Influence of general anesthesia combined with epidural anesthesia on adrenal cortex, stress factors and immunologic function in patients with lung cancer

Xiang-Yu Yin, Fan Huang, Zi-Ge Xu

Department of Anesthesiology, Baoding First Central Hospital, Baoding 071000 China

ARTICLE INFO

Objective: To observe the influence of general anesthesia combined with epidural anesthesia on adrenal cortex, stress factors and immunologic function in patients with lung cancer.

Methods: A total of 60 patients with lung cancer were randomly divided into two groups: observation group (30 cases) and control group (30 cases). Observation group: general anesthesia combined with epidural anesthesia; control group: patients were treated only by general anesthesia. Recording and comparing the levels of Ang-Ⅱ, Cor, AD, MDA, GC, ALDO, 17-OH, 17-KS and immunologic function before and after treatment.

Results: (1) Before treatment, there was no statistically significant difference in the serum Ang-Ⅱ, Cor, AD, MDA, GC, ALDO, 17-OH, 17-KS levels between the two groups. After treatment, the serum Ang-Ⅱ, Cor, AD, MDA, GC, ALDO, 17-OH, 17-KS levels of the two groups were significantly lower than those of the same group before treatment, and those levels of observation group were significantly better than the control group, there was significant difference between the two groups. (2) Before treatment, there was no statistically significant difference in CD4+, CD8+, CD4+/CD8+ between the two groups. After treatment, the CD4+, CD4+/CD8+ of the two groups were significantly lower than those of the same group before treatment, the CD8+ of the two groups were significantly higher, and those levels of observation group were significantly better than the control group, there was significant difference between the two groups. Conclusion: General anesthesia combined with epidural anesthesia for patients with lung cancer can perfect the levels of serum adrenal cortical hormone, stress factors and be beneficial to protect their immunologic function.

1. Introduction

At present, lung cancer is one of the most common malignant tumors in our country, its incidence rate and the mortality rate occupies the first place[1]. Radical resection of lung cancer can effectively reduce the cancerous tissue and improve the pulmonary function of patients, which is one of the main methods of clinical treatment of lung cancer[2]. However, surgical trauma, intraoperative anesthesia, drugs and other factors will further aggravate the immune function of patients with lung cancer damage, so the choice of reasonable anesthesia mode plays an important role in the recovery of immune function[3,4]. Therefore, this study aims to observe the influence of general anesthesia combined with epidural anesthesia on adrenal cortex, stress factors and immunologic function in patients with lung cancer.

2. Informations and methods

2.1 General information

A total of 60 patients with lung cancer who were treated in our hospital from April 2015 to February 2017 were selected and
randomly divided into control group and observation group. The control group consisted of 30 patients, including 18 males and 12 females, with an average age of (63 ± 11) years; 6 cases underwent pneumonectomy, 21 cases underwent lobectomy, 3 cases underwent partial lobectomy; There were 30 patients in the observation group, 19 males and 11 females, aged (62 ± 11) years, 8 cases underwent pneumonectomy, 20 cases underwent lobectomy, 2 cases underwent partial lobectomy. There was no significant difference between the two groups in age, gender and other data (\(P>0.05\)). The inclusion criteria included: (1) The patient was diagnosed as lung cancer by histopathological examination and other clinical examination. (2) In accordance with the indications for radical resection of lung cancer patients. (3) The patients and their family members were informed and signed informed consent form. (4) In accordance with general anesthesia and epidural anesthesia to exclude contraindications. (5) Exclusion of patients with severe liver and kidney diseases.

### 2.2 Treatment method

The control group was given general anesthesia, after given etomidate 0.2 mg/kg, propofol 1.2 mg/kg and fentanyl 3 g/kg by intravenous injection, then given 0.10 mg/kg intravenous injection of vecuronium, and during the operation, according to the actual needs of patients, an additional injection of fentanyl and vecuronium was given to the patients. The observation group was treated with compound epidural anesthesia on the basis of the control group. Before general anesthesia, epidural injection of 3ml 2% lidocaine was performed in the T7-8 space of the patient, and general anesthesia was confirmed after the occurrence of no spinal anesthesia.

### 2.3 Observation indexes

(1) Adrenal cortical hormone: 4 mL fasting venous blood was centrifuged at the beginning of the operation and 24 h after the operation, and the levels of angiotensin II (Ang-II), serum cortisol (Cor) and epinephrine (AD) were detected by biochemical immunology in all subjects. (2) Stress factors: 4 mL fasting venous blood was centrifuged at the beginning of the operation and 24 h after the operation, and serum levels of malondialdehyde (MDA), total cortisol (GC), aldosterone (ALDO), Urine 17- corticosteroids (17-OH) and 17-keto sterol (17-KS) levels between the two groups \(P>0.05\); After treatment, compared with the same group before treatment, the levels of Ang-II, Cor and AD were significantly lower in the two groups \(P<0.05\), The levels of Ang-II, Cor and AD in the control group were respectively \((46.37±5.95)\) ng/L, \((162.48±15.62)\) ng/mL, \((0.38±0.06)\) ng/mL, that in the observation group were \((35.23±6.45)\) ng/L, \((117.22±18.04)\) ng/mL, \((0.16±0.05)\) ng/mL, were significantly lower than the control group. The difference between the two groups was significant \(P<0.05\), see table 1.

### 3. Results

#### 3.1 Comparison of serum levels of Ang-II, Cor and AD in two groups

Before treatment, there was no significant difference in the levels of Ang-II, Cor and AD between the two groups \(P>0.05\); After treatment, compared with the same group before treatment, the levels of Ang-II, Cor and AD were significantly lower in the two groups \(P<0.05\), The levels of Ang-II, Cor and AD in the control group were respectively \((46.37±5.95)\) ng/L, \((162.48±15.62)\) ng/mL, \((0.38±0.06)\) ng/mL, that in the observation group were \((35.23±6.45)\) ng/L, \((117.22±18.04)\) ng/mL, \((0.16±0.05)\) ng/mL, were significantly lower than the control group. The difference between the two groups was significant \(P<0.05\), see table 1.

### 2.4 Statistical processing

SPSS 20.0 data package was used to analyze and process data, the measurement data of age, course of disease and immune level was carried out by Mean ± SD, count data as gender was carried out by frequency. \(t\) test and chi square test were used to compare and analyze the differences between the observation group and the control group. And \(P<0.05\) is considered to have statistically significant differences.

#### 3.2 Comparison of serum MDA, GC, ALDO, 17-OH and 17-KS levels between the two groups

Before treatment, there was no significant difference in the levels of MDA, GC, ALDO, 17-OH and 17-KS between the two groups \(P>0.05\); After treatment, compared with the same group before treatment, the levels of MDA, GC, ALDO, 17-OH and 17-KS were significantly lower in the two groups \(P<0.05\), the levels of serum MDA, GC, ALDO, 17-OH and 17-KS levels in the control group were respectively \((4.31±0.55)\) μmol/L, \((1.39±0.42)\) μmol/L, \((215.23±21.48)\) ng/L, \((55.78±14.61)\) mol/24 h, \((96.38±17.96)\) mol/24 h, that in the observation group were \((2.23±0.45)\) μmol/L,
Because observation group and control group with normal function, so as to relieve the patient’s condition tissues and cells through surgical resection, and retain the lung tissue the common clinical therapy at present, it can remove the lung cancer has achieved good development. Although lung resection is one of therapy and other treatment modalities, the treatment of lung cancer the development of thoracoscopic surgery, chemotherapy, targeted cancer has become a widespread concern in the medical field. With[7,8] cancer has a younger trend and in recent years, studies have reported that the incidence of lung The incidence and mortality of lung cancer are on the rise globally, [4. Discussion

The incidence and mortality of lung cancer are on the rise globally, and in recent years, studies have reported that the incidence of lung cancer has a younger trend[7,8]. The treatment and control of lung cancer has become a widespread concern in the medical field. With the development of thoracoscopic surgery, chemotherapy, targeted therapy and other treatment modalities, the treatment of lung cancer has achieved good development. Although lung resection is one of the common clinical therapy at present, it can remove the lung cancer tissues and cells through surgical resection, and retain the lung tissue with normal function, so as to relieve the patient’s condition[9,10]. However, the occurrence and development of lung cancer is related to the decline of immune function. Lung cancer patients are immune dysfunction, and the stress reaction of operation may aggravate the inhibition of immune function[11,12]. Anesthesia is also one of the factors affecting the function of immune system, the operation is mostly taken in 2 ways, namely intravenous anesthesia and general anesthesia combined with epidural anesthesia, with different effects in different ways on immune function[13,14]. Intravenous anesthesia can relieve pain, and the disadvantage is that it can only inhibit the limbic system of the cerebral cortex, and cannot achieve the function of epidural anesthesia blocking sympathetic and somatic nerve conduction. Therefore, general anesthesia combined with epidural anesthesia can reduce the postoperative stress response and weaken the inhibition of the immune system to a certain extent, and the choice of reasonable anesthesia mode is particularly important for the recovery of postoperative immune function[15].

Anesthesia and surgical trauma can make patients in stress state, patients can activate the hypothalamic pituitary adrenal axis system, promote the patient secretion of Ang- II, Cor and AD, the neural immune activity more body endocrine released into plasma, the expression of T specific antigen on the cell surface, which is an important defense stress reaction[16]. At the same time, it also leads to high excitability of sympathetic nerve in patients, releasing stress factors such as MDA, GC, ALDO, 17-OH and 17-KS. And these stress factors can inhibit the immune system function of patients, and promote the growth and metastasis of tumor cells, and have adverse effects on the treatment effect and prognosis[17]. High levels of cortisol and aldosterone reflect the high degree of stress in patients, and the levels of 17-OH and 17-KS are consistent with inhibition of immune function[18,19]. This study used general anesthesia combined with epidural anesthesia, the results showed: The levels of Ang- II, Cor, AD and the levels of MDA, GC, ALDO, 17-OH and 17-KS in the observation group were significantly better than those in the control group, the stress reaction of operation may aggravate the inhibition of adenral cortical hormone and stress factors. T lymphocyte subsets play an important regulatory role in humoral and cellular immunity, among them, CD4+ assisted humoral immunity and cellular immunity, CD8+ inhibits the synthesis and secretion of antibody and inhibits the proliferation of T cells. The low immune function in tumor patients is due to the decrease of CD4+ function, while the increase

### Table 2.

Comparison of serum MDA, GC, ALDO, 17-OH and 17-KS levels between the two groups ($n=30$).

<table>
<thead>
<tr>
<th>Group</th>
<th>Time</th>
<th>MDA (μmol/L)</th>
<th>GC (μmol/L)</th>
<th>ALDO (ng/L)</th>
<th>17-OH (mol/24 h)</th>
<th>17-KS (mol/24 h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Preoperative</td>
<td>5.87±0.32</td>
<td>2.13±0.64</td>
<td>310.36±23.65</td>
<td>71.22±18.04</td>
<td>135.78±19.84</td>
</tr>
<tr>
<td></td>
<td>Postoperative</td>
<td>4.31±0.55*</td>
<td>1.39±0.42</td>
<td>215.23±21.48*</td>
<td>55.78±14.61*</td>
<td>96.38±17.96*</td>
</tr>
<tr>
<td>Observation</td>
<td>Preoperative</td>
<td>6.06±0.36</td>
<td>2.01±0.87</td>
<td>309.87±27.66</td>
<td>72.08±15.62</td>
<td>134.96±28.74</td>
</tr>
<tr>
<td></td>
<td>Postoperative</td>
<td>2.23±0.45*</td>
<td>0.64±0.13*</td>
<td>153.41±21.04*</td>
<td>34.36±13.55*</td>
<td>72.36±18.01*</td>
</tr>
</tbody>
</table>

Note: The results of the comparison between observation group and control group are shown in Table 2.

### Table 3.

Comparison of T cell subsets in the two groups ($n=30$).

<table>
<thead>
<tr>
<th>Group</th>
<th>Time</th>
<th>CD4+</th>
<th>CD8+</th>
<th>CD4+/CD8+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Preoperative</td>
<td>40.96±3.15</td>
<td>26.01±2.69</td>
<td>0.67±0.28</td>
</tr>
<tr>
<td></td>
<td>Postoperative</td>
<td>30.71±3.08</td>
<td>25.54±3.01</td>
<td>1.01±0.13</td>
</tr>
<tr>
<td>Observation</td>
<td>Preoperative</td>
<td>41.45±3.26</td>
<td>27.53±2.62</td>
<td>0.68±0.12</td>
</tr>
<tr>
<td></td>
<td>Postoperative</td>
<td>35.62±2.87*</td>
<td>31.48±2.31 *</td>
<td>1.29±0.26*</td>
</tr>
</tbody>
</table>

Note: The results of the comparison between observation group and control group are shown in Table 3.

### 3.3 Comparison of T cell subsets in the two groups

Before treatment, there was no significant difference in the levels of CD4+, CD8+, CD4+/CD8+ between the two groups ($P<0.05$); After treatment, compared with the same group before treatment, the levels of CD4+ and CD4+/CD8+ in the two groups were significantly decreased, and the level of CD8+ was significantly increased ($P<0.05$). The levels of CD4+, CD4+/CD8+ in the control group were respectively (30.71±3.08), (1.01±0.13), that in the observation group were (35.62±2.87), (1.29±0.26), were significantly higher than the control group. The level of CD8+ in the observation group was (31.48±2.31), which was significantly lower than that of the control group (35.44±3.01), the difference between the two groups was significant ($P<0.05$), see Table 3.

### Table 3.

Comparison of T cell subsets in the two groups ($n=30$).

<table>
<thead>
<tr>
<th>Group</th>
<th>Time</th>
<th>CD4+</th>
<th>CD8+</th>
<th>CD4+/CD8+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Preoperative</td>
<td>40.96±3.15</td>
<td>26.01±2.69</td>
<td>0.67±0.28</td>
</tr>
<tr>
<td></td>
<td>Postoperative</td>
<td>30.71±3.08</td>
<td>25.54±3.01</td>
<td>1.01±0.13</td>
</tr>
<tr>
<td>Observation</td>
<td>Preoperative</td>
<td>41.45±3.26</td>
<td>27.53±2.62</td>
<td>0.68±0.12</td>
</tr>
<tr>
<td></td>
<td>Postoperative</td>
<td>35.62±2.87*</td>
<td>31.48±2.31 *</td>
<td>1.29±0.26*</td>
</tr>
</tbody>
</table>

Note: The results of the comparison between observation group and control group are shown in Table 3.
of CD8+ activity and the severe decrease of CD4+/CD8+ are important markers of poor prognosis. The results of this study showed that the degree of CD4+ and CD4+/CD8+ decrease and the degree of CD8+ increase in the observation group were significantly lower than those in the control group. This indicates that the immune function of patients has been inhibited after surgery, but combined anesthesia can reduce the inhibition of immune function, and has a good immune protection effect.

In summary, general anesthesia combined with epidural anesthesia for patients with lung cancer can perfect the levels of serum adrenal cortical hormone, stress factors and be beneficial to protect their immunologic function.

Reference


