Analysis of the Effect of Pain Nursing Combined with Exercise and Posture Intervention on Postoperative Patients with Kidney Stones and Improvement in VAS Scores

Lu Hua, Jin Chen

Taizhou Second People's Hospital, Taizhou 225500, Jiangsu, China

Abstract: *Objective*: To analyze the effect of pain nursing combined with exercise and posture intervention on improving Visual Analogue Scale (VAS) scores in patients after kidney stone surgery. *Methods*: A sample of 80 patients who underwent kidney stone surgery from October 2024 to October 2025 was randomly divided into groups using a random number table. Group A received pain nursing combined with exercise and posture intervention, while Group B received conventional nursing. Postoperative recovery time, VAS scores, and postoperative complications were compared between the two groups. *Results*: The postoperative recovery time in Group A was shorter than that in Group B, with $p < 0.05$. The VAS scores at 12 hours, 24 hours, and 72 hours postoperatively in Group A were all lower than those in Group B, with $p < 0.05$. The postoperative complication rate in Group A was lower than that in Group B, with $p < 0.05$. *Conclusion*: Pain nursing combined with exercise and posture intervention in postoperative nursing for kidney stone patients can shorten postoperative recovery time and alleviate pain scores.

Keywords: Kidney stones; Exercise and posture intervention; Pain nursing; VAS scores

1. Introduction

Surgery is the primary treatment for kidney stones, and the maturation of minimally invasive procedures has reduced surgical trauma in kidney stone patients, enabling rapid recovery of their physical health [1]. However, minimally invasive procedures are still invasive operations, which can lead to significant postoperative lumbago and back pain, as well as wound pain, thereby prolonging the postoperative rehabilitation time of patients [2]. Conventional postoperative nursing for kidney stones mainly focuses on nursing according to medical advice and symptomatic care, which may affect the prognosis of kidney stone patients [3]. Pain nursing combined with exercise and posture intervention is a modern nursing strategy that integrates the individual needs of patients and past

nursing experience in kidney stones. It aims to improve the quality of nursing by implementing various nursing measures, which can alleviate patient pain and accelerate their recovery [4]. Based on this, this study explores the value of pain nursing combined with exercise and posture intervention using a sample of 80 patients undergoing kidney stone surgery.

2. Materials and methods

2.1. Materials

A sample of 80 patients who underwent kidney stone surgery from October 2024 to October 2025 was selected and randomly divided into groups using a random number table. There were no statistically significant differences in the patient data between Group A and Group B, with $p > 0.05$, as shown in **Table 1**.

Table 1. Baseline data analysis table

Group	n	Gender (%)		Age (years)		Stone diameter (mm)	
		Male	Female	Range	Mean	Range	Mean
Group A	40	23 (57.50)	17 (42.50)	32–66	50.47 ± 1.88	5–21	12.42 ± 1.48
Group B	40	24 (60.00)	16 (40.00)	34–68	50.51 ± 1.92	5–19	12.38 ± 1.51
χ^2/t	-	0.0516		0.0941		0.1196	
p	-	0.8204		0.9252		0.9051	

2.2. Inclusion and exclusion criteria

2.2.1. Inclusion criteria

(1) Meeting the diagnostic criteria for kidney stones in "Surgery" [5];

(2) Meeting the indications for percutaneous nephrolithotomy;

(3) Signing the informed consent form;

(4) The time from onset to consultation is less than 3 months.

2.2.2. Exclusion criteria

(1) Hematological system diseases;

(2) High blood pressure and blood sugar levels;

(3) Malignant tumors;

(4) Abnormal organ function.

2.3. Methods group

2.3.1. Pre-nursing assessment

(1) Pain assessment

Evaluate the patient's pain using the VAS scale and inquire about any history of analgesic allergies.

(2) Physiological status assessment

Combine the patient's perioperative examination results and symptoms to preliminarily assess their limb mobility and cardiopulmonary function.

2.3.2. Pain nursing

(1) Pharmacological analgesia nursing

For patients with VAS scores of 1–3 indicating mild pain, administer ibuprofen sustained-release capsules or parecoxib sodium for analgesia as prescribed, while observing for adverse reactions such as renal impairment and gastrointestinal discomfort; for patients with VAS scores of 4–6 indicating moderate pain, administer non-steroidal anti-inflammatory drugs combined with weak opioids for analgesia as prescribed, such as tramadol injection and acetaminophen-oxycodone tablets, while observing for central inhibitory symptoms such as drowsiness and dizziness; for patients with VAS scores of 7–10 indicating severe pain, use a patient-controlled analgesia pump as prescribed, setting the loading dose and single-press dose according to the patient's needs.

(2) Non-pharmacological analgesia nursing

① Environmental and psychological interventions: Adjust the lighting and temperature in the ward, maintain a quiet environment, and minimize adverse stimuli such as bright light and noise. Use techniques such as meditation, deep breathing, and playing soft music to distract the patient's attention; for patients with severe fear and anxiety, whose pain thresholds may be lowered, strengthen communication, provide targeted emotional counseling, and cite successful past cases of kidney stone surgery to alleviate psychological pressure. ② Physical analgesia interventions: Apply cold compresses to the surgical incision within 24 hours postoperatively to stimulate vasoconstriction and reduce local edema and congestion. ③ After 24 hours postoperatively, assess the patient for no bleeding tendency and apply hot compresses to tense areas of the lumbar muscles to prevent muscle spasms and pain.

2.3.3. Exercise and posture nursing

(1) Within 6 hours postoperatively

Assist the patient in maintaining a supine position without a pillow, ensuring the head is turned to one side to prevent aspiration of vomit; assist the patient in turning over every 2 hours, maintaining a straight trunk to avoid twisting of the waist; encourage the patient to perform ankle pump exercises such as dorsiflexion and plantarflexion and quadriceps contraction training while lying flat, holding each movement for 5 seconds and relaxing for 3 seconds, repeating 10 times as one set, and exercising one set every hour.

(2) 6–24 hours postoperatively

Elevate the patient's head of the bed by 30–45°, prepare a soft pillow to support the lumbar and back areas, reducing the load on the lumbar muscles; encourage the patient to practice sitting up at the bedside, first turning to the side, letting the legs dangle naturally, and then using the hands to support the bed surface to sit up, avoiding bending forward; after successfully sitting up, observe for any discomfort such as orthostatic hypotension for 1–2 minutes; if no abnormalities are observed, control each sitting-up duration to 10–15 minutes, 3–4 times a day.

(3) 24–72 hours postoperatively

After the patient sits up without discomfort, guide them to hold onto the bed rail with both hands and stand up slowly, gradually extending the standing time; if incision pain intensifies during standing, immediately lie down and rest, and adjust the analgesia plan; observe the patient's vital signs for stability, and encourage them to walk at the bedside with the assistance of a walker, slowing down the walking speed and gradually extending the walking distance.

(4) Posture stone expulsion exercises

For patients with residual stones in the upper and middle renal calyces, guide them to stand and rotate their waist left and right while marching in place for 5–10 minutes, twice a day; for patients with residual stones in the lower renal calyx, maintain a head-down, feet-up position, lower the head of the bed by 15–20°, and use a soft pillow to elevate the buttocks, resting in a lateral position on the healthy side for 5–10 minutes, twice a day; for patients with residual stones in the upper ureter, guide them to lie on their healthy side and perform lower limb flexion and extension exercises for 5–10 minutes, twice a day.

(5) Pre-discharge guidance

Encourage the patient to engage in low-intensity aerobic exercises after discharge, including walking and tai chi, avoiding strenuous exercises such as weightlifting and running; instruct the patient to avoid prolonged sitting or lying at home, maintain a comfortable posture, change positions every 1–2 hours, and prepare a soft pillow to support the lumbar and back areas before going to bed; guide the patient to correctly use the VAS scale to assess pain levels, and for mild pain, take measures such as increasing water intake, adjusting posture, and applying hot compresses to relieve pain; for persistent moderate to severe pain, return to the hospital promptly for consultation.

2.3.4. Group B

Record the patient's urination status, including urine properties, color, and volume; maintain the patency of the drainage tube, regularly flush it with physiological saline; observe the patient's anal flatulence, instruct them to increase water intake and consume more fresh fruits and vegetables, and use diuretics to promote urination if necessary.

2.4. Observation indicators

2.4.1. Postoperative recovery indicators

Record the time for hematuria to disappear, the time for abdominal pain to subside, the time for urinary tract infection to be controlled, and the length of hospital stay.

2.4.2. Pain indicators

Record the VAS scores at 2 hours, 12 hours, 24 hours, and 72 hours postoperatively; the scores are positively correlated with the degree of pain after kidney stone surgery.

2.4.3. Complication indicators

Record the occurrences of poor drainage, urinary retention, postoperative infection, etc.

2.5. Statistical analysis

Data were processed using SPSS 23.0. The chi-square test (χ^2) was used to record count data, expressed as percentages (%), while the t-test was used to record measurement data, expressed as mean $\pm$ standard deviation ($\overline{x} \pm s$). Statistical differences were considered significant when $p < 0.05$.

3. Results

3.1. Postoperative recovery indicators

The postoperative recovery time in Group A was shorter than that in Group B, with $p < 0.05$. See **Table 2**.

Table 2. Analysis of postoperative recovery time indicators (days, mean ± standard deviation)

Group	Hematuria disappearance time (days)	Abdominal pain relief time (days)	Urinary tract infection control time (days)	Hospital stays (days)
Group A (n = 40)	2.12 ± 0.18	2.21 ± 0.19	1.81 ± 0.21	7.81 ± 0.49
Group B (n = 40)	2.42 ± 0.24	2.55 ± 0.23	2.09 ± 0.25	8.73 ± 0.62
t value	6.3246	7.2080	5.4239	7.3629
p value	0.000	0.000	0.000	0.000

3.2. Postoperative VAS score indicators

At 12 hours, 24 hours, and 72 hours postoperatively, the VAS scores in Group A were all lower than those in Group B, with $p < 0.05$. See **Table 3**.

Table 3. Analysis of postoperative VAS score indicators (Score, mean ± standard deviation)

Group	2h post-operation	12h post-operation	24h post-operation	72h post-operation
Group A (n = 40)	4.79 ± 0.84	2.49 ± 0.42	1.79 ± 0.28	1.31 ± 0.18
Group B (n = 40)	4.81 ± 0.89	3.21 ± 0.59	2.44 ± 0.37	1.99 ± 0.24
t value	0.1034	6.2877	8.8597	14.3357
p value	0.9179	0.000	0.000	0.000

3.3. Postoperative complication indicators

The postoperative complication rate in Group A was lower than that in Group B, with $p < 0.05$. See **Table 4**.

Table 4. Analysis of postoperative complications (n, %)

Group	Poor drainage	Urinary retention	Postoperative infection	Incidence rate
Group A (n = 40)	0 (0.00)	0 (0.00)	1 (2.50)	1 (2.50)
Group B (n = 40)	3 (7.50)	1 (2.50)	2 (5.00)	6 (15.00)
χ^2				5.2323
p				< 0.05

4. Discussion

Kidney stones account for a relatively high proportion of urinary system diseases, and percutaneous nephrolithotomy is commonly used clinically to remove stones and alleviate patient discomfort. However, surgery is an invasive procedure, and some patients may experience severe postoperative pain, which can affect their recovery [6]. Therefore, to alleviate postoperative pain symptoms and accelerate the excretion of stones in patients with kidney stones, efficient nursing services tailored to these patients are necessary. Under conventional nursing

care, patients undergoing kidney stone surgery often receive passive services that fail to meet the needs of modern patients with kidney stones [7]. Pain nursing focuses on pain control and provides individualized services for patients with varying degrees of pain, enabling rapid relief of their discomfort. Exercise and posture interventions can accelerate the excretion of residual stones, and nurses can adjust exercise plans based on the patient's physiological state and symptoms, which is conducive to accelerating patient recovery [8,9].

Based on the data analysis in this article, after implementing pain nursing combined with exercise and posture interventions, the postoperative recovery time for patients with kidney stones was shortened. The reasons for this include guiding patients to adopt correct postures and encouraging them to engage in scientific exercise during the nursing period, which can accelerate the postoperative recovery process [10]. Encouraging patients to perform ankle pump exercises and quadriceps training in the early postoperative period can improve limb blood circulation and prevent muscle atrophy and thrombosis. Gradual sitting-up, standing, and walking exercises after vital signs stabilize can improve limb function. Targeted posture interventions for stone expulsion can accelerate the excretion of residual stones in the body and prevent recovery delays associated with stone retention. Targeted pain management can alleviate patient discomfort and improve their exercise compliance [11]. Another set of data indicates that after implementing pain nursing combined with exercise and posture interventions, the VAS scores of patients with kidney stones at various postoperative time points decreased. The reasons for this include using the VAS scale to accurately assess the patient's pain level and administering stratified medications based on the degree of pain, such as non-steroidal anti-inflammatory drugs for mild pain, weak opioids for moderate pain, and patient-controlled analgesia pumps for severe pain, which can rapidly block pain transmission [12]. Additionally, during non-pharmacological pain management, optimizing the ward environment to reduce pain triggers, providing psychological counseling to increase the pain threshold, and using cold compresses to reduce edema and pain and hot compresses to relieve muscle spasms can achieve a multidimensional synergistic analgesic effect. The final set of data shows that after implementing pain nursing combined with exercise and posture interventions, the postoperative complication rate in patients with kidney stones decreased. The reasons for this include closely monitoring patients for adverse reactions during stratified pharmacological analgesia, which can reduce the risks of central inhibition, renal injury, and gastrointestinal discomfort. Posture management can prevent aspiration and waist twisting, which is beneficial for preventing postoperative infections and bleeding [13,14]. Furthermore, early exercise guidance during combined nursing can accelerate the excretion of residual stones and prevent deep vein thrombosis, while psychological counseling interventions can improve patient exercise compliance, which is conducive to comprehensively reducing the postoperative complication risk in patients with kidney stones [15].

5. Conclusion

In summary, implementing pain nursing combined with exercise and posture interventions after kidney stone surgery can reduce postoperative complications, alleviate postoperative pain, and shorten recovery time, making it worthy of promotion.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Peng Y, Zhao Y, Yang C, et al., 2022, Study on the Effect of Wenshen Paishi Decoction Combined with Rehabilitation Intervention in Promoting Renal Function Recovery in Patients After Complex Kidney Stone Surgery. Journal of Changchun University of Traditional Chinese Medicine, 38(6): 647–650.

[2] Huang D, Xie Y, 2025, Application Study of Contralateral Lateral Running Position Placement Intervention Combined with Comfort Care in the Perioperative Period of Patients with Complex Kidney Stones Undergoing FURL. Modern Diagnosis and Treatment, 36(5): 767–769 + 772.

[3] Zhang L, 2022, Study on the Effect of Implementing a Hierarchical Holistic Nursing Model in Patients After Kidney Stone Removal Surgery. Chongqing Medicine, 51(S02): 412–414.

[4] Tan Q, Tong H, Chen X, 2023, Analysis of the Effect of Applying a Hierarchical Intervention Model for Fistula Tube Nursing in Patients with Kidney Stones After Percutaneous Nephrolithotomy. Heilongjiang Medicine Journal, 36(4): 987–990.

[5] Chen X, Wang J, 2013, Surgery. 8th ed., Beijing: People's Medical Publishing House, 575–577.

[6] Du T, 2022, Observation on the Application Effect of a Hierarchical Holistic Nursing Model in Patients with Fistula Tubes After Kidney Stone Removal Surgery. Heilongjiang Medicine Journal, 46(1): 85–87.

[7] Wu G, 2022, Study on the Effect of Comfort Nursing Intervention on the Psychological State and Prognosis of Patients with Kidney Stones During the Perioperative Period. Modern Digestion & Intervention, 2022(S01): 1090–1091.

[8] Zheng Y, Guo J, Luo S, 2022, Intervention Effect of Evidence-Based Nursing Based on the ERAS Concept on Patients Undergoing Kidney Stone Surgery. Hainan Medical Journal, 33(16): 2173–2176.

[9] Zhang Q, Li T, Chen H, 2025, Application of Evidence-Based Nursing Based on the ERAS Concept in Patients Undergoing Kidney Stone Surgery. Journal of Shandong Medical College, 47(4): 83–85.

[10] Zhai S, Zhou R, 2024, Application of Evidence-Based Nursing Model in Perioperative Nursing of Patients Undergoing Kidney Stone Surgery. Guizhou Medical Journal, 48(7): 1160–1161.

[11] Shen J, Qian W, 2022, Analysis of the Effect of Targeted Nursing on Nursing Satisfaction During the Perioperative Period of Holmium Laser Lithotripsy for Kidney Stones. Modern Digestion & Intervention, 2022(S01): 1410–1410.

[12] Wang P, 2023, Observation on the Effect of Standardized Targeted Nursing on Nursing Satisfaction During the Perioperative Period of Holmium Laser Lithotripsy for Kidney Stones. China Standardization, 2023(24): 309–312.

[13] Li C, Zhou X, Peng Y, et al., 2024, Impact of Targeted Nursing on Patient Satisfaction During the Perioperative Period of Holmium Laser Lithotripsy for Kidney Stones. Journal of Urology (Electronic Edition), 16(1): 73–77.

[14] Dong X, Liu Y, 2022, Application of Targeted Nursing in Perioperative Nursing of Holmium Laser Lithotripsy for Kidney Stones and Its Preventive Value for Deep Vein Thrombosis. Thrombosis and Hemostasis, 28(3): 893–894.

[15] Qiu H, Xu N, 2023, Nursing Effect of Cognitive Behavioral Model Under the Pain-Free Concept in Patients After Percutaneous Nephrolithotomy. China Medical Herald, 20(1): 194–196 + F0003.