood sugar and blood pressure, settled without any medical interventions.

In our study we were limited to use dexamethasone 0.25mg/kg due to maximum one shot safe range of dose was 0.30 mg/kg¹⁵, no doubt higher doses of I/V dexamethasone increased the duration of analgesia and

further increase of dose may be prolonged duration of analgesia further but chance of side effects could be higher especially in diabetics and hypertensive patients. Although mechanism of dexamethasone as adjuvant to local anesthesia is unclear but we observed that its mechanism has more local effects than the systemic effects.¹⁶

CONCLUSION

In conclusion Higher doses of I/V dexamethasone can prolong analgesia and shorten onset of motor and sensory block when compared with bupivacaine alone but not superior to perineural dexamethasone in conjunction with bupivacaine in interscalene block.

Recommendation: We suggest the use of perineural dexamethasone as adjunctive to local anesthesia in peripheral nerve blocks as intravenous dexamethasone as adjuvant has no additional benefits.

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Author's Contribution:

Concept & Design of Study: Asif Nadeem

Drafting:

Muhammad Muazzam Butt

Data Analysis:

Muhammad Muazzam Butt

Revisiting Critically:

Asif Nadeem, Muhammad

Muazzam Butt

Final Approval of version: Asif Nadeem

Conflict of Interest: The study has no conflict of interest to declare by any author.

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