Applied analysis of ultrasound-guided ilioinguinal and iliohypogastric nerve blocks in the radical surgery of aged cervical cancer

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Abstract. In the present study, we evaluated the effects of ultrasound-guided ilioinguinal and iliohypogastric nerve blocks and intratracheal general anesthesia in the radical surgery of aged cervical cancer. From June 2014 to December 2014, 62 patients diagnosed with aged cervical cancer were enrolled in this study. The patients conformed to the indication of cervical cancer radical surgery. Patients were randomly divided into the test group and the control group according to the random number table with 31 individuals in each group. General anesthesia and compound ultrasound-guided ilioinguinal and iliohypogastric nerve blocks were applied in the test group, while intratracheal general anesthesia was used in the control group. The results showed that the operative time, awake time and the total dosage of propofol and sufentanil in the test group were significantly lower than those in the control group. The postoperative VAS score, the times to press the automatic control bump and continuous application time of the automatic control bump in the test group were significantly less than those in the control group. The occurrence rate of anesthesia-related adverse reactions in the test group during the perioperative period was significantly lower than that in the control group. Differences were statistically significant ($P<0.05$). We concluded that ultrasound-guided ilioinguinal and iliohypogastric nerve blocks significantly improved the analgesic effects during the perioperative and postoperative period in cervical cancer radical surgeries.

Introduction

Cervical cancer, also known as invasive cervical carcinoma, is the most common gynecologic malignant tumor (1). The first edition of NCCN2009 is widely employed in China, in which the specific therapeutic methods of cervical cancer in different clinic stages are prescribed in detail (2,3). For the cervical cancer patients during the clinical stage of IA, IB or IIA, the surgery method based on the radical hysterectomy remains the first choice of therapy which can fully improve the therapeutic effect and long-term survival rate.

The perioperative anesthesia method is vital to the improvement of the success rate of surgery. Frequently used methods for perioperative anesthesia include intratracheal general anesthesia and combined epidural and intravenous anesthesia. The method of ultrasound-guided ilioinguinal and iliohypogastric nerve blocks is a type of nerve blocking method that has been widely employed in recent years. This is a simple and useful regional anesthesia technique method proved to be superior and cost-effective in comparison with general anesthesia. Characteristic of the operative anesthesia is that peripheral nerve tissue has little effect on the body and the block segment is more specific, which can effectively ensure the stability of the internal environment and is more suitable to children, the elderly and critically ill patients (4). In previous clinical practice, anesthetists usually applied ilioinguinal and iliohypogastric nerve blocks according to their personal experience and often did not obtain satisfactory results (5).

The present study further investigated the clinical effects of ultrasound-guided ilioinguinal and iliohypogastric nerve blocks and general anesthesia in the radical surgery of aged cervical cancer.

Materials and methods

Patients. From June 2014 to December 2014, 62 patients diagnosed with aged cervical cancer were enrolled in this study. All the cases were confirmed to have cervical cancer and conformed to the indication of cervical cancer radical surgery. There were 23 patients in stage IA, 27 in stage IB and 12 in stage IIA. The patients were randomly divided into the test group and the control group according to the random number table (31 cases in each group). The study was approved by the Ethics Committee of Laiwu City People's Hospital (Shandong, China) and informed consent forms were signed by the patients or their families. We excluded the following patients from our

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Table I. Comparison of operative time, awake time and total dosage of propofol and sufentanil.

Groups	Operative time, min	Awake time, min	Total dosage of propofol, mg	Total dosage of sufentanil, mg
Test	46.3±11.8	18.4±5.3	11.2±3.4	15.4±3.2
Control	77.2±20.4	32.2±6.4	18.5±4.2	21.7±4.6
t-value	2.305	3.152	3.612	3.041
P-value	0.041	0.027	0.022	0.026

Table II. Comparison of VAS score, times to press automatic control bump and continuous application time of automatic control time.

Groups	VAS score	Pressing times	Continuous application time, h
Test	3.4±0.6	6.2±1.3	10.5±3.4
Control	4.9±0.7	9.7±1.6	19.7±4.2
t-value	3.412	3.715	3.469
P-value	0.023	0.018	0.021

VAS, visual analog scale.

Table III. Comparison of anesthesia-related adverse reaction rate during perioperative period [cases (%)].

Groups	Respiratory depression	Intra-operative body movement	Postoperative agitation	Nausea and vomiting	Total occurrence rate
Test	1 (3.21)	0 (0.00)	1 (3.21)	1 (3.21)	3 (9.68)
Control	4 (12.90)	2 (6.45)	3 (9.68)	2 (6.45)	11 (35.48)
χ^2	-	-	-	-	4.904
P-value	-	-	-	-	<0.001

study: i) Those who had undergone prior surgery for cervical cancer, ii) those with other viscera tumors, iii) those with severe reno-hepatic dysfunction or blood coagulation disorders, iv) those with <1 year of expected lifetime, and v) those who refused to participate in this study.

The age range for the patients in the test group was 61-79 years (average, 68.6±4.3 years). The weight range for the patients in the test group was 40-71 kg (average, 52.6±3.1 kg). In the test group we had 12 patients in stage IA, 15 in stage IB and 8 in stage IIA. The age range for the patients in the control group was 62-82 years (average, 69.4±4.5 years) and the weight range was 41-76 kg (average, 53.1±5.1 kg). In the control group we had 11 patients in stage IA, 12 patients in stage IB and 4 patients in stage IIA. Age, weight and neoplasm staging comparison between the groups revealed no statistically significant differences (P>0.05).

Test method. Patients in the two groups fasted (without water) for 8 h before anesthesia and were routinely monitored after entering the operating room. Intratracheal general anesthesia was performed for patients in the control group. Sufentanil (3 μg/kg) was injected intravenously at the beginning of anesthesia induction, and propofol + sufentanil (continuing microdosis venous pump) was used for maintaining anesthesia during the operation. Patients in the test group were injected intravenously with sufentanil after vein opening and were given ultrasound-guided ilioinguinal and iliohypogastric nerve blocks after tracheal intubation of general anesthesia. The color Doppler ultrasonic diagnosis apparatus was used (frequency maintained at 5-10 MHz) with the ultrasonic hedge covered with sterile membrane close to the anterior superior spine of patients and with one end of the probe pointing to the navel. We could see abdominal muscle tissue with 3 layers of echo under the guidance of ultrasound, and they were transversus abdominis, obliquus internus abdominis and external oblique aponeurosis, respectively. We saw an oval tissue between the obliquus internus abdominis and transversus abdominis. It was wrapped by the high-level echo as was shown in the apparatus and the target tissue was iliohypogastric and ilioinguinal nerves. Subsequently a 22 G puncture needle was slipped into the space between the transverse muscle and internal oblique muscle in parallel along the probe, the patients were injected with 0.2 ml/kg ropivacaine (concentration = 0.75%) and the nerve in pars ilica was wrapped with narcotic drug. The intravenous micropump speed of

propofol and sufentanil was adjusted during the operation according to the reaction of patients.

Observation target. We analyzed and compared the differences in operative time, awake time, total dosage of propofol and sufentanil, postoperative vision analog score (VAS) between the 2 groups. The difference of the times to activate automatic control bump and the continuous application time of automatic control bump was compared after the automatic control bump (sufentanil 150 μg + granisetron 2 mg) was used after the operation to maintain an analgesic effect. The occurrence rate of anesthesia-related adverse reactions in patients was compared between the 2 groups during the perioperative period.

Statistical analysis. SPSS 19.0 statistical software (SPSS, Inc., Chicago, IL, USA) was used for data analysis. Measurement data are shown as the mean ± standard deviation, and the intergroup comparison was tested by t-test. The enumeration data are shown by the number of cases or the percentage. Intergroup comparison was carried out using χ^2 test. $P<0.05$ was considered to indicate a statistically significant difference.

Results

Comparison of operative time, awake time and total dosage of propofol and sufentanil. The operative time, awake time and total dosage of propofol and sufentanil for the patients in the test group were significantly less than those for the patients in the control group, and the differences were statistically significant ($P<0.05$; Table I).

Comparison of VAS score, times to press automatic control bump and continuous application time of automatic control time. The VAS score, times to activate automatic control bump and continuous application time of automatic control time for the patients in the test group were significantly lower than those for patients in the control group. Differences were statistically significant ($P<0.05$; Table II).

Comparison of anesthesia-related adverse reactions rate during perioperative period. The anesthesia-related adverse reaction rate for the patients in the test group during perioperative period was significantly lower than that in the control group. Differences were statistically significant ($P<0.05$; Table III).

Discussion

The greatest advantage of ultrasound-guided ilioinguinal and iliohypogastric nerve blocks is the ability to display the anatomic structure of target anesthesia region in real time (6). Under the guidance of ultrasound the peripheral nerves and adjacent tissues can be directly observed upon anesthesia. By applying the blocks to the peripheral nerves the diffusion of narcotic drug can be observed and this can improve the success rate of peripheral nerve blocks and reduces the occurrence of complications (7). With continuous development of medical technology, comprehensive treatment methods are employed in hospitals to cure the malignant tumors and radical resection is usually employed for the patients who conform to the operation indication. Patients with tumor are weak and usually have diminished compensation function. Risk associated with anesthesia is high for these patients, thus choosing an appropriate anesthesia method to lower the risk of anesthesia is essential for clinical anesthesiologists (8,9).

Cervical cancer is the most common malignant tumor in women, causing physical and mental health complications. Cervical cancer patients often suffer from anxiety and fear and have poor adherence, therefore the basic principle for intraoperative anesthesia is pain relief as well as sleep quality. A large number of animal experiments showed that general anesthesia had a significant impact on the animals' nerves (10). Prior findings showed that high doses of narcotic drugs used for the general anesthesia, created severe adverse reactions and prolonged the time patients needed to regain their consciousness after the operation (11). Finding a more suitable anesthesia method is an important challenge in cervical cancer radical surgeries (12). Relevant research showed that the peripheral nerve blocks method was safe and effective and had little influence on the patients' circulation and respiration (13). Ilioinguinal and iliohypogastric nerve blocks run from nervous system waist 1 and thoracic 12 nerve and their running positions are superficial, thus it is easy to block and locate the position of ilioinguinal and iliohypogastric nerves (14). Ultrasound provides a direct view of blood vessels and nerves and can precisely locate the position from which the puncture needle is slipped into the body. Using ultrasound, damage to important organs and nerve blocks can be avoided (14). Additionally, direct injection of narcotic drugs around the nerves under the guidance of ultrasound shortens the onset time of local anesthetic (15).

In the present study, we have shown that the awake time for the patients in the test group was significantly shorter than that for the patients in the control group while the total dosage of narcotic drug used for the patients in the test group was significantly less than compared with the amount used in the control group. We showed that the ultrasound-guided ilioinguinal and iliohypogastric nerve blocks effectively reduced the total dosage of narcotic drug and was helpful for the patients to recover consciousness as soon as possible. The rate of adverse reactions in the test group patients was considerably less than that seen in the control group. Ultrasound-guided ilioinguinal and iliohypogastric nerve blocks was safer and had little negative influence on the patients. Postoperatively, the times to press automatic control bump and the continuous application time of automatic control bump for the test group were meaningfully less than those for the control group. We concluded that the ultrasound-guided ilioinguinal and iliohypogastric nerve blocks can provide better postoperative analgesia. Ultrasound-guided ilioinguinal and iliohypogastric nerve blocks can effectively shorten the awake time of patients, reduce the total dosage of narcotic drug to the utmost extent, reduce the rate of adverse reaction in patients and provide better postoperative analgesia with higher safety standards.

References

1. Yung KW, Yung TT, Chung CY, Tong GT, Liu Y, Henderson J, Welbeck D and Oseni S: Principles of cancer staging. Asian Pac J Surg Oncol 1: 1-16, 2015.
2. Abu-Rustum NR and Sonoda Y: Fertility-sparing surgery in early-stage cervical cancer: Indications and applications. J Natl Compr Canc Netw 8: 1435-1438, 2010.

3. Li JM, Shao JL, Zeng WJ and Liang RB: General/epidural anesthesia in combination preserves NK cell activity and affects cytokine response in cervical carcinoma patients undergoing radical resection: A cohort prospective study. Eur J Gynaecol Oncol 36: 703-707, 2015.
4. Marhofer P, Willschke H and Kettner S: Current concepts and future trends in ultrasound-guided regional anesthesia. Curr Opin Anaesthesiol 23: 632-636, 2010.
5. Liu SS, YaDeau JT, Shaw PM, Wilfred S, Shetty T and Gordon M: Incidence of unintentional intraneural injection and postoperative neurological complications with ultrasound-guided interscalene and supraclavicular nerve blocks. Anaesthesia 66: 168-174, 2011.
6. Bowens C Jr, Gupta RK, O'Byrne WT, Schildcrout JS, Shi Y, Hawkins JJ, Michaels DR and Berry JM: Selective local anesthetic placement using ultrasound guidance and neurostimulation for infraclavicular brachial plexus block. Anesth Analg 110: 1480-1485, 2010.
7. Perlas A, Lobo G, Lo N, Brull R, Chan VW and Karkhanis R: Ultrasound-guided supraclavicular block: Outcome of 510 consecutive cases. Reg Anesth Pain Med 34: 171-176, 2009.
8. Davis JJ, Swenson JD, Greis PE, Burks RT and Tashjian RZ: Interscalene block for postoperative analgesia using only ultrasound guidance: The outcome in 200 patients. J Clin Anesth 21: 272-277, 2009.
9. García-Navia JT, Tornero López J, Egea-Guerrero JJ, Vilches Arenas A and Vázquez Gutiérrez T: Effect of a single dose of lidocaine and ketamine on intraoperative opioids requirements in patients undergoing elective gynecological laparotomies under general anesthesia. A randomized, placebo controlled pilot study. Farm Hosp 40: 44-51, 2016.
10. Zhou DW, Mowrey DD, Tang P and Xu Y: Percolation model of sensory transmission and loss of consciousness under general anesthesia. Phys Rev Lett 115: 108103, 2015.
11. Oomens MA, Booij LH and Baart JA: The risk of general anaesthesia and sedation in the older people. Ned Tijdschr Tandheelkd 122: 674-679, 2015 (In Dutch).
12. Gelfand HJ, Ouanes JP, Lesley MR, Ko PS, Murphy JD, Sumida SM, Isaac GR, Kumar K and Wu CL: Analgesic efficacy of ultrasound-guided regional anesthesia: A meta-analysis. J Clin Anesth 23: 90-96, 2011.
13. Tani M, Sato M, Son I, Tanabe H, Hirota K, Shirakami G and Fukuda K: Transient femoral nerve palsy after ilioinguinal-iliohypogastric nerve block: Comparison of ultrasound-guided and landmark-based techniques in adult inguinal hernia surgery. Masui 64: 603-609, 2015 (In Japanese).
14. Yucel E, Kol IO, Duger C, Kaygusuz K, Gursoy S and Mimaroglu C: Ilioinguinal-iliohypogastric nerve block with intravenous dexketoprofen improves postoperative analgesia in abdominal hysterectomies. Braz J Anesthesiol 63: 334-339, 2013.
15. Mei W, Jin C, Feng L, Zhang Y, Luo A, Zhang C and Tian Y: Bilateral ultrasound-guided transversus abdominis plane block combined with ilioinguinal-iliohypogastric nerve block for cesarean delivery anesthesia. Anesth Analg 113: 134-137, 2011.