

Early reconstruction treatment of shot putters' acute complete anterior cruciate ligament injury under knee arthroscopy.

Shaohua Liu*

Hunan Mechanical and Electrical Polytechnic, Changsha, 410151, PR China

Abstract

During daily training, shot putters are prone to acute complete anterior cruciate ligament injury, which is mainly treated with early reconstruction under knee arthroscopy to restore stability of injured athletes' knee as soon as possible, help them towards early recovery and resume normal work and training. During knee arthroscopic treatment, extrusion screws are mainly used for acute complete anterior cruciate ligament injury patients to fix bone- patellar tendon (1/3)-bone complex autotransplantation, reconstruct anterior cruciate ligament, conduct stop reconstruction or suture medial collateral ligament. During 2006 and 2015, 3000 cases of patients with acute complete anterior cruciate ligament rupture and medial collateral ligament rupture were treated with an average follow-up of 1 year, incision healed well and no infection was found and the patient recovered well after operation. As can be seen from this retrospective analysis, under arthroscopy, reconstruction of acute complete anterior cruciate ligament injury can be performed. The outstanding advantages of this treatment are small surgical trauma, timely treatment and good effect. Early arthroscopic reconstruction of ACL can clear intra-articular injury, shorten the treatment process, and meet the standard of treatment specification. It is worthy to be promoted in clinical application.

Keywords: Acute complete anterior cruciate ligament injury, Knee arthroscopy, Reconstruction treatment, Effect.

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Introduction

An anterior cruciate ligament (ACL) tear is a serious knee injury with a high risk of morbidity in the young and active population [1]. Shot putters' acute anterior cruciate ligament rupture is a very serious sports injury. This damage is with relatively high violence, which is often combined with injury of other structures [2]. After the injury, if athletes cannot receive timely and accurate diagnosis and therapeutic treatment, the best time for treatment of acute complete anterior cruciate ligament injury will be adversely affected, bringing a series of complications, possibly secondary knee instability, which seriously affects patient's knee joint function, or even leads to a series of knee sequelae lesions. The ACL-injured knee has an associated meniscus injury at primary ACL reconstruction (ACLR) in .40% of patients [3]. An ACL injury is a strong risk factor for osteoarthritis, and a concomitant meniscus tear significantly increases that risk [4,5]. Some researchers showed that anterior cruciate ligament injury delayed more than 3 months without surgery, which could result in secondary injuries such as meniscus, articular cartilage and traumatic arthritis [6-8]. In long course of treatment, conventional knee joint damage is commonly treated with surgery, the basic method of which is incision. However, such surgery process is very complex with great trauma. Postoperative recovery rate and postoperative rehabilitation of patients are very slow, which will cause serious adverse effects

on career of athletes engaged in competitive sports as a profession [9]. Anterior cruciate ligament injury is a common training injury. With the development of arthroscopic technology, the open end surgery has been abandoned. Arthroscopic reconstruction of the ligament has become the gold standard for treatment [10,11]. Thus, early minimally invasive surgery for acute complete anterior cruciate ligament injury is the main focus of clinical research. The purpose was to determine the clinical effect of arthroscopic treatment for ACL reconstruction. This paper summarizes clinical study of early reconstruction of acute complete anterior cruciate ligament injury under knee arthroscopy. During 2006 and 2015, 3,000 patients were treated, who have good clinical rehabilitation recently, so certain clinical research achievements have been achieved. Now, the feelings and experiences will be summarized below.

Materials and Methods

General information

During 2006 and 2015, 3000 cases of patients with acute complete anterior cruciate ligament were treated, including 1800 cases of male patients, 1200 cases of female patients; the patients were aged between 16 to 25 years, with mean age at (18.32 ± 2.08) years old. There were 1200 cases with left knee anterior cruciate ligament injury and 1800 cases with right

knee anterior cruciate ligament injury. The inclusion criteria and exclusion criteria refer to the literature [1]. This research was approved by the Ethical Committee of Hunan Mechanical and Electrical Polytechnic according to the declaration of Helsinki promulgated in 1964 as amended in 1996, the approval number is 2006001. All the patients enrolled in the study are exercise-induced injury patients, of which, 2800 patients were professional shot putters, 200 patients were accidentally injured during shot activities. The period from injury to operation time lasted 1-11 days, averagely (5.32 ± 1.82) days. For combined injury, there were 1200 cases of complete rupture of medial collateral ligament, 1300 cases of transverse tear of medial joint capsule and extensor fascia, 50 cases of meniscus injury (Figure 1), 230 cases of posterior cruciate ligament rupture, 300 cases of patellar tendon partial rupture (1/3).



Figure 1. Schematic diagram of meniscus injury.

Surgical treatment

Knee arthroscopy search: The main equipment used for arthroscopy search was Dyonics 700 single-chip camera system (Smith&Nephew, Inc. London, Britain) (4.0 mm in diameter, with 30-degree bevel wide-angle endoscopy). After clear examination of complete anterior cruciate ligament rupture, take anteromedial oblique mouth about 10 cm in length from adductor tubercle to lower part of tubercle of tibia, then cut out bone-patellar tendon-bone complex (tibia lateral bone is 2.5 cm in length, 1.0 cm in thickness, patella lateral bone is 2.0 cm in length, 0.6 to 0.8 cm in thickness, whose width should be consistent with that of patellar tendon) after reveal of patellar tendon to reconstruct anterior cruciate ligament after finishing [12].

Treatment under knee arthroscopy: Search main structure within the joint with knee arthroscopy, treat meniscus injury, clean nub of anterior cruciate ligament, and then perform intercondylar notch shaping. Locate with ACUFEX microscopic locator, drill side seam of tibia and femur, introduce and install bone-tendon fusion into tunnel with guide pin, then feed extruder screw into lateral condyle side tunnel with guide pin to fix the above bone, perform hundred and eighty degrees' outward rotation of lower bone block, so that ligament develops into external beam state. Adjust the tension, bend and stretch knee to see whether it is isometric reconstruction, with or without collision, pull ligament closer and fix lower bone block after thirty degrees' knee flexion,

plus extrusion screws, double door-shaped nails, steel wire [13]. Before the operation, examine drawer and conduct Lachman test to reconstruct stability of anterior cruciate ligament knee joint.

Extra articular injury treatment: Perform varus operation under thirty degrees of knee flexion. Enter inside of structural knee along the original incision, and search extent of medial capsule and extensor knee damage and medial collateral ligament rupture site. Suture lacerated joint capsule, then suture extensor fascia. In situ suture repair can be performed for medial collateral ligament stop point and somatic part rupture. Lower dead point reconstruction is needed for complete rupture of lower dead point. Drill bone tunnel at the stop point, and fix the broken ends in the interior [14]. Place negative pressure drainage tube under deep fascia of incision, and suture patellar tendon defect and incision. Support plaster after thirty degrees of knee flexion, and make good fixing treatment.

Postoperative rehabilitation instruction and training methods

Supine guidance: Nurses instruct patients to take the right supine position and place according to good limb position to prevent and reduce spasm and effectively protect patient's shoulder. Patients' upper extremity should stretch, while the lower limb should take flexed position, with recumbent position regularly changed to prevent poor blood flow, elbow flexion, foot drop, etc.

Rehabilitation exercise: Nurses should guide patients and their families to correct rehabilitation exercise. Early rehabilitation exercise mainly include flexion, stretching, rotating, and control of parts including shoulders, elbows, fingers, hips, knees, ankles, etc. Later rehabilitation exercise mainly include training programs such as migration on bed, bridge movement, turning over, standing up, sitting-standing conversion.

Traditional Chinese medicine rehabilitation: Massage patient's acupoints such as Jianqian, Shousanli, Quchi, Xuehai, Zusanli, Hegu, Jiexi, Taichong, etc. two minutes per day [15]; Plus massage using a single thumb, pushing manipulation, rubbing reduction. The purpose is to promote blood circulation, relieve pain and clear the meridians. Decide whether to provide TCM rehabilitation therapy including moxibustion, cupping based on patients' clinical symptoms.

Clinicians, nurses and rehabilitation therapists should strengthen exchanges and communication, to determine rehabilitation therapeutic regimen according to clinical recovery of patient. After the therapeutic regimen is determined, clinical nurses should inform patients and their families of role and value of rehabilitation gymnastics with professional knowledge, patiently explain the role of each action for clinical rehabilitation, so as to mobilize patients and their families.

Design of rehabilitation gymnastics: Rehabilitation gymnastics is to exercise patients' limb function, so as to promote rehabilitation of neurological function. Design principles of rehabilitation gymnastics should adhere to soothing rhythm, appropriate exercise amount and action easy to remember. According to patients' rehabilitation phase, there are neurological rehabilitation gymnastics on bed and standing neurological rehabilitation gymnastics. There are six cycles in neurological rehabilitation gymnastics on bed, namely, neck movement, upper limb movement, waist and torso movement, lower limb movement, hip movement, toes movement. Rehabilitation gymnastics on bed should be done two to three times a day, and 30 minutes per time is appropriate [16]; action should be slow and place, avoid rush for quick results. There are seven cycles in standing neurological rehabilitation gymnastics, namely, shoulder movement, hand movement, arm flexion movement, finger movement, flexion of the knee, leg movement, facial exercise and massage. Standing rehabilitation gymnastics should be done twice in the morning and evening, with activity time controlled in about 30 min; activity time should be adjusted according to recovery of patient, and principle of gradual and orderly progress should be followed [17].

Results

During 2006 and 2015, 3000 cases of patients with acute complete anterior cruciate ligament rupture and medial collateral ligament rupture were treated with an average follow-up of 1 year. Patients have good rehabilitation recently, all of whom restore normal motor function.

Discussion

After following up for one year, we found that incision healed well and no infection was found and the patient recovered well after operation. Knee anterior cruciate ligament rupture is a common sports injury with very serious trauma. If not treated timely or appropriately, it will lead to anterior cruciate ligament knee deficiency, causing functional instability and a series of sequelae lesions, which severely affects patient's knee function and brings a lot of adverse effects to patient's daily life [18]. Knee structure and injury mechanism have obvious complexity. While resulting in anterior cruciate ligament rupture, serious injury is often also combined with damage to other structures. These injuries are mostly acute injuries, mainly including joint swelling and pain, blood clots, muscle cramps, interlocking muscle, etc. These factors also cause impact on the test results, affect diagnosis accuracy, and delay the best time for treatment. Although drawer test and Lachman test are important methods to examine anterior cruciate ligament injury, acute injury will significantly increase examination difficulty. Research data indicate that lowest preoperative positive rate is generally controlled within twenty-four percent, but positive rate under anesthesia is only 60%.

In the treatment of patients with old ACL injury, the proportion of secondary meniscus, articular cartilage injury and traumatic

arthritis increased significantly, which had a serious adverse effect on functional recovery. But early treatment and even emergency surgical treatment can immediately clear and timely treatment of combined injuries may exist within the joint, to avoid secondary articular cartilage and meniscus injury caused by delayed treatment, to minimize the occurrence of traumatic arthritis. With early arthroscopic treatment for acute complete anterior cruciate ligament injury, incidence of complications is low. If endoscopic anterior cruciate ligament reconstruction is required, operation time will be extended. In the meantime, great importance should be attached to seepage of intra-articular fluid to the crus which causes swelling. If such cases occur, endoscopic surgery should be immediately stopped to reduce incidence of complications and improve therapeutic safety and reliability [19]. After intra-articular lesions clear and corresponding endoscopic treatment can make early rehabilitation training more targeted guidance, avoid intra-articular injury is unknown and simple non operative treatment, excessive or long-term restrictions of knee joint activities, resulting in delayed recovery of joint function and even joint stiffness and other adverse consequences, conducive to the early rehabilitation of patients.

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***Correspondence to**

Shaohua Liu

Hunan Mechanical and Electrical Polytechnic

PR China