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Original Research Article

0.5% levobupivacaine and 0.5% levobupivacaine with dexamethasone 8mg combination under USG guided brachial plexus block by supraclavicular approach: Hemodynamic changes

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Abstract

Ultrasound guidance in anaesthesia is becoming an important tool in Anaesthesiologists. Sonography helps in addressing a variety of consequences such as patient safety, economic burden, duration of the procedure and success rates associated with invasive anaesthesia procedures. Consent from 50 patients were obtained in their own understandable language. After thorough pre-anaesthetic evaluation and overnight fasting, patients shifted to operation theatre and following monitors are connected. (Pulse oximeter, electrocardiogram, capnograph and non-invasive Blood pressure) Patients were randomly allocated into 2 groups (Group D and Group S) as per computer generated randomization table. The average diastolic blood pressure in both the groups was maintained from the baseline till 24 hours of observation. There was neither clinical nor statistical significant variation found. We did not find any clinical variations in the heart rate, SBP, DBP, MAP, RR of the patients preoperatively, intra and also postoperative period. All the recruited patients had maintained oxygen saturation >95% throughout the surgery.

Keywords: Levobupivacaine, dexamethasone, USG guided brachial plexus block

Introduction

Brachial block can be performed at multiple sites along its anatomical path. The Commonest approaches are the interscalene, supraclavicular, infraclavicular and axillary levels. This is illustrated in below image. At the level of the supraclavicular fossa, the plexus is most compactly arranged, consisting of distal trunks and origins of divisions. Hence, the supraclavicular approach of the brachial plexus has been thought to provide anaesthesia to the entire upper extremity with a rapid onset and in the most consistent manner [1, 2].
Ultrasound guidance in anaesthesia is becoming an important tool in Anaesthesiologists. Sonography helps in addressing a variety of consequences such as patient safety, economic burden, duration of the procedure and success rates associated with invasive anaesthesia procedures [3].

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Levobupivacaine is an amino-amide local anaesthetic drug belonging to the family of n-alkyl substituted pipecoloxylidide. It is the S-enantiomer of bupivacaine. It is a local anaesthetic agent, indicated for the production of local or regional anaesthesia or analgesia for surgery, for oral surgery procedures, for diagnostic and therapeutic procedures and also obstetrical procedures [4].

However increasing both volume and concentration to 20 mL levobupivacaine 0.75% is associated with a high incidence of hypotension (82%) and delayed block regression. Quality and duration of epidural block of it without excessive motor block and hemodynamic adverse events can be attained by continuous epidural infusion, which is also associated with excellent postoperative analgesia and similar recovery of sensory and motor function after equipotent doses of levobupivacaine, bupivacaine and ropivacaine [5].

Dexamethasone is a potent anti-inflammatory agent which has been investigated in the last decade for its role as an adjuvant to local anaesthetics in neuraxial as well as peripheral nerve blocks [6].

Methodology

Study design

Prospective, Randomised, Double-blinded, Controlled study

Study population

50 Patients undergoing upper limb surgeries distal to mid-humeral level.

Study period

1 year

Inclusion criteria

- Patients undergoing upper limb surgeries distal to the mid-humeral level
- Patients with ASA class 1 and class 2
- Age 18-65 years

Exclusion criteria

- Refusal by patients for the block or study.
- Patients with abnormal BT, CT or on anticoagulation therapy, severe anaemia, hypovolemia, shock, septicaemia and h/o seizures.
- Local infection at the site of puncture.
- Allergy to the study drugs.
- History of significant systemic disorders (cardiovascular, respiratory, central nervous system or renal system.

Consent from 50 patients were obtained in their own understandable language. After thorough pre-anaesthetic evaluation and overnight fasting, patients shifted to operation theatre and following monitors are connected. (Pulse oximeter, electrocardiogram, capnograph and non-invasive Blood pressure).

Patients were randomly allocated into 2 groups (Group D and Group S) as per computer generated randomization table.

Group D: Received 25 ml of inj. Levobupivacaine (0.5%) + 2ml of inj. dexamethasone (8 mg)

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Group S: Received 25 ml of inj. Levobupivacaine (0.5%) + 2ml of normal saline

Results

Table 1: Pulse Rate (per min): A Comparison between two groups of patients studied

Time	Group D(Mean ± SD)	Group S(Mean ± SD)	P Value
BPR	78.4±6.78	78.96±7.03	0.776
PR0MIN	77.76±6.04	76.92±6.32	0.77
PR1MIN	77.88±6.22	80.68±6.65	0.131
PR3MIN	77.8±5.41	79±7.09	0.504
PR5MIN	78.04±6.23	76.76±6.8	0.491
PR10MIN	78.6±6.19	77.98±6.07	0.25
PR15MIN	78.6±6.56	78.36±5.92	0.21
PR30MIN	78.28±6.05	78.6±4.84	0.15
PR60MIN	79.04±6.4	78.36±5.27	0.684
PR2HRS	85.64±6.89	84.59±6	0.18
PR4HRS	86.08±6.89	85.98±7.34	0.23
PR6HRS	84.48±6.28	84.76±6.92	0.32
PR12HRS	81.92±5.21	81.88±5.69	0.21
PR24HRS	80±5.54	79.92±5.77	0.19

The average pulse rate was maintained from the baseline till 24 hours with no much variation, either clinically or statistically.

Table 2: SBP (mm Hg): A Comparison in Two Groups of Patients Studied

Time	Group D (Mean ± SD)	Group S (Mean ± SD)	P Value
Baseline	120.48±10.91	121.04±7.13	0.56
0 min	120.4±10.6	120.9±8.1	0.187
1 min	122.08±10.76	123.8±7.23	0.51
3 min	123.84±10.31	124.56±6.67	0.77
5 min	123.32±10.01	125.84±6.18	0.28
10 min	122.16±10.68	123.12±6.7	0.7
15 min	120.08±10.38	121.64±6.01	0.51
30 min	116±10.5	116.4±10.6	0.89
60 min	116.24±10.81	118.08±7.38	0.48
2 hrs.	119.28±9.09	118.68±6.92	0.79
4 hrs.	120.48±9.49	120.6±5.65	0.95
6 hrs.	117.6±9.57	117.2±5.96	0.85
12 hrs.	118.8±9.18	120.92±5.33	0.32
24 hrs.	118.88±8.8	120.48±4.8	0.42

The average systolic blood pressure in both the groups was maintained from the baseline till 24 hours of observation. There was no statistically significant variation found.

Table 3: DBP (mm Hg): A Comparison in two groups of patients studied

Time	Group D(Mean ± SD)	Group S(Mean ± SD)	P Value
Baseline	75.8±6.07	76.32±4.12	0.72
0 min	76.04±6.31	77.72±6.28	0.35
1 min	76.32±6.88	77.56±6.38	0.51
3 min	79.52±6.68	81.28±6.85	0.36
5 min	76.2±6.6	78.24±6.94	0.29
10 min	77.04±6.59	75.2±6.63	0.33

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15 min	75.12±6.39	72.24±6.2	0.11
30 min	76.32±6.71	74.52±5.46	0.3
60 min	76.28±7.01	75.2±5.15	0.53
2 hrs	76.08±5.79	77.32±5.4	0.43
4 hrs	75.68±6.26	78.52±6	0.1
6 hrs	77.56±6.44	78.92±7.05	0.47
12 hrs	76.84±5.63	75.8±6.45	0.54
24 hrs	76.08±6.62	74.04±5.37	0.23

The average diastolic blood pressure in both the groups was maintained from the baseline till 24 hours of observation. There was neither clinical nor statistical significant variation found.

Table 4: MAP (mm Hg): A Comparison in two groups of patients studied

Time	Group D (Mean ± SD)	Group S (Mean ± SD)	P Value
Baseline	89.36±4.81	88.56±3.69	0.51
0 min	89.49±7.43	90.28±6.5	0.69
1 min	89.57±7.9	87.64±6.37	0.34
3 min	89.63±7.64	87.37±6.51	0.26
5 min	89.57±7.43	89.11±6.53	0.81
10 min	90.08±7.73	91.17±6.23	0.58
15 min	89.44±7.49	88.71±5.84	0.7
30 min	89.55±7.75	86.81±5.28	0.15
60 min	89.6±8.02	87.83±4.31	0.33
2 hrs	93.48±6.04	94.44±5.36	0.55
4 hrs	94.61±5.67	96.55±5.55	0.22
6 hrs	93.91±6.84	95.01±6.08	0.55
12 hrs	90.83±6.33	91.51±5.75	0.69
24 hrs	90.35±6.6	88.19±4.88	0.19

All the recruited study population was found to be having normal MAP from the baseline till the end of 24 hours, with no clinical or statistical significance between both the groups.

Table 5: SPO2%: A Comparison in two groups of patients studies

Time	Group D (Mean ± SD)	Group S (Mean ± SD)	P Value
Baseline	98.64±0.49	98.68±0.48	0.77
0 min	98.8±0.41	98.48±0.51	0.77
1 min	98.6±0.5	98.8±0.41	0.12
3 min	98.4±0.65	98.4±0.65	1.00
5 min	98.48±0.51	98.48±0.51	1.00
10 min	98.48±0.51	98.8±0.41	1.00
15 min	98.6±0.41	98.4±0.5	0.12
30 min	98.68±0.48	98.64±0.49	0.77
60 min	98.68±0.48	98.8±0.41	0.77
2 hrs	98.4±0.5	98.4±0.5	0.34
4 hrs	98.4±0.65	98.4±0.65	1.00
6 hrs	98.48±0.51	98.48±0.51	1.00
12 hrs	98.48±0.51	98.48±0.51	1.00
24 hrs	98.64±0.49	98.68±0.48	1.00

All the recruited patients in both case and control groups had maintained the oxygen saturation level >95% from baseline till the end of 24 hours.

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Discussion

Regional anaesthesia has been preferred over general anaesthesia in many orthopaedic surgeries, due to the relatively fewer complications associated with regional blocks [3]. Increasing the duration of local anaesthetic action is desired for prolongation of the postoperative patient comfort and also decreasing perioperative opioid consumption and related adverse effects [7].

Many adjuvants to local anaesthetics such as epinephrine, clonidine, opioids, dexmedetomidine and also neostigmine have been tried in the brachial plexus block but each drug has its own drawbacks. Recently the dexamethasone, very potent, selective and long-acting glucocorticoid has been tried as an adjuvant to local anaesthetics in brachial plexus block and has been found to prolong postoperative analgesia, reduced the requirement of the local anaesthetic and also the side effect profile [8].

Hypothesis behind these are vasoconstriction leading to reduction in absorption of LAs, increasing the activity of inhibitory potassium channels present over the nociceptive C-fibre and inhibiting synthesis and release of various inflammatory mediators. This effect has been proposed to last up to 48 hours. Hence our study was conducted to analyses the efficacy of dexamethasone as an adjuvant drug with levobupivacaine [9].

We did not find any clinical variations in the heart rate, SBP, DBP, MAP, RR of the patients preoperatively, intra and also postoperative period. All the recruited patients had maintained oxygen saturation >95% throughout the surgery.

Similar to our study, none of the comparative studies reported variation in any of the haemodynamic parameters. But contrary to our observations, Badran *et al*. [10] reported increase in the heart rate and mean arterial blood pressure in group C than in group D at 12 h and 24 h postoperatively.

Conclusion

Intraoperative haemodynamics such as heart rate, SBP, DBP, MAP, SpO2 and RR were monitored in all patients. It was found that there were no significant changes between the two groups.

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