Effect of laparoscopic myomectomy on the sex hormone levels in patients with uterine leiomyoma

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ABSTRACT

Objective: To explore the effect of laparoscopic myomectomy on the sex hormone levels in patients with uterine leiomyoma (UL). Methods: A total of 102 patients with UL who were admitted in our hospital were included in the study and divided into the observation group and the control group with 51 cases in each group according to different surgical treatment protocols. The patients in the observation group were performed with laparoscopic myomectomy, while the patients in the control group were performed with laparoscopic total hysterectomy. The postoperative sex hormone, MAPK, p-ERK, and VEGF levels in the two groups were compared. Results: FSH and LH levels after operation in the two groups were significantly elevated when compared with before operation (P<0.05), while E2 and P levels were significantly reduced (P<0.05). FSH and LH levels after operation in the observation group were significantly higher than those in the control group (P<0.05), while E2 and P levels were significantly lower than those in the control group (P<0.05). The serum MAPK, p-ERK, and VEGF expression levels after operation in the two groups were significantly reduced when compared with before operation (P<0.05), while the comparison between the two groups was not statistically significant (P>0.05). Conclusions: Myomectomy has a small effect on the sex hormone levels in patients with UL, and should be preferred according to the condition.

1. Introduction

Uterine leiomyoma (UL) is a common benign tumor in women of child-bearing age, with morbidity of about 20%–30%, and is mainly caused by the combined effects of the smooth muscle tissue proliferation of myometrium, local growth factors, and excessive secretion of hormones[1]. Most UL patients have no significant clinical symptoms, and 20% of them have increased menstrual blood volume, chronic pelvic pain, abdominal mass, pelvic peripheral organ pressure, increased leucorhea, and postpartum hemorrhage, which can severely affect the patients’ normal life[2]. Surgical resection is currently the main radical method in the treatment of UL, among which myomectomy, total hysterectomy, and subtotal hysterectomy are the common surgical methods in the clinic. Uterus and ovary are the important female organs, and can regulate the endocrine through secreting various biological factors; therefore, searching the treatment protocol with small effect on UL patients has been the hot issue in the clinical study[3]. The study is aimed to explore the effect of laparoscopic myomectomy on the sex hormone levels in patients with UL.

2. Materials and methods

2.1. General materials

A total of 102 patients with UL who were admitted in the Department of Obstetrics and Gynecology from February, 2015 to August, 2016 were included in the study, aged from 21 to 38 years old, with myoma diameter of 3–5 cm; 66 had intramural myoma, 19 had subserous myoma, and 17 had submucous myoma. All the patients had dysmenorrhea in different degrees, abnormal uterine hemorrhage, anemia, blood purulent leucorhea, and infertility,
and were confirmed by ultrasound and or CT. Those who had acute gynecological inflammation, other gynecological tumor, cervical cancer, endometrial cancer, pelvic inflammation, irregular vaginal bleeding, severe heart, liver, and kidney disease, and immunological system disease were excluded.

2.2. Methods

The patients were divided into the observation group and the control group with 51 cases in each group according to different treatment protocols. The comparison of age, myoma type, and other general materials between the two groups was not statistically significant \((P>0.05)\), and it was comparable. Routine examinations before operation in the two groups were performed, including urine routine examination, blood routine examination, liver and renal function, B ultrasound, and CT. CSEA was adopted. Bladder lithotomy position was taken. Continuous ECG monitoring was performed. The three hole method or four hole method was adopted to place Veress pneumoperitoneum needle. \(\text{CO}_2\) \(3.0–5.0\) L was infused to form the pneumoperitoneum. The intraoperative blood pressure was controlled at 12–15 mmHg. A longitudinal incision with a length of about 10 mm was made along the inferior margin of umbilical opening. Then 5 mm Trocar was punctured into the bilateral McBurney’s points, and two incisions with a length of 5 mm were made. The laparoscope was used to examine the uterus and pelvic cavity location, the size, number, and location of UL. The patients in the observation group were performed with laparoscopic myomectomy. Oxytocin (20 U) was injected into the uterus body. A longitudinal incision of uterine capsule was performed to separate and remove the myoma. For the large myoma unable to be got rid of, the whole myoma could be separated and a wedge-shaped incision could be made. 1-0 nylon thread was adopted. Electrocoagulation hemostasis was performed, and the incision was sutured. The bilateral adnexa were examined. The drainage tube was removed 24 h after operation. The patients in the control group were performed with laparoscopic total hysterectomy. The round ligaments and adnexa were separated. After being cut open, the bladder peritoneum was reversely folded and pushed downward. The cervix was cut open, and the bilateral cervical arteries were cut off. Then 2-0 nylon thread was adopted to ligate the cervix. The uterine body was rotarily cut and extracted. Electrocoagulation and cervical surface suture were performed. After being washed, the pelvic cavity was sutured layer by layer.

2.3. Observation indicators

The morning fasting venous blood before treatment and 6 months after treatment in the two groups was collected. RIA was used to detect LH, FSH, E2, and P levels. ELISA was used to detect MAPK, p-ERK, and VEGF levels.

2.4. Statistical analysis

SPSS 22.0 software was used for the statistical analysis. The measurement data were expressed as mean±SD. The \(t\) test was used for the homogeneity of variance, and non-parameter test was used for the heterogeneity of variance. \(P<0.05\) was regarded as statistically significant.

3. Results

3.1. Comparison of the sex hormone levels before and after operation between the two groups

The comparison of FSH, LH, E2, and P levels before operation between the two groups was not statistically significant \((P>0.05)\). FSH and LH levels after operation in the two groups were significantly elevated when compared with before operation \((P<0.05)\), while E2 and P levels were significantly reduced \((P<0.05)\). FSH and LH levels after operation in the observation group were significantly higher than those in the control group \((P<0.05)\) (Table 1).

3.2. Comparison of the serum MAPK, p-ERK, and VEGF expression levels before and after operation between the two groups

The serum MAPK, p-ERK, and VEGF expression levels before operation between the two groups was not statistically significant \((P>0.05)\). FSH and LH levels after operation in the two groups were significantly elevated when compared with before operation \((P<0.05)\), while E2 and P levels were significantly reduced \((P<0.05)\). FSH and LH levels after operation in the observation group were significantly higher than those in the control group \((P<0.05)\), while E2 and P levels were significantly lower than those in the control group \((P<0.05)\) (Table 1).

Table 1

<table>
<thead>
<tr>
<th>Groups</th>
<th>Time</th>
<th>FSH</th>
<th>LH</th>
<th>E2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Before operation</td>
<td>6.62±1.36</td>
<td>7.48±2.55</td>
<td>634.36±62.69</td>
<td>24.8±6.45</td>
</tr>
<tr>
<td></td>
<td>After operation</td>
<td>12.53±3.43*</td>
<td>13.86±4.69*</td>
<td>382.03±35.35*</td>
<td>15.52±5.33*</td>
</tr>
<tr>
<td>Control</td>
<td>Before operation</td>
<td>6.59±1.28</td>
<td>7.44±2.62</td>
<td>635.32±63.82</td>
<td>23.86±6.52</td>
</tr>
<tr>
<td></td>
<td>After operation</td>
<td>16.05±1.24*</td>
<td>18.18±5.57*</td>
<td>309.21±22.63*</td>
<td>11.67±4.48*</td>
</tr>
</tbody>
</table>

*\(P<0.05\), when compared with before operation; **\(P<0.05\), when compared with the control group.
operation between the two groups was not statistically significant ($P>0.05$). The serum MAPK, p-ERK, and VEGF expression levels after operation in the two groups were significantly reduced when compared with before operation ($P<0.05$), while the comparison between the two groups was not statistically significant ($P>0.05$) (Table 2).

4. Discussion

UL is a common benign gynecological tumor, resulting in infertility or abortion, with complicated pathogenesis, high recurrence rate by drug treatment, and difficult eradication; therefore, operation is currently the main treatment method in the treatment of UL. When compared with the total hysterectomy, myomectomy can reduce the ovarian damage degree, maintain the endocrine function, has a small effect on sex function, and enhance the living quality, with small trauma, rapid recovery, and less complications[4]. In the study, the laparoscope was adopted in the treatment of UL, and the operation was successful, showing that both of the two treatments protocols can effectively treat UL.

Ovary is an important female endocrine organ, has reproduction and endocrine effects, and can periodically synthesize and secrete estrogen and progestogen under the effect of hypothalamus-pituitary-ovarian gonadal axis[5]. Uterus is a female fertility and endocrine organ. Different surgical methods can produce different effects on the excision area size and location. As the target organ of ovary, uterus is closely associated with ovary in the aspects of anatomy and function[6]. The results in the study showed that FSH and LH levels after operation in the two groups were significantly elevated when compared with before operation ($P<0.05$), while E2 and P levels were significantly reduced ($P<0.05$); FSH and LH levels after operation in the observation group were significantly higher than those in the control group ($P<0.05$), while E2 and P levels were significantly lower than those in the control group ($P<0.05$), indicating that the laparoscopic myomectomy has a small effect on the sex hormone levels in patients with UL, with a significant treatment advantage[7]. After total hysterectomy, the ovarian blood supply is severely affected. The blood circulation disturbance can block the development of follicle and corpus luteum, resulting in reduced E2 secretion, feedback affects the release of LH, FSH, and P, and meanwhile reduce the release amount of estrogen to a certain degree. After total hysterectomy, due to the reduced release of PG, the endocrine process is inhibited[8-10]. Some researches demonstrate that[11,12] the occurrence and development of tumor are closely associated with the intracellular signal transduction pathway. MAPK pathway can transfer the extracellular signal into the cells. When receiving the stimulation of cytokines and extracellular pressure, MAPK can activate MEK-2, and is then phosphorylated into p-ERK which can induce the expressions of related genes after entering the nucleus, finally resulting in cell proliferation. VEGF can promote the formation of tissues and blood vessels which can provide nutrients for the growth of myoma; meanwhile, VEGF can promote the tissue proliferation and differentiation, whose level is elevated in various cancerous tissues[13,14]. The results in the study showed that the serum MAPK, p-ERK, and VEGF expression levels after operation in the two groups were significantly reduced when compared with before operation ($P<0.05$), while the comparison between the two groups was not statistically significant ($P>0.05$), indicating that the two surgical methods can inhibit the synthesis and secretion of extracellular signal conditioning kinase in order to prevent the plant, growth, and adhesion of abnormal proliferative cells on the organ[15,16].

In conclusion, the laparoscopic myomectomy and laparoscopic total hysterectomy can effectively treat UL, but the laparoscopic myomectomy has a smaller effect on the sex hormone levels in patients with UL, and should be preferred according to the condition.

References


