OPIOID SPARING EFFECT OF EPIDURAL LEVOBUPIVACAINE ON POSTOPERATIVE PAIN TREATMENT IN MAJOR SPINAL SURGERY

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Summary

Background and objective: Continuous epidural administration of a local anesthetic drug for postoperative pain treatment of patients, who undergo a fusion operation of lumbar vertebrae is limited by the suction of wound drainage. The effect of the single epidural administration of levobupivacaine 0.25% 10 mL 20 minutes before finishing of skin closure was examined on the postoperative demand for piritramide.

Methods: The study was conducted in a prospective, single blind and randomized manner. Forty patients scheduled for posterior intervertebral body fusion of two or three vertebrae were divided into two groups. Group A received levobupivacaine 0.25% 10 mL epidurally, Group B received piritramide 0.08 mg kg^{-1} i.v. Time of administration was 20 minutes before predicted finish of skin closure in both groups. Piritramide was administered intravenously to achieve a VAS of 3 or less during the phase of awakening. After regaining of co-operativity, piritramide was self administered via PCA pump. VAS and the demand of

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piritramide within 12 hours postoperative were recorded.

Results: VAS at the time of being approachable (P = 0.23), VAS at the time of regaining co-operativity (P = 0.53) and VAS 12 hours postoperative (P = 0.27) did not differ significantly. The postoperative demand of piritramide was significantly lower in Group A (0.36 ± 0.25 mg kg^{-1} vs. 0.52 ± 0.19 mg kg^{-1} in Groop B ((P = 0.026).

Conclusion: The epidural administration of levobupivacaine 0.25% 10 mL 20 minutes before finishing of skin closure effects opioid sparing in the pain treatment of patients undergoing posterior interbody fusion of two or three vertebrae.

Keywords: Anesthetics, local; levobupivacaine, opiods, piritramide; analgesia; epidural; surgical procedures, posterior lumbar interbody fusion; postoperative pain.

Introduction

Postoperative recovery from operations of vertebral fusion of the lumbar spine, is complicated by severe pain because of the new tension on the paravertebral muscles. The aim of this study was to investigate whether the late intraoperative single epidural administration of levobupivacaine[1] reduces the demand for piritramide to achieve a VAS of 3 or less within 12 hours postoperatively. A reduction of piritramide avoids apnea, nausea and vomiting[2,3]. Because of the suction of the drainage tube, a continuous administration of levobupivacaine via epidural catheter was regarded non-effective. A further aim of this study was to investigate a probable effect on postoperative blood loss, on the need of extraordinary operations caused by hematomas in the operative site and on the postoperative hospital stay.

Materials and Methods

After approval of the local Ethic Committee and written informed consent, 40 patients of both sexes ASA Grade I-III scheduled for elective

posterior interbody fusion of two (PLIF 1) or three (PLIF 2) lumbar vertebrae, were recruited on the preoperative day. A prospective randomized single blinded study was designed. In both groups anesthesia was induced with etomidate and maintained with sevoflurane and nitrous oxide, and rocuronium used for muscle relaxation. Remifentanil infusion was started prior to intubation and was stopped after skin closure.

Patients were divided in two groups based on random numbers. Patients in group A, Levobupivacaine 0.25% 10 mL[4] were given by the operating surgeon via Touhy's needle epidurally. The anatomical point of injection was the posterior epidural space of the lowest non operated lumbar vetebra. The injection was performed in caudocranial direction at least 20 minutes before the installation of the suction after finishing skin closure. Patients in group B received piritramide 0.08 mg kg^{-1} i.v. last 20 minutes[5] before the predicted finishing of skin closure. In both groups piritramide was given intravenously by the medical staff of the recovery room to achieve a VAS (0 mm = no pain to 100 mm = extreme pain) of 3 or less during the phase of awakening and by a patient controlled analgesia PCA infusion pump (Rythmic Micrel Medical Devices, Greece) after regaining adequate co-operativity[6,7]. The bolus dose was 2 milligrams and the lockout time was 20 minutes. VAS was evaluated before transfer from the recovery room to ordinary ward. VAS and total amount of piritramide was evaluated 12 hours after the end of operation.

Statistical Methods

Patients were allocated based on random numbers in order to distribute possible effects of concomitant variables in a statistically acceptable fashion. Continuous variables were tested for normality with Kolmogorov-Smirnov tests. Two-sided, independent Student t-tests were used for metric scaled and normal distributed variables, continuously and ordinal distributed variables were tested with Mann-Whitney U test. Pearson's Chi-Square test was used to analyze crosstabulation tables. Statistical significance was set at the $P < 0.05$ level. All analyses were done with STATISTICA 6.0[8].

Results

Fourty patients were analysed in this study. There were no significant differences between both study groups with regard to age, height, weight (Table 1) and to type of operation (Table 2).

Table 1
Patient characteristics in both study groups

	Levobupivacaine 0.25% 10 mL epidurally	Piritramide i.v 0.08 mg kg^{-1}	*P*
Age (years)	64.6 ± 9.3*	59.0 ± 13.6	0.14
Size (cm)	167.2 ± 8.3	170.4 ± 10.7	0.30
Weight (kg)	78.9 ± 17.6	76.5 ± 14.6	0.64

* Means ± standard deviation.

Table 2
Crosstabulation table for study group versus type of surgery

	PLIF 1	PLIF 2	Row percentages
No	15	5	20
Row %	70%	25%	100%
Yes	10	10	20
Row %	50%	50%	100%
Totals	24	14	40

No statistical significant relationship: $P = 0.2$.

The interval from the epidural injection of levobupivacaine 0.25% to the installation of the suction and the interval from the i.v. administration of piritramide 0.08 mg kg^{-1} to the installation of the suction did not differ statistically significantly (27.3 ± 5.5 vs. 28.8 ± 9.75 minutes; $P = 0.47$). The VAS did not differ statistically significantly (Table 3, 4 and 5).

Table 3
VAS at the time of being approachable

	VAS at the time of being approachable		
Levobupivacaine 0.25% 10 mL epidurally	25% percentile	Median	75% percentile
No	3.0	3.0	5.0
Yes	1.5	2.5	3.0

No statistically significant relationship: $P = 0.23$.

Table 4
VAS at the time of regaining co-operativity

	VAS at the time of regaining co-operativity		
Levobupivacaine 0.25% 10 mL epidurally	25% percentile	Median	75% percentile
No	2.0	2.5	3.0
Yes	2.0	2.0	3.0

No statistically significant relationship: $P = 0.53$.

Table 5
VAS 12 hours postoperative

	VAS 12 hours postoperative		
Levobupivacaine 0.25% 10 mL epidurally	25% percentile	Median	75% percentile
No	2.0	2.0	2.5
Yes	2.0	2.0	3.0

No statistically significant relationship: $P = 0.27$.

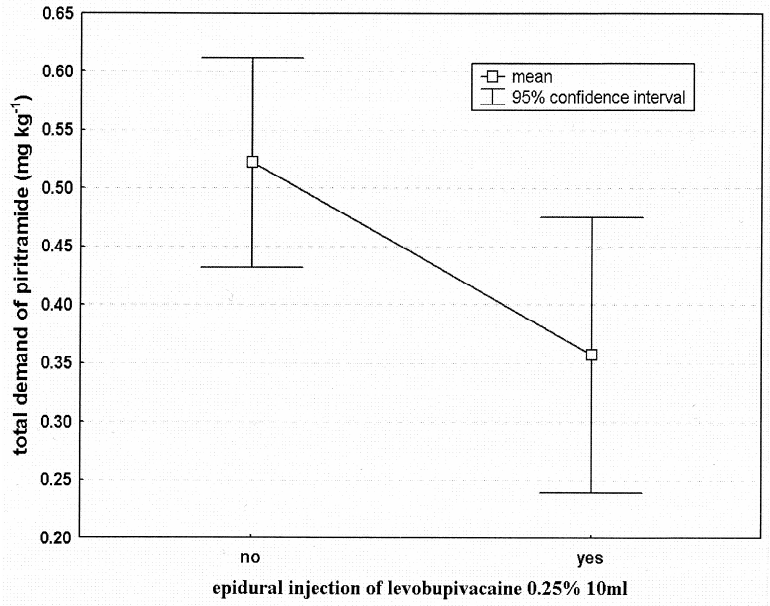
The average total demand of piritramide to achieve a VAS of 3 or less within 12 hours postoperatively, was statistically significant lower in patients who received the epidural injection of levobupivacaine 0.25% 10 mL compared with patients without administration ($P = 0.026$) (Table 6; Figure 1).

Table 6
Demand of piritramide in (mg kg^{-1})

	Levobupivacaine 0.25% 10 mL epidurally		*P*
	No	Yes	
Piritramide before finish of skin closure (mg kg^{-1})	0.08 ± 0.0	-	-
Piritramide additional to PCA pump (mg)	0.10 ± 0.07	0.10 ± 0.07	0.88
Piritramide via PCA pump (mg kg^{-1})	0.34 ± 0.2	0.26 ± 0.24	0.26
Piritramide total demand (mg kg^{-1})	0.52 ± 0.19	0.36 ± 0.25	

* Statistically significant difference.

Fig. 1
Whiskerplot with means and 95% confidence intervals of total demand of piritramide in patients with and without epidural injection of levobupivacaine 0.25% 10 mL.



The postoperative blood loss was equal in both groups (Table 7). There was no significant difference between the two groups with regard to necessity of reoperations caused by hematoma (Table 8). Postoperative hospital stay of both groups showed no significant difference (levobupivacaine treatment vs. piritramide treatment 7.5 ± 2.0 vs. 8.4 ± 3.6 days; $P = 0.72$).

Table 7
Amount of wound drainage within 24 hours postoperative

	Levobupivacaine 0.25% 10 mL epidurally		
	no	yes	*P*
Amount of wound drainage within 24 hours postoperative (mL)	340.0 ± 178.1	341.0 ± 171.2	0.99

Table 8
Reoperations caused by hematoma

	Reoperations caused by hematoma		
Levobupivacaine 0.25% 10 mL epidurally	No	Yes	Row percentages
No	1	19	20
Row %	5%	95%	100%
Yes	0	20	20
Row %	0%	100%	100%
Totals	1	39	40

No statistically significant relationship: $P = 0.43$.

Discussion

This prospective, randomized, single-blinded study shows, that the late intraoperative epidural injection of levobupivacaine 0.25% 10 mL reduces the demand of piritramide for treating pain within 12 hours postoperatively. This may contribute to avoid piritramides side effects like apnea, nausea and vomiting. A further study will be necessary to investigate whether the epidural administration of higher concentrated levobupivacaine influences the opioid sparing effect without loss of

sensomotor function. Beyond that, this study shows that the late intraoperative epidural administration of levobupivacaine 0.25% 10 mL does not influence postoperative blood loss. This finding may interfere with a former study of finding Kakiuchi who found out that epidural blockade reduces intraoperative bleeding[9]. Furthermore there was neither an effect of the investigated treatment on the necessity of reoperation, nor on duration of hospital stay.

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