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Taleb Hassan Abbas

Ministry of Health, Baghdad
Medical Office, Al-Karkh, Al
Karkh General Hospital,
Baghdad, Iraq

Naji Kareem Hassan

Ministry of Health, Baghdad
Medical Office, Al-Karkh, Al
Karkh General Hospital,
Baghdad, Iraq

Saadi Hameed Abbood

Ministry of Health, Baghdad
Medical Office, Al-Karkh, Al
Karkh General Hospital,
Baghdad, Iraq

The block of the crural nerve as a technique of analgesia postoperative knee surgery

Taleb Hassan Abbas, Naji Kareem Hassan and Saadi Hameed Abbood

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Abstract

Ten ASA patients 1 and 2 are being studied, aged 18 to 54 years (mean \pm SD: 37 ± 17 years) and undergoing knee surgery. At the end of the surgical procedure under general anesthesia, an epidural catheter is placed in the colorectal cavity. After radiological monitoring, a large dose of bupivacaine 0.5% epinephrine 2.5 mg \cdot kg⁻¹ was injected. A 0.125% non-adrenaline bupivacaine was maintained for 48 hours at a dose of 0.25 mg \cdot kg⁻¹ \cdot h⁻¹. The pain score measured using a visual analog scale before occlusion was 5.0 ± 1.9 . From the 6th hour to the 48th hour, it decreased significantly. The plasma concentrations of bupivacaine obtained at 24, 36, and 48 hours were significantly higher than those at 30 minutes, and 1, 6, and 12 hours. The steady-state concentration of bupivacaine was $1.78 \pm 0.59 \mu\text{g} \cdot \text{ml}^{-1}$. The clearance rate of bupivacaine was $2.59 \pm 0.91 \text{ ml} \cdot \text{min}^{-1} \cdot \text{kg}^{-1}$. No neurological complications were observed.

Keywords: Anesthesia (techniques), loco regional anesthesia, crural block anesthetics (premises), bupivacaine surgery, knee pharmacology, pharmacokinetics introduction

Introduction

The 3 in 1 block described by WINNIE allows to blocking the crural, obturator, and femoral cutaneous nerves with a single injection [18]; It's about a postoperative analgesia method proposed after knee surgery [3, 8, 11, 13]. The establishment in place a catheter allows, in the postoperative period, re-injection of local anesthetic bolus or in continuous infusion [2, 12]. Few data are known for pharmacokinetics continued and prolonged administration of bupivacaine by crural means. Only concentrations Plasma Bupivacaine until the 16th hour are known [2]. The purpose of this work is to study the pharmacokinetics of bupivacaine administered for 48 hours by crural patients after knee surgery.

Patients and methods

Ten ASA Class 1 and 2 patients undergoing ligament surgery at the knee or at the lower end of the femur were studied after the consent and the agreement of the ethics of the hospital. Patients studied are punctuated by 18 to 54 years (mean \pm SD: 37 ± 17 years old) and 56 hours 100 kg (69 ± 15 kg).

All patients benefit from general anesthesia of "swing" type during surgery. This anesthesia combines thiopental, fentanyl, vecuronium, halogenated anesthetics and a nitrous oxide-oxygen mixture (F₁₀₂ 30%). At the end of anesthesia, an 18-gauge catheter is placed in the crural space, according to the technique loss of resistance [2]. The catheter is introduced from 15 to 20 cm, in the cephalic direction and correct positioning is monitored radiologically in wakefulness by injection of 7-10 ml of iodine product (Iopamiron 200®). A hour after the exit of the operating block and quotation of the initial pain, a bolus 2.5 mg/kg - ~ bupivacaine 0.5%, adrenalin 1/200 000 e (0.5 ml \cdot kg⁻¹) is injected. A maintenance infusion is performed with bupivacaine 0.125% no adrenalized at a dose of 0.25 mg. kg⁻¹. h⁻¹ for 48h (0.2 ml. kg⁻¹. h⁻¹). Three hours after the start infusion, if analgesia is insufficient, the infusion rate can be increased by 20%. Spontaneous analgesia is side using an analogue visual scale, graduated from 0 (no pain) ~ 10 (maximum pain). The quotation of the pain is made before the injection of bupivacaine and then all the twelve hours until 48° h. In case of pain (50% increase on the visual scale), Morphine (5 mg) is injected subcutaneously. For pharmacokinetic study, venous blood samples on dry tube are made 30 rain, 1, 6, 12, 24, 36 and 48 h after the charge dose. The samples are centrifuged and the serum is frozen. Measurement of plasma concentrations of bupivacaine is carried out by chromatography in Phase gaseous [1].

Corresponding Author:

Taleb Hassan Abbas

Ministry of Health, Baghdad
Medical Office, Al-Karkh, Al
Karkh General Hospital,
Baghdad, Iraq

The average concentration at equilibrium as well as the clearance of bupivacaine are calculated. Clearance is extrapolated from the formula dividing the amount of bupivacaine infused by the plasma equilibrium concentration. Signs of toxicity, especially neurological, are research during the study. Local signs are also noted: local pains, possible urinary retention, infectious signs. At 48 hours, the catheter is withdrawn and

Culture for all patients. All values are expressed in mean value + SD. The statistical analysis by analysis of variance for repeated measures followed by a t test or Newman-Keuls test compare the evolution of pain rating and rates plasma levels of bupivacaine ($p < 0.05$ is considered significant).

Results

The results of the spontaneous pain score are schematized in Figure 1. The pain score,

About an hour after the end of the surgery and before analgesia, is 5.0 ± 1.9 . It decreases significantly from the 6th to the 48th hours. Otherwise, infusion rate of bupivacaine is increased 20% in four patients (patients 2, 3, 7 and 9). In the same way, three patients must receive 10 mg of morphine in 48 hours, a patient receives 30mg in 30h, and a last 55mg in 36h. It should be noted that in patients receiving 30 mg morphine in 30 hours, there is a leak of fluid anesthetic around the puncture orifice. The protocol is stopped for this patient 30 h. Plasma concentrations of bupivacaine are listed. Those which are obtained at 24h, 3 and 48 hours are significantly higher than the concentrations obtained 30 min, 1, 6 and 12 h. The average concentration bupivacaine ~ steady state is $1.78 \pm 0.59 \text{ mg} \cdot \text{ml}^{-1}$. The mean clearance of bupivacaine is $2.59 \pm 0.91 \text{ ml} \cdot \text{min}^{-1} \cdot \text{kg}^{-1}$. No serious neurological complications are observed. One of the patients has tinnitus 3 h after the infusion has stopped, that is 51 hours after the beginning of the protocol. The plasma level of bupivacaine this time-1h is $2.05 \text{ mg} \cdot \text{ml}^{-1}$. Four cases of catheter cultures are revealed positive (*Staphylococcus epidermidis*) without any infection in the patient. Finally, a patient has a local cutaneous reaction with erythematous eruption of the groin and lower abdomen, which motivates the end of the study at the 30th h. Finally, none Urinary retention is not observed.

Discussion

This study shows that plasma concentrations of bupivacaine, obtained during postoperative analgesia by a continuous crural block after knee surgery, are in the non-toxic, despite a slight decrease in plasma clearance of bupivacaine. The interest of this analgesia technique has been previously described by DAHL *et al.* [2] in a study comparing a control group (infusion physiological serum) and a group receiving infusion of bupivacaine; supplementation in morphine and pain scores significantly decreased in the bupivacaine group between the 2nd and the 16th ~ h. Our study, in the absence of controlled group, does not confirm analgesic efficacy; however, the scoring of scores of pain advocates analgesic action, which, together with radiological control, confirms the correct position of the catheter and the impregnation of the branches of the lumbar plexus. Moreover, the late significance of lowering the numbers pain (6th h) is related to relative weakness of the initial score (5 on average on the scale of pain), and especially ~ individual variability of this pain score. It should be noted that patients need morphine in addition to is lying; Moreover, the need to give morphine

supplement during analgesia The epidural has already been reported [10]. The patient receiving 55 mg of morphine feels a clear hypoesthesia in the femoral zone but a absence of sensory block in the cutaneous zone. If a patient receives 30 mg of morphine, this is due to the need to complete a analgesia during physiotherapy sessions active on that.

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