Efficacy of electroacupuncture using "Jin's three needles" points on postoperative urinary retention after spinal anesthesia

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Abstract

Background: There is still a lack of high-quality clinical evidence to explore the effect of electroacupuncture using "Jin's Three Needles" in patients with postoperative urinary retention (POUR) after spinal anesthesia. **Objectives:** To assess the clinical therapeutic effect of "Jin's Three Needles" electroacupuncture on POUR after spinal anesthesia, and to identify some treatment-related factors influencing efficacy. **Methods:** Thirty-one patients diagnosed with postoperative urinary retention after spinal anesthesia in the Center of Orthopedic and Plastic Surgery - Hue Central Hospital from June 2022 to June 2024 were included using a convenience sampling method (non-probability sampling). **Results:** The average age of the participants was 73.03 ± 20.84 years, with participants aged 50 years and older accounting for 83.87%. The male-to-female ratio was 9/22. The average surgical duration was 70.81 ± 16.23 minutes. The distance from the bladder dome to the superior border of the pubic symphysis was mainly ≤ 5 centimeters. Electroacupuncture using "Jin's Three Needles" to treat postoperative urinary retention after spinal anesthesia showed very good and good effectiveness of 93.55%. No treatment failures were recorded. Treatment-related factors influencing efficacy consist of age and distance from the bladder dome to the superior border of the pubic symphysis ($p > 0.05$). **Conclusion:** This study can provide more comprehensive evidence to prove whether electroacupuncture using "Jin's Three Needles" is effective for patients with POUR after spinal anesthesia and identify some treatment-related factors influencing efficacy.

Keywords: *Postoperative urinary retention, spinal anesthesia, electroacupuncture, Jin's Three Needles*.

1. INTRODUCTION

Urinary retention is common after anesthesia and surgery, reported incidence of between 5% and 70%. Comorbidities, type of surgery, and kind of anesthesia influence the development of postoperative urinary retention (POUR) [1]. Spinal anesthesia is the simplest and most reliable technique in regional anesthesia. It is widely used for lower abdominal, pelvic, perineal, and lower extremity surgeries. However, spinal anesthesia is more likely to result in detrusor dysfunction due to blocking the afferent and efferent limbs of the micturition reflex and may subsequently lead to bladder overdistension Once bladder is sufficiently overdistended, detrusor contractility remains impaired, which can lead to the development of POUR [2].

In recent years, as one of the acupuncture methods, electroacupuncture (EA) has been considered an effective treatment for POUR. Studies have shown that EA can regulate bladder function, improve the tension and compliance of the detrusor muscle, and maintain the normal contractile activity of the bladder [3]. The "Jin's Three Needles" is a therapeutic approach that utilizes a combination of three acupoints, based on Traditional Medicine theories. Developed by Professor Jin Rui, a renowned acupuncturist from Lingnan, this method is derived from his extensive clinical experience. Key acupoints in this technique include Guanyuan, Zhongji, and Sanyinjiao. These points are frequently employed in clinical practice to address urinary system disorders, including urinary retention [4]. Although an increasing number of trials have shown the efficacy of EA in treating POUR, there is still a lack of high-quality clinical evidence to explore the effect of electroacupuncture using "Jin's Three Needles" in patients with POUR after spinal anesthesia. Therefore, this research was conducted to achieve the following purposes:

1. Survey of clinical characteristics in patients experiencing postoperative urinary retention after spinal anesthesia.

2. To evaluate the efficacy of electroacupuncture using "Jin's three needles" point on urinary retention after spinal anesthesia and determine some treatment-related effective factors.

2. MATERIALS AND METHODS.

2.1. Study design and participants

The study was conducted on patients who were 18 years or older and had been diagnosed with POUR

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after spinal anesthesia in the Center of Orthopedic and Plastic Surgery - Hue Central Hospital. The data were collected from June 2022 to June 2024 using a convenience sampling method (non-probability sampling).

2.1.1. Inclusion Criteria

- The study focused on patients aged 18 years or older who had been diagnosed with POUR, characterized by the following symptoms: a persistent urge to urinate without the ability to void, suprapubic pain or discomfort, and a palpable distended bladder above the pubic symphysis.

- Patients have not received other methods of urinary retention treatment during the study period.

- Voluntary participation in the study and compliance with the full treatment protocol.

2.1.2. Exclusion Criteria

- Patients with urinary retention caused by organic or structural conditions, such as urethral cancer or trauma, benign prostatic hyperplasia (BPH), urethral or ureteral calculi, congenital urogenital malformations, and other anatomical abnormalities.

- Patients diagnosed with urinary retention prior to surgery.

- Patients with severely overdistended bladder, at risk of bladder rupture.

- Patients or their relatives do not consent to participate in the study.

2.2. Study design

Uncontrolled clinical trial study.

2.3. Sampling methods

The data was collected by convenience (non-probability) sampling method. As a result, the number of participants who were enrolled in the study was 31.

2.4. Study method

Examination and selection of patients into the study group. Explain treatment and research procedures. All patients received electroacupuncture using the "Jin's Three Needles" as follows: Quanyuan (CV4), Zhongji (CV3), bilateral Zusanli (ST36), bilateral Sanyijiao (SP6), bilateral Yinlingquan (SP9) x once per day.

- Research variables:

(1) Sociodemographic features: age, gender

(2) Disease profile: duration of surgery, distance from the bladder dome to the superior border of the pubic symphysis.

(3) General treatment outcomes.

(4) Treatment-related factors.

- Criteria for evaluating treatment results

According to the guidelines of clinical research principles of modern Chinese medicine and modern medicine in the treatment of "Longbi" [5]:

Very good: The patient was able to urinate after the first session of electroacupuncture.

Good: The patient was able to urinate after the second to third session of electroacupuncture.

Medium: The patient was able to urinate after the fourth to fifth session of electroacupuncture.

Fail: After the 5th time of electroacupuncture, the patient was not able to urinate.

2.5. Statistical analysis

All collected data were recorded and statistically analyzed using SPSS version 20.0. Descriptive analysis was performed, in which categorical variables were presented as numbers and percentages, and continuous variables as mean ± standard deviation (SD). The Chi-squared test was used to assess the differences between categorical variables.

3. RESULTS

3.1. Characteristics of patients

Table 1. Some characteristics of the study sample

Characteristics		n	%
Age	≤ 49	5	16.13
	50 - 79	9	29.03
	≥ 80	17	54.84
	Average age: 73.03 ± 20.84 (28 - 100)		
Gender	Male	9	29.0
	Female	22	71.0
Surgery duration (minutes)	< 60	8	25.8
	60 - < 89	17	54.8
	≥ 90	7	19.4
	70.81 ± 16.23 (45 - 150)		

Distance from bladder dome to superior border of the pubic symphysis (centimetres)	≤ 5	13	41.9
	6-10	11	35.5
	> 10	3	9.7
	None	4	12.9

A total of 31 patients participated in this study. The average age of the participants was 73.03 ± 20.84 years, ranging between 28 to 100 years, in which the age group ≤ 49 has 5 patients (16.13%), the age group 50 - 79 has 9 patients (29.03%), the age group ≥ 80 has 17 patients (54.84%).

The gender distribution of the participants was relatively imbalanced, with 9 males (29.0%) and 22 females (71.0%).

The clinical characteristics of the cohort were diverse. Regarding duration of surgery, the mean duration was 70.81 ± 16.23 minutes, the 60 - < 89 minutes group accounted for the highest percentage (17/31 = 54.8%), followed by the < 60 minutes group (25.8%) and the lowest group was > 90 minutes, accounting for 19.4%.

Futhermore, the distance from the bladder dome to the superior border of the pubic symphysis was measured: 13 participants (41.9%) had a distance ≤ 5 cm, while 11 participants (35.5%) had a distance between 6 to 10 cm, and 3 participants (9.7) is more than 10 cm. And 4 participants had no experience with this symptom.

3.2. Treatment results

3.2.1 General treatment results

Table 2. General treatment result

Treatment results	n	%
Very good	19	61.29
Good	10	32.26
Medium	2	6.45
Fail	0	0
Total	**31**	**100**

Table 2 record the general treatment results, showing that the rates of very good and good treatment outcomes were 61.29% and 32.26%, respectively, while 6.45% of patients experienced average results. No instances of treatment failure were reported.

3.2.2 Some treatment-related factors.

3.2.2.1 Treatment results and participants' age.

Table 3. Treatment results and participants' age

Age group	Treatment results			p
	Very good	Good	Medium	
≤ 49	5 (100)	0 (0.0)	0 (0.0)	0.001
50 - 79	9 (100)	0 (0.0)	0 (0.0)	
≥ 80	5 (29.4)	10 (58.8)	2 (11.8)	

The age group from 50-79 and the group ≤ 49 years old had very good treatment results of 100%, higher than the group ≥ 80 years old (29.4%). The age group ≥ 80 years old had good and average rates of 58.8% and 11.8%, respectively. There was a significant difference in treatment efficacy and participants' age ($p < 0.05$).

3.2.2.2 *Treatment results and gender.*

Table 4. Treatment results and gender

Gender	Treatment results			p
	Very good	Good	Medium	
Male	8 (88.9)	1 (11.1)	0 (0.0)	0.166
Female	1 (11.1)	9 (40.9)	2 (9.1)	

There was no significant difference in treatment efficacy between the male and female participants ($p > 0.05$).

3.2.2.3 Treatment results and duration of surgery

Table 5. Treatment results and gender

Duration of surgery	Treatment results			p
	Very good	Good	Medium	
< 60	4 (50.0)	3 (37.5)	1 (12.5)	0.809
60 - 89	10 (58.8)	6 (35.3)	1 (5.9)	
≥ 90	5 (83.3)	1 (16.7)	0 (0.0)	

There was no significant difference in treatment efficacy and duration of surgery (p > 0.05).

3.2.2.4 Treatment results and the distance from the bladder dome to the superior border of the pubic symphysis

Table 6. Treatment results and the distance from the bladder dome to the superior border of the pubic symphysis

Distance from bladder dome to superior border of the pubic symphysis	Treatment results			p
	Very good	Good	Medium	
None	4 (100)	0 (0.0)	0 (0.0)	0.001
≤ 5	11 (84.6)	2 (15.4)	0 (0.0)	
6-10	4 (36.4)	7 (63.6)	0 (0.0)	
≥ 10	0 (0.0)	1 (33.3)	2 (66.7)	

All patients who had not experienced this symptom achieved very good results. Treatment results decreased gradually as the distance increased. The group of patients with a distance ≤ 5cm had very good treatment results at 84.6%, higher than that of the 6 to 10 cm group at 36.4%. The > 10 cm group had 33.3% of patients with good treatment results and the medium treatment results were 67.7%. The difference was statistically significant with p < 0.05.

4. DISCUSSION

4.1. Characteristics of patients

The results of research conducted on a sample of 31 patients show that the average age of the participants was 73.03 ± 20.84 years, ranging between 28 to 100 years, in which the age group ≤ 49 has 5 patients (16.13%), the age group 50 - 79 has 9 patients (29.03%), the age group ≥ 80 has 17 patients (54.84%). This rate was quite equivalent to the study of Abdul-Muhsin (2020) average age was 72.35 ± 8.27 [6]. Possible reasons for such age influences include age-related progressive neuronal degeneration leading to bladder dysfunction. Analogously, it has been reported that the elderly population generally faces a higher risk of urinary retention due to weakened bladder and pelvic floor muscles, polypharmacy, and comorbidities [7]. And table 1 shows that POUR after spinal anesthesia is rare in people under 50 years old, accounting for only 16.13%. This result is consistent with some previous studies showing that people over 50 years old have the risk of urinary retention by 2.4 times [1].

In contrast to earlier studies that male gender was noted as a risk factor for POUR with a higher incidence than females. Table 1 shows that the female-to-male ratio was 2.45/1, and this rate was quite similar to the study of Meltem Cakmak (2020) [8]. This finding may be related to the fact that benign prostatic obstruction, as a major gender-specific pathology, which increases POUR risk, was excluded in our study.

A single institution review reported that for every 10-minute increase in operative time, an 11% increase in POUR is expected [9]. In surgeries of longer duration, more intravenous fluids are expected to be given. A large amount of intravenous fluid can cause the detrusors to become less active, which can then result in POUR.

We divided the distance from the bladder dome to the superior border of the pubic symphysis into 4 group: 13 participants (41.9%) had a distance ≤ 5cm, while 11 participants (35.5%) had a distance between 6 to 10 cm, and 3 participants (9.7) is more than 10 cm. And 4 participants had no experience with this symptom. During surgery, the patient receives intravenous fluids that enhance blood flow and increase glomerular filtration, resulting in an extended distance between the bladder dome and the superior border of the pubic symphysis. As a result, urinary retention may be detected later, and its severity may increase.

4.2. Treatment results and some related factors

TM theory categorizes urinary retention as "LongBi". This condition is characterized by excessive blood loss or kidney Qi injury during childbirth or surgery, Qi depletion, kidney Qi deficiency, urinary adjustment failure, and post-operation liver Qi stagnation, which all contribute to urinary retention. The mechanism of acupuncture is based on the meridians, in which stimulating specific points can strengthen the kidney Qi and encourage urination.

In our study, we chose the CV4, CV3 points as the primary local acupoints and the SP6, SP9 and ST36 points as the distal acupoints. According to acupuncture meridian theory, CV3 is the Mu point of the bladder meridian and CV4 is the intersection point of the conception vessel and the three yin channels of the foot, which is a key point for the clinical treatment of diseases of the urinary and reproductive system The local acupoints above are all located near the bladder, and acupuncture at these points can clarify and regulate the bladder meridian and help to promote urination. ST36 belongs to the stomach meridian of the foot-yangming and regulates water metabolism and promotes urination. SP6 is the intersection point of the liver, spleen, and kidney meridians, and SP9 is the He-sea point of the spleen meridian. Both acupoints are used to invigorate the spleen, regulate qi activity, and promote urination [10]. EA is a type of therapeutic practice that inserts fine needles at specific acupoints and adds electrical stimulation, which can have positive impacts on diseases, according to traditional medicine theory. Compared with manual acupuncture, EA added constant electrical stimulation at acupoints. It is believed that constant low-amplitude electrical stimulation through the sacral nerve roots leads to ascending signals passed on to the micturition centers, which modulate efferent signals to the bladder [11].

Our study indicated that the treatment effect diminished with age. This phenomenon could be due to the progressive degeneration of nerve cells with age, which may impair bladder function recovery and decrease nerve sensitivity to electroacupuncture. These results highlight that age plays a significant role in the recovery potential of patients with urinary retention after spinal anesthesia. Treatment of urinary dysfunction in older adults has largely been bladder-centric: therapeutics predominantly target the detrusor muscle. There is a lack of therapeutic success seen in drugs targeting adrenergic and cholinergic mechanisms in patient populations. Anticholinergic drugs, for example, are largely ineffective and are not generally recommended in older patients due to the cognitive side effects [12]. Therefore, electroacupuncture, as a non-pharmacological technique of traditional medicine, can stimulate and enhance bladder contractility through neural and humoral mechanisms. This approach may serve as an alternative to medication for treating urinary retention in the elderly following spinal anesthesia.

Regarding treatment results and the distance from the bladder dome to the superior border of the pubic symphysis. Table 6 shows that treatment results decreased gradually as the distance increased. The difference was statistically significant with $p < 0.05$. Nguyen Thi Tuyet Trang (2020) also found that the distance between the bladder dome and the superior border of the pubic symphysis before electroacupuncture influenced the treatment outcomes and extended the duration of the treatment [13]. In patients under spinal anesthesia, bladder filling perception is abolished, so excessive infusion of intravenous fluids may lead to overdistension of the bladder [14]. Electroacupuncture, through periodic stimulation, promotes contraction of the detrusor muscles with each session, thereby stimulating the central nervous system, urinary center, and pelvic nerves to restore the micturition reflex. This highlights the importance of early diagnosis of POUR. To prevent the POUR, some therapeutic attempts, such as restrictive fluid regimens, ingestion of caffeine, and administration of α-blockers, have been used in clinical practice. Unfortunately, these strategies cannot meet all the clinical needs due to their limited application fields. For instance, administration of α-blockers may lead to severe hypotension for patients undergoing spinal anesthesia because blood pressure lowered by spinal anesthesia may be further reduced by α-blockers [2]. Therefore, it is necessary to develop a new therapy to facilitate the recovery of postanesthetic bladder function. Electroacupuncture may be a treatment strategy for bladder dysfunction secondary to spinal anesthesia.

This study also demonstrated that the efficacy of electroacupuncture is not significantly influenced by gender and duration of surgery ($p > 0.05$). Voiding is controlled by the detrusor, which is the smooth muscle (SM) in the wall of the bladder from the insertion of the ureters to the dome (top) of the bladder. Three layers of SM comprise the detrusor. Longitudinal cells populate the inner and outer layers, whereas those cells found in the middle are arranged circularly. The detrusor is thicker in men

than women, as greater voiding pressure is needed to empty the bladder through the longer urethra of males. But the ratio between SM and connective tissue does not differ between women and men of any age. Furthermore, it has been reported that the contractility of the human detrusor is sex-independent [15]. Currently, no specific reports indicate whether gender affects the effectiveness of electroacupuncture treatment in patients with POUR after spinal anesthesia or not. EA is widely used in clinical trials and laboratory research because of its continuity of stimulation and repeatability of operation. Besides, the therapeutic efficacy of EA can be modulated by varying frequency, intensity, and duration. Several studies about gender differences in EA efficacy in the treatment of various diseases have been reported, with results varying widely depending on the pathology and often based primarily on animal models [16]. Therefore, additional research in this area is essential to develop tailored treatments that address the specific needs of both male and female patients.

During the study, no cases of adverse effects related to electroacupuncture were observed, such as needle fainting, local bleeding at the needle site, needle breakage, local infection, or bladder rupture. Some studies evaluating the effectiveness of electroacupuncture for treating urinary retention have reported that the incidence of such adverse effects is very low [17]. Therefore, electroacupuncture is a safe treatment method for patients with POUR following spinal anesthesia.

5. CONCLUSION

This study can provide more comprehensive evidence to prove whether electroacupuncture using “Jin’s Three Needles” is effective for patients with POUR after spinal anesthesia and points out some treatment efficacy-related factors.

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