

TITLE: EVALUATION OF BUPIVACAINE AND FENTANYL EPIDURAL ANALGESIA FOR EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL)

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Introduction

ESWL (Dornier HM3 apparatus) in awake patients requires a delicate balance of effective analgesia, restricted stone movement to 7mm or less and minimal motor blockade. Segmental blockade to T₆ or above, is necessary and this may cause arterial hypotension, especially with distal ureteric stones (DUS) which require an erect sitting posture. Evidence suggests that mixtures of epidural local anesthetics and opiates may be more successful than local anesthetics alone, for enhancing analgesia (1). We assessed the efficacy of mixtures of bupivacaine (B) 0.125, 0.25 and 0.5% with and without epinephrine (E) and fentanyl (F) as adjuvants for analgesia in ESWL for renal and distal ureteric stones.

Methods

331 consenting and unpremedicated patients for ESWL under epidural analgesia were allocated to 10 test groups of 30 or more patients. Any group was closed if a total of 3 patients experienced pain at any time during ESWL treatment. Test groups were as follows: (1) B 0.125% + F 100mcg. (2) B 0.125% + F 100mcg + E 2.5mcg/ml. (3) B 0.25%. (4) B 0.25% + F 100mcg. (5) B 0.25% + E 5 mcg/ml. (6) B 0.25% + E 5mcg/ml + F 100mcg. (7) B 0.25% + I.V. F 100 mcg. (8) B 0.25% + E 5 mcg/ml + I.V. F 100 mcg/ml. (9) B 0.5% + F 100 mcg. (10) B 0.5% + E 5mcg/ml + F 100 mcg.

Epidural puncture was made between T₈ - L₁ for renal stones and T₁₂ - L₃ for DUS. Epidural F was injected as a 2ml bolus via the epidural catheter 5 - 10 minutes after administration of the local anesthetic mixture. Hypalgesia to ice and pinprick was carried to T₆ or higher. All patients received an I.V. crystalloid preload of 7-10 ml/kg immediately prior to blockade. Sedation was provided with diazepam I.V. 0.06 - 0.3mg/kg as required after immersion in the water bath. Observations were made of sensory segmental spread, dose requirements, stone excursion, motor blockade of the legs 60-75 minutes after induction, and incidence of arterial hypotension to 25% below resting systolic pressure. Hypotension was treated with I.V. fluids and vasopressors as required. Patient satisfaction was scored on a scale of 0-10. Data were analyzed by analysis of variance with correction for multiple comparison of means. The Chi-square test was used for qualitative data.

Results

Average bupivacaine dose requirements for renal stones were 62.5± 1.8mg for 0.5%, 45± 1.7mg for 0.25% and 33.5± 1.5mg for the 0.125% solution. Approximately 25% more bupivacaine was required for DUS. The incidence of pain and arterial hypotension are shown in Table 1. Renal stone excursions in 232 patients with freely mobile kidneys are shown in Figure 1, compared to 20 patients receiving G.A. and IPPV. Mild sedation with diazepam I.V. after epidural blockade, rapidly reduced stone movement by about 50%. Completely successful analgesia and

patient satisfaction were obtained in Groups 2, 6, 9 and 10 for renal stones. 0.5% bupivacaine (Groups 9 and 10) was not used for DUS because of posturing difficulties due to a high incidence of motor block. Significant arterial hypotension did not occur with 0.125% bupivacaine.

Conclusions

Effective analgesia for ESWL was provided by low concentrations of bupivacaine when epinephrine and fentanyl were used as epidural adjuvants. The side effects of motor blockade and arterial hypotension were least apparent with the 0.125% bupivacaine. However, the 0.25% solution may be more reliable for DUS which usually demand higher shock-wave energy than renal stones. Diazepam is an important accessory drug to epidural blockade for reduction of renal stone excursion. The respiratory effects of diazepam under these conditions are undergoing further study.

Reference

- Hjortso NC, Lund C, Morgensen T, Bigler D, and Kehlet H. Anesth. Analg. 65:1033, 1986.

Table 1. Incidence of pain, hypotension and observed motor block in 331 patients

Group n	Pain Incidence			Incidence of Hypo-tension	Incidence of Observed Motor Block
	Renal Stones	Distal Ureteric	Stones		
1	9	3/9	-	0/9	0/9
2	53	0/46	1/7	0/53	0/53
3	12	3/11	0/1	1/12	0/12
4	30	3/28	0/2	5/30	4/28
5	35	0/31	1/4	3/35	0/35
6	70	0/59	0/11	8/70	7/50
7	30	2/29	0/1	7/30	0/30
8	30	1/28	0/2	4/30	0/30
9	30	0/30	-	3/30	5/22
10	32	0/32	-	6/32	10/20

