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General anaesthesia is better suitable than epidural anaesthesia for surgical removal of giant intraperitoneal tumours

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Abstract. – OBJECTIVE: Our objective was to compare general and epidural anaesthesia for surgical resection of giant intraperitoneal tumours.

PATIENTS AND METHODS: 80 patients with giant intraperitoneal tumours were randomly divided into two groups which respectively received general or epidural anaesthesia prior to the surgery. General anaesthesia was done under intubation and mechanical ventilation.

RESULTS: Vital signs, including diastolic pressure, systolic pressure, heart rate and oxygen saturation, were not significantly different between two groups before the surgery. Vital signs were decreased in patients of both groups after surgery. However, vital signs in the general anaesthesia group were markedly higher than in the epidural anaesthesia group ($p < 0.05$), indicating that the changes of vital signs were less pronounced in the general anaesthesia group. Furthermore, the operation time in this group was markedly shorter than in the epidural anaesthesia group, while the success rate was markedly higher. In addition, the intraoperative blood loss and infusion volume were both markedly lower in the general anaesthesia group, as well as the occurrence rate of supine position ($p < 0.05$ for all comparisons). Occurrence of heart failure, lung edema, altered water-electrolyte balance, ECG abnormalities in patients undergoing surgery under general anaesthesia group was significantly lower ($p < 0.05$ vs. patients under epidural anaesthesia). There were no deaths in either patient group, and all patients were successfully cured and discharged.

CONCLUSIONS: General anaesthesia under intubation and mechanical ventilation is better suited for surgical removal of giant intraperitoneal tumours.

Key Words:
Giant intraperitoneal tumour, General anaesthesia, Epidural anaesthesia.

Introduction

Giant intraperitoneal tumour is not common in clinical practice[1,2]. The main therapeutic method is resection of the entire tumour which poses a substantial challenge for anaesthesists[3,4]. In these patients, the internal organs are pressed and forced away from their normal locations, causing abnormal circulation and respiration. The general condition of the patients is poor, and complications are frequent. These patients are less able to tolerate the surgery and anaesthesia, and inappropriate anaesthesia may jeopardize the surgery. As the surgery is long, anaesthetics, and their dose and administration mode must be careful selected to ensure the success of the surgery[5,6]. Here we compared two methods of anaesthesia (general vs. epidural anaesthesia) to test their suitability for this surgery.

Patients and Methods

Patients

Eighty patients with giant intraperitoneal tumour, who were admitted between April 2007 and October 2014, were enrolled in this study. The patients were randomly divided into two groups. Forty patients (16 male and 24 female patients, average age [mean ± SD] of 54.50 ± 2.00 years, age range of 18-64 years) received epidural anaesthesia. There were 9 patients with giant tumour of the spleen, 18 with giant tumour of the uterus, 6 with giant tumour of the ovary, and 7 with retroperitoneal giant tumour. Another 40 patients (15 male and 25 female patients, aged 53.50 ± 2.50 [19-63] years) received general anaesthesia. This group included 10 patients with giant tumour of the spleen, 19 with giant tumour of the uterus, 6 with giant tumour of the ovary, and 5 with retroperitoneal giant

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tumour. Both groups were comparable with regard to their age, gender distribution, distribution of affected internal organs. In addition, average tumour sizes were also comparable between two patients groups.

Patients with contraindications (infection and abscess at the epidural puncture site, severe scoliosis, contraindication to intubation) were excluded from this study.

All patients or their guardians were informed about advantages and disadvantages of this study, and signed an informed consent. The study protocol was approved by the Ethics Committee of our Hospital.

Epidural Anaesthesia

Patients underwent strict preoperative preparation. Patients with hypertension, coronary heart disease, or dyspnoea were treated accordingly. First, we established bilateral upper limb venous accesses. The patients were in the right lateral position, the skin of prospective puncture site was disinfected, the drape was put on, and a local subcutaneous anaesthetic was injected using a 5-ml injection syringe. Then, the puncture needle was used for epidural puncture. Using the lateral approach, the needle smoothly entered into the epidural space. A 2% lidocaine or 0.75% bupivacaine injection was administered, the syringe was retrieved while injecting, and the drug was administered at two-thirds of the usual dose. Then, lumbar anaesthesia was applied.

During the surgery, if condition of muscle relaxation did not satisfy the surgeon, or if the anaesthetic effect was insufficient and venous anaesthesia was difficult to implement, or if muscle relaxant could warrant sufficient muscle relaxation, intubation combined with general anaesthesia were used to avoid coercive surgery.

General Anaesthesia

First, the cervical vertebra and opening degree were accurately evaluated. Then, bilateral venous accesses were established, and 0.5 mg of atropine or racanisodamine were injected. After 10 min, 0.05-0.1 mg of fentanyl, 0.15 mg/kg of cisatracurium besylate, 10 mg of diazepam, or 0.15 mg/kg of etomidate (20-50 mg for an adult and 1-2 mg/kg for a pediatric patient) were injected sequentially. After the eyelash reflex had disappeared, patients were intubated. Then, 2-3 mg/kg of propofol were administrated, and surgery was started when the vital signs became stable. Urapidil was used to decrease blood pres-

Table I. Vital signs before and after the surgery.

	Before surgery				After surgery			
Type of anaesthesia	Diastolic pressure (mm Hg)	Systolic pressure (mm Hg)	Heart rate (time/minute)	Oxygen saturation (%)	Diastolic pressure (mm Hg)	Systolic pressure (mm Hg)	Heart rate (time/minute)	Oxygen saturation (%)
Epidural anaesthesia	135.40 ± 25.51	80.64 ± 10.49	70 ± 2	95 ± 3	115.94 ± 16.87	65.67 ± 10.75	64 ± 3	94 ± 2
General anaesthesia	132.54 ± 24.97	80.79 ± 10.61	69 ± 3	95 ± 2	126.83 ± 15.04	75.64 ± 10.76	70 ± 2	98 ± 2
p	N.S	N.S.	N.S.	N.S.	< 0.05	< 0.05	< 0.05	< 0.05

Footnote: Data are presented as mean ± SD. N.S.: not significant.

sure in patients with hypertension, while ephedrine was used to increase blood pressure in patients with hypotension. If patients had arrhythmia, surgery was paused and resumed after arrhythmia was corrected. During the surgery, the intubation tube was fixed to prevent slipping out[6].

Outcomes

The outcomes were blood pressure, heart rate, oxygen saturation, pulmonary function, water-electrolyte balance, ECG, and operation time.

Statistical Analysis

The data were analyzed using the statistical software SPSS11.0 (IBM Corporation, Chicago, IL, USA). Qualitative data were compared using the chi-square test. Quantitative data were presented as mean ± SD and compared using the *t*-test. Differences with a p less than 0.05 were considered statistically significant.

Results

Outcomes Before and After Surgery

Vital signs, including diastolic pressure, systolic pressure, heart rate and oxygen saturation, were not significantly different between two groups before the surgery. Vital signs were decreased in patients of both groups after surgery. However, vital signs in the general anaesthesia group were markedly higher than in the epidural anaesthesia group ($p < 0.05$), indicating that the changes of vital signs in the general anaesthesia group were less pronounced than in the epidural anaesthesia group (Table I).

Surgery and Anaesthetic Conditions

The operation time in the general anaesthesia group was markedly shorter than in the epidural anaesthesia group, while the success rate was markedly higher. The intraoperative blood loss and infusion volume were both markedly lower in the general anaesthesia group. The same was true for the occurrence rate of supine position (Table II).

We observed that 5 patients with initial epidural anaesthesia had to be changed to general anaesthesia, as their muscle relaxation, surgical field and analgesic depth could not meet the surgery demand.

Complications and Safety

Occurrence of heart failure, lung edema, altered water-electrolyte balance, ECG abnormalities in patients undergoing surgery under general anaesthesia group was significantly lower ($p < 0.05$ vs. patients under epidural anaesthesia). There were no deaths in either patient group, and all patients were successfully cured and discharged (Table III).

Discussion

As mentioned above, giant intraperitoneal tumour is a rare clinical phenomenon[7,8]. Not surprising, the knowledge about this tumour is scarce, especially in remote areas. Most patients from those regions who have giant intraperitoneal tumour are in a poor general condition, complicated with different degrees of anemia, emaciation, and water-electrolyte dysbalance[9,10]. This diminishes patients' ability to withstand the surgery, increasing the risks of both surgery and anaesthesia[11]. The effectiveness and safety of anaesthesia are very important to ensure the success of the surgery[12-14]. The following are the key points in the selection of the anaesthetic method. First, good analgesic effect should be achieved,

Table II. Intraoperation parameters.

Type of anaesthesia	Operation time, hours	Successful anaesthesia, absolute number (%)	Blood loss during surgery, ml	Supine position hypotension, absolute number (%)	Intraoperative infusion volume, ml
Epidural anaesthesia	2.50 ± 1.50	35 (87.50)	624.85 ± 34.68	21 (52.50)	2546.64 ± 120.46
General anaesthesia	1.50 ± 1.00	40 (100%)	524.64 ± 31.64	12 (30.00)	1937.16 ± 86.48
p	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Footnote: Data are presented as mean ± SD or as absolute number (%).

Table III. Complication rates.

Type of anaesthesia	Heart failure, absolute number (%)	Lung oedema, absolute number(%)	Water-electrolyte dysbalance, absolute number (%)	Decreased body temperature, absolute number (%)	ECG abnormality		
					Tachycardia, absolute number (%)	Atrial fibrillation, absolute number (%)	Cardiac arrest, absolute number (%)
Epidural anaesthesia	4 (10.00)	3 (7.50)	9 (22.50)	6 (15.00)	5 (12.50)	3 (7.50)	2 (5.00)
General anaesthesia	2 (5.00)	1 (2.5)	3 (7.50)	2 (5.00)	2 (5.00)	0	0
p	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		

Footnote: Data are presented as absolute number (%).

and it is very crucial because of a big tumour size. In this regard, general anaesthesia better satisfies the requirements during the surgery compared with epidural anaesthesia. Second, good muscle relaxation effect is paramount. The tumour size is big, and properly relaxed muscle status facilitates preparing the surgical field and shortens the operation time. Third, safety is very important. Any anaesthetic method is associated with certain risk, and safety is especially important for patients in poor condition[15,16].

Epidural anaesthesia is achieved by injection of local anaesthetic in the epidural space[17]. Because spine tension is high in most patients with giant intraperitoneal tumour, side approach is selected for epidural anaesthesia. Because the spine and epidural space have been compressed by the tumour for a long time, the dose of the anaesthetic should be reduced. Usually, two-thirds of the routine dose should be administered to ensure the safety of the anaesthesia[18,19]. Since the operation time is long and the requirement for proper muscle relaxation is high, epidural anaesthesia is not satisfactory for resection of this tumour.

In contrast, general anaesthesia is deep. Giant intraperitoneal tumour often compromises respiration and blood supply to inner organs[20,21]. The use of general anaesthesia combined with mechanical ventilation can better warrant the breathing and blood oxygen saturation. In addition, the use of a muscle relaxant in general anaesthesia facilitates the surgical incision[22,23].

In this study, patients with giant intraperitoneal tumours received general or epidural anaesthesia. During general anaesthesia, vital signs were more stable, the pain stimulus to patients was less pronounced, respiration was substituted by ventilator, and respiratory rate and depth were stable. Thus, complications were markedly rarer than in the epidural anaesthesia group.

Proper thermal insulation is another crucial factor for the surgery success. During the surgery, a large volume of donor blood is transfused, and abdominal cavity is exposed to heat dissipation. Therefore, body temperature easily decreases. Low body temperature can cause coagulation disorders and increase blood loss. Furthermore, low body temperature can cause delayed recovery after general anaesthesia[24,25]. Thermal insulation should include blood warming up before the transfusion, and the temperature of operation room and postoperative ICU set to 28º C. In addition, bedclothes and electric blanket should be used to keep the patients warm[26,27].

Conclusions

General anaesthesia under intubation is more suitable for surgical removal of giant intraperitoneal tumours.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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