CLINICAL EFFECT OF NERVE BLOCK COMBINED WITH TRACHEAL INTUBATION GENERAL ANAESTHESIA IN ELDERLY PATIENTS UNDERGOING HIP SURGERY

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ABSTRACT

Objective: *To explore the clinical effect of nerve block combined with tracheal intubation general anaesthesia in elderly patients undergoing hip surgery.*

Methods: *A total of 74 elderly patients who underwent hip surgery in our hospital from April 2017 to April 2019 were selected as the research subjects. The patients were randomly divided into two groups by a simple random grouping method. The patients in the study group (n=37) received nerve block combined with general anaesthesia for tracheal intubation, and the patients in the control group (n=37) received general anaesthesia for tracheal intubation. Heart rate (HR), diastolic blood pressure (DBP) and systolic blood pressure (SBP) were observed before induction of anaesthesia (T0), after loss of consciousness (T1), immediately after endotracheal intubation (T2), 2 minutes after endotracheal intubation (T3) and at extubation (T4), as well as pain scores at 6, 12 and 24 hours after the operation and the incidence of complications.*

Result: *Repeated-measurement variance analysis showed significant differences between groups, with time and group as the main effect factors ($P < 0.05$). The HR, DBP and SBP in the study group were not significantly different from those in the control group ($P>0.05$), whereas the HR, DBP and SBP in the control group were significantly different ($P<0.05$). No significant difference was found in hemodynamic parameters at T0 and T1 between the two groups ($P>0.05$). HR, DBP and SBP at T2–T4 in the study group were lower than in the control group ($P<0.05$). Repeated measurements of variance analysis showed significant differences in visual analogue scale (VAS) scores between groups, with time and group as the main factors ($P<0.05$). The VAS scores of the study group at 6, 12 and 24 hours after the operation were significantly lower than those of the control group ($P<0.05$). The incidence of complications in the study group was significantly lower than in the control group ($P<0.05$).*

Conclusion: *The application of nerve block combined with tracheal intubation general anaesthesia in elderly patients undergoing hip surgery was beneficial to maintaining stable haemodynamics, alleviating early postoperative pain and reducing complications, so it has certain clinical application value.*

Keywords: *Old age, hip surgery, nerve block, deneral anaesthesia with tracheal intubation.*

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Introduction

Hip surgery is common in clinical orthopaedics. Because elderly patients often have complications such as diabetes and high blood pressure, and important organ function has different degrees of decline, the risk of anaesthesia in hip surgery is increased. Related studies have found that anaesthesia is an independent factor in the mortality of hip surgery, and nerve block can contribute to a certain degree of mortality[1]. Ultrasound-guided nerve block has the advantages of accurate positioning, a high success rate, less numbness and fewer operative complications[2]. Our hospital has achieved good clinical results in the treatment of elderly patients with hip surgery using nerve block combined with tracheal intubation.

Methods

General information

Seventy-four patients undergoing advanced hip surgery, admitted to our hospital from April 2017 to April 2019, were selected as subjects.

The case inclusion criteria were:

• Age ≥65 years;

• Patients with femoral intertrochanteric fractures, femoral neck fractures or hip fractures, who underwent open or closed reduction and internal fixation surgery;

• ASA grade II–III. Patients and their families signed an informed consent.

Exclusions were:

• Allergic drug history;

• Block infection;

• Peripheral neurological disease;

• Mental system disease;

• Long-term use of opioids and disturbance of consciousness.

Patients had two or more comorbidities before the operation, including diabetes, hypertension, cerebrovascular disease and coronary heart disease. Seventy-four patients were randomly divided into two groups by a simple randomization method.

The study group (nerve block combined with tracheal intubation general anaesthesia) comprised 37 cases, including 16 men and 21 women, aged 65-87 years, with a mean age of 78.64±6.79 years. Their body mass index (BMI) ranged from 19-26 kg/m^2, with a mean of 22.31±1.86 kg/m^2.

The control group (tracheal intubation general anaesthesia) comprised 37 cases, including 17 men and 20 women, aged 66-86 years, with a mean age of 78.15±6.72 years old. Their BMI ranged from 18-26 kg/m^2, with a mean of 22.19±1.81 kg/m^2. No significant differences existed in gender, age, BMI or other general data between the two groups (P>0.05), which were comparable.

Methods

All patients underwent oxygen inhalation and upper extremity venous access, with monitoring of heart rate (HR), blood oxygen saturation, and electrocardiogram. Under local anaesthesia, a radial arterial line was placed and the blood pressure was monitored. Then, the value of the two blood pressures in the ward and the average calculated value of the blood pressure stability values were taken as the basic values before anaesthesia induction. For patients with long-term diabetes and hypertension, an internal jugular vein catheter was placed, and the central venous pressure was monitored[3]. Through portable ultrasound-guided positioning, a 0.5% ropivacaine 30-mL femoral nerve and lateral femoral cutaneous nerve block were used in the study group, and anaesthesia was induced after the onset; the control group was directly anaesthetized.

Anaesthesia induction

Intravenous injection (sequential) 0.03 mg/kg midazolam, 2 μg/kg fentanyl, 0.2 mg/kg etomidate, 0.15 mg/kg cis-sulfatracurium. The injection rate was controlled, ensuring patients' blood flow was maintained steadily. Endotracheal tube insertion was performed in all patients until patient consciousness, lash reflexes disappeared and muscles were completely relaxed. After the airway was successfully established, an anaesthesia machine was connected to perform mechanical ventilation. Parameter settings: tidal volume 8 mL/kg, respiratory rate 12 times/min, end-tidal carbon dioxide partial pressure 35-40 mmHg.

Anaesthesia maintenance

All patients underwent intravenous anaesthesia, pumping 50-80 μg/kg/min propofol and 0.05-0.15 μg/kg/min remifentanil and injecting 0.1-0.15mg/kg of cis-benzene atracurium. According to the changes of monitoring indicators, combined with the amount of bleeding and depth of anaesthesia, the intraoperative drug pumping rate and blood transfusion volume were adjusted. Fifteen minutes before the surgery, the drug pump injection was stopped.

After the surgery, the patient's spontaneous breathing, muscle strength recovery, brain state index (CSI) higher than 80 and in response to the doctor's instructions, tracheal intubation. Postoperative analgesia used tramadol or parecoxib according to pain status[4].

Observation indicators

• Hemodynamic indicators. The HR of the two groups was observed and recorded before the induction of anaesthesia (T0), after the disappearance of consciousness (T1), immediately after tracheal intubation (T2), 2 minutes after tracheal intubation (T3), and at the time of extubation (T4), along with DBP and SBP changes.

• Pain scores. The degree of pain at 6h, 12h and 24h after surgery was assessed by visual analogue scale (VAS)[5]. Pain level: no pain (0 points), mild pain (below 3 points), moderate pain (4-6 points), severe pain (7-10 points).

• Complications. Nausea and vomiting, coughing, agitation, and postoperative hoarseness and sore throat complications were observed in patients during anaesthesia recovery.

Statistical processing

The statistical software SPSS 22.0 was used to process the data. Count data were expressed by n (%) and the independent sample χ^2 test; measurement data were represented by $\bar{x}\pm s$, and the variance analysis of the repeated measurement data was used to analyse the difference between the two groups and the time. The time difference of the point measurement values, the comparison of the two groups of time points, the independent samples t-test, the pairwise comparison using the LSD-t-test. P<0.05 was considered statistically significant.

Results

Haemodynamics at different time points

Repeated–measures analysis of variance showed that the hemodynamic parameters at different time points were significantly different between the groups with time-based effects and group-based factors (P<0.05). The HR, DBP and SBP in the two groups were significantly increased at T2. No significant difference was found in HR, DBP or SBP from T2-T4 in the study group (P>0.05) or HR and DBP from T2-T4 in the control group. The level of SBP changed significantly, and the difference was statistically significant (P<0.05). No significant differences were found in haemodynamics between the two groups at T0 and T1 (P>0.05). HR, DBP and SBP in the study group were lower than in the control group at T2-T4 (P<0.05; Table 1).

Index	Group	T0	T1	T2	T3	T4
HR (time/min)	Study group (n = 37)	81.37±12.42	71.48±11.25	78.76±12.03	75.42±11.71	77.58±11.52
	Control group (n = 37)	81.69±12.48	71.13±11.36	88.18±12.94	81.47±11.95	88.12±12.91
	t value	0.111	0.133	3.243	2.200	3.705
	P-value	0.912	0.894	0.002	0.031	<0.001
DBP (mmHg)	Study group (n = 37)	74.65±10.28	62.01±11.68	73.41±10.69	69.58±11.27	70.46±10.11
	Control group (n = 37)	74.89±10.32	61.87±11.52	83.36±12.87	76.75±10.82	82.89±12.74
	t value	0.100	0.052	3.618	2.792	4.649
	P-value	0.920	0.959	0.001	0.007	<0.001
SB (mmHg)	Study group (n = 37)	133.67±16.38	128.49±15.82	141.17±16.82	137.29±15.12	139.26±15.71
	Control group (n = 37)	133.88±16.41	128.69±15.80	160.39±17.84	146.72±16.93	153.67±17.25
	t value	0.055	0.054	4.768	2.527	3.757
	P-value	0.956	0.957	<0.001	0.014	<0.001

Table 1: Comparison of hemodynamic status between two groups at different time points ($\bar{x}\pm s$).
Note: HR, DBP, SBP with time factor as the main effect of F=11350.554, 7863.275 / 12786.746, P<0.01; group=factor of the main effect of F=2462.400, 3451.137, 1794.237, P<0.01.

Postoperative VAS score

Repeated-measurement variance analysis showed that the VAS score of the study group was significantly lower than that of the control group at 6, 12 and 24 hours after the operation (P<0.05), with the time factor as the main effect (F=8775.696; P<0.001) and the group factor as the main effect (F=643.258; P<0.001; Table 2).

Group	Number of cases	6 hours after operation	12 hours after operation	24 hours after operation	F value	P-value
Research group	37	3.05±0.83	2.37±0.59	1.02±0.27	113.566	<0.001
Control group	37	4.88±1.28	3.53±1.02	2.42±0.96	73.188	<0.001
t value		7.297	5.988	8.539		
P-value		<0.001	<0.001	<0.001		

Table 2: Postoperative VAS scores of the two groups were compared ($\bar{x}\pm s$, min).
Note: F=8775.696 with time factor as the main effect, P<0.01; F=643.258 with group factor as the main effect, P<0.01.

Complications

The incidence of complications in the study group (8.11%) was significantly lower than in the control group (29.71%; P<0.05; Table 3).

Group	Number of cases	Nausea and vomiting	Restlessness	Cough	Hoarseness	Sore throat	Total incidence
Research group	37	1 (2.70)	1 (2.70)	1 (2.70)	0 (0)	0 (0)	3 (8.11)
Control group	37	1 (2.70)	5 (13.51)	3 (8.11)	1 (2.70)	1 (2.70)	11 (29.71)
χ^2 value		0	2.902	1.057	1.014	1.014	5.638
P-value		1	0.088	0.304	0.314	0.314	0.018

Table 3: Comparisons of postoperative complications between the two groups [n (%)].

Discussion

Given the background of the ageing population, fracture surgery in the elderly is increasing yearly.

Among these, hip fractures comprise mainly femoral intertrochanteric and femoral neck fractures, mostly occurring in the elderly group. Studies have shown that early internal fixation after hip fracture in the elderly can significantly reduce the incidence of complications and mortality within one year[6]. The choice of appropriate anaesthesia methods is the focus of current research. In the operation of hip fracture, tracheal intubation general anaesthesia is a common anaesthesia method, which can achieve effective oxygen supply during the operation. However, many studies have noted that the analgesic effect of this anaesthesia alone is not obvious[7]. Another study found that tracheal intubation general anaesthesia combined with nerve block clinical application effect is considerable[8].

Tracheal intubation general anaesthesia is a relatively stable and safe way to establish anaesthesia for the respiratory tract. Its popularization has promoted the development of anaesthesia technology. General anaesthesia with tracheal intubation can help to ensure the patient's respiratory tract is unobstructed and the operation can gain more space. However, the analgesic effect of general anaesthesia with tracheal intubation alone is difficult to determine. Patients may have cough and physical reactions, which makes the operation more difficult[9]. Peripheral nerve block has little effect on the physiological aspects of patients, and postoperative analgesia is superior, so it has been widely valued. The application of nerve block can block the intraoperative noxious stimulation to a certain extent, effectively inhibit peripheral and central sensitization, and then have a pre-emptive analgesic effect[10]. Accurate localization is the key to clinical nerve block. Ultrasound-guided nerve block can significantly shorten the onset time, prolong the block time, improve the effect of nerve block, reduce the dosage of anaesthetics and reduce the incidence of complications[11].

Using nerve block in elderly patients undergoing hip surgery has several advantages. Firstly, it can reduce the use of anaesthetics in the operation process. Secondly, it can play a pre-emptive analgesic effect to reduce the degree of pain after the operation. Thirdly, it is conducive to the maintenance of postoperative analgesia. Fourthly, it can reduce complications. Fifthly, it is conducive to early out-of-bed activities and functional exercises after the operation. In addition, nerve block can promote the temporary disappearance of sensorimotor function in the innervation area, which has little effect on haemodynamics and is conducive to recovery after the operation[12]. Li Yan et al.[13] studied anaesthesia methods in 60 elderly patients undergoing hip surgery and found that the VAS pain score and the demand for analgesics in the early stage after the operation in the tracheal intubation general anaesthesia combined with nerve block group were significantly higher than in the tracheal intubation general anaesthesia group. Other data show that nerve block combined with tracheal intubation general anaesthesia is more conducive to reducing the complication rate[14]. Huang Shubin et al.[15] showed that general anaesthesia tracheal intubation combined with nerve block can reduce the stress response of patients, reduce the level of inflammatory chemokines, promote stable haemodynamics, and then significantly improve postoperative analgesia, improving the safety and effectiveness of surgery compared with general anaesthesia tracheal intubation alone.

The data in this study showed that HR, DBP and SBP in both groups increased significantly at T2. No significant difference existed in HR, DBP or SBP from T2-T4 in the study group (tracheal intubation general anaesthesia combined with nerve block), while HR, DBP and SBP from T2-T4 in the control group (tracheal intubation general anaesthesia) changed significantly. No significant difference was found in hemodynamic indexes at T1, but HR, DBP and SBP at T2–T4 in the study group were lower than in the control group.

The VAS scores of the study group at 6h, 12h and 24h after the operation were significantly lower than those of the control group. The incidence of complications in the study group (8.11%) was significantly lower than that in the control group (29.71%). The clinical effect of nerve block combined with tracheal intubation general anaesthesia in elderly patients undergoing hip surgery was better than that of tracheal intubation general anaesthesia.

Conclusion

The application of nerve block combined with tracheal intubation general anaesthesia in elderly patients undergoing hip surgery was conducive to maintaining stable haemodynamics, alleviating early postoperative pain and reducing complications, so it has a certain clinical value.

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