Egyptian Journal of Anaesthesia (2013) **29**, 155–159

Egyptian Society of Anesthesiologists

Egyptian Journal of Anaesthesia

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Research Article

Levobupivacaine patient controlled analgesia: Epidural versus blind fascia iliaca compartment analgesia – A comparative study

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Received 29 July 2012; revised 25 September 2012; accepted 5 October 2012
Available online 4 November 2012

KEYWORDS

Fascia iliaca block;
PCEA;
Levobupivacain

Abstract This study was designed to compare the analgesic efficacy of levobupivacaine patient controlled analgesia epidural versus patient controlled analgesia with fascia lliaca compartment block. In patients undergoing fixation of fracture neck femur.

Methods: Sixty patients ASA II&III undergoing fixation of fracture neck femur were randomly allocated into two groups (n = 30).

Group E: Epidural group given levobupivacaine 0.25% 15 ml before induction of general anesthesia, followed by postoperative PCEA with levobupivacaine (0.125%).

Group F: Fascia iliaca block group given levobupivacaine 0.25% 30 ml through the catheter before induction of general anesthesia, followed by postoperative patient controlled fascia illiaca analgesia with levobupivacaine (0.125%).

Severity of postoperative pain at rest in 24 h using VAS, number of patients required additional analgesia (tramadol) in 24 h, doses of postoperative 24 h tramadol consumed, postoperative mean arterial blood pressure and heart rate were recorded.

Results: The severity of postoperative pain was statistically significantly less in E group, number of patients required tramadol in 24 h were statistically significantly less in E group than F group, postoperative tramadol consumed was statistically significantly less in E group than F group.

Conclusion: PCEA with levobupivacaine (0.125%) was associated with satisfactory analgesia than patient controlled analgesia with fascia iliaca block in patients undergoing fixation of fracture neck femur.

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Peer review under responsibility of Egyptian Society of Anesthesiologists.

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1. Introduction

Postoperative pain may be undertreated in elderly [1] and the use of opioid analgesics is limited because of fear of adverse events [2], effective pain relief is essential for early mobility and discharge from hospital [3].

1110-1849
http://dx.doi.org/10.1016/j.egja.2012.10.002

The use of epidural analgesia is associated with good pain control and avoid the side effects of opiods [4].

Patient-controlled epidural analgesia (PCEA) provides excellent postoperative pain relief [5,6].

The use of regional anesthetic techniques attenuate or eliminate postoperative pain and avoids complications of opioids [7].

Fascia iliaca compartment block is an anterior thigh regional block of lumbar plexus [8], if local anesthetics injected posterior to the fascia iliaca, it diffuse in to its internal layers then to the femoral, lateral femoral cutaneous, genitofemoral, and obturator nerves [9] which was later confirmed by radiography [10].

It is an alternatives to central neural blockade and provides unilateral analgesia with less side-effects than epidural analgesia [11].

Fascia iliaca compartment block has a rapid onset and it provided effective analgesia in post-traumatic hip fracture in the elderly [12].

The Aim of this study was to evaluate the analgesic effects of levobupivacaine patient controlled analgesia epidural versus patient controlled fascia lliaca compartment block in patients undergoing fixation of fracture neck femur under general anesthesia.

2. Method

After approval of the ethical committee in an orthopedic hospital (Kuwait), a written informed consent obtained from 60 patients ASA II&III, aged 55–65 years old, planned for fixation of fracture neck femur under general anesthesia from January 2009 to December 2010.

Patients were excluded if they had any other fractures, neurological disease (Alzheimer, dementia), any contraindication to regional anesthesia (e.g. local infection, coagulation abnormality, or patient refusal), known allergy to the study drug.

The study protocol, the epidural and fascia iliaca block, and the Visual Analogue Scale (VAS) for pain, the use of PCA device were explained to each patient during the preoperative visit.

All patients were premedicated with oral midazolam 0.1 mg/kg, 60–90 min before surgery. In the operating room, a intravenous cannula was inserted and 10 ml/kg normal saline was infused. Electrocardiogram pulse oximetry, and non-invasive arterial blood pressure at 5 min intervals were applied.

All patients given fentanyl 50 ug to control pain during block procedures.

Patients were randomly allocated into two equal sized groups.

Group E (n = 30). Insertion of epidural catheter, patients were placed in lateral position (with fractured side up), under strict aseptic condition, skin infiltration with 2 ml lidocain (1%) at L3–L4 or L4–L5 space using 18 gauge Touhy needle and catheter (PERIFIX, B.BRAUN, Melsungen, Germany) using loss of air resistance technique, a test dose of 3 ml lidocaine 1% with 1:200,000 adrenaline was injected and after exclusion of intrathecal or intravascular catheter placement, the catheter was fixed and 15 ml levobupivacaine 0.25% (Chirocaine, Abbott laboratories) was injected through the catheter in increments of 5 ml with repeated aspiration. Sensory block was assessed using the pin prick and motor block using a modified Bromage scale (0 = no blockade: extended limb lift off the bed; 1 = flexion/extension at knee and ankle joint; 2 = no flexion/extension at knee or ankle joint; 3 = complete blockade).were checked and verified.

Group F (n = 30): The FIC block was performed, the patient placed supine, under strict aseptic condition using the technique of Dalens et al. [13], the entry point of the needle was 1 cm below the limit between the outer and middle thirds of the inguinal ligament is infiltrated with 2 ml lidocain (1%), a 18G Tuohy needle and catheter G20 (PERIFIX, B.BRAUN, Melsungen, Germany) was introduced at a 75° angle. The first resistance break (pop) was felt when the tip of needle went through the fascia lata. The needle was introduced in the same angle until the break of a second resistance, corresponding to the perforation of the fascia iliaca. The angle with the skin was 75°, then, reduced to 30° and the needle introduced 1 cm cephalad. Then an epidural catheter was introduced 15 cm beyond the tip of the needle and secured (by tunneling though the skin), levobupivacaine 0.25% 30 ml was given slowly in increments of 3 ml with repeated aspiration. Sensory block was assessed after 15 min by using pin prick over the sensory distribution of the femoral nerve (anterior aspect of the thigh), lateral femoral cutaneous nerve (lateral aspect of the thigh), and obturator nerve (medial and posterior aspect of the knee) and motor blockade using a modified Bromage scale were verified.

Then general anesthesia was induced in all patients with i.v. propofol, fentanyl, cisatracurim, oral cuffed endotracheal tube, anesthesia was maintained with oxygen, sevoflorane, additional doses of cisatracurium, mechanical ventilation with maintenance of endtidal carbondioxide 35–40 mmHg.

At the end of surgery neuromuscular blockade was reversed with neostigmin and atropine IV, the trachea was extubated when the patient respond to commands, all patient were transferred to PACU where they were monitored and reminded how to use the PCA devise. The postoperative pain at rest was assessed using Visual Analogue Scale (VAS), where zero score corresponds to no pain and 10 to the maximum or worst pain. Patients were then instructed to start using patient-controlled epidural analgesia (PCEA) in epidural group and patient-controlled facisia iliaca analgesia in F group, the PCA pump (CADD-Legacy® PCA Pump, Model 6300, Smiths Medical, USA) Fig. 1. was adjusted to deliver continuous basal infusion of levobupivacain 0.125% 4 ml/h and demand boluses in increments of 2 ml with a lockout interval of 15 min. Tramadol hydrochloride 50 mg IV was given as rescue analgesia if VAS > 3.

All patients admitted to the high dependency unit (HDU) for the next 24 h.

The following parameters were evaluated and recorded in the anesthesia sheets, PCA sheets:

1. Patient characteristics.
2. The severity of postoperative pain at rest measured at 1, 8, 16, and 24 h postoperatively using (VAS).
3. Number of patients required additional analgesia (tramadol hydrochloride 50 mg IV).
4. Postoperative 24 h tramadol hydrochloride consumed in milligrams.
5. Postoperative mean arterial blood pressure, heart rate at 1, 8, 16, and 24 h.
6. Grade of patients' satisfaction (good/fair/unsatisfactory).

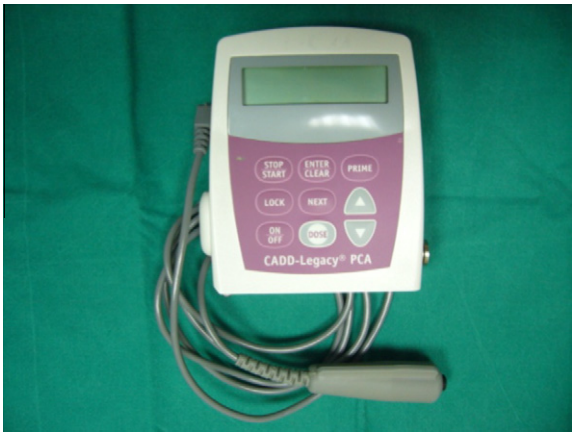

Figure 1 CADD-legacy PCA machine.

2.1. Statistical analysis

Data are presented as mean (SD) or median (range), student *t*-test was used: for comparison between means of two groups, Mann–Whitney *U* test for nonparametric data. *P* values < 0.05 were considered statistically significant. Statistical package for social science (SPSS) software version 15 was used. We calculated sample size of 25 patient in each group based on previous study [14] in which 21 patients were needed in each group to demonstrate a 30% difference in pain score also study by Foss et al. [15] in which 24 patients were included in each group. We increase the number to 30 patients in each group to compensate if any case excluded due to failure or difficult technique. The α-error level was fixed at 0.05 and the power was set at 90%.

3. Results

Two patients excluded from the study in E group (difficult technique) and three in the F group (one patient due to catheter dislodgment postoperative and the other two patients due to inadequate block).

Patient's characteristics and operative data showed no statistical significant difference between the two studied groups (Table 1).

Number of patients required postoperative tramadol (50 mg IV) were less in E group than F group, doses of postoperative tramadol consumed IV was statistically significantly lower in E group than F group, patient satisfaction was more in E group (Table 2).

The severity of postoperative pain at rest measured in 24 h was statistically significantly less in group E compared to group F (Table 3).

No significant difference in postoperative mean arterial blood pressure and heart rate (Tables 4 and 5).

4. Discussion

The present study demonstrated that PCEA with levobupivacaine (0.125%) is associated with satisfactory postoperative pain relief than patient controlled analgesia with fascia iliaca compartment block in patients undergoing fixation of fracture neck femur under general anesthesia.

Table 1 Patient characteristics and operative data in the studied groups. Data presented as mean ± SD.

	Group E (n = 28)	Group F (n = 27)
Age (years)	61.1 ± 3.3	60.25 ± 3.3
Gender (M/F)	10/18	10/17
ASA (II/III)	21/7	19/8
Weight (kg)	82.3 ± 2.4	83.1 ± 1.9
Height (cm)	162.1 ± 4.5	162.3 ± 5.2
Duration of surgery (min)	97.6 ± 8.5	98 ± 6.8

No statistical significant differences between the studied groups.
Group E = patient controlled epidural analgesia group, group F = patient controlled fascia iliaca.

Table 2 Number of patients requiring tramadol postoperative, postoperative tramadol consumed (mg) Patient Satisfaction. Data are presented as mean ± SD or number.

	Group E (n = 28)	Group F (n = 27)
No of patients requiring tramadol postoperative	5	9[S]
Tramadol consumed (mg)	110.00 ± 22.36	144.44 ± 39.08[S]
Patient satisfaction (good/fair/unsatisfactory)	(22/4/2)	(15/7/5)[S]

S = significantly different (P < 0.05) compared to group E.
Group E = patient controlled epidural analgesia group, group F = patient controlled fascia iliaca.

Table 3 Postoperative Visual Analogue Scale (VAS). Data presented as median and range.

VAS	Group E (n = 28)	Group F (n = 27)
First h	4 (2–4)	4 (3–5)[S]
8	2 (2–4)	4 (2–5)[S]
16	3 (2–3)	4 (2–4)[S]
24	3 (2–4)	3 (2–5)[S]

S = statistically significant (P < 0.05) deference compared to group E.
Group E = patient controlled epidural analgesia group, group F = patient controlled fascia iliaca.

Table 4 Postoperative mean arterial blood pressure (mmHg). Data presented as mean ± SD.

Time (h)	Group E (n = 28)	Group F (n = 27)
First	99.56 ± 2.5	98.35 ± 2.3
8	93.43 ± 2.3	94.26 ± 2.8
16	91.26 ± 2.7	92.36 ± 1.0
24	91.12 ± 3.0	92.00 ± 2.0

No statistical significant differences between the studied groups.
Group E = patient controlled epidural analgesia group, group F = patient controlled fascia iliaca.

In this study, levobupivacaine (0.125%) PCEA provided satisfactory postoperative pain relief, in agreement with this results the study by Casati et al. [16], showed that patient-controlled

Table 5 Postoperative heart rate (Bpm), data presented as mean ± SD.

Time (h)	Group E (n = 28)	Group F (n = 27)
First	70.20 ± 3.0	70.12 ± 1.9
8	69.10 ± 3.2	68.33 ± 4.5
16	66.00 ± 1.1	65.20 ± 2.0
24	65.23 ± 2.8	65.00 ± 2.3

No statistical significant differences between the studied groups. Group E = patient controlled epidural analgesia group, group F = patient controlled fascia iliaca group.

epidural analgesia with 0.125% levobupivacaine provided adequate pain relief after major orthopedic surgery. Also Smet [17] showed that patient-controlled epidural analgesia with levobupivacaine 0.125% provided effective postoperative analgesia after orthopaedic surgery compared to patient-controlled epidural analgesia with sufentanil and ropivacaine 0.165% and less use of opiods.

In this study, FICB group number of patients required postoperative tramadol was more than patients in PCEA group which is against previous studies and can be explained by different local anesthetic used [18,19] or different age groups [20,21].

In this study, FICB group there was no postoperative hemodynamic complications it was also approved in previous studies [19,22].

In contrast to the use of continuous epidural infusion of local anesthetics which is commonly associated with hypotention [23] in this study the use of levobupivacaine PCEA was not associated with postoperative hemodynamic complications, and we did not use opoids which may explain the hypotention with the use of PCEA in previous study after orthopaedic surgery [17].

5. Conclusion

Levobupivacaine PCEA was associated with satisfactory postoperative analgesia than patient controlled analgesia with fascia iliaca compartment block in patients undergoing fixation of fracture neck femur under general anesthesia.

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