

Literature Review of Western Medicine Treatment of Uterine Fibroids

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Abstract:

Uterine fibroids are the most common benign tumor in women of reproductive age, with an incidence rate of 20%–50% during the reproductive years and a cumulative occurrence rate of 70%–80% by age 50. Their development is closely related to estrogen and progesterone levels. Most patients are asymptomatic, while some may experience menorrhagia and prolonged menstruation, significantly affecting physical and mental health and quality of life. This article reviews recent domestic clinical studies and guidelines, summarizing the mechanisms, efficacy, indications, advantages, and disadvantages of three Western medical treatment methods: pharmaceuticals, minimally invasive surgery, and interventional therapy, to provide a reference for individualized clinical treatment. The results show that medication can control symptoms but has a high recurrence rate, minimally invasive surgery can radically remove lesions with minimal impact on fertility, and interventional therapy can serve as a complementary option. In conclusion, Western medicine has developed an individualized treatment system, and combined, precise therapy is the future direction..

Keywords:

Uterine Fibroids, Western Medicine Treatment, Drug Treatment, Minimally Invasive Surgery, Interventional Therapy

1. Introduction

Uterine fibroids, also known as uterine leiomyoma, is a benign tumor formed by abnormal proliferation of uterine smooth muscle cells with a small amount of fibrous connective tissue. Its pathogenesis is not completely clear. It is currently recognized that it is closely related to the abnormal regulation of estrogen and progesterone [1]. The disease occurs in women of childbearing age between 30 and 50 years old, and is rare before puberty. After menopause, as the level of estrogen in the body decreases, fibroids can mostly shrink or subside on their own. This feature also provides a theoretical basis for clinical conservative treatment. According to epidemiological surveys, there are obvious racial and regional differences in the incidence of uterine fibroids. The incidence of black women is significantly higher than that of white and Asian women, and the age of onset is earlier. The clinical manifestations of uterine fibroids vary from person to person, mainly related to the size, number, location and

growth rate of fibroids. Common symptoms include abnormal uterine bleeding, pelvic pain, abdominal mass, compression symptoms and infertility. With the continuous development of medical technology, the concept of Western medicine for the treatment of uterine fibroids has shifted from the traditional “one-size-fits-all” to individualized treatment, emphasizing the comprehensive consideration of factors such as the patient’s age, severity of symptoms, size and location of fibroids, and fertility needs. Choose the most suitable treatment plan for patients [2,3]. At present, the methods of western medicine in the treatment of uterine fibroids are mainly divided into three categories: drug therapy, minimally invasive surgery and interventional therapy. All kinds of treatment methods have their unique mechanism of action, clinical efficacy and scope of application. In this paper, combined with relevant clinical research and guidelines at home and abroad in recent years, various treatment methods are systematically reviewed to provide reference for clinical treatment.

2. Drug Therapy

The core principle of drug treatment is ‘symptomatic treatment, individualized medication’. At present, the commonly used drugs in clinical practice mainly include gonadotropin-releasing hormone (GnRH) agonists, progesterone antagonists, sex hormones, etc. There are some differences in the mechanism of action, clinical efficacy, advantages and disadvantages of various drugs [4].

2.1. Gonadotropin-releasing hormone (GnRH) agonists

GnRH is a kind of peptide hormone secreted by hypothalamic peptidergic neurons, which plays an important role in the three major systems of human endocrine, immune and nerve. It can stimulate the synthesis of luteinizing hormone and follicle stimulating hormone in anterior pituitary cells by pulsed release [5]. GnRHa is a medium gonadotropin releasing hormone agonist, which can inhibit the secretion of gonadotropin by pituitary, reduce the level of sex hormones in serum, inhibit ovarian function, inhibit the tissue growth of myoma, and promote the apoptosis of myoma cells. However, long-term use of GnRH-a will produce side effects such as thrombosis, chest pain, osteoporosis, and perimenopausal period. It is recommended that the clinical use time should not exceed 6 months [6]. Leuporelin acetate belongs to a kind of GnRH-a, which can indirectly enhance the excitability of the gonadal system and pituitary gland, and promote the secretion of estrogen and progesterone such as luteinizing hormone and follicle stimulating hormone in the patient's body by competitively binding the GnRH receptor, thereby blocking the access to nutrition for uterine fibroids, avoiding the rapid growth of fibroids and providing a wider operating space for laparoscopic surgery. Therefore, it is more conducive to the successful completion of the operation and reduces the risk of damage to related organs and tissues [7].

2.2. Progesterone antagonists

In clinical conservative treatment, progesterone antagonist mifepristone is often given for intervention. As a competitive progesterone receptor regulating drug, it has a strong affinity for the progesterone receptor (PR) ligand binding region, which can effectively reduce the progesterone level in the body, thereby inhibiting the growth of uterine fibroids and reducing the volume of fibroids. At the same time, it can stop bleeding, correct anemia, and reduce menstrual bleeding. It has a significant effect in

relieving clinical adverse symptoms such as excessive menstruation and prolonged menstruation, and in the treatment of small benign uterine fibroids with functional uterine bleeding. However, the exact mechanism of mifepristone in the treatment of uterine fibroids has not been fully elucidated. The existing studies suggest that the occurrence and development of uterine fibroids are closely related to the abnormal level of sex hormones in the body. The high estrogen state formed by the increase of E2 level in the lesion site, as well as the abnormal changes of sex hormones and related growth factors, are all important factors to promote the occurrence and development of fibroids. Although short-term application of mifepristone can achieve certain curative effect, myoma is easy to relapse after drug withdrawal, and there are some adverse drug reactions, mainly gastrointestinal reactions, psychiatric symptoms and skin reactions. Most of the symptoms are mild, which will still cause different degrees of discomfort to patients. In addition, long-term high-dose use of mifepristone may also increase the risk of endometrial cancer, which limits its long-term and conventional application to a certain extent. It is necessary to strictly control the dosage and course of treatment in clinical use, taking into account the therapeutic effect and drug safety [8,9].

2.3. Progesterone hormones

As a synthetic progesterone, medroxyprogesterone acetate competitively binds to estrogen receptors, blocks the growth-promoting effect of estrogen on leiomyoma, and induces apoptosis of leiomyoma cells. It can reduce the menstrual volume of some patients, but long-term use may lead to abnormal liver function and increased risk of thrombosis. It is suitable for short-term control of acute bleeding or creation of conditions for surgery, and is not suitable for long-term maintenance. Levonorgestrel intrauterine sustained-release system, through intrauterine sustained-release progesterone, directly inhibits endometrial hyperplasia, reduces menstrual volume, and has mild systemic side effects. It is suitable for women with menorrhagia as the chief complaint and no reproductive needs, but the failure rate of placement is high in patients with submucosal myoma or uterine cavity deformation. It cannot be combined with estrogen replacement therapy to avoid offsetting the efficacy [10].

3. Microinvasive Surgery

Surgery is still an important treatment for symptomatic uterine fibroids. Total hysterectomy is a radical method, which is suitable for patients with no fertility needs, severe symptoms or ineffective drug treatment, and can eliminate the risk of new fibroids and various types of abnormal uterine bleeding at the same time. Hysteromyomectomy is suitable for women who want to retain their reproductive function. It can be performed by laparotomy, laparoscopy or hysteroscopy. Hysteroscopic myomectomy has been widely recommended for submucosal fibroids. At present, minimally invasive surgery commonly used in clinical practice mainly includes laparoscopic / hysteroscopic myomectomy and total hysterectomy [11,12].

3.1. Laparoscopic / hysteroscopic myomectomy

Laparoscopic myomectomy is a minimally invasive surgery. The field of vision during laparoscopic surgery is clearer. It can achieve refined resection of the tumor, avoid damage to the surrounding tissue, reduce intraoperative blood loss, and is conducive to postoperative recovery. However, laparoscopic surgery requires drilling through the patient's abdominal cavity, and then placing the laparoscopic device.

Postoperative suture is also required. Therefore, there may be limitations such as long operation time and slow postoperative recovery of patients. Hysteroscopic myomectomy does not require laparotomy. Transvaginal placement of hysteroscopy can clarify the information of fibroids, and resection of fibroid tissue under endoscopic vision can reduce the risk of related complications. There is no suture of abdominal incision after operation, which can relieve postoperative pain and improve postoperative quality of life. In addition, hysteroscopic surgery has less damage to normal tissues and can reduce the risk of complications. Hysteroscopic surgery is only suitable for submucous myoma of uterus and intramural myoma of uterus, and hysteroscopic electrotomy of uterine fibroids has obvious advantages in patients with smaller uterine fibroids. It is difficult to perform this procedure for patients with larger volume, and incomplete resection is easy to occur [13,14].

3.1. Total hysterectomy

Minimally invasive surgery is used to reduce the surgical incision, reduce the amount of intraoperative blood loss, and reduce the occurrence of related complications. Minimally invasive myomectomy can reduce the incidence of postoperative adverse conditions in patients with uterine fibroids, does not increase the recurrence rate, and can improve the prognosis of patients [15]. This kind of operation can completely remove the myoma of uterus and eliminate the possibility of recurrence, which is suitable for patients with no reproductive needs or severe symptoms. However, this operation requires a longer recovery time, and the patient will permanently lose fertility, which may also affect ovarian function and hormone levels. [16].

3.2. Interventional therapy

Interventional therapy is a minimally invasive treatment method that has developed rapidly in recent years. It does not need to cut the abdominal wall, enters the body through vascular puncture or natural lumen, and conducts targeted treatment for fibroids. It has the advantages of non-invasive or minimally invasive, retaining the uterus, rapid postoperative recovery, and low complication rate. As an important supplement to minimally invasive surgery, it provides more options for the treatment of uterine fibroids [17]. At present, the commonly used interventional treatment methods mainly include uterine artery embolization (UAE) and high intensity focused ultrasound (HIFU).

3.3. Uterine artery embolization (UAE)

Uterine artery embolization (UAE), as a vascular interventional therapy, has been used in the treatment of uterine fibroids for 30 years. The main mechanism is to make fibroids ischemic, hypoxic, necrotic and atrophic by embolizing the blood supply vessels of fibroids, thereby alleviating or eliminating clinical symptoms. It can significantly reduce the volume of fibroids and improve the symptoms and quality of life of patients. The indications for UAE in the treatment of uterine fibroids mainly include symptomatic uterine fibroids without fertility requirements, failure of non-surgical treatment, refusal of surgery or multiple surgical histories, and patients with difficulty in reoperation ; relative indications include those with fertility requirements but strong requirements for UAE treatment, intramural fibroids with a maximum diameter of > 10cm, submucosal fibroids with a maximum diameter of > 5cm, and subserous fibroids or cervical fibroids with a protrusion of > 50 %, as well as

postoperative recurrence and three-dimensional reconstruction of CT angiography suggesting uterine artery recanalization and no ovarian artery participating in blood supply. At present, the application of UAE in patients with fertility requirements is still controversial. This procedure may embolize uterine or ovarian blood vessels, leading to uterine and ovarian ischemia, causing complications such as intrauterine adhesions, uterine atrophy, and ovarian dysfunction. At the same time, it may reduce the natural pregnancy rate and increase the abortion rate and the risk of placenta previa. Therefore, it is not recommended for patients with fertility needs [18]. UAE has the advantages of simple operation, small trauma, and preservation of normal anatomical structure of the uterus. The short-term symptom control effect is good and the complications are less, but some patients may have postoperative ineffectiveness or recurrence. A clinical study of 325 patients showed that the cumulative recurrence rate of 2 years after UAE was about 8.6 %. In addition, uterine fibroids are hormone-dependent diseases, and the levels of estrogen and progesterone in patients are abnormally elevated. In addition, the physiological and psychological stress caused by surgery suggest that it is of great clinical significance to carry out standardized evaluation and individualized management of patients with uterine fibroids treated with UAE. [19,20].

3.4. High intensity focused ultrasound (HIFU)

HIFU is a non-invasive treatment method, which does not require incision, has small trauma, high safety and definite curative effect. Using the penetrability and focusability of ultrasound, ultrasound is concentrated in the target tissue, so that the temperature of the target area increases rapidly, thus promoting coagulation necrosis of fibroids. HIFU has good tissue penetration and directionality, which can focus on the target area of fibroids, so that the temperature of the focus area can reach 60 ~ 100 °C quickly, which can promote the degeneration and necrosis of fibroid cells, thereby eliminating the tumor and restoring the normal morphology of the uterine cavity. Moreover, it has less damage to the endometrium, which can reduce the stimulation to the ovary, which is beneficial to the recovery of patients after operation. It has little effect on the ovarian secretion function of patients, which can protect the fertility function of patients and improve the fertility function of patients [21,22]. However, there is still a lack of systematic clinical research evidence on the complications of vaginal delivery such as uterine rupture, uterine inertia and postpartum hemorrhage after HIFU treatment of uterine fibroids [23].

4. Conclusions

With the development of medical technology, Western medicine treatment of uterine fibroids has entered the era of individualized minimally invasive, forming a comprehensive system of complementary drugs, minimally invasive surgery and interventional therapy. All kinds of therapies have their own advantages and disadvantages. Clinically, individualized choices should be made according to the patient's age, symptoms, fibroid size and location, and fertility needs. Drug therapy is the first choice for conservative treatment, which is suitable for patients with mild symptoms, small fibroids, no fertility needs or temporarily unsuitable for surgery. It can control symptoms and reduce fibroids, but the recurrence rate is high and needs to be reviewed regularly. Minimally invasive surgery is the first choice for patients with clear surgical indications and ineffective drugs. It has less trauma, faster recovery and less impact on fertility. Laparoscopic myomectomy is suitable for those with fertility

needs, and total hysterectomy is suitable for those without fertility and with severe symptoms. Interventional therapy can be used as a minimally invasive supplement, non-invasive or minimally invasive, retaining the uterus, suitable for those who are intolerant or unwilling to undergo surgery, but the impact on fertility is not clear and needs to be carefully selected. Future research will focus on the combination of targeted drugs and minimally invasive techniques, in-depth pathogenesis, research and development of high-efficiency and low-toxicity drugs, optimization of surgical and interventional procedures, reduction of recurrence, maximum protection of fertility and physiological functions, and improvement of quality of life. At the same time, more large-sample and long-term clinical studies are needed to provide a more reliable basis for program selection.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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