Egyptian Journal of Anaesthesia

ISSN: (Print) 1110-1849 (Online) Journal homepage: https://www.tandfonline.com/loi/teja20

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To cite this article: Sherif Anis, Nabil Abd El Moaty, Azza Youssef, Raouf Ramzy & Raham Hassan (2011) Lumbar plexus block as a method of postoperative analgesia after hip surgery, Egyptian Journal of Anaesthesia, 27:2, 127-133, DOI: 10.1016/j.egja.2011.02.001

To link to this article: https://doi.org/10.1016/j.egja.2011.02.001

Egyptian Journal of Anaesthesia (2011) **27**, 127–133

Egyptian Society of Anesthesiologists

Egyptian Journal of Anaesthesia

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Research Article

Lumbar plexus block as a method of postoperative analgesia after hip surgery

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Received 26 December 2010; revised 27 January 2011; accepted 18 February 2011
Available online 10 May 2011

KEYWORDS

Lumbar plexus block;
Clonidine;
Hip surgery

Abstract *Background:* Posterior lumbar plexus block provides unilateral blockade and great hemodynamic stability. In this trial, the efficacy of addition of clonidine to bupivacaine used in lumbar plexus block (LPB) was evaluated.
Patients and methods: Sixty ASA I or II adult patients undergoing hip surgery, receiving general anesthesia, were randomly allocated to three equal sized groups, according to the technique of postoperative analgesia. In group A patients extubated when they met the standard extubation criteria. In group B, a mixed solution of 15 mL bupivacaine 0.5% and 15 mL normal saline 0.9% was injected through lumbar plexus block technique before extubation. In group C, 2.5 μg/ml clonidine was added to bupivacaine. Postoperative pain, sedation, hemodynamics, analgesic consumption, local anesthetic side effects and serum cortisol level were compared.
Results: There was a highly significant statistical difference between the three groups as regards the postoperative VAS scores ($P < 0.001$). In contrast to group A patients, VAS remained < 50 mm till the 6th hour postoperatively in group B patients and till the 12th hour in group C with high significant difference in postoperative morphine consumption ($P < 0.001$). Hemodynamics and respiratory rate were in normal range 2 h postoperatively in the three groups. After the 6th hour postoperatively; SBP, DBP, HR and RR were significantly higher in group A patients in comparison to groups B and C ($P < 0.05$). In group C patients; SBP, DBP, HR and RR were in normal range for the first 12 h postoperatively. Blood cortisol level was higher then normal in group A

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Peer review under responsibility of Egyptian Society of Anesthesiologists.
doi:10.1016/j.egja.2011.02.001

Production and hosting by Elsevier

patients since 2 h postoperatively (*P*, 0.05), while started to rise from the 6th hour in group B patients and the 12th hour in group C patients.

Conclusion: The study showed that posterior lumbar plexus block was an effective postoperative analgesic technique in patients undergoing hip surgeries and that adding clonidine in a concentration of 2.5 μg/ml to bupivacaine 0.25% has resulted in decreasing the postoperative analgesic requirements.

1. Introduction

Clinical experience has demonstrated that postoperative pain in total hip arthroplasty is severe, especially during the first 24 h, and worsens with patient mobilization. Effective relief of postoperative pain is essential for patient comfort and satisfaction, allows greater mobility, minimizes postoperative morbidity and mortality, and promotes faster recovery by preventing or decreasing muscle spasms that hinder early joint mobilization [1].

Techniques used more commonly for analgesia after hip surgeries include patient-controlled analgesia (PCA) with IV opioids, subarachnoid analgesia, epidural analgesia, and anterior or posterior (psoas compartment block) lumbar plexus block (LPB) [2]. The main advantages of LPB over neuraxial analgesia are unilateral blockade, resulting in greater hemodynamic stability, an improved ability to ambulate, and absence of urinary retention. Posterior lumbar plexus block promotes effective unilateral analgesia after total hip arthroplasty, reducing pain scores and consumption of analgesics. The posterior approach to the lumbar plexus is associated with the risk of dispersion or inadvertent injection of the anesthetic solution in the epidural or subarachnoid space [3].

Clonidine is an α_2-adrenergic agonist, on pre and postsynaptic receptors, that is increasingly used as an adjuvant to local anesthetics administered peripherally. α_2 agonists, produce analgesia via supraspinal (stimulation of descending inhibitory pathways) and spinal adrenergic receptors. (inhibition of substance *P* release, increase acetyl choline release) Clonidine has also direct inhibitory effects on peripheral nerve conduction (A and C nerve fibers) [4].

The purpose of this study was to evaluate lumbar plexus nerve blockade as an effective technique in managing postoperative pain after hip surgery and the efficacy of addition of clonidine to bupivacaine in prolongation of bupivacaine's effect was also tested.

2. Patients and methods

This randomized controlled study was carried out in Ain Shams University Specialized Hospital. The study was performed on 60 adult patients of ASA I or II physical status undergoing hip surgery. After approval of the institutional review board and having patient written informed consent, patients, who asked to receive general anesthesia, were randomly allocated to one of three equal groups according to the technique of postoperative analgesia.

Patients of both sexes, aged 18–60 years with weight between 50 and 100 kgs and height between 150 and 190 and were included.

Pregnant women, patients who had an ASA physical status more than II, patients who had neurologic disorders and with hypersensitivity or known allergy to local anesthetic or opioids; contraindication to regional anesthesia (local infection, sepsis, coagulation abnormality) were excluded form the study.

Secondary exclusion criteria were failure to perform lumbar plexus block and, patients further refusal to participate in the study due to severity of side effects.

Routine preoperative assessment was done to the patients including: history, clinical examination, laboratory investigations (complete blood picture, kidney function tests, liver function tests, prothrombin time, partial thromboplastin time), chest X-ray, ECG (electrocardiogram) was done for patients above 40 years.

The patients received instructions on how to use a visual analog scale that consisted of an unmarked 100 mm line, with 0 mm representing no pain and 100 mm representing the worst pain imaginable. Rescue analgesia was however given when VAS >50 mm at rest or >80 mm with movement.

All patients were monitored with electrocardiography, noninvasive blood pressure, pulse oximetry, capnography, peripheral nerve stimulator applied on the ulnar nerve, baseline hemo-dynamic readings were recorded. Once IV access (via a wide bore cannula) had been achieved, an infusion of crystalloid solution was started. All patients received general anesthesia in the following way; intravenous induction with midazolam 0.05 mg/Kg, fentanyl 2 μg/kg, followed by thiopental sodium 4 mg/kg (or till loss of eye lash reflex), then muscle relaxant was given atracuriun 0.5 mg/kg followed by endotracheal intubation and controlled mechanical ventilation. Maintenance of anesthesia was with halothane 0.75% in oxygen-air mixture giving an FiO2 of 0.5 via closed – circuit system, and atracurium was given in incremental doses 0.1 mg/kg given whenever the twitch response showed 50% recovery. At the end of the procedure, the muscle relaxant effect was reversed by using neostigmine 0.05 mg/kg in combination with atropine 0.02 mg/kg. After regaining of motor power, before recovery from inhalational anesthetic, patients were randomly divided into three equal sized groups (A, B and C), using a series of closed envelops.

In group (A), extubation was performed when patients were fully wake, as evidented by eye opening to verbal command, and when residual neuromuscular blockade was completely antagonized, as evidenced by absence of fade to a tetanic stimulation. In group (B), a mixed solution of 15 mL bupivacaine 0.5% and 15 mL normal saline 0.9% ($=75$ mg bupivacaine totally) was injected through lumber plexus block technique then extubation was done as in group A.

The lumbar plexus was located (through the L4 approach by Capdevila) [2]. The spinous process (SP) of L4 was identified as the point in which the intercristal line intersects with the vertebral column. A line from the center of the L4 SP

was drawn lateral to intersect with the line that passed through the posterior superior iliac spine (PSIS) and parallel to the vertebral column of the side to be blocked. The puncture point was at the junction of the lateral one third and medial two thirds of the line joining L4 and the line passed through PSIS. The needle was advanced at right angles to the skin in all planes until the transverse process of L4 was encountered. The needle was then directed caudally and gently advanced no more than 20 mm until quadriceps muscle twitching was elicited using a peripheral nerve stimulator (Vygon). Initially, 1.5 mA, 50 μs and 2HZ stimuli were used then we gradually decreased the current till 0.5 mA and local anesthetic dose was injected with frequent aspiration.

In group (C); clonidine with a concentration of 2.5 μg/mL (75 μg clonidine totally) was added to bupivacaine (which was of the same mixture as in group B) and then extubation was done as in group A. Postoperatively, the patients were monitored and assessed at 1, 2, 4, 6, 12 an 24 h for pain assessment at rest and with movement using the visual analog scale (VAS).

In case of subjective scores: >50 mm at rest or >80 mm with movement, pain was managed by incremental doses of intramuscular morphine at a dose of 5 mg and total amount of analgesic requirements in the first 24 h was calculated.

Sedation score: (0 = wide awake, 1 = drowsy, 2 = asleep, 3 = unarousable) was also assessed hemodynamics (Blood pressure, Heart rate and Rhythm), respiratory rate were recorded at 2, 6 and 12 h postoperatively.

Side effects of local anesthetics as respiratory depression, hypotension, bradycardia, signs and symptoms of central nervous system toxicity such as circumoral numbness, tongue parathesia, dizziness, tinnitus and blurred vision were observed.

Blood samples were taken to measure serum cortisol level at 2, 6 and 12 h postoperatively.

2.1. Statistical analysis

Statistical analysis was done on a personal computer using the Statistical Package for Social Sciences version 16.0 (SPSS©, SPSS Inc., Chicago, IL).

Shapiro–Wilk test was first conducted to test the hypothesis that numerical data are normally distributed.

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Normally distributed numerical data were presented as mean (standard deviation) and between-group differences were compared parametrically using one-way analysis of variance (ANOVA).

Non-normally distributed numerical data were presented as median (interquartile range) and inter-group differences were compared non-parametrically using the Kruskal–Wallis test with application of the Mann–Whitney *U*-test post hoc whenever a statistically significant difference was detected.

Nominal data were presented as number (percentage) and between-group differences were compared using the Pearson χ^2-test.

$P < 0.05$ was regarded as statistically significance.

3. Results

There were no statistically significant difference between the three groups as regards age, height, weight and sex ($P > 0.05$), (Table 1). There was a highly significant statistical difference between the three groups of the study as regards the VAS scores. There was a high statistical significant difference between the three groups as regards total morphine consumption ($P < 0.001$) with the highest consumption among group A patients and the lowest among group C patients (Table 2). There was also, a high significance difference between the three groups as regards the time of first rescue analgesic dose (Table 2) ($P < 0.001$), group A patients needed the first analgesic doze within 1 h postoperatively while group B and C patients needed the first analgesic dose within 6th and 12th hour, respectively. As shown in Table 3, VAS at rest was significantly high in group A (without lumbar plexus block) from the 1st hour postoperatively in comparison to groups B and C ($P < 0.001$) and that was managed as scheduled in the study protocol by giving 5 mg morphine intra-muscularly (IM) with subsequent decrease in VAS scores. Six hours postoperatively, the VAS scores started to increase again and became significantly higher in A group ($P < 0.001$), so a second dose of rescue analgesia (in the form of 5 mg morphine intramuscularly) was given with subsequent decrease in VAS scores. 14 patients needed a 3rd dose of rescue analgesia in between the 12th and 24th hour postoperatively.

Regarding group B (lumbar plexus block with 30 mL bupivacaine 0.25%), VAS remained <50 mm till the 6th hour postoperatively were it started to increase with subsequent rescue analgesia administration in the form of 5 mg morphine IM with subsequent decrease in VAS scores. In 12 patients, a 2nd dose of rescue analgesia was needed inbetween the 12th and 24th hour postoperatively. In group C (lumbar plexus block using 30 mL bupivacaine 0.25% and 75 μg clonidine), the VAS started to increase significantly after the 12th hour postoperatively before which the VAS remained <50 mm. Only 14 patients needed a rescue analgesic dose of morphine between the 12th and 24th hour postoperatively. There was highly significant statistical difference between the three groups as regards postoperative morphine consumption ($P < 0.001$).

Table 1 Demographic data.

	Group A $N = 20$	Group B $N = 20$	Group C $N = 20$	*P*-value
Age (years)	31.55 ± 7.29	32.81 ± 5.88	31.91 ± 5.02	>0.05
Height (cms)	176.450 ± 2.46	177.790 ± 3.88	176.130 ± 1.10	>0.05
Weight (kg)	75.616 ± 4.46	76.880 ± 2.68	77.840 ± 1.99	>0.05
Sex prevalence (F/M)	**11/9**	**8/12**	**10/10**	**0.626**

Table 2 Postopertative analgesic consumption in first 24 h.

Variable	Group A $N = 20$	Group B $N = 20$	Group C $N = 20$	P-value
Cumulative postoperative morphine consumption in first 24 h (mg)	15 (10–15)	10 (5–10)*	5 (5–5)*,†	<0.001
Time to first analgesic (h)	1 (1–2)	6.5 (6–8)*	14 (12–15)*,†	<0.001

With the Kruskal–Wallis test.
* $P < 0.001$ versus group A with the Mann–Whitney U-test.
† $P < 0.001$ versus group B with the Mann–Whitney U-test.

Table 3 Comparison between the three studied groups as regards VAS.

Pain (h)	Group A $N = 20$		Group B $N = 20$		Group C $N = 20$		P-value
	Range	Median	Range	Median	Range	Median	
After 1	10.0–10.0	10.00	0.0–2.0	1.00	0.0–2.0	1.00	<0.001*
After 2	2.0–6.0	4.00	0.0–2.0	1.00	0.0–2.0	1.00	0.511
After 4	4.0–5.0	4.50	0.0–4.0	2.00	0.0–4.0	2.00	0.511
After 6	8.0–10.0	9.00	3.0–7.0	5.00	1.0–4.0	2.50	<0.001*
After 12	2.0–8.0	5.00	1.0–8.0	4.50	4.0–8.0	6.00	>0.05
After 24	4.0–6.0	5.00	2.0–8.0	5.00	2.0–8.0	5.00	>0.05

* Significant of p value.

Table 4 Comparison between the three studied groups as number of postoperative analgesic doses.

Total number of analgesic doses	Number of patients that took 0 doses	Number of patients that took single dose	Number of patients that took 2 doses	Number of patients that took 3 doses
Group A ($N = 20$)	0	0	6	14
Group B ($N = 20$)	0	8	12	0
Group C ($N = 20$)	6	14	0	0
P-value	<0.001*			

* Significant of p value.

As shown in Table 4, 6/20 patients required 2 rescue analgesic doses (in the form of 5 mg morphine IM) and 14/20 patients required 3 rescue analgesic doses in group A. On the other hand, in group B (LPB with 30 mL bupivacaine 0.25%) 8/20 patients required a single dose and 12/20 required 2 doses. In group C (LPB with 30 mL bupivacaine 0.25% plus 75 μg clonidine), 6/20 patients didn't receive any rescue analgesic doses and only 14/20 patients took a single dose.

There was a highly significant statistical difference between the three groups of the study as regards sedations scores as shown in Table 5 (P-value 0.015, 0.010 at 1st and 2nd hour, respectively). And by doing the Mann–Whitney test to detect the least significant difference (LSD) it was found that at the first 2 h of the study the median value of sedation scores was highest among group C. Also it was found starting from the 4th hour postoperatively, there were no statistical difference between the three groups ($P > 0.05$).

The high sedation score found in group C can be attributed to the clonidine administered in LPB. The sedation was not that high due to the use of small dose (75 μg).

As regards systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate and respiratory rate, there was high statistical significant differences between group A, group B and group C) (Table 6) ($P < 0.05$).

Regarding group A, the systolic and diastolic blood pressures heart rate and RR were in normal range after 2 h postoperatively. This can be attributed to the rescue analgesia given to this group's patients (in the form of 5 mg morphine IM) from the 1st hour postoperatively because of their high VAS scores at that time of the study. After the 6th hour postoperatively, systolic and diastolic blood pressures were high denoting sympathetic stimulation due to postoperative pain. This can be matched with high VAS scores measured at that time of the study so a second dose of rescue analgesia was given with subsequent decrease in both systolic and diastolic blood pressure HR and RR. At the 12th hour postoperatively both systolic diastolic blood pressure as well as, HR and RR started to increase again.

In group B, 2 h postoperatively both systolic, diastolic blood pressures RR and HR were in normal range as patients in this group were pain free. After the 6th hour postoperatively, both systolic and diastolic blood pressures, HR and RR were high. This can be matched with high VAS scores measured at that time of the study. Rescue analgesia was given with subsequent decrease in blood pressure. After 12 h, both systolic and diastolic blood pressures HR, RR started to increase again.

In group C, systolic and diastolic blood pressures, HR and RR were in normal range for the first 12 h postoperatively after which they were significantly high with subsequent administration of rescue analgesia.

No side effects of local anesthetics occurred during the first 24 h postoperatively in the three groups.

As regards blood cortisol level, there was a high statistical significant differences between the group A, group B and group C (Table 7) ($P < 0.05$). Blood cortisol level was higher then normal in group A patients since 2 h postoperatively while started to rise from the 6th hour in group B patients and from the 12th from postoperatively in group C patients.

4. Discussion

After hip surgeries, pain is severe and it is aggravated by movements, especially in the first 24 h. And although different postoperative analgesia strategies are available, the best one, based on the efficacy of pain control and effects on postoperative rehabilitation, has not been determined.

Peripheral blocks, such as lumbar plexus blocks, allow early ambulation, enabling effective physiotherapy and early discharge.

Clonidine is an α_2 adrenergic receptor agonist. It is an imidazoline compound acting on imidazoline receptors which control arterial blood pressure. Clonidine combined with short acting (lidocaine) and intermediated (mepivacaine) local anesthetics for peripheral nerve blocks prolongs the duration of anesthesia and analgesia [5].

The current clinical study was designed to test the efficacy of the postoperative analgesic effects promoted by posterior

Table 5 Comparison between the three studied groups as regarding sedation scores.

Sedation score (h)	Group A $N = 20$		Group B $N = 20$		Group C $N = 20$		P-value	Mann–Whitney test		
	Range	Median	Range	Median	Range	Median		A and B	A and C	B and C
After 1	0–0	0.00	0–0	0.00	0–2	1.00	0.015*	1.000	0.030*	0.012*
After 2	0–0	0.00	0–0	0.00	0–1	0.00	0.010*	1.00	<0.001*	<0.001*
After 4	0–0	0.00	0–0	0.00	0–0	0.00	1.000	1.000	1.000	1.000
After 6	0–0	0.00	0–0	0.00	0–0	0.00	1.000	1.000	1.000	1.000
After 12	0–0	0.00	0–0	0.00	0–0	0.00	1.000	1.000	1.000	1.000
After 24	0–0	0.00	0–0	0.00	0–0	0.00	1.000	1.000	1.000	1.000
P-value	1.000		1.000		0.035*					

* Significant of p value.

Table 6 Comparison between the three studied groups as regarding SBP, DBP, HR and RR.

(h)	Group A $N = 20$	Group B $N = 20$	Group C $N = 20$	P-value
	Mean ± SD	Mean ± SD	Mean ± SD	
SBP				
After 2	134.55 ± 3.66	120.55 ± 3.10	110.180 ± 4.153	>0.05
After 6	164.08 ± 3.70	155.58 ± 2.34	130.170 ± 3.239	<0.05
After 12	150.98 ± 2.01	166.68 ± 2.57	158.930 ± 3.991	>0.05
DBP				
After 2	80.02 ± 2.87	74.81 ± 2.44	76.329 ± 2.822	>0.05
After 6	106.12 ± 3.56	97.36 ± 2.64	75.364 ± 2.597	<0.05
After 12	103.45 ≠ 3.86	96.69 ± 3.81	95.750 ± 3.523	>0.05
HR				
After 2	60.36 ± 3.72	64.94 ± 4.17	63.175 ± 4.355	>0.05
After 6	100.84 ± 3.89	96.30 ± 4.09	63.841 ± 5.402	<0.05
After 12	95.72 ± 4.52	95.64 ± 4.19	102.840 ± 5.136	>0.05
RR				
After 2	11.83 ± 0.91	12.09 ± 2.07	11.094 ± 1.401	>0.05
After 6	16.82 ± 0.87	16.57 ± 0.77	12.896 ± 0.890	<0.05
After 12	15.14 ± 1.34	16.67 ± 0.78	16.641 ± 1.341	>0.05

Table 7 Comparison between the three studied groups as regarding blood cortisol level.

Assessment of stress hormones (h)	Group A $N = 20$	Group B $N = 20$	Group C $N = 20$	P-value
	Mean ± SD	Mean ± SD	Mean ± SD	
After 2	300.00 ± 21.76	190.66 ± 7.25	102.500 ± 28.447	<0.05*
After 6	275.00 ± 44.43	280.18 ± 26.53	112.500 ± 28.447	<0.05*
After 12	310.00 ± 43.53	314.46 ± 103.46	268.540 ± 26.532	>0.05

* Significant of p value.

lumbar plexus block in patients undergoing hip surgeries under general anesthesia. A secondary objective included was testing the efficacy of adding clonidine as an adjunct to bupivacaine on postoperative analgesic requirements.

The main finding in this study was that the posterior lumbar plexus block was very effective as a postoperative analgesic technique in hip surgeries by reducing pain scores and analgesic consumption for patients having hip surgeries under general anesthesia. Patients in group (B) (LPB with bupivacaine), were almost pain free from 4 to 6 h postoperatively. This can be obviously concluded from their low VAS scores, lower morphine consumption, time of first analgesic dose and normal hemodynamic parameters values and serum cortisol level. After 6 h, there was gradual increase in VAS scores with subsequent expected increase in hemodynamic parameters values and need for a rescue dose of analgesia. (12/20 patients required 2 doses).

Patients in group (C) (LPB with bupivacaine + 75 μg clonidine) were almost pain free during the first 8–12 h postoperatively. This can be obviously concluded from their low VAS scores, lower morphine consumption, delayed time of first analgesic dose and normal hemodynamic parameters values and serum cortisol level during that period. After 12 h, there was gradual increase in VAS scores with subsequent expected increase in hemodynamic parameters values and need for a rescue dose of analgesic (14/20 patients took a single dose).

So adding 75 μg clonidine to bupivacaine has significantly increased the duration of postoperative analgesia from an average of (4–7 h) to (8–12 h). No side effects were encountered in both groups.

Sedation was encountered only in group C which was attributed to the addition of clonidine to local anesthetic. But it was only confined to the first 2 h postoperatively and not in all patients. This can be attributed to the small dose used in the study (75 μg).

Stevens et al. demonstrated effective analgesia for 10–12 h after PCB (psoas compartment block) with subsequent reduction in consumption of rescue morphine. Stevens' study was performed on 60 patients undergoing total hip arthroplasty who were randomised to receive general anesthesia with or without a posterior lumbar plexus block. The block was performed after induction using a nerve stimulator, and 0.4 mL/kg bupivacaine, 0.5%, (with epinephrine 1:200,000) was injected.

In the post anesthesia care unit, a greater than fourfold reduction in pain scores was observed in the plexus group and morphine consumption remained significantly lower in the plexus group [6]. This is in contrast to the current study, where 0.25% bupivacaine without adrenaline was used (group B) with subsequent significant lower pain scores only from 4 to 6 h after the blockade.

Another study on analgesic effect of LPB was done by Srivastaval et al. on 44 patients with hip fractures operated under spinal anesthesia. The blocks were given at the end of operation with 0.25% of bupivacaine. It showed that single shot lumbar plexus block was effective in providing prolonged postoperative analgesia and reducing the pain scores and requirement of supplemental analgesics during first 24 h. Contrary to the present study, they demonstrated longer duration of analgesia, even longer than the expected duration of bupivacaine probably due to summative effects of pre-emptive analgesic effect of spinal anesthesia and the analgesic action of I.M. diclofenac, which was given to majority of the patients [7].

The results of the current study are in accordance with the work of Duarte et al. who performed their study on 43 patients undergoing total hip arthroplasty under general anesthesia. LPB in one group was performed using 0.5% bupivacaine with 1:200,000 epinephrine and in the other group it was performed using 0.5% ropivacaine. This study demonstrated that LPB is an effective postoperative analgesic technique after total hip arthroplasty and that the use of 0.5% ropivacaine for posterior lumbar plexus block in those patients resulted in significantly lower pain scores at 8, 12, and 24 h after the blockade when compared with 0.5% bupivacaine with 1:200,000 epinephrine. Despite this, intravenous morphine consumption (as rescue analgesia) was not affected by the type of local anesthetic used [8]. The results of Duarte study is in accordance to the current results regarding the decrease in postoperative analgesic consumption but only during the 1st 6 h postoperatively (instead of 24 h in his study). This could be attributed to the usage of 0.25% bupivacaine without adrenaline (group B).

Clonidine has been shown to prolong sensory analgesia when given as an adjunct to peripheral nerve block. These proposed mechanisms are direct action on A and C fibers by direct action on sodium channels, α_2 mediated vasoconstriction and central α_2 analgesia [5]. However, it has not been evaluated when given in conjunction with LPB. Most of the published reports have described the effects of clonidine on upper extremity nerve blocks. The addition of clonidine to the longer acting local anesthetics bupivacaine, ropivacaine, and levobupivacaine, has produced more varied results.

Eledjam et al. demonstrated that, when clonidine was added to bupivacaine and injected into the brachial plexus sheath, it resulted in longer analgesia than when epinephrine was added (16.56 versus 12.1 h) [9]. This goes with the present study which showed prolongation of postoperative analgesia up to 12 h. However the duration in the current study was shorter, and this can be contributed to the small dose we used for clonidine (75 μg) in comparison to their study which used (150 μg).

Hutschala et al. investigated the effects of clonidine (2 μg/kg) added to bupivacaine 0.25% (1 mg/kg) plus epinephrine 1:200,000 in axillary brachial plexus blocks in a randomized, double blinded study on 70 healthy volunteers. The clonidine block group showed a significantly longer duration of sensory and motor block (10 h) as compared with the control IM clonidine group and placebo group [10].

On the other hand Cucchiaro et al. study was done on 435 patients who underwent a single-shot peripheral nerve block for postoperative analgesia at The Children's Hospital of Philadelphia who had underwent painful procedures, such as anterior cruciate ligament reconstruction and open reduction internal fixation of the elbow and concluded that clonidine (1 μg/kg) added to bupivacaine or ropivacaine can extend the duration of the block [11].

Saied et al. [12] concluded that the addition of 150 μg clonidine to ropivacaine, for brachial plexus blockade, prolongs motor and sensory block and analgesia, without an increased incidence of side effects. In that study there was a trend towards an increase in the level of sedation in the clonidine group but this did not reach statistical significance and this goes with the present study that showed minimal sedation scores in the first 2 h postoperatively while using 1 μg/kg clonidine as an adjunct to bupivacaine 0.25%.

In another study done by Casati et al. they found that adding 1 μg/kg clonidine to 0.75% ropivacaine provided a 3 h de-

lay in first request for pain medication after hallux valgus repair, with no clinically relevant side effects [13].

Mannion et al. had proved that intravenous but not perineural clonidine prolongs postoperative analgesia after psoas compartment block with 0.5% levobupivacaine for hip fracture surgery where 36 patients requiring hip fracture surgery received PCB and general anesthesia. There was no difference between both groups. The groups were similar in terms of 24 h cumulative morphine and acetaminophen consumption. There were no significant differences among groups regarding postoperative adverse effects (bradycardia, hypotension, sedation, and nausea). They concluded that IV but not perineural clonidine (1 μg/kg) prolongs analgesia after PCB without increasing the incidence of adverse effects [14].

Their study failed to demonstrate prolongation of anesthesia or analgesia by perineural clonidine in PCB. A possible mechanisms for their findings is that levobupivacaine is similar to ropivacaine in having intrinsic, although weaker, vasoconstrictive activity. These vasoconstrictive properties may negate clonidine's vasoconstrictor activity and explain levobupivacaine's longer duration of sensory block compared with racemic bupivacaine.

There were some limitations in the current study: a single dose of clonidine (75 μg) was studied. It is possible that a larger dose of clonidine could have influenced the clinical outcome, postoperative analgesic requirements and postoperative complications. But this dose was sufficient in agreement with doses in other studies, resulting in almost no significant complications.

Also, almost all patients were ASA I, although hip surgeries usually occurs in old age with multiple associated comorbidities.

As a conclusion, posterior lumbar plexus block was an effective postoperative analgesic technique in patients undergoing hip surgeries. And adding clonidine in a dose of (75 μg) to bupivacaine 0.25% has resulted in decreasing the postoperative analgesic requirements during the first 12 h postoperatively with no significant complications.

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