Open Wedge High Tibial Osteotomy for the Treatment of Varus Knee Osteoarthritis with Medial Meniscus Herniation

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Abstract: Objective: To analyze the application value of open wedge high tibial osteotomy. Methods: From January 2022 to January 2023, 60 patients with varus knee osteoarthritis with medial meniscus protrusion were selected and randomly divided into observation group (30 cases) and control group (30 cases). The control group received total knee arthroplasty, and the observation group received open wedge high tibial osteotomy. The difference in surgical outcome between the two groups was compared, and the changes of VAS score and HSS score before and after surgery were compared between the two groups. Results: ①The intraoperative blood loss and postoperative complication rate in the observation group were lower than those in the control group (P<0.05), and the operation time and hospital stay were shorter than those in the control group (P<0.05). ②The change range of VAS score and HSS score in the observation group before and after operation was higher than that in the control group (P<0.05). Conclusion: Both open wedge high tibial osteotomy and total knee arthroplasty have good therapeutic effect. However, open wedge-shaped high tibial osteotomy has less blood loss, faster recovery, and can improve the pain and joint function of patients, so it can be widely used.

***Keywords*:** open wedge high tibial osteotomy, varus knee osteoarthritis; clinical efficacy

1. Introduction

Total knee arthroplasty is currently a common method for the treatment of knee joint diseases. It can reconstruct the anatomical structure of the knee joint and improve the joint function of patients. However, there are problems of large trauma, large amount of bleeding and high complications, which have certain limitations [1]. Therefore, finding a simple and efficient treatment plan is an important subject of clinical research. Open wedge high tibial osteotomy is improved on the basis of conventional high tibial osteotomy. It has the advantages of less trauma and will not affect the femoral metaphysis bone. It can relieve the joint pain symptoms of patients and improve the patient's joint Function [2]. In order to observe the application value of open wedge-shaped high tibial osteotomy, this article selected 60 patients with varus knee osteoarthritis with medial meniscus protrusion from January 2022 to January 2023 for comparative observation. The research is as follows.

2. Materials and methods

2.1 Clinical data

A total of 60 patients with varus knee osteoarthritis with medial meniscus protrusion from January 2022 to January 2023 were selected and randomly divided into an observation group (30 cases) and a control group (30 cases). In the observation group, there were 15 males and 15 females; their age ranged from 43 to 58 years old, with an average of (51.6±4.6) years old. In the control group, there were 16 males and 14 females; their age ranged from 40 to 59 years old, with an average of (51.2±4.3) years old. This study was approved by the Hospital Ethics Committee. Inclusion criteria: ①Patients younger than 60 years old with varus knee osteoarthritis with medial meniscus protrusion, who meet the indications for surgical treatment; ②Patients and their family members were informed about the study and voluntarily signed the consent form. Exclusion criteria: ① Patients with mental illness, cognitive impairment, and obesity; ② Patients with previous knee meniscus surgery, severe heart, lung, liver, and kidney diseases, and coagulation disorders. There was no statistically significant difference between the two groups in terms of general data and they were comparable.

2.2 Methods

The control group was treated with total knee arthroplasty, and the specific measures were: intravenous inhalation compound anesthesia, routine tying of a tourniquet, storage from the medial side of the patella, exposure of the joint cavity,

removal of osteophytes, positioning of the femur, tendons and bones, and osteotomy, After installing the artificial joint, the patella was repaired, the operation cavity was flushed after hemostasis, and the incision was sutured routinely.

The observation group was treated with open wedge-shaped high tibial osteotomy, and the specific measures were: intravenous inhalation compound anesthesia, routine tourniquet tying, arthroscopic insertion from the inside of the knee joint, and exploration of the knee joint cavity, especially the articular cartilage, ligaments and meniscus According to the injury situation, the damaged meniscus is repaired, and if it cannot be repaired, a partial meniscectomy is performed. After arthroscopic treatment, an "L"-shaped surgical incision was made on the medial tibial plateau, the fascia and free skin flap were routinely separated, the tendon was exposed, and the tibial backyard was bluntly separated to protect important nerves and blood vessels. Fix with Kirschner wires and fluoroscopy under the X-ray C-arm to confirm the osteotomy plane, spread it above the insertion of the tibial tuberosity with a spreader, and then perform osteotomy, place a force rod to confirm the osteotomy and preoperative planning Lines of force are aligned, then secured with locking plates and screws. Drainage tubes were routinely placed and bandaged under pressure after the operation.

After operation, the two groups of patients performed limb function exercises under the guidance of rehabilitation teachers, and gradually increased the range of motion of the affected limbs.

2.3 Observation indicators

①Compared the differences in surgical outcomes between the two groups. ②Compared the changes of VAS score and HSS score between the two groups before operation and 1 month after operation. In this study, the visual analogue scale (VAS score) was used to evaluate the joint pain of patients, and the higher the score, the stronger the pain [3]; Knee joint function score (HSS score) was used to evaluate the patient's knee joint function, and the higher the score, the higher the knee joint function of the patient [4].

2.4 Statistical analysis

SPSS 22.0 statistical software was used for statistical analysis, and when $P<0.05$, the difference was considered statistically significant.

3. Results

3.1 Differences in surgical nodules between the two groups

The blood loss during operation and the incidence of postoperative complications in the observation group were lower than those in the control group ($P<0.05$), and the operation time and hospitalization time were shorter than those in the control group ($P<0.05$). See Table 1.

Table 1. Differences in surgical nodules between the two groups

Group	Operation time (min)	Intraoperative blood loss (mL)	Postoperative complication rate (n, %)	Length of hospital stay (d)
Observation group (n=30)	50.5±5.4	160.6±21.4	3 (10.0)	8.5±2.6
Control group (n=30)	68.4±7.3	503.5±64.8	8 (26.7)	13.5±3.8
X^2/t	5.235	5.421	5.336	5.432
P	0.042	0.044	0.043	0.044

3.2 Changes in the scores of the two groups

The change range of VAS score and HSS score in the observation group before and after operation was higher than that in the control group ($P<0.05$). See Table 2.

Table 2. Changes in the scores of the two groups

Group	VAS score		HSS score	
	Before surgery	1 month after operation	Before surgery	1 month after operation
observation group	6.5±1.6	2.2±0.6	42.1±8.6	70.6±12.3
control group	6.4±1.7	3.1±0.8	42.3±8.4	62.4±10.1
t	1.231	5.325	1.115	5.285
P	0.114	0.043	0.102	0.042

4. Discussion

Knee osteoarthritis is a common orthopedic disease, and the incidence of the disease continues to increase with age [5]. The disease mainly manifests as joint pain, movement disorder, and even joint deformity, which affects the normal work and life of patients. For patients with protruding meniscus, surgical treatment is often used in clinical practice because conservative treatment has no obvious effect. Conventional arthroscopic surgery can perform simple repairs, but the repair effect is not ideal [6]. Although total knee arthroplasty can reconstruct the joint structure, it has large trauma, many complications, and the service life of the prosthesis is limited. Some patients may need revision surgery, so it has certain limitations.

Open wedge high tibial osteotomy is mainly to correct the line of lower limbs through osteotomy, reduce the stress on the lateral compartment, thereby correcting varus deformity and improving the joint function of patients [7]. During the operation, arthroscopic exploration can be used to observe articular cartilage lesions, repair and resect the meniscus, so as to eliminate the pathogenic factors inside the knee joint, and then adjust the line of force of the lower limbs through osteotomy to improve the pathogenic factors outside the knee joint. In this way, the patient's joint pain symptoms can be improved to the greatest extent, and the bone section can be formed in the cancellous bone area, which can increase the contact area of the bone section and accelerate bone healing [6]. However, this operation also has certain limitations, and the failure rate of patients aged >65 years is higher, so the patients selected in this article are all patients aged <60 years. The intraoperative blood loss and postoperative complication rate of the observation group were lower than those of the control group ($P<0.05$), and the operation time and hospitalization time were shorter than those of the control group ($P<0.05$); the changes of VAS score and HSS score of the observation group before and after operation The amplitude was higher than that of the control group ($P<0.05$), which shows that open wedge high tibial osteotomy has better application value.

In conclusion, both open wedge high tibial osteotomy and total knee arthroplasty have good therapeutic effects. However, open wedge-shaped high tibial osteotomy has less blood loss, faster recovery, and can improve the pain and joint function of patients, so it can be widely put into use.

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