Yang ZJ, Xiao XW. Effect of acupuncture plus medium-frequency electric stimulation on bladder function after radical hysterectomy for cervical cancer. J Acupunct Tuina Sci, 2017, 15(5): 371-376
DOI: 10.1007/s11726-017-1030-y

Clinical Study

Effect of acupuncture plus medium-frequency electric stimulation on bladder function after radical hysterectomy for cervical cancer

针刺加中频电刺激对宫颈癌根治术后膀胱功能的影响

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Abstract

Objective: To observe the effect of acupuncture plus medium-frequency electric stimulation on bladder function after radical hysterectomy for cervical cancer.

Methods: A total of 170 patients confirmed by biopsy and surgical pathology and treated with radical hysterectomy for cervical cancer were randomly divided into an acupuncture group, an observation group and a control group by random digital table. Fifty-six cases in the acupuncture group were treated with acupuncture after surgery, one session each day, till the extubation day; 58 cases in the observation group were treated with acupuncture plus medium-frequency electric stimulation after surgery, one session each day, till the extubation day; and 56 cases in the control group didn't receive any intervention, and the catheter was retained till the extubation day. On the postoperative day 14, all groups were dealt with catheterization to determine the residual urine volume, in order to observe the occurrence rate of urinary retention and the recovery of bladder function and to compare the differences of the therapeutic effects among the groups.

Results: The occurrence rates of urinary retention were respectively 16.1%, 20.7% and 46.4% in the acupuncture group, observation group and control group, with significant differences (P<0.05). When comparing the acupuncture group and the observation group with the control group, there were significant differences (both P<0.05). In comparison between the acupuncture group and the observation group, there was no significant difference (P>0.05). The recovery rates of bladder function in the three group were respectively 42.9%, 60.3% and 41.1% without significant differences (P>0.05). Moreover, there were no significant between-group differences (P>0.05), but acupuncture plus medium-frequency electric stimulation showed a better tendency.

Conclusion: The single application of acupuncture therapy is effective and able to prevent urinary retention after radical hysterectomy for cervical cancer. Acupuncture plus medium-frequency electric stimulation can effectively enhance the recovery of bladder function and reduce the residual urine volume in the bladder to the maximum.

Keywords: Acupuncture Therapy; Electric Stimulation Therapy; Uterine Cervical Neoplasms; Postoperative Complications; Urinary Retention; Women

【摘要】目的：观察针刺与中频电疗法对宫颈癌根治术后膀胱功能的影响。**方法：**将170例经活检或手术病理确诊为宫颈癌并行宫颈癌根治术的患者按随机数字表法随机分为针刺组、观察组和对照组。针刺组56例，术后接受针刺治疗，每日1次，至拔管日；观察组58例，术后接受针刺加中频电刺激治疗，每日1次，至拔管日；对照组56例，不接受任何干预措施，留置导尿管至拔管日。各组均于术后第14 d给予导尿法测定膀胱残余尿量，观察尿潴留的发生率及膀胱功能的恢复情况，比较各组间的疗效差异。**结果：**针刺组、观察组和对照组尿潴留的发生率分别为16.1%、20.7%及46.4%，有显著性差异(P＜0.05)，且针刺组、观察组与空白对照组比较，均有显著性差异(均P＜0.05)，针刺组与观察组比较，无显著性差异(P＞0.05)；三组病例膀胱功能恢复率分别为42.9%、60.3%及41.1%，无显著性差异(P＞0.05)，且每两组间比较亦无显著性差异(P＞0.05)，但观察组有优于针刺组及空白对照组的趋势。**结论：**单独使用针刺疗法即可有效预防宫颈癌根治术后尿潴留，而针刺与中频电并用可有效提高膀胱功能恢复率，最大程度降低膀胱残余尿量。

【关键词】针刺疗法；电刺激疗法；宫颈癌；术后并发症；尿潴留；女性

【中图分类号】R246.3　　**【文献标志码】**A

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With advances in the screening techniques for cervical cancer, more and more patients with cervical cancer can be detected. This makes cervical cancer one of the most common malignant cancers in gynecology. Extensive hysterectomy and pelvic lymph node dissection have become the first option in the radical treatment of cervical cancer. But, many patients after radical surgery would present urinary disturbance[1], which has a high incidence rate, long duration and no specific medications to treat. This seriously affects patients' quality of life (QOL). Therefore, it needs to be further studied. Acupuncture treatment for urinary retention after radical surgery of cervical cancer is a new finding, significant for pioneering a new field in acupuncture treatment of postoperative complications[2]. Sponsored by the Basic Research and Business Special Fund of Shandong University, this study was carried out by a rigorous randomized and controlled design, to observe the effect of acupuncture therapy plus medium-frequency electric stimulation on bladder function after radical surgery for cervical cancer, and to compare the differences of the therapeutic effects among groups, in a hope to provide objective evidence to clinical practice. Now, the report is given as follows.

1 Clinical Materials

1.1 Diagnostic criteria

In reference to 1995 edition of the diagnostic criteria of International Federation of Gynecology and Obstetrics (FIGO) for cervical cancer, after extensive hysterectomy and pelvic lymph node dissection and routine catheter indwelling to the 14th day, postoperative urinary retention was diagnosed if the patient could not urinate voluntarily or could urinate but residual urine volume ≥100 mL.

1.2 Inclusion criteria

Those in the conformity with the above diagnostic criteria after receiving radical surgery for cervical cancer; age above 18 and below 70 years old; without urinary infection and urinary retention before surgery; indwelling catheter after surgery for continuous urinary catheterization; extubation on the 14th day after surgery, residual urine volume was detected after voluntary urination, and no other interventions before that; those signed the informed consent.

1.3 Exclusion criteria

Those not in conformity with the above diagnostic and inclusion criteria; those under the treatment of acupuncture or medium-frequency electric stimulation, but not till the day of extubation; extubation not on the 14th day after surgery; those administered before and after extubation with neostigmine on others that may affect bladder function; those sick with obstruction of the lower urinary tract, bladder tumor, injury or stone of the urethra, urinary infection, spinal injury, and sequela of cerebrovascular diseases and others that may induce urinary retention; those with lateral or bilateral ureter injured during radical surgery for cervical cancer; those complicated with serious diseases in the cardiocerebrovascular, hepatic, renal or hemopoietic system; those with mental disorders; and those accepted treatment that may affect bladder function in the recent 1 month.

1.4 Rejection criteria

Those meeting the exclusion criteria; those with incomplete lab data unable to judge the therapeutic effect; those using medications or other therapeutic measures that affect the assessment of therapeutic effect.

1.5 Dropout criteria

Those present with serious adverse reaction during the observation; those presenting serious and other complications during the observation, or with deteriorating situation that could induce dangerous events; and those with poor compliance and unrequested treatment.

1.6 Statistical management

The data were processed with SPSS 16.0 version statistical software for statistical analysis. The comparison of the enumeration data was processed by Chi-square test. The measurement data conforming to the normal distribution and the homogeneity of variances were expressed by mean ± standard deviation ($\bar{x} \pm s$). The one-way analysis of variances or non-parametric test of multiple independent samples was used for intra-group comparisons. The rank-sum test was used for heterogeneity of variance. $P < 0.05$ indicated the statistical significance in difference.

1.7 General data

A total of 170 cases treated in the Gynecology Department of Qilu Hospital of Shandong University between January 2012 and November 2013, diagnosed wtih cervical cancer and treated with radical surgery were selected and divided by the random digital table into 3 groups, 56 cases in the acupuncture group, 58 cases in the observation group and 56 cases in the control group. In statistical analysis of the data of age and grading of pathological situation, the differences were statistically insignificant (all $P > 0.05$), indicating that the three groups were comparable (Table 1).

Table 1. Comparison of general data among the three groups

Group	*n*	Average age ($\bar{x}\pm s$, year)	Grading of pathological situation (case)			
			Ia	Ib	IIa	IIb
Acupuncture	56	46.1±9.7	1	43	11	1
Observation	58	47.4±9.9	1	43	12	2
Control	56	45.7±11.3	7	41	7	1

2 Therapeutic Methods

The three groups received the same nursing interventions, i.e. maintaining the smooth flow of the catheter, without bending, curving or dropping off, disinfecting the area around the perineum and urethra with iodophor solution twice daily, and keeping clean in the area of perineum.

2.1 Acupuncture group

Points: Zhongwan (CV 12), Tianshu (ST 25), Shuidao (ST 28), Taichong (LR 3), Sanyinjiao (SP 6), Zusanli (ST 36) and Yinlingquan (SP 9).

Method: The points were located in reference to the literature[2]. The filiform needles of 0.30 mm in diameter and 40 mm in length were selected. Zhongwan (CV 12) and Tianshu (ST 25) were punctured perpendicularly for 20-25 mm. Shuidao (ST 28) was punctured obliquely toward Qugu (CV 2) for 25-30 mm, transmitting the needling sensation to the perineum. Taichong (LR 3) was punctured obliquely toward Yongquan (KI 1) for 15-20 mm. Sanyinjiao (SP 6) was punctured backward and obliquely by 45 ° with the medial side of the tibia for 20-25 mm. Zusanli (ST 36) and Yinlingquan (SP 9) were punctured perpendicularly for 20-25 mm. After the arrival of needling sensation in points, even reinforcing-reducing manipulation was performed for 1 min. The needles were retained for 20 min and manipulated twice [by lifting, thrusting, twirling and rotating manipulations in small amplitude (0.1-0.3 cun in lifting-thrusting manipulation, and twisting angle ＜180 °)]. From the 3rd day after the surgery, the treatment was given once every day, till the extubation on the 14th day.

2.2 Observation group

2.2.1 Acupuncture treatment

The patients received the same acupuncture treatment as those in the acupuncture group.

2.2.2 Medium-frequency electric stimulation therapy

Model J18A1 computer medium-frequency pulsation power was used to stimulate the area of bladder, within the tolerance of the patient, for 20 min each time. The treatment frequency and observation period were as same as those in the acupuncture group.

2.3 Control group

The patients in the control group only received the same nursing intervention, without any other therapeutic measures.

3 Observation of Therapeutic Effects

3.1 Observed items[3]

The catheterization was used to determine the residual urine volume in the bladder after extubation on the 14th day after the surgery and voluntary urination.

3.2 Criteria of therapeutic effects

The recovery of bladder function was judged based upon the residual urine volume in the bladder.

Satisfied restoration: Residual urine volume less than 50 mL.

Poor restoration: Residual urine volume ≥50 mL.

The recovery rate ＝ Satisfied cases ÷ Group cases ×100%.

The occurrence rate of urinary retention ＝ Cases of urinary retention ÷ Group cases ×100%.

3.3 Therapeutic results

No dropout cases in this study.

3.3.1 Comparison of the recovery of bladder function

By statistical analysis, there was no statistical difference in the recovery of bladder function among the three groups ($P>0.05$), and without statistical differences in between-group comparisons (both $P>0.05$). But, the recovery rate of bladder function showed a better tendency in the observation group than in the acupuncture group and the control group, indicating that acupuncture plus medium-frequency electric stimulation might benefit the restoration of bladder function (Table 2).

Table 2. Comparison of restoration of bladder functions among the three groups (case)

Groups	*n*	Satisfied restoration	Poor restoration	Recovery rate (%)
Acupuncture	56	24	32	42.9
Observation	58	35	23	60.3
Control	56	23	33	41.1

3.3.2 Comparison of occurrence rate of urinary retention

By statistical analysis, the differences in the occurrence rate of urinary retention among the three groups were statistically significant ($P<0.05$). The occurrence rates of urinary retention in the acupuncture group and observation group were lower

than the rate in the control group ($P<0.05$), indicating that acupuncture and acupuncture plus medium-frequency electric stimulation could effectively prevent postoperative urinary retention. The difference was not statistically significant between the acupuncture group and the observation group ($P>0.05$), indicating that acupuncture plays an important role in the prevention of postoperative urinary retention (Table 3).

Table 3. Comparison of occurrence rates of urinary retention among the three groups (case)

Group	*n*	Occurred	Absent	Occurrence rate (%)
Acupuncture	56	9	47	16.1[1)]
Observation	58	12	46	20.7[1)]
Control	56	26	30	46.4

Note: Compared with the control group, 1) $P<0.05$

4 Discussion

Urinary retention after radical surgery for cervical cancer is a common urodynamical abnormality after gynecological surgery and has become one of the increasing hot issues in the clinics[4].

The normal urinary activity depends on the integrity of the bladder and urethra and is controlled by the nervous center and adjusted by the humor. It is believed in modern medicine that urinary retention induced by pelvic lymph node dissection and extensive hysterectomy is related to the following eight factors. First, it is related to nerve injury during surgery[5]. Most scholars believe that in cutting the uterosacral cardinal ligament during surgery, injury of the automatic nerve could not be avoided, and it is easy to injure the branch of the automatic nerve lateral and posterior to it while managing the ureteral tunnel, inducing nervous bladder paralysis, interruption of the urinary reflex and finally causing the decrease of compliance in the detrusor muscle of the bladder and increase in the residual urine volume[6]. Secondly, it is related to the injury of blood vessels[7]. The hematoma and postoperative scar formation could also injure the pelvic plexus and pelvic nerves, leading to over extension of the bladder and hence paralysis of the bladder in short period of time after surgery[8]. Thirdly, the bladder loses its support after extensive hysterectomy, and the prolonged removal of the vagina could change the posterior vesicourethral angle and urethral inclination angle, causing retroversion of the bladder[9], protrusion of the rear wall, in pseudodiverticulum change, and big folds present in the wall of the bladder, triangular wall of the bladder and urethral wall, leading to difficulty in urination. Fourthly, it is related to urinary infection. The long-term catheter indwelling after surgery or repeated catheter indwelling would damage the mucous membrane of the urethra, causing urinary infection[10]. Moreover, edema in the urethral mucosa would increase the resistance of urine discharge. Fifthly, the long-term catheter indwelling makes the bladder stay in a constant empty state, losing its tension and failing to perform its functions, and hence causing paralysis of the bladder and cystitis[11]. Sixthly, it is related to effect of anesthetics. The longer the anesthetic time, the deeper the anesthetic. The inhibition of the urinary center leads to adynamia of detrusor muscle and hence urinary retention. Seventhly, mental stress and incision pain would inhibit the sympathetic nerve, causing reflex spasm of the bladder sphincter and weakness of the detrusor muscle, and hence urinary difficulty. Eighthly, it is related to the age. The higher the patient's age, the higher the incidence rate of postoperative urinary retention. The incidence rate of postoperative urinary retention would be increased to 2.4-2.8 times in the patients above 50 years old[12], and the duration of urinary retention would be longer[13-14]. This may be related to degeneration of bladder function by degeneration of the nerve function due to age increase[15].

It is believed in some studies that the larger the operative scope is, the higher the incidence rate of urinary retention would be[16]. Its incidence rate reaches to 21.0%-85.0%[17] in the foreign reports and is 4.4%-44.9%[18] in the domestic reports. In this study, the incidence rate of postoperative urinary retention, without intervention, is 46.4%, identical to the reports at home and abroad.

At present, the therapeutic method used frequently in clinic for urinary retention after radical hysterectomy of cervical cancer is continuous catheterization, in the main goal to create a natural law of urinary intention in the bladder by catheterization and timed opening of the catheter, so as to restore the voluntary urination. Because of the invasive operation, it would remarkably increase the probability of urinary infection[19]. Moreover, obstruction in the bladder outlet, caused by edema of the bladder sphincter muscle and urethral gland and increase of resistance in the urethral outflow, due to long-term intubation of the catheter, may also cause postoperative urinary retention, thus causing a vicious circle and aggravating urinary retention[20]. Therefore, to adopt the effective therapeutic means and to strengthen the contractive ability of the detrusor muscle and to reduce spasm in the external urethral sphincter muscle would be beneficial to the improvement of the bladder functional damage due to surgery, restoration of the urinary functions of the bladder, elimination of the suffering of re-intubation of the catheter, reduction of the probability of urinary infection, and enhancement of the patient's QOL.

Postoperative urinary retention belongs to the scope of *Long Bi* (retention of urine) in traditional Chinese

medicine. Its pathological location is closely related to the lung, spleen, kidney and three jiao, and its pathogenesis is mainly related to damage of the Thoroughfare Vessel and Conception Vessel by surgical injury, and deficiency of qi and blood. If the kidney is deficient and fails in its qi transformation, the bladder would fail to open and close properly. When the spleen is deficient and fails in its transportation and transformation, water and dampness could not flow, leading to poor urination and urinary retention[12]. Acupuncture therapy can effectively reduce the incidence rate of postoperative urinary retention, increase the success rate of extubation of the catheter, and reduce the days of hospitalization and suffering of the patients. In modern acupuncture treatment and prevention of urinary retention, the commonly used acupoints are Sanyinjiao (SP 6), Yinlingquan (SP 9), Taichong (LR 3), Guanyuan (CV 4), Zhongji (CV 3), Shuidao (ST 28), Shenshu (BL 23) and Pangguangshu (BL 28), located mainly in the lower limbs, lower abdomen and lumbosacral region[21].

Puncturing acupoints in the lower abdomen and lumbosacral regions, plus electric pulsation stimulation, can excite the motor nerve fibers in the bladder area[22], in order to repair the bladder-governing nerves injured during surgery, so as to relieve bladder paralysis and restore the function of voluntary urination, and simultaneously can cause muscular contraction, excite the smooth muscle of the bladder, and enhance the tension of the detrusor muscle to train the contraction of the bladder. On the other hand, it can promote and improve blood circulation in the bladder area of the lower abdomen, to relax the muscles in the perineum, such as the urethral sphincter muscle, and hence strengthen the urinary functions of the bladder and maximally reduce residual urine, so as to treat urinary retention. Yinlingquan (SP 9) in the lower limb, the He-Sea point of the Spleen Meridian, is able to strengthen the spleen and remove water and dampness. Taichong (LR 3) is able to circulate qi and govern the opening and closing function. Once qi flows, water could flow to ensure smooth urination. Sanyinjiao (SP 6), a crossing point of three yin meridians of foot, liver, spleen and kidney, can dredge qi and blood in the three yin meridians, to regulate three meridians jointly and normalize the bladder, and can regulate the cerebral cortex and nervous functions of the internal organs, and relax spasm of the internal sphincter muscle of the bladder and the external urethral sphincter muscle[23]. Stimulation caused by acupoint-injection at Sanyinjiao (SP 6) can directly reach the pelvic plexus of the internal organs, and play a regulatory role on the tension of the bladder by nerve reflex channel. It has been proven by modern studies that Sanyinjiao (SP 6) and Yinlingquan (SP 9) in combination will regulate tension of the bladder, and strengthen the functions of the bladder[24]. All the acupoints in combination can have the anti-pathogenic qi restored, yang qi transformed, qi transformation of the bladder functioned, so as to ensure normal urination. It has also been proven by modern experiments that acupuncture can obviously enhance the internal pressure of the bladder in animals, lower down the urinary threshold and reduce the residual urine volume. It is clear that acupuncture can strengthen the excitement and tonicity of the bladder, enhance the contraction of the bladder detrusor muscle, increase the discharge frequency, excitement and conduction of the pelvic nerves[25], and promote the restoration of dendrite length of motor neuron, so as to increase the number of dendrite and promote the regeneration of the nerves after injury[26].

By electrodes on the abdomen, medium-frequency electric therapy gives electric stimulation of different frequencies to the patients, to reflectively strengthen the contraction of the pelvic floor muscles for gradually restoring the contracting functions of the pelvic floor muscles, restoring the normal blood circulation in the pelvic tissues, promoting the healing of the surgical injury on the bladder surface and restoring the functions of the bladder sphincter muscles[27].

In this study, acupuncture treatment alone can effectively treat urinary retention after radical surgery for cervical cancer. However, acupuncture and medium-frequency electric stimulation in combination can effectively enhance the restoring rate of bladder functions and maximally reduce the residual urine volume in the bladder, which provides an objective basis for our reasonable selection of the therapeutic method in the clinical practice.

Conflict of Interest

The authors declared that there was no potential conflict of interest in this article.

Acknowledgments

This work was supported by Scientific Research Fund Project of Qilu Hospital of Shandong University (山东大学齐鲁医院科研基金资助项目, No. 2015QLQN17); Basic Research and Business Special Fund of Shandong University (山东大学基本科研业务费专项资金, No. 260101756166072).

Statement of Informed Consent

Informed consent was obtained from all individual participants included in this study.

Received: 28 April 2017/Accepted: 29 May 2017

References

[1] Manchana T, Sirisabya N, Lertkhachonsuk R, Worasethsin P, Khemapech N, Sittisomwong T, Vasuratna A, Termrungruanglert W, Tresukosol D. Long term complications after radical hysterectomy with pelvic lymphadenectomy. J Med Assoc Thai, 2009, 92(4): 451-456.

[2] Yan XJ, Li GY, Shang HL, Wang G, Chen LS, Han YB. Complications of laparoscopic radical hysterectomy and pelvic lymphadenectomy: experience of 117 patients. Int J Gynecol Cancer, 2009, 19(5): 963-967.

[3] Tian XK, Liu YJ. Practical Prevention and Treatment of Obstetrics and Gynecology Surgical Injury. 2nd Edition. Beijing: Science Press, 2004: 234.

[4] Ji M, Shan JZ, Wu HM, Shen YP. Clinical observation of prevention and treatment of postoperative urinary retention after extensive hysterectomy of cervical cancer. Zhongguo Wuzhenxue Zazhi, 2007, 7(2): 230-231.

[5] Wu YX, Qiu S, Meng J. Injury of Pelvic plexus after radical surgery of cervical cancer and its prevention. Zhonghua Zhongliu Zazhi, 1994, 16(6): 465-468.

[6] Uccella S, Laterza R, Ciravolo G, Volpi E, Franchi M, Zefiro F, Donadello N, Ghezzi F. A comparison of urinary complications following total laparoscopic radical hysterectomy and laparoscopic pelvic lymphadenectomy to open abdominal surgery. Gynecol Oncol, 2007, 107(1): 147-149.

[7] Ren AM, Yang D, Han LM, Xu M, Zhang XZ, Tu RQ. Treatment of urinary retention after radical hysterectomy with tamsulosing combining pyridostigmine bromide. Fudan Xuebao (Yixue Ban), 2008, 35(3): 373-379.

[8] Sun SS, Yang XS, Sun Y. Exploration on prevention of postoperative urinary retention after surgery of cervical cancer by purse string suture of bladder dissection surface. Xiandai Fuchanke Jinzhan, 2003, 12(5): 385.

[9] Yu S, Hao SW, Zuo WW. Prevention of 30 cases of urinary retention after surgery of cervical cancer by acupuncture plus medications. Hebei Zhongyi, 2008, 30(4): 406-407.

[10] Hu YF, Hu GF. Observation of nursing intervention for postoperative urinary retention after extensive hysterectomy. Xiandai Zhongxiyi Jiehe Zazhi, 2005, 14(8): 1103-1104.

[11] Shan YH, Wei LH. Analysis of post-operative urine retention of cervical carcinoma. Zhongguo Fuchanke Linchuang Zazhi, 2003, 4(1): 28-30.

[12] Chen XN, Zhang SZ, Zhao KZ. Observation on electroacupuncture treatment of 60 patients with urine retention after cervical cancer operation. Shanghai Zhenjiu Zazhi, 2006, 25(3): 13-14.

[13] Baldini G, Bagry H, Aprikian A, Carli F. Postoperative urinary retention: anesthetic and perioperative considerations. Anenthesiology, 2009, 110(5): 1139-1157.

[14] Wu AK, Auerbach AD, Aaronson DS. National incidence and outcomes of postoperative urinary retention in the Surgical Care Improvement Project. Am J Surg, 2012, 204(2): 167-171.

[15] Lau H, Lam B. Management of postoperative urinary retention: a randomized trial of in-out versus overnight catheterization. ANZ J Surg, 2004, 74(8): 658-661.

[16] Zhang QB. Cervical Cancer Surgery. Beijing: People's Medical Publishing House, 1992: 101-106.

[17] Schaefer G. Complication in Obstetrics and Gynecologic Surgery. Hagerstown: Happer & Row, 1981: 389.

[18] Yan JL. Prevention of urine retention in postoperative uterine cervix cancer patients. Huli Yanjiu, 2006, 20(4): 989-990.

[19] Axelsen SM, Petersen LK. Urogynaecological dysfunction after radical hysterectomy. Eur J Surg Oncol, 2006, 32(4): 445-449.

[20] Zezhat F, Mahdavi A, Nagarsheth NP. Total laparoscopic radical hysterectomy and pelvic lymphadenectomy using harmonic shears. J Minim Invasive Gynecol, 2006, 13(1): 20-25.

[21] Peng XJ, Liang Q, Zhang YC, Du GZ. Research on application of frequently-used acupoints for urinary retention. Zhongyi Zazhi, 2013, 54(23): 2046-2048.

[22] Zhang FM, Chen YM, Gao ML. Analysis of clinical effects of computer medium-frequency for treatment of 30 cases of postoperative urinary retention. Binzhou Yixueyuan Yuanbao, 2006, 29(1): 17.

[23] Pang GJ, Zhang T, Tang PF. Observation on the therapeutic effect of Sanyinjiao (SP 6) acupoint-injection for treatment of postoperative urinary retention. Zhongguo Zhen Jiu, 2003, 23(12): 717-718.

[24] Yang JS. Acupuncture and Acupoints. Shanghai: Shanghai Scientific and Technical Publishers, 1989: 175-248.

[25] Zhang HJ, Li XR, Zhao L. Study on the treatment of uroschesis following operation of cervical carcinoma by acupuncture and moxibustion. Hulixue Zazhi, 2000, 15(6): 323-325.

[26] Li PT, Tao ZL. Influence of electric stimulation on form of spinal motor neurons in regeneration of peripheral nerves. Zhongguo Zhen Jiu, 1997, 17(4): 237-241.

[27] Li YM, Li H, Xiao AM, Hou J. A clinical analysis about low frequency electric stimulation prevent urinary retention in 32 patients after radical hysterectomy. Hanshao Jibing Zazhi, 2010, 17(2): 25-26.

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