RESEARCH ARTICLE

Comparison between Using Lidocaine and Lidocaine with Dexamethasone on the Onset and Duration of Epidural Anesthesia

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ABSTRACT

Background: Lumbar epidural anaesthesia in humans was first described by Pagés in 1921, His work was built on by Dogliotti in the 1930s who described how the epidural space could be recognised using a resistance loss syringe. Aim of the study is assessment the adding of dexamethasone as a stabilizer agent to lidocaine can prolong the duration of block and speed its onset.

Methods: Twenty adult patients scheduled for elective lower abdominal and lower limb orthopaedic under epidural anaesthesia were randomly allocated into two groups: group A (n=10) received 1.5% lidocaine and group B (n=10) receive 1.5% lidocaine with dexamethasone (8 mg) via epidural catheter. Onset, duration of sensory block and pain score, adverse outcome was recorded and compared.

Results: Onset of sensory block was the same in two groups, duration of block was significantly prolong by the addition of dexamethasone with no obvious adverse effects have been recorded.

Conclusions: This study revealed that the addition of dexamethasone as additive to lidocaine in epidural anaesthesia prolongs the duration of block.

Keywords: Dexamethasone, Epidural, Lidocaine**.**

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INTRODUCTION

"Spinal, caudal, and epidural" blockage was first used for operating processes at the turn of the twentieth century. Lumbar epidural anaesthesia in humans was first described by Pagés in 1921, His work was built on by Dogliotti in the 1930s who described how the epidural space could be recognised using a resistance loss syringe.[1,2] Continuous epidural anaesthesia is a neuraxial technique offering a range of applications wider than single-dose spinal anaesthesia. An epidural block can be performed at the lumbar, thoracic, or cervical level. Sacral epidural anaesthesia is referred to as a caudal block.[3] Epidural anaesthesia is slower in beginning (10–20 min) and may not be as condensed like a spinal anaesthesia. This revealed as a more marked difference segmental block, that beneficial clinically.[4] Lidocaine is available in 1% and 2% solutions; it has an onset time of 10 to 15 minutes and duration of up to 120 minutes, which can extended to 180 minutes with the addition of epinephrine. Local anaesthetic (3 mL) having epinephrine 5 µg/mL. Local anaesthetic should be adequate for subarachnoid injection will outcome in pure suggestion of spinal anaesthesia. Intravenous epinephrine injection usually yields 30 beats/minute lead to increase cardiac rate 20–40 seconds afterward Injection.[5,6] Lidocaine changes signal transmission in neurons by obstructive the fast voltage gated Sodium channels inside the cell membrane of neuron accountable for signal spread.[7] With acceptable blockage, not depolarize membrane have not transmit an action potential, lead to aesthetic effect and stop pain signals from diffusion to the brain.[8] Dexamethasone, a highly potent long-acting glucocorticoid, is routinely used to control and treat acute and radicular pain by systemic or epidural administration in humans.[9] This drug is one of the latest agents of interest for use as an adjunct to lidocaine in various nerve blocks. The addition of dexamethasone to lidocaine has provided long-lasting anti-nociception and analgesia and has reduced pain scores and opioid consumption in human patients.[10] Aim of the study is assessment the adding of dexamethasone as a stabilizer agent to lidocaine can prolong the duration of block and speed its onset.

METHOD

Cross sectional comparative, study that done at Baghdad Teaching Hospitals from Nov. 2019 - Aug. 2020. All patients

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orally well versed and they were requested the agreement to be share of the study. study involved 20 patients scheduled for lower limb orthopedic or plastic surgery, urological, and inguinal surgeries using epidural technique and randomly owed of two groups: **Group A**: 10 patients received lidocaine only. **Group B**: Included 10 patients received dexamethasone and lidocaine. **Inclusion criteria:** Adults aged between 18–60 years. ASA II, III, or I. **Exclusion criteria:** Morbid obesity (BMI ≥ 40 kg/m^2). Severe hemorrhage. Patients on anticoagulant therapy. Patients with coagulopathy. Hypersensitivity to local anesthetics. Patients with bleeding tendency disorders. Local site of entrance infection. Patient refusal. Demographic data, aforementioned medical, surgical, treatment history and entirely physical check with vital features check and laboratory examination. A complete pre anesthetic assessment done: standard heart rate, pressure, ECG and SPO2. Epidural block done at (L2 – L3) or (L3 – L4) space by needle then by epidural tube 5 cm pass to the space. Chief dose 3 mL of lidocaine and 15-mcg epinephrine was firstly giving to prevent and decrease the intravenous injection and then shadowed after 3-minute break by a chief dose. Patients in group a received 2 mL/segment of 1.5% lidocaine and patients in-group B received 2 mL/segment of 1.5% lidocaine with 8 mg dexamethasone. Patients detected for the next test dose and main dose of drug giving, sensory blockage period at several level of dermatomes (S1, S5, L2, T10, T6), vital strictures interoperation, sensory blockage assessed by 2 minutes period by ice pack for 20 minutes in cephalic till caudal style along the left anterior axillary line. Visual analogue score is used to assess pain in both groups, all patients were asked to choose which one of the faces best describe their pain level at 30 minutes after taking the standard dose of local anaesthetic via the catheter.[11] Statistical analysis done by SPSS 22, frequency and percentage used for categorical data, mean, median and SD for continuous data. Chi-square used for assessed association between variables. T test used for evaluation differences between mean and median of continues variables. The p-value less or equal to 0.05 is consider significant.

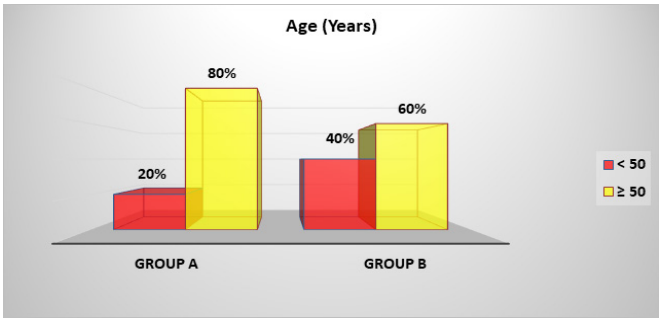

Figure 1: Distribution of study patients by age.

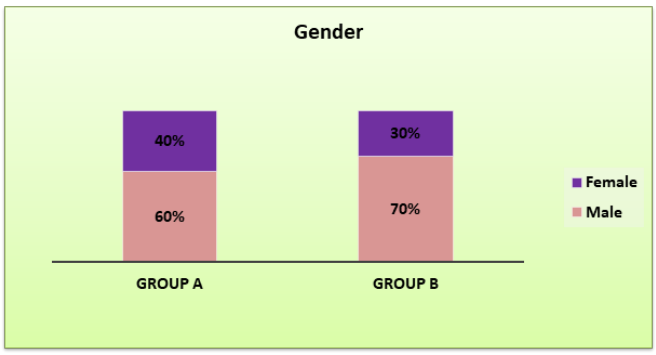

Figure 2: Distribution of study patients by gender.

RESULTS

The distribution of study patients by general characteristics is shown in Figures (1 and 2) and Tables (1 and 2). Study patient's age (35–60) years old (49 ± 7.5 years). The highest proportion of study patients in groups A and B was aged ≥ 50 years (80% and 60%, respectively). Regarding gender, proportion of males was higher than females in groups A and B (60% and 70%, respectively).

There were no significant differences in all features between study groups as shown in Tables 1 and 2.

The comparison between study groups by need for another dose of lidocaine (after sensation of pain) after 90 minutes is shown in Table 3. We noticed that all patients in group B didn't need another dose of lidocaine compared to 40% of patients in group A needed and this difference was statistically significant (p = 0.025).

Table 4 shows the comparison between study groups by mean of onset and duration of block. We noticed that the mean of duration of block was significantly higher in-group B than that in-group A (145.6 versus 95.3 mints). No significant difference noticed between study groups regarding onset of block.

Table 1: Comparison between study groups by certain characteristics.

	Study Group		
Variable	*A* *Mean ± SD*	*B* *Mean ± SD*	*p-value*
Age (Years)	49.0 ± 8.4	49.0 ± 7.0	1.0
BMI (kg/m^2)	25.71 ± 4.6	26.1 ± 4.9	0.855
Systolic BP(mmHg)	112.0 ± 7.9	121.3 ± 14.8	0.101
Diastolic BP (mmHg)	76.5 ± 10.3	83.0 ± 4.2	0.089
MAP (mmHg)	88.33 ± 7.7	93.1 ± 6.5	0.152
HR (Beats/mint.)	92.0 ± 5.4	88.0 ± 2.6	0.054

Table 2: Comparison between study groups by gender.

	Study Group			
Gender	*A (%)* *n= 10*	*B (%)* *n= 10*	*Total (%)* *n= 20*	*p-value*
Male	6 (60.0)	7 (70.0)	13 (65.0)	.0639
Female	4 (40.0)	3 (30.0)	7 (35.0)	

Table 3: Comparison between study groups by need for another dose of lidocaine (after sensation of pain) after 90 minutes.

	Study Group			
Need for another dose of lidocaine	*A (%)* *n= 10*	*B (%)* *n= 10*	*Total (%)* *n= 20*	*p-value*
Yes	4 (40.0)	0 (0)	4 (20.0)	0.025
No	6 (60.0)	10 (100.0)	16 (80.0)	

Table 4: Comparison between study group by mean of onset and duration of block.

	Study group		
Variable	*A Mean ± SD*	*B Mean ± SD*	*p-value*
Onset of block (minutes)	13.0 ± 3.6	14.0 ± 1.3	0.296
Duration of block (minutes)	95.3 ± 5.1	145.6 ± 5.3	0.001

DISCUSSION

Epidural anaesthesia is a neuraxial technique with a wide range of uses in anaesthesia, analgesia and chronic pain. Dexamethasone mixed with local anaesthetic and used in the epidural anaesthesia. The ability of dexamethasone to produce block prolongations has been documented by several studies in humans.[12] Although the exact mechanism (s) of dexamethasone regarding the enhancement of the duration of the blocks is yet to be explained, some authors have attributed it to the vasoconstrictive properties of corticosteroids.[13] Glucocorticoid receptors rather than nonspecific pharmacological pathways[14] mainly mediate vasoconstrictor effects of corticosteroids. The mechanism connected to its anti-inflammatory effect that prevents materials such as "prostaglandins, glutamate and substance p in the spinal cord".[15] Others prerogative that its membrane steadying effect attained by alterations in the potassium networks.[16] According to the safety of using dexamethasone as epidural injection, Bisgaard T *et al*. studied the Size of corticosteroids used for epidural injections as unintentional injection corticosteroids into "a vertebral or foramina artery" can lead emboli in brain and spinal cord. And as a result, Dexamethasone sodium phosphate particle size was approximately 10 times smaller than red blood cells and the particles did not appear to aggregate; even mixed with lidocaine solution, the size of the particles were unchanged Compared with the particulate steroid solutions, dexamethasone sodium, had the least propensity to collection, and had lower thickness. These features decrease the danger of embolic infarcts or avoid them from happening after intra-arterial inoculation. Dexamethasone epidural may mend postoperative outcome of pain and weakness.[17] Gao *et al.*[18] state that local dexamethasone giving epidural-by-epidural needle lead to lowering back pain in gynaecology operation. Another study stated that epidural dexamethasone lowering backache after used epidural anaesthesia.[19,20] According to the addition of dexamethasone to local anaesthetic agent in epidural anaesthesia examined the addition of dexamethasone 8 mg to isobaric bupivacaine 0.5% in unilateral inguinal herniorrhaphy and have proven that the beginning of anaesthesia was significantly additional fast in the dexamethasone group, where in our study in spite of using another local anaesthetic agent there is no significant difference (p = 0.296) detected between study groups regarding onset of block where is both thesis agreed about the period of block was evidently lengthy in patients have dexamethasone than in the control persons.[21] Also in another study (Bahman *et al*.) which studied the addition of 8 mg dexamethasone to (bupivacaine 0.5% plus fentanyl) in thoracic or abdominal surgery and approved. The duration of analgesia was significantly lengthier and pain mark was low in the Dexa. Group.[22] Also Naghipour *et al*. approved that dexamethasone (4 or 8 mg giving in lumbar and thoracic epidural) to bupivacaine and fentanyl lead to increase in time of analgesia. Although the study used bupivacaine and dexamethasone, the results confirm the results of our study".[23] Study that found dexamethasone against fentanyl, when used as epidural anaesthesia that relief pain after operation.[23]

CONCLUSION

Adding of dexamethasone to 1.5% Lidocaine does not shorten the onset time of sensory blockage of epidural anaesthesia, but increase significantly the duration without increasing in side effect.

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