TOPICAL ANAESTHESIA FOR EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY

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SUMMARY
We have investigated 60 patients in a prospective double-blind, placebo-controlled study to assess the efficacy of EMLA (Eutectic Mixture of Local Anaesthetics) cream to provide analgesia during extracorporeal shock wave lithotripsy (ESWL) with a second generation lithotriptor. Before operation, EMLA or placebo cream was applied to the patient's back at the anticipated shock head-skin interface. During the procedure increments of fentanyl 0.5 μg kg⁻¹ were given i.v. on patient demand. There was no significant difference (P = 0.83) in the dose of fentanyl given to each group. We cannot recommend, therefore, the use of EMLA cream as an analgesic during ESWL with a second generation lithotriptor.

KEY WORDS
Anaesthesia: topical. Surgery • extracorporeal shock wave lithotripsy.

Over the past decade, extracorporeal shock wave lithotripsy (ESWL) has been developed and used extensively in the management of urinary tract stones. With the first generation lithotriptors, it was necessary for patients to have general, extradural or spinal anaesthesia [1]. The changed physical parameters of shock wave generator energy and focusing devices of the more recent second generation machines, such as the Storz Modulith SL 20, have reduced the need for general or regional anaesthesia. Patients may be managed now using neuroleptic techniques or i.v. analgesia alone [1]. As these patients are usually managed as outpatients, it would be advantageous to keep the level of sedation to a minimum without compromising patient comfort.

The aim of this study was to investigate if the application of the topical anaesthetic cream, Eutectic Mixture of Local Anaesthetics (EMLA), to the skin area exposed to the shock wave, reduced the analgesic requirement for fentanyl during ESWL.

METHOD AND RESULTS
The study was approved by the Hospital Ethics and Drugs committee. Informed written consent was obtained from each patient who agreed to take part in the study.

We studied 60 patients of physical status ASA I or II, with uncomplicated renal calculi and undergoing ESWL for the first time.

Astra Pharmaceuticals provided 60 identical, 60-g tubes, numbered from 1 to 60. Fifty percent of the tubes contained EMLA cream and the other 50% contained a placebo cream. The order of tubes had been distributed randomly by the company.

The patients were admitted as outpatients and numbered consecutively from 1 to 60. A 400-cm² area was demarcated on the patient's back at the anticipated site of the shock head coupling. One hundred minutes before the expected start of the procedure, 60 g of cream was applied to the area and covered by an occlusive dressing. The cream and occlusive dressing were left in place throughout the procedure. No other premedication was given.

The patients were positioned supine on the lithotripsy machine and the stone localized by fluoroscopy and ultrasound. The shock head was positioned such that the shock head-skin interface was over the demarcated area. Care was taken to ensure that air was not trapped at the interface. An i.v. infusion of compound sodium lactate solution 1 litre was commenced and metoclopramide 10 mg given i.v. Each patient was monitored with pulse oximetry, ECG and non-invasive arterial pressure.

ESWL was commenced at a generator voltage of 12 kV. The generator voltage was increased to 18 kV or 19 kV over the first 250 shocks and maintained at these values for the remainder of the procedure. The patients were advised to request analgesia if they experienced discomfort or pain. If they requested analgesia, they were given fentanyl 0.5 μg kg⁻¹ i.v. and this dose was repeated as required throughout the procedure. Supplementary oxygen was given if necessary.

The EMLA cream was regarded as being effective if the dose of fentanyl was reduced by 50%. Statistical significance (P < 0.05) was tested using Student's t test.

The two groups were comparable in age, sex distribution, weight and height. Two patients were excluded from the placebo group because at operation it was found that their stones had passed into the ureter. There was no significant difference...
ESWL was from the skin surface. This is supported by the fact that a large element of the pain experienced during ESWL is described initially as a sharp stinging pain at the skin, which intensifies to a "thumping" sensation as the energy increases. On examining the charts of patients, there is almost invariably an area of erythema, sometimes petechiae and occasionally bleeding over the area of skin through which the shock wave passes. We speculated, therefore, that a large element of the pain experienced during ESWL was from the skin surface. This is supported by other workers who have successfully used local infiltration of the skin to reduce the amount of systemic analgesia needed during ESWL [2].

The topical anaesthetic, EMLA cream, has been used successfully for painless venepuncture, removal of condylomata acuminata and harvesting of split skin grafts. It has been shown that, after an application time of 90 min, skin analgesia to a depth of greater than 4 mm can be achieved [3, 4]. Using ultrasound, Fornage and Deshayes determined the mean dermal thickness over the back to be 3.6 (0.5) mm [5]. Hence, if a large element of the pain experienced during ESWL is at the skin surface, we postulated that EMLA cream should reduce the amount of systemic analgesia required during the procedure.

Our study has shown that, when compared with placebo, EMLA cream did not reduce the amount of systemic analgesia required during ESWL with the Storz Modulith SL 20. This is in contrast with a similar study by Bierkens and colleagues [6], who showed that EMLA cream reduced fentanyl requirements during ESWL, but not significantly. However, they used a Siemens Lithostar, and even in their placebo group only 53% of patients required fentanyl, in a mean dose of 0.98 μg kg⁻¹. In comparison, 96% of our placebo group required fentanyl in a mean dose of 3.1 μg kg⁻¹. This highlights the variable anaesthetic requirements for ESWL with the different second generation machines.

We conclude that the pain experienced during ESWL with the Storz Modulith SL 20 is at a level deeper than the skin surface. The pain may be caused by stone movement, impingement of the shock wave on the peritoneum or renal pelvic tissues or, in occasional patients, from the shock wave accidentally hitting the 12th rib. Thus we cannot recommend topical anaesthesia for lithotripsy with the Storz Modulith SL 20.

**Acknowledgements**

We thank Astra Pharmaceuticals for providing the EMLA and placebo cream and Mr M. K. Bulsara, of the University of Western Australia, for statistical analysis of the data.

**References**