TREATMENT OF KNEE JOINT DISCOID MENISCUS INJURY OF BASKETBALL PLAYERS WITH ARTHROSCOPY: ANALYSIS OF RISK FACTORS FOR POSTOPERATIVE PAIN

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ABSTRACT
To further improve the clinical effect of treating knee joint discoid meniscus injury with arthroscopy in basketball players, this paper analyzed the detailed effects of arthroscopy in the treatment of knee joint discoid meniscus injury and identified the risk factors for postoperative pain. 1400 basketball players who had arthroscopy treatment for knee joint discoid meniscus injury were selected as subjects. After treatment, a 12-month postoperative follow-up was implemented to observe the recovery, injury recurrence, and postoperative pain. Based on the occurrence of postoperative pain as a critical criterion, patients were divided into a painful group and a painless group to analyze the risk factors for pain. Results showed that after surgery, 1274 out of 1400 patients with knee joint discoid meniscus injury recovered well, indicating an overall effective rate of 91%. The remaining 126 patients were not effectively treated, as they suffered severe postoperative pain after surgery, with a pain occurrence rate of 9%. Through comparison of risk factors, it was found that there were significant differences between the two groups in terms of average age, load bearing time, joint soft bone injury condition, and postoperative cold compress condition (p<0.05). There were no significant differences in terms of their body weights and surgical methods (p>0.05). These findings suggested that using arthroscopy to treat knee joint discoid meniscus injury of basketball players can realize significant therapeutic effect and an increased healing rate. Some patients may be prone to risk factors for postoperative pain, to a certain degree due to their age and previous injury history. To minimize such negative impact of the surgery, target analysis of these risk factors should be conducted in future studies in order to formulate targeted clinical treatment and nursing intervention for better healing.

Keywords: Arthroscopy, Knee Joint Discoid Meniscus Injury, Postoperative Pain, Risk Factor Analysis.

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Introduction
Discoïd meniscus, also called discoïd soft bone, refers to the abnormal appearance of the meniscus. The normal meniscus is large and thick. It is particularly important in basketball players, as they are subjected to large amounts of exercise and need to perform complex skillful moves. When they perform movements with torsional forces, the upper leg would bear substantial weight, and the lower leg is fixed in a half buckling position. When a player is taking on an abducent position, the body and femoral region take a sharp internal rotation, such that the meniscus would be positioned between the femoral condyle and the tibia, subjected to the rotational force and resulting in fracture. In the case of sprain, the larger the buckling degree of the knee joint, the later the fractured part would be. The mechanism of external meniscus injury is similar, but the applied force is in a reverse direction. If parts of a broken meniscus slip in the knee joint, it would cause mechanical fault to joint movement, which would obstruct joint stretching and lead to formation of interlocking. Some basketball players may suffer injuries at the anterior angle, relief angle, middle area, or edge parts of the meniscus synchronously due to external collision or improper movements.
The main types of injuries include transverse fissure, interhemisphere fissure, horizontal fissure or irregular fissure, and even broken into loose bodies inside of the joint. Clinical experience has shown that knee joint discoid meniscus is subjected to a higher injury risk due to its special structure and its location where blood supply is abnormal\(^4\)-\(^6\). The Discoid meniscus is shown in Figure 1.

![Figure 1: Discoid meniscus appearance.](image)

Arthroscopic surgery is a clinical surgical treatment, in which patient’s skin is cut for producing severe pores in a chopstick shape, with diameters ranging between 5-10 mm, so that tiny camera and surgical instruments can be placed into the joint for diagnosing and treating different kinds of joint diseases. In recent years, the therapeutic effect of arthroscopic treatment for different types of joint injuries in China has been verified\(^7\)-\(^9\). However, studies have also shown that some patients with knee joint discoid meniscus may suffer different degrees of postoperative pain after arthroscopic treatment, which may lead to surgical failure in some serious conditions, with patients suffering massive pain\(^10\). To effectively solve these problems, in this paper we conducted detailed analysis of the clinical effect of arthroscopic surgery in treating knee joint discoid meniscus injury and identified the risk factors and possible causes for postoperative pain.

### Data and methods

#### Subjects

The research subjects were 1400 patients with knee joint discoid meniscus injury, who had been admitted to 30 different medical institutions from Jan 2013 to Jun 2014. All of them were basketball players, including 948 professional ones and 452 amateurish players; There were 943 males and 457 females, with age ranging between 41-47, and an average age at 26.47±5.78; The number of patients with double side injuries was 211, while the number of patients with single side injury was 1189 (including 637 left knee injuries and 552 right knee injuries); Meniscus forming technique was employed for treating 1120 patients, and sub-total meniscectomy was employed for treating the remaining 280 patients.

Through analysis of clinical data, it was found that all patients were subjected to CT test and MRI test and confirmed as discoid meniscus injury. Inside of the meniscus, strips or patches of abnormal signals can be observed with these tests, and the existence of discoid meniscus was proven by arthroscopic test. All patients had arthroscopic surgery for the first time. To control for confounding factors, we did not consider patients with joint deformities, metabolic bone diseases, medication of bone metabolism in recent times, malignant tumor, severe hepatic and kidney function obstacles, serious knee joint soft tissue injuries, degeneration of joint, or coagulation disorder dysfunction. All patients volunteered to receive arthroscopic treatment and signed informed consents before treatment.

#### Treatment Method

Before surgery, each patient was given with whole body epidural anesthesia and took supine position. The patient’s knee joint was benched at 90 degrees for conventional preoperative disinfection\(^11\). Using a 30-degree knee joint arthroscopy, it was placed in from anterolateral and anteromedial knee joint. After placing it in, the knee joint structure and the appearances of internal and external meniscuses and discoid meniscus were carefully observed, so as to fully determine the injury type, injured parts, and injured range. Detailed surgical procedures were as follows:

Sub-total meniscectomy: a shaping scalpel was placed in from the anteromedial knee joint to clear hypertrophic synovium, while a clamp was placed from the anterolateral side as an auxiliary instrument to clear off seriously injured meniscus\(^12\). Regarding the situation where the meniscus torn area has already impacted surrounding tissues, both parts of the meniscus and its surrounding tissue were cut off, clearing all fragments and washing the articular cavity using normal saline. After the operation, the articular cavity and bursa suprapatellaris was checked in a certain order to avoid tissue residue.
After that, the arthroscopy and auxiliary instruments were successively removed and the operative incision was closed.

Menisci reformation: shaping scalpel was placed in from the anteromedial knee joint to clear hypertrophic synovium. A clamp was placed from anterolateral side as an auxiliary instrument to cut off thickened discoid meniscus. The cut edge was repaired to maintain the C-shape of the meniscus. Regarding bucket handle tears, it should form along the tear edge; while regarding lamellar tearing, the under layer can be cut.

During operation, attachment points of the anterior angle and relief angle were protected, and attention was paid to care for the transverse ligament and meniscofemoral ligament of the knee (13). After that, the arthroscopy and auxiliary instruments were successively removed and the operative incision was closed.

Clinical observation criterion

After surgery, 6-12 months of follow up was conducted to track the recovery process. Based on the rating criterion for the knee joint, the therapeutic effects observed in patients were evaluated as follows (14-16):

• not good: occurrence of pain in both daily life and during exercise, with limitation of motion;
• average: occasional occurrence of pain during exercise;
• good: no limitation of daily activities, occasional occurrence of pain during exercise;
• excellent: no pain in both daily life or during exercise.

The effective treatment rate was calculated as: (good + excellent) / total number of patients * 100%.

According to the particular situations of postoperative pain, patients were divided into two groups (painful group and painless group) for analyzing the risk factors for postoperative pain.

Statistical method

For the analysis of the clinical effects of treating knee joint discoid meniscus injury of basketball player using arthroscopy and the analysis of risk factors for postoperative pain, SPSS21.0 statistical software was used to analyze and process data. Enumeration data was expressed in the form of (n, %) and tested by chi-square; measurement data was expressed in the form of (±s) and analyzed by t tests. The level of statistical significance was set at 0.05.

Results

After surgery, the meniscus of most patients was well recovered. Figure 2 shows an example of the joint inner conditions before and after the operation. After 12 months of follow up, results showed that the overall effective rate of arthroscopic surgery reached 91% (1274/1400), including 743 patients with excellent effect, 531 patients with good effect. There were 126 patients suffering from serious postoperative pain, including 83 patients with an average therapeutic effect and 43 patients with a not good therapeutic effect. The occurrence rate of postoperative pain was 9%.

The 1274 patients (91%) were categorized as the painless group, of which the average age was (24.37±5.43) years, average load bearing time was (8.46±1.28) days; According to analysis of the clinical data, 843 patients had never suffered articular cartilage injury, while the remaining 431 ones had ever suffered; There were 967 patients who had been treated with postoperative cold compress, while 307 had not; The remaining 126 patients (9%) were categorized as the painful group, with an average age of (41.37±6.42) years, and average load bearing period for the first time of (4.13±2.24) days; In the painful group, there were 94 patients who had never suffered articular cartilage injury, and 108 who did not obey doctor's orders and performed cool compress. Through statistical analysis, it was found that all of these differences between the two groups were statistically significant (p<0.05). There were no significant differences between the groups in body weights, surgical methods, and gender compositions (p>0.05).

Figure 2: Appearances of knee joint discoid meniscus before and after arthroscopic surgery.

Discussion

Based on the current results, it was found that the occurrence of postoperative pain after treatment of knee joint discoid meniscus using arthroscopic surgery was mainly related to the patient's age, articular cartilage injury, early load bearing or cold
compress after surgery. Comparisons of these factors between the the painful group and the painless group helped identify them as statistically significant risk factors for postoperative pain (p<0.05).

Hence, after arthroscopic surgery, doctors should provide patients with proper postoperative care, including education of knowledge on the recovery process during rehabilitation period, so as to let them fully understand what they should pay attention to after surgery, to control for the risk factors for postoperative pain as much as possible, improving the therapeutic effect of the surgery.

References


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