

# Acupuncture for Pain in Extracorporeal Shockwave Lithotripsy

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## ABSTRACT

**Background and Purpose:** In most cases, analgesia is required for extracorporeal shockwave lithotripsy (SWL) treatment. Commonly, a combination of a sedative and a synthetic opioid is used, with a wide range of undesirable side effects. To provide an alternative analgesic especially for outpatients, we performed a prospective trial investigating the usefulness of acupuncture.

**Patients and Methods:** A series of 90 patients were included in the study, 49% of whom presented with renal calculi and 10% with proximal-, 10% with middle-, and 31% with distal-ureteral stones. Pain control was performed by acupuncture in the traditional Asian method. The intensity of pain and patient satisfaction were assessed a visual analog scale (VAS). Patients with previous SWL under conventional analgesia also were asked about differences in pain and satisfaction.

**Results:** No significant side effects occurred. The median pain score on the VAS was 2/10 (interquartile range 1). Six patients (6.6%) specified a pain intensity of >4, and in 4 patients (4.4%), a conventional analgesic had to be given to finish SWL. The median satisfaction level was 2/5 (interquartile range 1). Nearly all (93.4%) of the patients would opt again for acupuncture in case of repeated SWL.

**Conclusion:** In many patients, acupuncture achieves satisfactory pain control for SWL. Further randomized multi-institutional studies are needed to confirm this conclusion.

## INTRODUCTION

EXTRACORPOREAL SHOCKWAVE LITHOTRIPSY (SWL) revolutionized urologic stone therapy after first being described by Chaussy and associates in 1980.<sup>1</sup> At present, this procedure is, beside endourologic procedures, the therapy of choice in the treatment of renal and ureteral calculi.<sup>2</sup> Unfortunately, SWL is not a completely pain-free procedure. The development of modern lithotripters brought some improvement, but in most cases, analgesia is still necessary. The method of analgesia is the subject of clinical discussions and shows a substantial range of possibilities.<sup>3-5</sup> A weight- and age-adapted combination of a sedative and a synthetic opioid is favored.<sup>6,7</sup> However, both of these medications show a wide range of side effects. To achieve satisfactory analgesia with adequate dosage, continuous monitoring is necessary to avoid respiratory depression and circulatory collapse, and all patients are restricted in their driving ability and mental competence for several hours. These complications and effects frequently imply that outpa-

tients who have to practice their professional activity shortly after SWL have the therapy carried out without analgesia. Looking for an alternative analgesic without the above-mentioned side effects, we performed this prospective study to examine the effectiveness of acupuncture as analgesia during SWL.

## PATIENTS AND METHODS

### Patients

All patients who presented consecutively to our department with urinary stones except those with urinary tract infections or blood coagulation disorders were offered acupuncture instead of intravenous analgesia for SWL. The 90 patients who consented after receiving precise information were included in this trial. Their average age was 51.7 years (range 23–67 years), and 26 (29%) were women and 64 (71%) men. Almost half of the patients (49%) had renal calculi, while 10% had proximal-, 10% middle-, and 31% distal-ureteral stones.

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### Stone localization and fragmentation

Preoperative stone localization was performed according to international guidelines with ultrasound and intravenous urography. For SWL, a Multi-Line Lithostar lithotripter (Siemens, Erlangen, Germany) with radiologic- and ultrasound-guided detection was used. Renal stones and stones in the proximal ureter were treated with a maximum of 4000 impulses at a maximum of 18.2 kV. Middle- and distal-ureteral stones were treated with up to 5000 impulses and a maximum energy of 21 kV.

### Technique of acupuncture

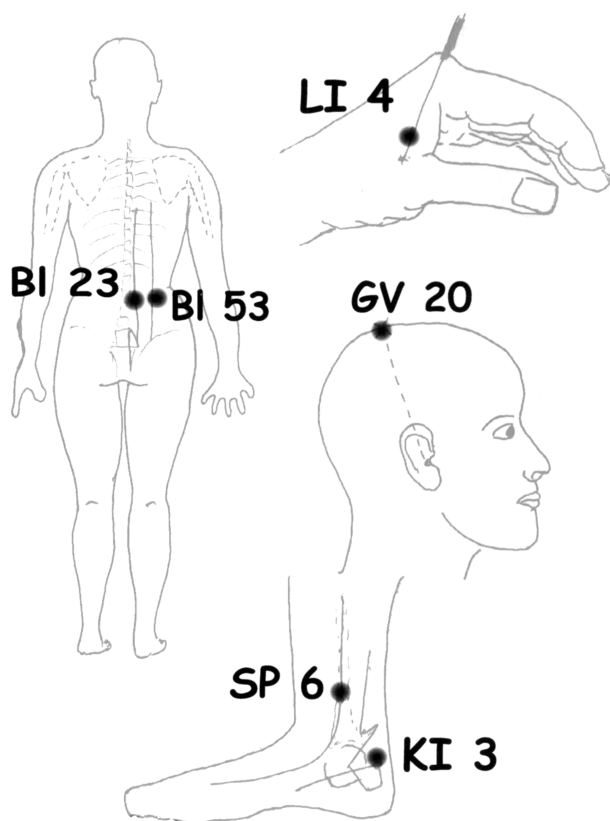
Acupuncture was performed by urologists experienced in the technique. In Germany, certification is necessary to perform acupuncture in clinical practice, with certification requiring at least 120 hours of theoretical education and 80 hours of practical teaching. The placement of the acupuncture needles took <5 minutes in all cases. Sterile single-use, thin (0.3 × 30-mm), solid, stainless-steel needles (Seirin) were used, being inserted at a 45° to 90° angle into the acupoints in the musculature until the “De Qi,” a feeling of numbness and tingling within the range of the acupoint, was achieved. The depth of the needles depended on the location of the acupoint and the individual thickness of the subcutaneous tissue. The average depth of insertion was about 1 to 2 cm. By manual rotation of the needles, intermittent stimulation was delivered until the beginning of the SWL. The needles remained *in situ* for the entire duration of SWL and then were removed.

The selection of the acupoints was carried out in cooperation with Professor Sohn, Chief of the Department for Traditional Asiatic Medicine, Wong Kwang University, Sinyong Dong Iksan, South Korea, and the first Chairman of the Korean Society for Traditional Asiatic Medicine. The number of needles used was standardized to the nine traditional points (Fig. 1). All acupuncture points are generally considered either for analgesia, especially of the lower back (Large Intestine 4 [LI 4], Governing Vessel 20 [GV 20], Urinary Bladder 23 [BL 23], Urinary Bladder 52 [BL 52], Kidney 3 [KI 3]), or for anxiety-related disorders (Spleen 6 [SP6]) (Table 1). If patients reported intolerable pain, conventional analgesia was performed with an intravenous infusion of piritramide 0.1 mg/kg and midazolam 0.03 mg/kg.

For assessing pain intensity, a linear 10-cm (range 0–10) visual analog scale (VAS) (0 = no pain; 10 = maximum intolerable pain) was used.<sup>8</sup> The VAS is a validated instrument for assessing pain and has been used in various trials concerning pain in SWL as well as in acupuncture treatment.<sup>9</sup> Patient satisfaction was evaluated on a scale of 0 to 5 (0 = very well, 3 = moderately, 5 = not at all). The degree of pain and satisfaction was recorded 10 minutes after the treatment. In addition to these data, both the time needed to reach the maximum energy and circulatory function were ascertained during treatment. The data of 10 patients who underwent previous SWL under conventional analgesia were evaluated separately.

### Statistics

All statistical analyses were performed by Microsoft Excel 2000. For valid comparability, we used the median and the interquartile range.



**FIG. 1.** Location of acupoints BI 23, BI 52, Governor Vessel 20, and symmetric acupoints SP 6, KI 3, and LI 4. Acupoints BI 23 and BI 52 are located on same side as stone.

## RESULTS

During and after SWL, no cardiovascular abnormalities or severe side effects were observed in any patient. The median blood pressure readings were 141/85 mm Hg before treatment, 139/84 mm Hg during SWL, and 140/82 mm Hg after the treatment. As side effects, only mild pain sensations were indicated at the moment of insertion of the acupuncture needles and during the time of stimulation. The average pain intensity during SWL was 2 (interquartile range 1) on the VAS. Six patients (6.6%) indicated a pain level of  $\geq 4$ . Because of intolerable pain in 4 patients (4.4%), SWL had to be continued under conventional analgesia. Patients reported their satisfaction with acupuncture in 44.5% (N = 40) of the cases as very good (0 on the satisfaction scale), in 43% (N = 39) as good (1 or 2 on the scale), in 10% (N = 9) as moderate (3 on the scale), and only in 2.5% (N = 2) as bad (4 or 5 on the scale). The median satisfaction level was 2 (interquartile range 1).

Most of the patients (93.4%) expressed willingness undergo any necessary repeated SWL under acupuncture as analgesia. Of 10 patients who previously underwent SWL under conventional analgesia, 3 judged the acupuncture “better” pain therapy, 5 “equivalent” to the conventional analgesia, and 2 “worse.” Four of these patients, who underwent previous SWL without any analgesia, assessed acupuncture as an improvement.

TABLE 1. EFFECT AND LOCATION OF ACUPUNCTURE POINTS USED

<i>Acupuncture point</i>	<i>Description</i>	<i>Effect</i>
Urinary Bladder 23 (BL 23)	1.5 cm lateral to GV 4, level with L2	BL 23 is a main point for acute or chronic low back pain and strains. The kidney is stimulated by tonifying the yin, thereby increasing diuresis
Urinary Bladder 52 (BL 52)	3 cm lateral to GV 4, level with L2	A point to reinforce the KB Back Shu (BL23)
Large Intestine 4 (LI 4)	In middle of 2nd metacarpal bone on radial side	LI 4 is believed to influence Qi and the blood. Traditional Asian medicine maintains that strong movement of Qi and blood in body alleviates pain
Spleen 6 (SP 6)	3 cm directly above tip of medial malleolus on posterior border of tibia	Should affect anxiety-related disorders and is frequently used in urinary disorders
Governing Vessel 50 (GV 20)	5 cm above midpoint of anterior hairline	Generally considered to be an analgesic point
Kidney 3 (KI 3)	In depression midway between tip of medial malleolus and attachment of Achilles tendon	For acute lower back pain. Kidney is stimulated by tonifying the yin, thereby increasing diuresis

## DISCUSSION

Sufficient analgesia is necessary for SWL, taking into consideration the requirements of an ambulatory treatment. In the literature, different pain concepts are described, which obtain almost equivalent results. Issa and associates<sup>10</sup> compared the effectiveness of three analgesic protocols: morphine sulfate, ketorolac tromethamine, and topical lidocaine/prilocaine. No statistically significant difference was found among these agents, but morphine was more likely to cause the well-known symptoms of oversedation, nausea, and vomiting. Similar results were shown by Chia and Liu,<sup>11</sup> who compared fentanyl, tramadol hydrochloride, and tenoxicam and showed that there was no difference in analgesia. In the fentanyl-treated group, a decrease in oxygen saturation and the already-described digestive problems were observed. The average pain intensity reported in the literature ranges from 1.5 to 2.5 on the VAS depending on the drug combination.<sup>12</sup> In our study, a similar result could be achieved, with a score of  $1.77 \pm 0.94$ . This is confirmed by the high patient satisfaction level: 87.5% of the patients assessed the procedure as good or very good, and 93.1% of the patients would repeat SWL under analgesia with acupuncture.

Nonetheless, the effectiveness of acupuncture is frequently doubted in our Western culture even though its use is increasing. The effect of acupuncture as analgesia depends on various factors. First, there is the placebo effect and a suggestion effect ("physician as a drug") that takes place in every treatment and medication. These subjective effects cannot be measured. On the other hand, an experimental biochemical effect has been reported.<sup>13</sup> Biochemical, immunohistochemical, molecular biologic, and neurophysiological investigations show that the short-term effects of acupuncture could be obtained by activat-

ing the endogenous opiate-mediated antinociception and the descendant pain-restraining system.<sup>14</sup>

Nevertheless, the acupuncture technique is subject to a large range of variations. Campbell<sup>15</sup> mentions the variety of point selection, methods, and duration of needling that exist among acupuncturists. Most decisive is the experience of the person performing the acupuncture. The positive results of this study are a reason for further investigations in randomized trials. At present, we cannot conclude that acupuncture is generally equivalent to conventional analgesia. Our study would not allow this conclusion even if the same measuring instruments had been used, because we did not randomize the patients. But it has to be taken into account that every pain sensation has subjective influences regardless of the kind of analgesia. Considering this fact, we can conclude that acupuncture is an appropriate alternative, side effect-free, pain therapy for selected SWL patients with appropriate acceptance of the method.

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