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Editorial Board Member of *World Journal of Clinical Cases*, Guoping Zheng, MD, PhD, Associate Professor, Faculty of Medicine and Health, Sydney Medical School-Westmead Clinical School, The University of Sydney, Sydney 2145, Australia. [guoping.zheng@sydney.edu.au](mailto:guoping.zheng@sydney.edu.au)

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## Observational Study

# Wrist-ankle acupuncture combined with pain nursing for the treatment of urinary calculi with acute pain

Li-Mei Wu, Qian Liu, Xiao-Hua Yin, Li-Ping Yang, Jun Yuan, Xiao-Qi Zhang, Yan-Li Wang

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## Abstract

### BACKGROUND

Urological calculi often cause renal colic, which is characterized by paroxysmal or persistent severe pain in the upper abdomen or lumbar region. Development of methods to quickly relieve these pain symptoms has garnered clinical attention. Wrist-ankle acupuncture is a type of floating acupuncture therapy administered at selected points in the carpal and ankle areas, and it has good pain-relieving effects. We used wrist-ankle acupuncture combined with pain nursing for pain intervention in patients with renal calculi to confirm its application and safety.

### AIM

To study the effect of wrist-ankle acupuncture combined with pain nursing in the treatment of urinary calculi with acute pain.

## METHODS

Eighty-two patients with urinary calculi with acute pain as the first symptom followed at our hospital from November 2019 to June 2021 were enrolled in the study and classified into two groups according to the odd and even numbers of the visit sequences, each with 41 cases. The control group received a routine nursing intervention and intramuscular injection of nonsteroidal anti-inflammatory drugs, whereas the observation group received pain management nursing and wrist-ankle acupuncture. Subsequently, the pain-relieving effect was compared between the two groups.

## RESULTS

The score on the visual analog scale (VAS) at 24, 48, and 72 h postintervention was decreased in both groups compared with the baseline data; moreover, the observation group scored significantly lower than the control group on the VAS at each time point after the intervention ( $P < 0.05$ ). The clinical efficacy at 24 h postintervention was not significantly different between the two groups ( $P > 0.05$ ). In turn, the pain recurrence rate at 72 h postintervention was lower in the observation group compared with the control group ( $P < 0.05$ ). Finally, the nursing satisfaction rate in the observation group was significantly higher than that observed in the control group ( $P < 0.05$ ). No serious adverse reactions occurred during the treatment and the safety of treatment was high in both groups.

## CONCLUSION

Wrist-ankle acupuncture combined with pain nursing for treating urolithiasis with acute pain effectively alleviated the degree of pain and reduced the recurrence rate, which was worthy of clinical application.

**Key Words:** Urinary calculi; Renal colic; Wrist-ankle acupuncture; Pain nursing; Acute pain; Therapeutic effect

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**Core Tip:** In this observational study, the control group underwent conventional nursing intervention with pharmacological analgesia, whereas the observation group underwent wrist-ankle acupuncture combined with pain nursing. Wrist-ankle acupuncture combined with pain nursing could rapidly relieve the pain symptoms and reduce the pain recurrence rate in patients with urinary calculi, and it also significantly improved patient satisfaction with care.

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## INTRODUCTION

Urinary calculi often cause renal colic, which is specifically characterized by paroxysmal or persistent severe pain in the upper abdomen or waist. The pain probably also spread to the groin, testis, and labia [1,2]. Renal colic is most commonly the first symptom of urinary calculi. The pain may last from several minutes to several days and is frequently accompanied by nausea, sweating, and even shock [3]. Methods to effectively relieve pain symptoms within a short time have always been the focus of the clinical management of patients with urinary stones. Wrist-ankle acupuncture is a kind of floating needling therapy by selecting acupoints at the wrist-ankle. Currently, wrist-ankle acupuncture is used in obstetrics, orthopedics, malignant tumors, and other fields, and has been proven to afford a good analgesic effect. Moreover, wrist-ankle acupuncture is safe, easy to operate, and cheap [4-6]. To effectively relieve pain among patients with urinary calculi and improve the safety of pain relief, this article studied the effect and safety of wrist-ankle acupuncture combined with pain nursing in patients with urinary calculi with acute pain as the first symptom.

## MATERIALS AND METHODS

### Patients

Eighty-two patients with urinary calculi with acute pain as the first symptom who were followed up at our institution from November 2019 to June 2021 were enrolled in this study.

**Inclusion criteria:** (1) Report of acute renal colic as the first symptom, which was in line with the Criteria of Diagnosis and Therapeutic Effect of Diseases and Syndromes in Traditional Chinese Medicine (TCM)[7]; (2) Observation of typical clinical manifestations, such as renal percussion pain, urinary tract irritation sign, and renal colic, during physical examination; (3) Positive routine test for occult blood in the urine; (4) Confirmation of the presence of kidney, ureter, or bladder stones by ultrasound, computed tomography, or pyelography, with a stone diameter < 1 cm; (5) Age between 35 and 60 years; and (6) Score of  $\geq 4$  points for pain degree on the visual analog scale (VAS) at admission.

**Exclusion criteria:** (1) Pregnancy; (2) Sepsis; (3) Severe infectious diseases; (4) Congenital malformation of kidney and ureter; (5) Urethral calculus; (6) Obstructive nephropathy; (7) Malignant tumors; (8) Damaged skin at the acupuncture site; (9) Other chronic pain diseases; and (10) Intake of painkillers 6 h before participating in this study.

**Case data:** 82 patients with urinary calculi who met the above inclusion and exclusion criteria were divided into the observation and control groups according to their visit serial number (odd or even), with 41 patients in each group. The observation group included 22 men and 19 women aged 37-59 years (average age,  $46.56 \pm 6.53$  years). Moreover, the urinary calculi were located in the ureter in 28 cases and in the bladder in nine cases, whereas mixed stones were observed in four cases. The VAS pain self-assessment score at admission was 4-9 points (average,  $7.41 \pm 1.16$  points). In turn, the control group included 23 men and 18 women aged 35-60 years (average,  $47.41 \pm 7.11$  years). The urinary calculi were located in the ureter in 28 cases and the bladder in nine cases, whereas mixed calculi were detected in four cases. The VAS pain self-assessment score at admission was 4-9 points (average,  $7.51 \pm 1.08$  points). No significant difference was observed between the general materials of the two groups ( $P > 0.05$ ).

### Treatment methods of the control group

The patients in the control group received routine nursing care after hospitalization, as well as intramuscular injection of nonsteroidal anti-inflammatory drugs, to relieve their pain.

**Routine nursing:** The nursing staff assisted patients in completing a routine physical examination, imaging, and other examinations; kept the ward quiet and tidy; protected the privacy of the patients adequately; and imparted simple health education, sports guidance (such as jumping), and emotional care, and reduced the patients' sense of tension during hospitalization and, to some extent, eliminated their resistance to pain management.

**Intramuscular injection of nonsteroidal drugs:** According to the requirements of nursing specifications, 30 mg of ketorolac tromethamine (Chengdu Brilliant Pharmaceutical Co., Ltd., National Medicine Permission No. H20193141) was injected intramuscularly, and the patient's pain was evaluated 2 h later. If the pain did not abate, 0.05 g of pethidine hydrochloride was additionally injected intramuscularly (Qinghai Pharmaceutical Factory Co., Ltd., NMPN H20193141), and the patient's pain was evaluated 2 h later. All patients were treated for 3 d.

### Treatment methods of the observation group

The patients in the observation group received pain nursing and wrist-ankle acupuncture after hospitalization.

**Pain nursing care:** (1) Pain cognitive intervention: The causes of the pain triggered by urinary stones were explained to the patients, and approaches to reduce the pain caused by stones by improving diet, exercise, and sleeping habits were divulged; (2) Sports and life guidance: For those with small stones, jumping exercises (such as rope skipping and jumping jacks) were recommended, to promote the excretion of stones. Moreover, the patients were advised to carry out sports and receive life health education after being discharged from the hospital. It was also recommended that the patients engage in rope skipping exercise for 15 min every morning and evening, as well as in jogging, walking, and other training with appropriate intensity on a weekly basis, according to their physical condition. In terms of diet, the patients were required to drink at least 2 L of water every day and to try to avoid eating spinach, sugar beets, and carbonated drinks (to prevent the formation of stones); (3) Posture intervention: The nurses actively guided the patients to adjust their posture and suggested that the patients use a knee-chest prone or curled position and cooperate with breathing training and proper massage, to reduce the pain; and (4) Psychological intervention: The patients were taught to use psychological intervention methods, such as attention diversion and music therapy, to reduce their attention to pain.

**Wrist-ankle acupuncture:** (1) Before acupuncture, the patients were instructed to empty their stool and urine, take a proper posture, fully expose the acupuncture site, and pay attention to keeping warm; (2) Acupoint selection: The lower 5 and the lower 2 acupoints were located. The lower 5 acupoint was located 3 in above the lateral malleolus, near the posterior edge of the tibia, and the lower 2 acupoint was located 3 in above the medial malleolus, near the posterior edge of the tibia; (3) Acupuncture needle insertion: The Huatuo brand filiform needle of the 0.25 mm × 25 mm type was adopted and the patient was guided to relax the whole body; moreover, the skin was disinfected using a routine procedure. The operator's left hand was fixed above the needle, with the thumb tightening the skin. In addition, the operator held the needle handle using the bottom of the right thumb and the top of the index and middle fingers, with the needle positioned at a 30° angle to the skin, to penetrate the subcutis quickly. The needle body remained close to the skin surface, which was penetrated to a certain depth along the superficial subcutaneous layer. It is better to have a soft feeling under the needle. The depth of the needle was about 1.4 in; (4) Needle adjustment: Feelings of soreness, distension, and numbness indicate that the acupuncture is too deep and that re-acupuncture is necessary; and (5) Needle placement for 90 min: If the patient had adverse reactions during this period, a corresponding treatment was carried out immediately. The patients were treated for 3 d, once per day.

### Observations

The VAS scale was used to assess the pain level of the patients in the two groups at different time points (before and at 24, 48, 72 h after the intervention). The score on the VAS scale ranged from 0 to 10 points, with 0 points suggesting no pain, less than 3 points suggesting mild pain, 4-6 points suggesting moderate but tolerable pain, and 7-10 points suggesting intense and intolerable pain that affected sleep and appetite.

Evaluation of the treatment efficacy in the two groups: The pain intensity was used as the evaluation standard for efficacy at 24 h after the intervention, and the Nimodipine method was used to calculate the treatment efficacy in the two groups. "Cure" was defined by the disappearance of the pain symptoms, accompanied by a decrease in the VAS of 90%. In turn, "Obvious Effect" corresponded to a significant improvement of the pain symptoms, with a decrease in the VAS score of 60%. An "Effective" outcome indicated that the pain symptoms improved and that the VAS score decreased by 30%. Finally, "Ineffective" indicated that the pain improvement was not obvious, and that the VAS score decreased by < 30%. Effective rate of treatment = (cure + obvious effect + effective)/total × 100%.

After the treatment, the patients were observed for 72 h, and the number of pain recurrence or aggravation episodes within 72 h was counted in the two groups.

Safety observation: The two groups were observed for the development of adverse reactions, such as fainting during acupuncture, belching, epigastric pain, nausea and vomiting, palpitation, and sweating, during the treatment.

The patients' satisfaction with the treatment was evaluated regarding four parameters, *i.e.*, nursing attitude, nursing means, pain management, and health education, using the self-designed scale of the department. The scores on each dimension were 1-5 points and were positively correlated with nursing satisfaction.

### Statistical analysis

SPSS version 19.0 statistical software was used to process the data. The measurement data were expressed as mean ± SD. The mean between the two groups was compared using an independent sample Student's test. The counting data were expressed as percentage. The two groups were compared using the  $\chi^2$  test. Significance was set at  $P < 0.05$ .

## RESULTS

### Comparison of the pain degree between the two groups at different time points

After the intervention, the VAS score for pain in the two groups decreased at 24, 48, and 72 h compared with that recorded before the intervention; moreover, the VAS score at each time point after the intervention was significantly lower in the observation group compared with the control group at the same time node ( $P < 0.05$ , Table 1).

### Comparison of the therapeutic efficacy between the two groups

At 24 h after the intervention, no significant difference in therapeutic efficacy was observed between the two groups ( $P > 0.05$ , Table 2).

### Pain recurrence within 72 h after the intervention in the two groups

The rate of recurrence of pain within 72 h after the intervention was significantly lower in the observation group than in the control group ( $P < 0.05$ , Table 3).

**Table 1 Comparison of the pain degree between the two groups at different time points (mean  $\pm$  SD)**

Group	Before the intervention	24 h after the intervention	48 h after the intervention	72 h after the intervention
Observation ( <i>n</i> = 41)	7.41 $\pm$ 1.16	2.46 $\pm$ 0.71 <sup>a</sup>	0.51 $\pm$ 0.51 <sup>a</sup>	0.24 $\pm$ 0.43 <sup>a</sup>
Control ( <i>n</i> = 41)	7.51 $\pm$ 1.08	3.17 $\pm$ 0.80 <sup>a</sup>	1.32 $\pm$ 0.47 <sup>a</sup>	0.46 $\pm$ 0.50 <sup>a</sup>
<i>t</i> value	0.395	4.250	7.478	2.136
<i>P</i> value	0.694	< 0.001	< 0.001	0.036

<sup>a</sup>*P* < 0.05 vs the same group before the intervention.

**Table 2 Comparison of the therapeutic efficacy between the two groups, *n* (%)**

Group	Cure	Obvious effect	Effective	Ineffective	Total efficacy rate
Observation ( <i>n</i> = 41)	20 (48.78)	17 (41.46)	3 (7.32)	1 (2.44)	40 (97.56)
Control ( <i>n</i> = 41)	17 (41.46)	12 (29.27)	10 (24.39)	2 (4.88)	39 (95.12)
$\chi^2$ value	-	-	-	-	0.346
<i>P</i> value	-	-	-	-	0.556

**Table 3 Pain recurrence within 72 h after the intervention in the two groups, *n* (%)**

Group	0-12 h	12-24 h	24-36 h	36-48 h	48-60 h	60-72 h	Total
Observation ( <i>n</i> = 41)	0 (0.00)	1 (2.44)	0 (0.00)	0 (0.00)	1 (2.44)	0 (0.00)	2 (4.88)
Control ( <i>n</i> = 41)	1 (2.44)	2 (4.88)	2 (4.88)	3 (7.32)	1 (2.44)	0 (0.00)	9 (21.95)
$\chi^2$ value	-	-	-	-	-	-	5.145
<i>P</i> value	-	-	-	-	-	-	0.023

### Comparison of nursing satisfaction between the two groups

Nursing satisfaction was significantly higher in the observation group than in the control group (*P* > 0.05, Table 4).

### Comparison of the treatment safety between the two groups

No serious adverse reactions were reported in the two groups during the treatment, therefore the treatment safety was high.

## DISCUSSION

Stone displacement stimulation is the chief cause of acute renal colic in patients with urinary calculi. Patients often exhibit sweating, nausea, vomiting, hematuria, and other symptoms, even shock when the pain is severe. Pain, respiration rate, pulse, body temperature, and blood pressure are listed as the five major vital signs. Painlessness is the most basic right of patients. Effective pain relief within a short time is one of the main needs of patients with urinary calculi[8]. Nonsteroidal anti-inflammatory drugs (NSAIDs) are pain relievers that are commonly used in clinical practice; however, these drugs cause a variety of side effects and may lead to gastrointestinal adverse reactions[9]. Therefore, it is of great significance to identify a safer and more effective method to relieve pain in patients with urinary calculi.

Traditional medicine has great attainments in pain relief. For example, acupuncture is the most common means of pain relief and has the advantages of ease-of-use, high security, and low price. Among these techniques, wrist-ankle acupuncture belongs to the floating needling method in acupuncture therapy, which is used only in specific parts of the wrist and ankle with shallow subcutaneous acupuncture carried out along the longitudinal axis of the limbs[10-12]. The indications of each acupuncture point of wrist-ankle acupuncture correspond to those of the 12 meridians one by one. The acupuncture points are roughly located on the corresponding route of the 12 meridians and are very close to specific points, such as the meridian points, five shu acupoints, and collateral points. Zheng *et al* [13] showed that wrist-ankle acupuncture can help relieve pain symptoms in patients with peri-arthritis

**Table 4 Comparison of nursing satisfaction between the two groups (mean ± SD)**

Group	Attitude	Means	Pain management	Health education	Total
Observation ( <i>n</i> = 41)	4.51 ± 0.51	4.73 ± 0.45	4.54 ± 0.50	4.83 ± 0.38	18.61 ± 0.97
Control ( <i>n</i> = 41)	4.05 ± 0.89	4.12 ± 0.75	3.78 ± 0.69	3.85 ± 0.82	15.80 ± 1.54
<i>t</i> value	2.891	4.476	5.665	6.885	9.879
<i>P</i> value	0.005	< 0.001	< 0.001	< 0.001	< 0.001

of the shoulder, improve their shoulder joint range of motion, reduce the inflammatory reaction of the body, and improve the quality of life of patients. In turn, Zhang *et al*[14] showed that wrist-ankle acupuncture can effectively reduce the degree of cancerous pain in patients with cancer and improve the analgesic effect on explosive pain. In addition, wrist-ankle acupuncture can enhance the analgesic effect in elderly patients with fractures after internal fixation operation using a proximal femoral antiro-rotation intramedullary nail[15,16].

TCM classifies renal colic as lumbago, stranguria, and other categories. The main pathogenesis of renal colic is stone blockage, which causes blood stasis and Qi stagnation, kidney deficiency, poor blood circulation, and pain. The 12 acupuncture points in wrist-ankle acupuncture are all located on the meridians and acupoints, which can effectively regulate the meridians and lungs, promote the movement of Qi and blood, and regulate Yin and Yang. In addition, there is evidence that wrist-ankle acupuncture plays a role in spasmolysis for improving blood circulation and pain relief by stimulating nerve endings[17-19]. This study found that the pain self-evaluation scores of patients with urinary calculi treated with wrist-ankle acupuncture were lower at 24, 48, and 72 h after the implementation of acupuncture compared with patients using NSAIDs; moreover, the recurrence rate of pain within 72 h after the intervention also exhibited a decreasing trend, suggesting that wrist-ankle acupuncture has good application value for rapidly relieving the pain symptoms of patients with urinary calculi.

In addition, improvement of the quality of nursing work also helps reduce the pain experience among patients with urinary calculi. This study actively carried out a nursing reform and set up a pain-intervention nursing program for pain cause by urinary calculi. According to the US WebMD medical news network, a little exercise on a weekly basis, such as jogging for 1 h and walking for 3 h, can reduce the risk of kidney stones by 31%. Jumping sports, such as rope skipping and jumping jacks, can help eliminate small kidney stones and effectively relieve pain[20-22]. The patients in the observation group in the present study received more-detailed sports and life guidance combined with psychological guidance, posture intervention, and pain cognitive intervention. The pain nursing intervention program provides comprehensive nursing services for patients with kidney stones with pain as the first symptom, from multiple perspectives. Our results indicate that the score on nursing satisfaction of the patients in the observation group, who received wrist-ankle acupuncture combined with pain nursing intervention, was higher than that of patients in the control group, who received NSAIDs combined with conventional nursing.

The study had the following limitations: Small sample size, short duration of wrist-ankle acupuncture pain intervention, and inclusion of only one control group. Future studies should be conducted with a larger sample size, longer duration of wrist-ankle acupuncture pain intervention, and multiple control groups to confirm the safety and efficacy of wrist-ankle acupuncture in treating acute pain caused due to urinary calculi.

## CONCLUSION

In conclusion, wrist-ankle acupuncture combined with pain nursing intervention can relieve the pain symptoms of patients with urinary calculi within a short time, reduce the recurrence rate of pain within 72 h, and significantly improve patient satisfaction with nursing, which is worthy of clinical promotion.

## ARTICLE HIGHLIGHTS

### Research background

Wrist-ankle acupuncture is a type of floating acupuncture therapy administered at selected points in the carpal and ankle areas, which has been shown to have good pain-relieving effects. The application and safety of wrist-ankle acupuncture combined with pain nursing were confirmed for administering pain intervention in patients with renal calculi.

**Research motivation**

Wrist-ankle acupuncture combined with pain nursing was used to effectively relieve the degree of pain and improve the safety of pain-relieving treatments in patients with urinary calculi.

**Research objectives**

This study aimed to assess the efficacy, safety, and clinical applicability of wrist-ankle acupuncture therapy for the treatment of acute pain caused by urinary calculi.

**Research methods**

We conducted an observational study on patients with acute pain complicated by urinary calculi. The control group received the conventional nursing intervention and pharmacological analgesia, whereas the observation group received wrist-ankle acupuncture and pain nursing. We compared the pain-relieving effect and nursing satisfaction between the two groups.

**Research results**

The pain visual analog scale (VAS) scores at 24 h, 48 h and 72 h after the intervention decreased in both groups compared with their preintervention scores. Moreover, the VAS scores at all time points after the intervention were lower in the observation group than that in the control group at the same time points. The pain recurrence rate was lower in the observation group than in the control group at 24 h postintervention. Additionally, the nursing satisfaction rate was higher in the observation group than in the control group.

**Research conclusions**

Wrist-ankle acupuncture combined with pain nursing can quickly relieve the pain symptoms of patients with urinary calculi, reduce the recurrence rate of pain within 72 h of treatment, and significantly improve patient care satisfaction.

**Research perspectives**

This study has provided preliminary evidence that wrist-ankle acupuncture combined with pain nursing can effectively and safely relieve acute pain patients with urinary calculi. Future studies should validate these study findings by conducting larger clinical trials. The study's clinical generalization is strong.

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**FOOTNOTES**


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**Author contributions:** Wang YL proposed the research theme; Wu LM designed the research protocols and wrote the manuscript; Liu Q participated in the analysis the data; Yin XH revised major elements of the manuscript; Wu LM, Liu Q, Yin XH, Yang LP, Yuan J, and Zhang XQ participated in study's intervention program; all authors reviewed and approved the final version to be published.

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**Country/Territory of origin:** China

**ORCID number:** Li-Mei Wu 0009-0002-4387-3445; Qian Liu 0009-0002-3215-3127; Xiao-Hua Yin 0009-0005-5715-7062; Li-

Ping Yang 0009-0003-3658-7130; Jun Yuan 0009-0006-8457-3202; Xiao-Qi Zhang 0009-0004-1065-7388; Yan-Li Wang 0009-0006-6342-0098.

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