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Sticks and Stones: Use of Acupuncture in Extracorporeal Shockwave Lithotripsy

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ABSTRACT

***Background and Purpose*: Extracorporeal shockwave lithotripsy (SWL) is an effective noninvasive, outpatient method of stone clearance. In our unit, it is performed using a combination of oral analgesia and intravenous sedation, which allows us to treat to therapeutic levels in the vast majority of our patients. However, we have encountered patients who do not tolerate various elements of the analgesia protocol and thus cannot be treated to full effect. The options for these people are currently limited to either SWL under formal sedation or epidural or general anesthetic or the use of another technique of stone clearance, such as percutaneous nephrolithotomy, which may not be as appropriate, and again necessitates an anesthetic, an inpatient stay, or both.**

***Patients and Methods*: We describe three patients who had previously failed SWL who received acupuncture in place of standard analgesia prior to the next treatment.**

***Results*: All three patients were able to tolerate the procedure better and were treated at a higher level with more shocks than in the previous session. No side effects were noted.**

***Conclusions*: We propose that acupuncture may be considered in patients unable to take standard sedoanalgesia. It is a cost-effective, safe method of inducing sedation with analgesia and had no demonstrable side effects in our series. It provides an attractive alternative to the use of general or regional anesthetics in these patients.**

INTRODUCTION

EXTRACORPOREAL SHOCKWAVE LITHOTRIPSY (SWL) is the recommended first-line therapy for small renal and upper-ureteral stones, but its use can be limited by pain. In our unit, SWL is performed under sedoanalgesia in the outpatient setting using a combination of analgesia and intravenous benzodiazepine. Sedoanalgesia is a well documented method of analgesia in these patients, as it produces effective pain relief without compromising recovery time or producing long lasting side effects.[1] In our unit, this practice allows the large throughput of patients necessary to provide an efficient service to our catchment area.

Whilst this method can be very effective, it poses a problem for those patients intolerant of the medications. Traditionally, these patients would have required other forms of anesthetic, such as intravenous propofol and fentanyl, intrathecal infusions, or general anesthetic, with all their attendant risks, to achieve the same outcome.[2] The eutectic mixture of local anaesthetic (EMLA) cream has been utilized but has been reported as needing supplemental analgesia administered via patient-controlled pump.[3] As our institution operates a service without an anaesthetist available, these methods were not appropriate, and therefore, we became interested in less traditional forms of analgesia.

The ancient Chinese art of acupuncture has been utilized in various aspects of medicine, both for its sedative and analgesic properties and for symptom relief.[4] However, one study[5] has failed to demonstrate utility for it in the acute pain setting. The technique may have local, central, and placebo effects. Acupuncture points, muscle trigger points, and motor end-plates are very similar. Locally, intramuscular movements of the needle cause insertional activity, or depolarization of innervated sin-

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gle or grouped muscle fibers. These are micro-twitches, and the effect can be enhanced by electrostimulation of the needles using a pulse generator. These twitches produce micro-stretch effects on the muscle fibers nearby, thus reducing the local pressure on pain-sensitive structures such as intramuscular nerves and blood vessels.[6] The technique also has a central effect, wherein pressure on peripheral acupuncture points activates the antinociceptive system including the endogenous opiate system,[7] certain brain nuclei, modulators, and neurotransmitters through the descending inhibitory pathway,[8] leading to analgesia. We demonstrate here the use of acupuncture as a therapeutic tool, describing three patients who were unable to tolerate our standard sedoanalgesia protocol and were subsequently treated to therapeutic levels of SWL using acupuncture only.

PATIENTS AND METHODS

Our standard sedoanalgesia protocol uses a combination of oral paracetamol (acetaminophen), codeine, and piroxicam, administered 30 minutes before the procedure, and up to 5 mg of intravenous midazolam and 100 mg of pethidine (meperidine) with 10 mg of metoclopramide immediately prior to the treatment. This allows us to treat most individuals to therapeutic levels.

The three patients described here all underwent treatment using our standard protocol but suffered attendant problems, namely allergies to several of the components of the sedoanalgesia protocol (Case 1), intolerance of the drugs (Case 3), or extreme pain despite maximal doses of sedoanalgesia (Case 2) (Table 1). In all cases, the procedure had to be aborted, and hence, no stone fragmentation occurred. As each of the three patients had previously failed our sedation protocol, they served as their own controls for the purposes of the study.

All patients were treated with acupuncture by an anesthetic consultant with a special interest in this area. Acupuncture needles were inserted into the points half an hour prior to commencing treatment and were stimulated with an electroacupuncture pulse generator set to 4 Hz. The needles were inserted to stimulate the region innervated by T_{10}–L_2, namely, in the midline, four fingerbreadths below the umbilicus (CV4), three fingerbreadths lateral to the center of the umbilicus bilaterally (ST25), and two fingerbreadths lateral to the lower border of the tip of the spinous process of L2 and L4 bilaterally (BL23 and BL25). The needles remained in place throughout the treatment and were removed immediately afterward. No additional sedation or analgesia was used.

RESULTS

In all cases, acupuncture was beneficial for these patients. Comparison of the lithotripter level, shock rate, and shock number with those of the initial treatment under sedoanalgesia showed the better treatment parameters available with acupuncture (Fig. 1). In addition, each patient was contacted and asked the following question: *If you have to have shockwave lithotripsy in the future, which type of anesthesia would you prefer?* They were given the choice of general anesthetic, epidural or spinal anesthetic, sedoanalgesia or acupuncture. Patients 1 and 2 both said they would be happy to have treatment with acupuncture, while Patient 3 said she would prefer a general anesthetic.

Patient 1 is having SWL treatment with paracetamol analgesia and acupuncture on a monthly basis. The stone is partially fragmented at present. Patient 3 was treated with one further session of SWL with acupuncture 2 weeks later, but a percutaneous nephrolithotomy was subsequently performed because of the lack of significant stone fragmentation. Patient 2 had two further sessions of SWL with acupuncture a month apart and has been rendered stone free.

DISCUSSION

As the public become more educated with regard to their own health, they are beginning to question, and rightly so, the need for and side effects of medications prescribed to them. Shockwave lithotripsy is an outpatient technique in most centers, and our sedoanalgesia protocol, although effective in our experience, is a powerful cocktail of sedative and opioid analgesics with potentially significant side effects. For example, piroxicam may precipitate acute asthma attacks in those susceptible,[9] and both opioids and midazolam can produce marked respiratory depression,[10] particularly when they are given in combination.[11] Although these effects may be completely reversed by flumazenil,[12] many SWL units, our own included, are staffed by radiographers together with specialist nurses or junior physicians, who may have little or no experience in managing acute airway problems. In our unit, there is no anesthetic supervision, and so other sedoanalgesia protocols including, for example, propofol, are inappropriate, as it would be reasonable to state that these procedures should not be undertaken without an experienced anesthetist available. However, the use of acupuncture has not been documented to have any of these side effects. Whilst it would be necessary to have available a pro-

Table 1. Characteristics of Patients

	Stone size (mm)	*Density*	*Location*	*Habitus*	*Medical issues*
1	12 × 5	Cluster	L lower pole	Obese	Asthma, angina, osteoporosis, allergic to opiates
2	3 × 2	Dense	R upper pole	Slim	Asthma
3	25 × 12	Dense	R middle calix	Slim	Asthma, anxiety

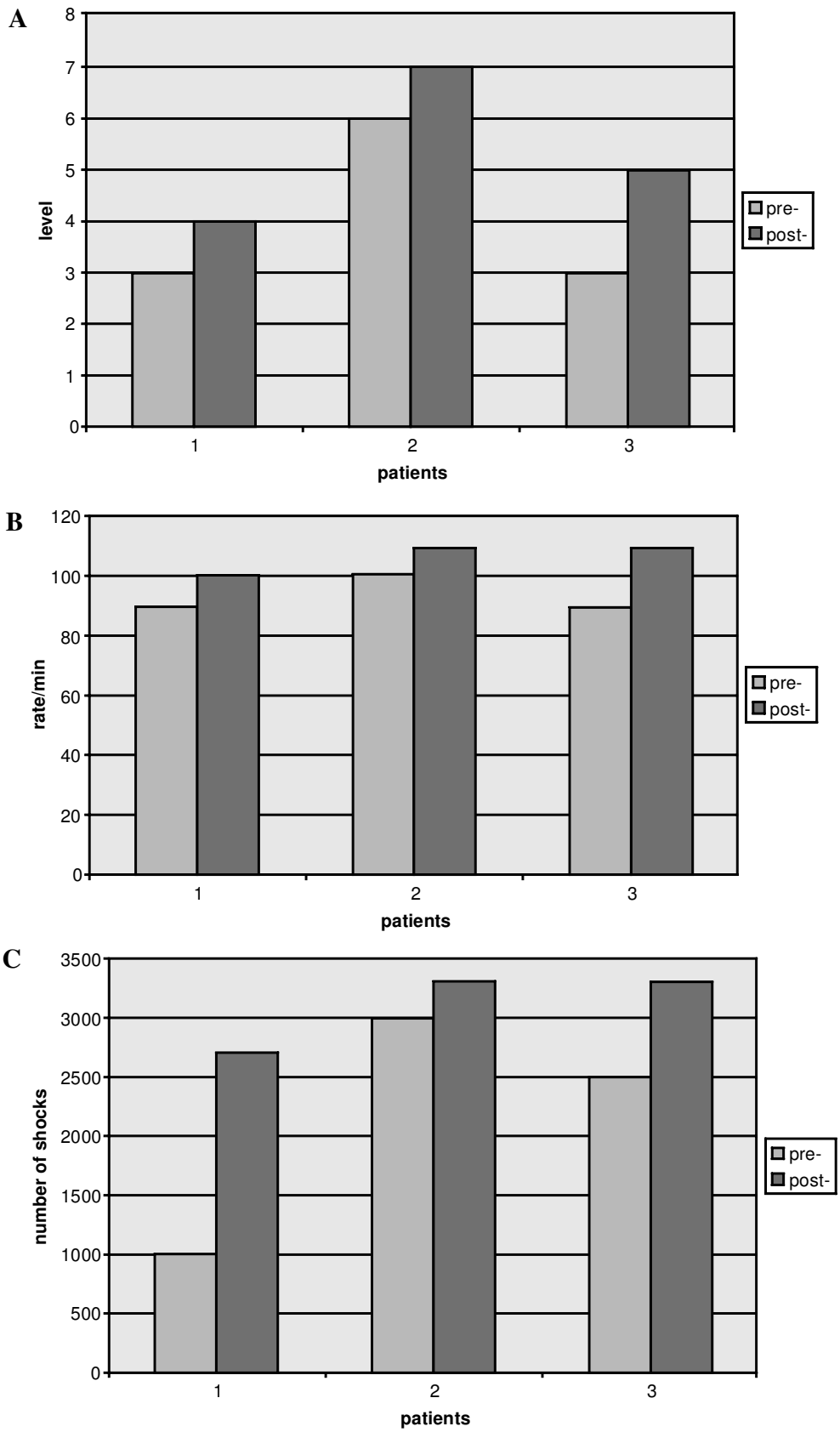

FIG. 1. Changes in treatment parameters from sedoanalgesia to acupuncture sessions. **(A)** Level of SWL treatment. **(B)** Rate of shockwave delivery. **(C)** Total shocks.

fessional to place the needles, the risks to the patient in terms of hypersensitivity or airway complications are nonexistent. More work has recently been performed looking at the use of acupuncture in labor,[13] as well as in other acute pain settings,[14] where it had more analgesic effect than placebo, and it is hoped that this interest will expand the use of acupuncture in the medical profession.

We are aware that we are reporting on very few patients, but we believe that the results shown here demonstrate that acupuncture may be effective in the acute pain setting and should be considered in appropriate patients, such as the three described here. We also accept that it is difficult to compare the two treatments directly, as by the second session, the stone had already been partially treated, and hence the stone status was not exactly the same prior to each session. We do not propose that acupuncture is a technique suitable for all, merely one that should be offered to people who would not otherwise be suitable for outpatient SWL services or those who request it. Our results show that good outcomes can be achieved, and a formal randomized study is planned at the unit to fully evaluate this technique.

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