



# Application of Kegel Motion Combined With Warming Acupuncture at the Eight Acupuncture Points in Patients With Urinary Incontinence After Radical Prostatectomy

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**Purpose:** To study the effect of Kegel exercise combined with Baliao warming acupuncture in the treatment of urinary incontinence after radical prostatectomy.

**Methods:** A single-center, retrospective cohort study was conducted on patients with clinically localized prostate cancer. This study involved 200 patients through a specific exclusion criterion admitted to the Department of Urology of our hospital, including 100 cases in the control group (single Kegel Motion) and 100 cases in the experimental group (Kegel Motion combined with acupuncture) from July 2017 to November 2020. Time from catheter removal to full recovery of urinary continence was recorded by 1 month, 3 months, and 6 months after surgery. The International Consultation on Incontinence Questionnaire-Short Form, the “1-hour diaper test,” and the Quality of Life Incontinence Questionnaire were used to evaluate the frequency and severity of urinary incontinence, the

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efficacy of urinary incontinence and the patients' qualities of life, respectively. An independent sample *t* test, rank sum test, and  $\chi^2$  test were adopted for comparison between groups.

**Results:** None of the frequency, severity, and efficacy of urinary incontinence nor the patients' qualities of life showed a difference between the experimental group and the control group at 1 month after surgery ( $P > 0.05$ ) but showed significant differences at 3 months and 6 months postoperatively ( $P < 0.05$ ).

**Conclusions:** The Kegel Motion combined with warming acupuncture at the 8 acupuncture points can reduce the incidence of urinary incontinence, improve urinary control ability, and improve the quality of life of patients with urinary incontinence after radical prostatectomy.

*Key words:* Kegel motion – Baliao point temperature acupuncture – Prostate cancer – Urinary incontinence

Prostate cancer is a common malignant tumor for male patients in urology. According to statistics of the American Cancer Society, in 2016, prostate cancer ranked first among cancers in male patients.<sup>1</sup> Although in China the incidence of prostate cancer is much lower than that in western countries, it is in a significant rising trend and has currently become one of the major diseases affecting men's health.<sup>2</sup> At present, robotic-assisted laparoscopic radical prostatectomy is the preferred option for the treatment of regional prostate cancer.<sup>3</sup> With the development of robotic radical surgery, the number of cases of postoperative complications has also decreased. Urinary incontinence is one of the common complications. Statistics from a foreign large multicenter and prostate cancer database show that the incidence of urinary incontinence within 1 month after surgery is as high as 87%,<sup>4</sup> which is related to intraoperative urinary sphincter injury and nerve injury, bladder neck resection, and machine-aided reconstruction of the bladder and urethra.<sup>5</sup> Although urinary incontinence does not pose any threat to patients' life safety, its symptoms make it embarrassing for patients to speak out. Therefore, it has a serious impact on patients' normal social activities and physical exercise, thus resulting in patients' adverse emotions, such as shyness, low self-esteem, anxiety, and fear, as well as some psychological diseases such as depression and psychological obstacles,<sup>6</sup> so patients' postoperative quality of life is seriously affected. To effectively alleviate the problem of postoperative urinary incontinence in patients with prostate cancer, this study retrospectively observed the Kegel Motion and Kegel Motion with warming acupuncture at the 8 acupuncture points to assess the role of acupuncture in improving the recovery of urinary control after radical prostatectomy.<sup>7,8</sup>

## Materials and Methods

### *Clinical data*

This study involved 200 patients admitted to the Department of Urology of our hospital from July 2017 to November 2020. Patients selected had undergone the robotic-assisted laparoscopic radical prostatectomy operated by 5 urinary surgeons and had postoperative urinary incontinence symptoms. Surgical procedures were done with the Da Vinci Si Surgical System. The exclusion criteria were as follows: (1) those who were younger than 50 years or older than 75 years; (2) those who had systemic treatment (chemotherapy, androgen deprivation therapy, or new endocrine therapy, etc.) or local treatment (external radiotherapy, interstitial brachytherapy, focal treatment, etc.) before surgery; (3) those who were unable to exercise pelvic floor function; and (4) those who adopted other forms of treatment for urinary incontinence during the follow-up period and those who had already had urinary leakage before surgery. Finally, a total of 200 cases were selected. According to the different intervention methods for urinary incontinence, the study subjects were divided into 100 cases in the control group (exercising the pelvic floor function through Kegel Motion after surgery) and 100 cases in the experimental group (applying Kegel Motion combined with warming acupuncture at the 8 acupuncture points after surgery). The 100 patients in the experimental group still had severe urinary incontinence 1 month after surgery (1-hour diaper test  $>50$  g). All patients could favorably cooperate to complete each follow-up visit, voluntarily participated in the trial, and signed the informed consent form. In the control group, 4 cases were lost to follow-up and 1 case withdrew from the study because he could not

Table 1 Basic variables comparison

Variables	Treatment group (n = 93)	Control group (n = 95)	z/ t / $\chi^2$	P value
Age	71.38 ± 4.29	71.13 ± 2.56	0.325	0.746
Prostate specific antigen	16.5 (12.0–34.8)	14.5 (11.8–36.1)	–0.504	0.614
Prostate volume	27.47 ± 8.61	26.64 ± 9.81	0.178	0.86
Body mass index	23.6 ± 1.4	22.8 ± 1.1	–2.179	0.089
Charlson Comorbidity Index	2.98 ± 1.05	3.02 ± 0.82	0.04	0.930
Marriage				
Married	75	71	0.988	0.61
Divorced/widowed	17	23		
Unmarried	1	1		
Level of education				
Junior high and below	30	27	0.327	0.567
High school and above	63	68		
Payment methods				
Health care	79	86	1.363	0.243
Own expense	14	9		
Gleason score				
≤6	40	42	0.368	0.832
7	24	27		
8–10	29	26		
T stage of tumor				
T1	4	7	1.362	0.714
T2	56	52		
T3a	29	30		
≥T3b	4	6		

adhere to Kegel Motion. In the experimental group, 1 case was lost to follow-up, 1 case could not adhere to Kegel Motion, and 5 cases withdrew from the study midway because they could not adhere to acupuncture. Finally, 95 cases in the control group and 93 cases in the experimental group were included. The differences between the basic data of the 2 groups were not statistically significant ( $P > 0.05$ ) and were comparable. The general data of the 2 groups were compared, as shown in Table 1.

## Methods

### Control group

The control group was nursed according to the general nursing routine after urological surgery. The primary nurses instructed the patients to use diapers when incontinence occurred to keep the perineum clean and dry to prevent incontinence associated dermatitis. The nurses explained the purpose and specific contents of Kegel Motion to the patients after surgery and instructed them to take functional exercises of the pelvic floor muscles after discharge. The details were as follows: first, empty the bladder, wear loose clothing, and perform exercises of the perineum and anal sphincter under relaxed conditions (the muscles of the lower limbs, abdomen, and buttocks were

kept in a relaxed state). The patients could choose an appropriate position, such as supine position, sitting position, or standing position, based on their own conditions. For the sitting position, patients would sit on a chair, spread the feet shoulder-width apart, stretch the back, raise the face, and relax the shoulders and the abdomen. In the supine position, patients would stand on the knees, spread the shoulders, and relax the abdomen. In the standing position, patients would spread the hands and feet shoulder-width apart, lean on a table, focus the weight on the wrists, stretch the back, raise the face, and relax the shoulders and abdomen. Then patients would contract the pelvic floor muscles for 5 seconds (i.e., let the patients do the action of contracting the anus and the urethra at the same time). Start by contracting only 2 seconds to 3 seconds and gradually extend the time to 10 seconds. Then relax the pelvic floor muscles for 10 seconds (relax the anus and urethra). Finally rest for 10 seconds. That is a complete pelvic floor muscle training. Patients were instructed to do it continuously for 15 minutes to 30 minutes and repeat 3 sets per day or 150 to 200 times per day. The nurses showed and instructed patients in various ways, such as oral, pictures, videos, and missionary platform display, testing and ensuring each patient could perform the Kegel Motion correctly before discharge. The nurses insisted

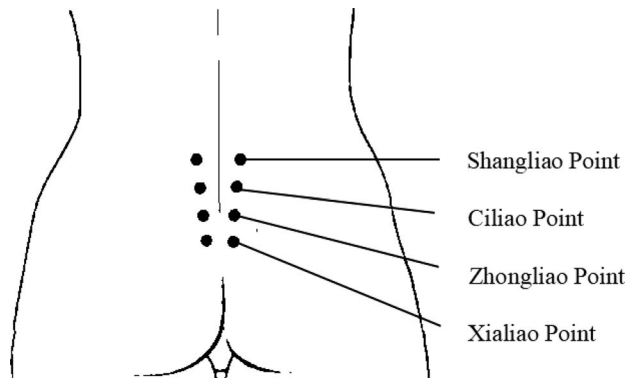


Fig. 1 The 8 acupoints of Baliao.

on recording urination diary and giving the patients diet instruction and health education at discharge. The managers established the WeChat steering group and supervised patients to clock in the group when they completed the Kegel Motion in a fixed period every day. The patients came to the hospital 1 month, 3 months, and 6 months after surgery and completed the questionnaire during each review.

#### Experimental group

##### Combination construction

The purpose and specific content of the Kegel Motion were explained to the patients in the experimental group after surgery. The patients were instructed to take functional exercises for the pelvic floor muscles after discharge. In addition, the patients performed the warming acupuncture daily at 8 acupoints for 1 month after surgery at our Chinese Medicine Outpatient Clinic. The details of patient instructions were as follows (Figure 1): patients were instructed to empty the bladder, lie in a prone position, and choose the secondary, middle, and inferior acupoints. Routinely disinfect the skin of the acupoint area. Select the 0.30-mm-diameter, 75-mm-long disposable sterile acupuncture needles. Adopt the oblique insertion of the needle with the needle tips facing the posterior midline to directly needle the secondary, middle, and inferior acupoints. After the needles are inserted, adopt the lifting, thrusting, and twirling of the needle (twirling 180 degrees, frequency 5 times/10 seconds, depth <10 mm). Keep the mild reinforcing-reducing method and transmit the needle sensation to the lower abdomen. After the acupuncture, perform the warming acupuncture. Divide into 2 groups. Focus on 4 points in each group every other day. Take 2 groups alternately. One group for one side of the secondary and inferior

acupuncture points, as well as the opposite side of the upper and middle acupoints. The remaining 4 points were for the other group. After the arrival of qi locally, place the moxa stick on the needle handle. Shelter the points from skin burns caused by the stick off. Ignite the moxa stick. The skin of the sacral region would gradually appear to have a warm sensation. When the whole stick burnt away, clean up the ash. Remove the needle after the local warm feeling gradually disappeared. The preceding treatment was carried out once a day. Two sticks of moxibustion were applied to each acupoint and the needles were left for 30 minutes. Six days were a course of treatment, including a day of rest. Patients' states were observed after 6 cycles of treatment. Each patient should keep in touch with the nurse in charge of the experimental group during the acupuncture. Patients were instructed to stop immediately if experiencing needle sickness or moxibustion allergy during the warming acupuncture.

##### Combination implementation

Based on the control group, the following aspects were added to the patients in the experimental group:

- (1) The patient information files for the implementation of the joint nursing program were established. The follow-up nursing was made, and the electronic information files were built according to the information file. The bedside nurses were responsible for recording the implementation of Kegel Motion, guiding the warming acupuncture at the 8 acupoints and informing patients of the precautions after acupuncture.
- (2) The WeChat group for the experimental group was established, which was managed separately from the control group by 2 trained nurses. The nurses supervised the patients to complete the Kegel Motion combined with warming acupuncture at the 8 acupoints in a fixed period every day and reminded them to clock in the WeChat group. Also, the nurses were responsible for answering questions raised by patients and their family members or solving problems encountered during implementation and communicating in real time. Nurses could not only urge patients to actively participate and exercise efficiently, but also effectively monitor the implementation.
- (3) After a course of warming acupuncture, the knowledge lecture was carried out. The group leader formulated a lecture plan, gathering patients and their family members of the experimental

group. Through exchanging experiences with peers about the Kegel Motion combined with warming acupuncture at the 8 acupuncture points, and discussing difficulties encountered and countermeasures to deal with them, patients were able to face the disease correctly and increase their confidence in healing.

- (4) The primary nurse collected the problems encountered by the patients during the acupuncture therapy and answered them when the acupuncturist performed the therapy for the patients. The nurse also guided the patients to learn meditation and relaxation exercises, taught methods of psychological adjustment, and established positive feedback from patients. The patients filled out the questionnaires at the 1-month, 3-month, and 6-month postoperative reviews.

#### *Indicator observation*

The frequency and severity of urinary incontinence, the treatment effect, and the patients' quality of life at 1 month, 3 months, and 6 months after surgery were observed.

#### **International Consultation on Incontinence Questionnaire-Short Form**

The International Consultation on Incontinence Questionnaire-Short Form (ICIQ) was adopted to assess the frequency and severity of urinary incontinence.<sup>9</sup> The form included 3 scoring questions, which were grouped into 1 dimension to evaluate the frequency and the severity of urinary incontinence as well as the impact on quality of life, with scores of 0 to 5, 0 to 6, and 0 to 10, respectively, and a total score of 0 to 21. The researchers classified the ICIQ scores into different severity levels: mild (1 to 5), moderate (6 to 12), severe (13 to 18), and very severe (19 to 21). The form also included 1 nonscoring question with a scale Cronbach's alpha coefficient of 0.92.

#### **One-hour diaper test**

According to the "1-hour diaper test" compared with the previous data, the efficacy of urinary incontinence was divided into 3 levels: curative, effective, and ineffective. If 1-hour leakage of urine was  $\leq 1$  g, it was considered mild; if 1 to 10 g, moderate; if 10 to 50 g, severe; and if  $\geq 50$  g, very severe. "Curative" meant that the patient's incontinence symptoms disappeared, there was no need to use a diaper, and the leakage of urine almost disappeared. "Effective" meant that the leakage was reduced, and the number of times or grams of diaper usage was reduced by more than

50%. "Ineffective" meant that the incontinence was not significantly relieved and the number of times or grams of diaper usage daily did not change significantly from before treatment.<sup>10</sup>

#### **The Quality of Life Incontinence Questionnaire**

The Quality of Life Incontinence Questionnaire (I-QOL), developed by Dr Wagner and his team at the University of Washington, included 3 dimensions: behavioral limitations (8 items), psychological impact (9 items), and social functioning limitations (5 items), and was scored on the Likert Scale with 5 options for each item (completely, often, sometimes, rarely, never).<sup>11</sup> It was scored from 1 to 5, with a total score of 110, with higher scores indicating higher quality of life. The internal consistency was good, with a Cronbach's alpha coefficient of 0.94 and a 2-week test-retest reliability of 0.93.

#### *Statistical methods*

SPSS 22.0 software was adopted for statistical analysis. Normally distributed measurement data were described by means and standard deviations. Non-normally distributed measurement data were described by quartiles. An independent sample *t* test, rank sum test and  $\chi^2$  test were adopted for comparison between groups. Count data were described by number of cases and percentages, and differences were considered statistically significant at  $P < 0.05$ .

#### **Results**

There was no significant difference in the frequency and severity of urinary incontinence between the patients in the experimental group and the control group at 1 month postoperatively ( $P > 0.05$ ), but there were significant differences at 3 months and 6 months postoperatively ( $P < 0.05$ ) (Table 2).

There was no significant difference in the efficacy of urinary incontinence between the patients in the experimental group and the control group at 1 month postoperatively ( $P > 0.05$ ), but there were significant differences at 3 months and 6 months postoperatively ( $P < 0.05$ ) (Table 3).

There was no significant difference in the patients' qualities of life between the experimental group and the control group at 1 month postoperatively ( $P > 0.05$ ), but there were significant differences at 3 months and 6 months postoperatively ( $P < 0.05$ ) (Table 4).

Table 2 Comparison of the frequency and severity of urinary incontinence between the 2 groups of patients at 1 month, 3 months, and 6 months postoperatively

Time	Frequency and severity of urinary incontinence		t	P value
	Treatment group	Control group		
One month	16.77 ± 3.53	17.29 ± 3.08	0.072	0.964
Three months	8.47 ± 4.12	14.51 ± 3.98	15.144	0.001
Six months	4.21 ± 3.78	10.13 ± 4.60	11.216	0.004

Discussion

Urinary incontinence is one of the major postoperative complications in patients with prostate cancer.<sup>12</sup> It is due to a variety of causes. The important factors leading to urinary incontinence after radical prostatectomy may include loss of anatomic support and damage to the urinary sphincter and pelvic innervated nerves. Urinary incontinence not only greatly affects patients' physical and mental health, but also leads to reduced social interaction and increased psychological burden, which has a significant negative impact on a patient's quality of life and psychological status.<sup>13</sup> Therefore, patients with urinary incontinence after radical prostatectomy should receive special care to avoid serious consequences.

There is no specific medicine for the urinary incontinence after radical prostatectomy, and no surgical procedure that can completely avoid the incontinence. However, many studies have shown that carrying out rehabilitation training can help reduce the incontinence.<sup>14,15</sup> The exercise of pelvic floor muscle function is mainly adopted to strengthen the pelvic floor muscles by contracting the anal perineum and to improve

Table 3 Comparison of the efficacy of urinary incontinence between the 2 groups at 1 month, 3 months, and 6 months postoperatively

Efficacy of urinary incontinence	Treatment group	Control group	χ <sup>2</sup>	P value
One month				
Cured	1	2	0.448	0.799
Effective	34	32		
Invalid	58	61		
Three months				
Cured	32	16	17.574	0.000
Effective	52	48		
Invalid	9	31		
Six months				
Cured	47	32	14.715	0.001
Effective	44	46		
Invalid	2	17		

Table 4 Comparison of the quality of life of urinary incontinence patients between the 2 groups at 1 month, 3 months, and 6 months postoperatively

Time	Treatment group	Control group	t	P value
One month	64.36 ± 6.04	66.21 ± 2.61	-1.840	0.069
Three months	87.73 ± 12.19	72.82 ± 10.33	7.379	0.000
Six months	98.62 ± 17.28	78.94 ± 15.36	10.122	0.000

the excitability and coordination of the pelvic floor muscles and nerves as well as the coordination of the pelvic floor muscles during urination.<sup>16,17</sup> It is one of the most common conservative methods to restore the pelvic floor muscles and bladder function after surgery. Clinically, it is widely believed that standardized pelvic floor muscle exercises can help restore urinary control function after radical prostate surgery. According to the European Association of Urology Guidelines, pelvic floor exercises are recommended for all patients after radical prostate surgery to accelerate the recovery of urinary control function after surgery.<sup>18</sup> The Kegel Motion is the most important part of the preoperative preparation and postoperative instructions for patients undergoing robotic-assisted laparoscopic radical prostatectomy. The bedside nurses teach patients the specific methods of Kegel Motion in the preoperative instructions, instruct them to practice themselves, and remind them to exercise the Kegel Motion on the third day after surgery. The nurses monitor patients daily and remind them to keep up with the training after discharge.

In recent years, more and more Chinese medical methods such as acupuncture and acupressure have been adopted in patients with urinary incontinence. According to traditional Chinese medicine, the "8 acupuncture points" belong to the bladder meridian of Taiyang, making the waist and kidney robust, activating qi-flowing and promoting urination. The 8 acupuncture points are in 8 posterior sacral foramina, as 4 pairs of symmetrically distributed acupuncture points. By acupuncture, the points can be stimulated to release the neurotransmitters in the nerve pathways, thus improving bladder function and relieving urinary incontinence. The 8 acupuncture points are in the lumbosacral region, the deep part of which is the area of the pathway of the first to fourth sacral nerves. The sacral nerves and their living-in spinal segments are the spinal centers of the urinary reflex, which innervate the urinary sphincter and the bladder detrusor. The warming acupuncture at the 8 acupuncture points is specifically targeted at the treatment of urinary incontinence.<sup>19</sup> The warming acupuncture can

effectively regulate the kidney function and bladder function, further producing regular contract and stretch movements of the patient's detrusor and internal bladder sphincter, thus enabling the patient to form a good urinary reflex to promote the recovery of urinary function.<sup>20</sup>

The Kegel Motion has been applied in foreign countries to male patients with stressful urinary incontinence after laparoscopic radical prostatectomy.<sup>21</sup> It was performed for 37 patients after radical surgery. The results showed that they could better alleviate the incontinence; however, there has been no report of warming acupuncture at the 8 acupuncture points abroad. Under the trend of multidisciplinary collaboration, the Department of Urology and the Department of Traditional Chinese Medicine of our hospital collaborated to perform the uniting care of the Kegel Motion and the warming acupuncture at the 8 acupuncture points. The acupuncturist applied the needles for the patients. The follow-up nurse ensured the implementation of the combined therapy, including guiding the patients to perform Kegel Motion in a standardized manner, supervising the patients to clock in the WeChat group when they completed the training daily, monitoring the implementation of the training, correcting the patients' bad habits in a timely manner, and answering patients' questions and confusion about acupuncture, monitoring patients' condition after warming acupuncture, and setting up talks or lectures to enhance nurse-patient communication and establish positive feedback and confidence for patients. These series of measures not only ensured the safety of the patients' treatment, but also promoted patients' treatment compliance and motivation.

In this paper, the authors adopted the Kegel Motion combined with warming acupuncture at the 8 acupuncture points to intervene in patients with urinary incontinence after radical prostatectomy, and observed the incidence of urinary incontinence, the times of diaper use, the efficacy of urinary incontinence, and the quality of life. The results showed that compared with the patients in the control group, the incidence of urinary incontinence in the experimental group decreased, the times of diaper use decreased, the efficacy of urinary incontinence was significant, and the quality of life improved after 3 months of treatment,  $P < 0.05$ .

However, several limitations should be considered as well. First, our study is a retrospective study, which has its unavoidable defects. Also, patients enrolled in our study were entirely the Chinese yellow races, and regional disparity remained. Finally, due to the inconvenience of extra examinations,

patients usually refuse to accept urodynamic examination nor electromyography to evaluate their urinary incontinence. For this reason, we used questionnaires to evaluate urinary continent status instead, which might not be a quantitative measurement with an objective aspect.

## Conclusion

In conclusion, the Kegel Motion combined with warming acupuncture at the 8 acupuncture points can reduce the incidence of urinary incontinence, improve urinary control ability, and improve the quality of life of patients with urinary incontinence after radical prostatectomy. Thus, it can be promoted.

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All participants gave informed consent for the research, and that their anonymity was preserved. The protocol for the research project has been approved by Medical Ethics Committee, Affiliated Drum Tower hospital, Medical School of Nanjing University (approval number: 2021-083-02). The datasets used or analyzed during the current study are available from the corresponding author on reasonable request. All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or nonfinancial interest in the subject matter or materials discussed in this manuscript.

## Author Contributions

H.C.: conception and design, acquisition of data, analysis and interpretation of data; drafting of manuscript. C.W.: conception and design, acquisition of data, or analysis and interpretation of data; drafting of manuscript. Z.Z.: conception and design, acquisition of data, analysis and interpretation of data; drafting of manuscript. L.H.: acquisition of data, analysis and interpretation of data. X.Q.: acquisition of data, analysis and interpretation of data. J.Z.: acquisition of data, analysis and interpretation of data, supervision. H.G.: conception and design, analysis and interpretation of data; drafting of manuscript, supervision. All authors

have read and approved the final version of this manuscript.

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