

STUDY ON THE RISK FACTORS OF PAIN PERSISTENCE IN PATIENTS WITH MENISCUS INJURY OF KNEE JOINT FOR 6 MONTHS AFTER ARTHROSCOPIC SURGERY

CHENPO DANG^{1, #}, GUIRONG YI^{2, #}, LINGWA SHAO^{3, #}, GUILIN PENG³, PENG ZHOU¹, BAOPENG LI¹, HONGBIN SHAO¹, XIAOJIE YANG¹, FEIYI HOU¹, QINXU YANG¹, SHENSONG LI^{1, *}

¹Department of Orthopedics (Sport Medicine), The 940th Hospital of Joint Logistics Support force of Chinese People's Liberation Army, Lanzhou, 730050, Gansu, People's Republic of China - ²Department of Gastroenterology, The Second Affiliated Hospital of Lanzhou University, Lanzhou, 730050, Gansu, People's Republic of China - ³Department of Orthopedics, The 944th Hospital of Joint Logistics Support force of Chinese People's Liberation Army, Jiuquan, 735000, Gansu, People's Republic of China

[#]These authors contributed equally to this work

ABSTRACT

Objective: To explore the risk factors for persistent pain in patients with meniscus injury of knee joint 6 months after arthroscopic surgery.

Methods: Clinical data of 320 cases of knee meniscus injury underwent arthroscopic surgery in our hospital from January 2016 to June 2020 were analyzed retrospectively, of which 48 cases suffered from persistent pain for 6 months after arthroscopic surgery. The clinical characteristics and curative effect data were analyzed. Logistic regression model was used to evaluate the risk factors of 6 month- postoperative persistent pain.

Results: The excellent and good rate of 320 patients was 91.25%. The age, joint cartilage injury ratio, weight bearing ratio within 7 days after operation and synovial membrane resection ratio in the persistent pain group were significantly higher than those in the non-persistent pain group ($P < 0.05$). The proportion of cold compress in operation area after operation in persistent pain group was significantly less than that in non-persistent pain group ($P < 0.05$). Multivariate analysis of Logistic regression model showed that age ≥ 65 years old, joint cartilage injury, weight bearing within 7 days after operation, cold compress in the operation area after operation and synovial membrane removal during operation were all independent risk factors for 6 month- postoperative persistent pain ($P < 0.05$).

Conclusion: The risk of persistent pain in patients with meniscus injury of knee joint 6 months after arthroscopic surgery is independently related to age, articular cartilage injury, the starting time of postoperative weight bearing, cold compress in postoperative operation area and synovial membrane removal during operation.

Keywords: Arthroscopic surgery, knee joint, meniscus injury, pain, risk factors.

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Introduction

Meniscus injury is one of the most common injuries in the knee joint. With the continuous development of transportation and the accelerated rhythms of life and work, the incidence and cases of meniscus injury have been increasing year by year in recent years^(1, 2). Meniscus, one of the key structures supporting the knee joint and human movement,

has many functions such as transmitting body load, buffering external impact and maintaining the stability of the knee joint⁽³⁾. Patients with meniscus injury often seek medical advices due to symptoms such as decreased leg support and locked joints, which has a serious impact on normal work and life⁽⁴⁾. Arthroscopic knee surgery has become increasingly popular in the treatment of meniscus injury of knee joint, which has been proved to

alleviate clinical symptoms and improve quality of life⁽⁵⁾. Considerable studies, however, have revealed that some may experience pain symptoms after arthroscopy, which seriously affects the rehabilitation process and clinical prognosis^(6,7).

In the present study, clinical data of 320 cases of knee meniscus injury underwent arthroscopic surgery in our hospital from January 2016 to June 2020 were analyzed retrospectively, aiming to explore the risk factors for persistent pain in patients with meniscus injury of knee joint 6 months after arthroscopic surgery. The present results are summarized as follows.

Materials and methods

General information

Clinical data of 320 cases of knee meniscus injury underwent arthroscopic surgery in our hospital from January 2016 to June 2020 were analyzed retrospectively, of which 48 cases suffered from persistent pain for 6 months after arthroscopic surgery.

Inclusion criteria:

- Patients seek medical advices due to joint pain, interlocking or muscle atrophy;
- The imaging examination confirmed the existence of knee meniscus injury;
- Patients underwent arthroscopic surgery successfully;
- The clinical data was complete.

Exclusion criteria:

- History of knee joint surgery;
- Complicated with lower limb fracture;
- Contraindications of operation;
- Unable to communicate and evaluate normally.

This study complied with the Declaration of Helsinki, and informed consent was obtained from all patients.

Methods

Surgical methods

Continuous epidural anesthesia or combined spinal-epidural anesthesia was adopted. The anteromedial and lateral approach was used for exploring and determining the type of meniscus injury. If necessary, auxiliary incisions were made. During the operation, the meniscus injury was treated by plastic surgery or repair suture. If the meniscus was degenerated or seriously ruptured, subtotal meniscectomy was feasible. After the incision was

sutured, the cotton pad was placed on the knee, and the elastic bandage was tied at the same time. For patients with more synovial tissue resection or joint surface bleeding during operation, the joint cavity tube was placed and removed after 24-48 hours of negative pressure drainage.

Evaluation Indexes

The clinical characteristics were recorded by reviewing medical cases, including gender, age, injury site, injury cause, combined articular cartilage injury, operation mode, intraoperative and postoperative treatment. According to IKDC knee joint scoring standard, the curative effect was evaluated and the excellent and good rate was calculated. The postoperative follow-up was more than 6 months to observe the persistence of postoperative pain. The criterion for determining the presence of pain was: pain VAS score ≥ 3 points⁽⁸⁾.

Statistical analysis

The SPSS20.0 statistical software was used for data analysis and processing. Univariate analysis was performed using the χ^2 test, and results were expressed as %. Multivariate analyses was performed using logistic regression. $P < 0.05$ was determined as statistically significant.

Results

Analysis of clinical characteristics and efficacy data

320 patients were evaluated as excellent, good and poor after operation, with 180 cases, 112 cases, 16 cases and 12 cases respectively, and the excellent and good rate was 91.25%; The age, joint cartilage injury ratio, weight bearing ratio within 7 days after operation and synovial membrane resection ratio in the persistent pain group were significantly higher than those in the non-persistent pain group ($P < 0.05$). The proportion of cold compress in operation area after operation in persistent pain group was significantly less than that in non-persistent pain group ($P < 0.05$). There was no significant difference in other clinical features between the two groups ($P > 0.05$). See Table 1 for details.

Logistic regression model analysis of risk factors for 6 month-postoperative persistent pain

Multivariate analysis of Logistic regression model showed that age ≥ 65 years old, joint cartilage injury, weight bearing within 7 days after operation,

cold compress in the operation area after operation and synovial membrane removal during operation were all independent risk factors for persistent pain after 6 months ($P < 0.05$). See Table 2 for details.

Indexes	Non-persistent pain group (n=272)	Persistent pain group (n=48)	P
Gender			0.54
Male	160	32	
Female	112	16	
Age			0.00
<65years old	201	11	
≥65 years old	71	37	
Injury site			0.27
Medial	152	28	
Lateral	120	20	
Cause of injury			0.19
Car accident injury	70	14	
Sports injury	82	18	
Fall injury	68	9	
other	52	5	
Combined with articular cartilage damage			0.00
Y	80	33	
N	192	15	
Weight-bearing time after surgery			0.00
<1wk	103	36	
≥1wk	169	12	
Cold compress on the surgical area after surgery			0.00
Y	216	16	
N	56	32	
Postoperative cold compress time in the surgical area			0.25
<12h	48	12	
≥12h	168	4	
Surgery			0.38
Meniscus forming	162	27	
Meniscus suture repair	110	21	
Excision of synovium during surgery			0.00
Y	33	36	
N	239	12	

Table 1: Analysis of clinical characteristics.

Indexes	β	SE	Wald χ^2	P	OR	95%CI
Age ≥65 years old	1.41	0.24	7.83	0.02	4.37	2.04-9.51
Combined with articular cartilage damage	1.76	0.19	8.19	0.01	4.85	1.38-8.70
Start weight-bearing within 7 days after surgery	1.24	0.07	9.30	0.00	5.93	1.72-12.08
Without cold compress in the operation area after operation	1.83	0.28	10.63	0.00	3.75	1.34-9.97
synovial membrane removal during operation	1.37	0.54	9.86	0.00	5.21	1.90-11.67

Table 2: Logistic regression model analysis of risk factors for persistent pain in patients 6 months after operation.

Discussion

Relevant studies have shown that the proportion of meniscus injuries in people who have long been engaged in heavy physical, high-load labor and traffic accidents is relatively high⁽⁹⁾. Imaging examination of patients with meniscus injury of knee joint is characterized by local tissue thickening and enlargement, accompanied by symptoms such as pain aggravation and interlocking after exercise, which has a serious impact on daily work and life⁽¹⁰⁾.

In the past, knee joint meniscus injuries were mostly treated with meniscus subtotal resection. The surgeon need to complete the operation under direct vision during operation, which may casue too long exposure time of joint internal structure and significantly increase the risk of iatrogenic trauma and infection. Minimally invasive orthopedic surgery technology has made great progress in recent years, among which minimally invasive surgery, represented by arthroscopic surgery, has been widely used in the treatment of meniscus injury of knee joint^(11, 12). During this period, the surgeon can complete the formation or repair suture of the meniscus injury under the endoscope, and achieve a satisfactory repair effect⁽¹³⁾. Meniscusplasty is mainly suitable for patients with severe meniscus injury. After exploring the injury and surrounding adjacent relationship through arthroscopy, partial resection and reconstruction are adopted to maintain the normal shape of meniscus to the maximum extent, which can effectively reduce the pain of knee joint and reduce the risk of secondary injury⁽¹⁴⁾.

Meniscus repair and suture is more used for the treatment of young patients with meniscus edge rupture and good blood supply. By repairing and suturing under arthroscopy, surgeons can maximize the preservation of normal meniscus shape, protect annulus fibrosus tissue and meniscus concussion

absorption function, and avoid axial stress injury⁽¹⁵⁾. In our study, 320 patients were evaluated as excellent, good and poor after operation, with 180 cases, 112 cases, 16 cases and 12 cases respectively, and the excellent and good rate was 91.25%, which indicated that arthroscopic surgery has the advantages of treating knee meniscus, and consistent with previous reported results⁽¹⁶⁾.

Postoperative pain of knee meniscus injury is common, which may be related to iatrogenic trauma and local inflammatory reaction during operation⁽¹⁷⁾. Postoperative pain is considered as the main reason for the decline of quality of life and delay of rehabilitation in patients with meniscus injury of knee joint, however, the potential risk factors for persistent pain of patients remain unclear⁽¹⁸⁾. In the results of this study, the age, the proportion of articular cartilage injury, the proportion of weight bearing within 7 days after operation and the proportion of synovial membrane resection during operation in the persistent pain group were significantly higher than those in the non-persistent pain group ($P < 0.05$). The proportion of cold compress in operation area after operation in persistent pain group was significantly less than that in non-persistent pain group ($P < 0.05$). Multivariate analysis of Logistic regression model showed that age ≥ 65 years old, joint cartilage injury, weight bearing within 7 days after operation, cold compress in the operation area and synovial membrane removal during operation were independent risk factors for persistent pain after 6 months ($P < 0.05$), which suggested that elderly people, joint cartilage injury, early weight bearing after operation, cold compress treatment after operation and synovial membrane removal during operation could easily lead to persistent postoperative pain in patients with knee meniscus injury.

With the increase of age, the blood supply in knee joint area decreases, the ability of tissue repair deteriorates, and the risk of local inflammation increases, and thus the condition of elderly people is often more serious than that of young and middle-aged people. Therefore, the pain after arthroscopy is more obvious and difficult to relieve⁽¹⁹⁾. It has been reported that, if patients with knee meniscus injury suffer from articular cartilage injury simultaneously, the decline of joint function may be more obvious, and it takes a longer time to recover after operation⁽²⁰⁾. Meanwhile, this kind of combined injury also significantly increases the risk of iatrogenic injury during operation. Some scholars consider that

after arthroscopy, early getting out of bed should be used to promote the recovery of joint function, but if weight-bearing walking too early can often induce meniscus displacement or rerupture, which seriously affects the surgical effect. Therefore, the repair of meniscus should be evaluated scientifically after operation, the time of weight-bearing training should be determined reasonably, and the training should be started after the muscle strength of lower limbs reaches the standard, so as to prevent meniscus reinjury to the maximum extent⁽²¹⁾. The role of postoperative cold compress in relieving swelling and pain in joint operation area has been widely recognized, which contributes to realize early postoperative rehabilitation⁽²²⁾. Resection of the surrounding synovial tissue during knee arthroscopic surgery often indicates that the patient has an inflammatory reaction in the articular cavity and obvious surrounding synovial hyperplasia, eventually resulting in a higher risk of persistent postoperative pain⁽²³⁾.

Taken together, the risk of persistent pain in patients with knee meniscus injury 6 months after arthroscopic surgery is independently related to age, articular cartilage injury, the starting time of postoperative weight bearing, cold compress in the postoperative operation area and synovial membrane removal during operation.

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Corresponding Author:

SHENSONG LI

Department of Orthopedics (Sport Medicine), The 940th Hospital of Joint Logistics Support force of Chinese People's Liberation Army, Lanzhou, 730050, Gansu, People's Republic of China

Email: lss619391919@163.com

(China)