

Case Report

FIXATION FAILURE IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING KIRSCHNER WIRE; A CASE REPORT

Mohsen Mardani-Kivi¹ and *Zahra Haghparast Ghadim-Limudahi²

¹Guilan University of Medical Science Orthopedic Department, Clinical Research and Development
Center of Ghaem International Hospital, Rasht, Iran

²Guilan University of Medical Sciences, Rasht, Iran

*Author for Correspondence: dr.zahra.haghparast@gmail.com

ABSTRACT

Technical issues such as graft failure are the most common causes of Anterior Cruciate Ligament (ACL) reconstruction failure. Here we report a case of ACL reconstruction using Kirschner wire resulting in displacement of hardware in joint space, extensive destruction of the articular surface and severe pain. Such catastrophic results show using such metal pins is a medical error and it is not an appropriate treatment.

Keywords: Fixation, Anterior Cruciate Ligament Reconstruction, Kirschner Wire

INTRODUCTION

Recurrent Anterior Cruciate Ligament (ACL) instability happens in 10-40 % of patients following reconstruction surgery. One of the most common causes (24%) is technical issues including improper tunnel placement and graft failure (Mars group, 2010; Qi, 2015).

ACL instability secondary to graft failure can be related to incorrect graft choice, graft incorporation, infection and fixation (failure of fixation method, graft tension, and graft isometry) (Mars group, 2010; Qi, 2015).

During the past decade, various fixation systems have been used for ACL graft fixation, decreasing joint laxity and increasing mechanical strength (Qi, 2015). Some of these systems are Endobutton, Interference screws, bio-absorbable Rigid fix pins or Cross pins fixation systems, which have their own pros and cons and fixation failure or knee instability can happen in any of them postoperatively.

Several reports have been published with failure in fixation with all kinds of pins (Qi, 2015; Boden, 2013), however, to our best knowledge, there are no reports of the failure of using of Kirschner wire for the fixation, in this case report we discuss the first case of fixation breakage associated with using of Kirschner wire.

CASE

A 27-year-old male fit and well (BMI=24), white-collar, came to the orthopedic clinic on July 18th, 2015 with left knee pain, swelling and limited range of motion. He is not a professional athlete; however, he had played soccer occasionally until 2 years ago.

Two years ago, after a rotational soccer injury, he sustained left complete ACL rupture and underwent arthroscopic reconstruction surgery. After surgery, he has experienced pain on surgery site intermittently, but recently it has got worse (pain rating scale 7-8 out of 10) and constant. Kneeling was painful and in physical examination the score for both Lachman and Pivot Shift tests were 2+. Based on previous knee x-ray after surgery (Figure-1), it became clear that in the previous surgery for bone patellar tendon bone graft (BTB) fixation, metal pins (Kirschner Wire) was used, which is very uncommon. Also, two metal interference and cancellous screws were used for fixation of tibial and femoral graft respectively.

The second image was taken 2 years after surgery, the following findings were seen; displacement of hardware in joint space, extensive destruction of the articular surface, joint space narrowing, and soft tissue swelling (Figure-2).

Case Report



Figure 1: Radiography of Left Knee after ACL reconstruction



Figure 2: Radiography of Left Knee 2 years after ACL reconstruction

According to these catastrophic radiographic findings, the patient became candidate for arthroscopic surgery on July 25th, 2015. Metal pins were removed and re-reconstruction performed. During arthroscopy, there was the evidence of multiple micro-fractures on femoral and tibial condyles. After six months' follow-up, patient gained full knee joint range of motion and the pain reduced to 1-2 out of 10. The stability of ACL was confirmed with KT-2000, Anterior drawer and Lachman tests. The patient gave informed consent prior to being included in this case report.

DISCUSSION

Graft stability depends on the fixations devices and the choice of the graft, to have enough strength, and prevent dislocation under rotational movement (Boden, 2013).

The BTB graft, that had been used in our patient, compare to hamstring fixation has more security and less failure (Drogest, 2010). In addition, there are numerous studies that have focused on designing different methods and devices for BTB fixation, in most of them using Interference screws have had the best outcome, but none of them has recommended using metal pins for BTB fixation (Drogest, 2010; Ibrahim, 2015). After a while, these metal pins will back out, and due to their metal nature, can cause a serious damage to different parts of the joint which can result in pain, crepitation, and fluid retention in the joint space. This painful swelling seen in our patient after the inflammatory process started in soft tissue due to metal pins displacement, reaction to the foreign body and then inflammatory granuloma formation. Considering the fact that our patient was a young man with no intensive physical activity, who had tolerated the intermittent pain and postponed his doctor visit, therefore, in that period of time the severe joint damage had happened.

Kirschner wire indications are in fixation of unstable displacement and fractures mostly in shoulders, wrists, and hands (Tan, 2016). These metal pins are cheap and available, and because they can be used percutaneously, there is less damage to soft tissue and tendons (Tan, 2016; Zacharia, 2016). However, there are numerous case reports of displacement and migration of these pins and their fatal complications including intra-aortic migration from clavicle fixation (Tan, 2016) and hydro pneumothorax from shoulder fracture fixation (Zacharia, 2016).

There are several studies on different methods of fixation in arthroscopic knee injuries treatment, which makes the choosing of the best treatment method challenging (Qiw, 2015; Boden, 2013; Drogest, 2010). for instance, in a study of comparing radiographic and clinical outcome of using either the interference screws or the transcondylar cross-pin screw, there was no significant difference between using these two methods for ACL reconstruction (Kawano, 2011). However, in a clinical trial, Ibrahim et al (Ibrahim,

Case Report

2015) did compare the intra-tunnel fixation using bio-absorbable Rigid fix cross pins to extra-tunnel femoral fixation using an Endobutton. They reported no failure in intra-tunnel fixation, but 4 treatment failures using extra-tunnel fixation method. In a separate clinical trial, they compared BTB fixation using intra-articular screws (aperture fixation) to hamstring grafts using cortical buttons (suspensory fixation), even though the aperture fixation method increased the joint stiffness in the early postoperative period, but there was no significant difference in regard to long-term outcome or revision rate of using either method (Webster, 2016).

In general, it may be concluded that the use of bio-absorbable implants that are made from Poly-L-lactic acid and can be absorbed by the body have the better short-term and long-term outcomes compare to metal analogs (Wylie, 2017). However, to make a strong statement, large clinical trials are needed to evaluate the long-term outcome of different implants and methods, but it certainly can be said that using Kirschner Wire in ACL reconstruction is a medical error and it is not an appropriate treatment.

Conflicting interests: “All named authors hereby declare that they have no conflicts of interest to disclose”.

Funding: All named authors hereby declare that they have no funding and support

Ethical approval details: The Guilan University of Medical Science Ethics Committee approved the study.

ACKNOWLEDGMENT

We thank Dr. Keyvan Hashemi Motlagh for his insightful suggestions.

REFERENCES

- Mars Group (2010).** Descriptive epidemiology of the Multicenter ACL Revision Study (MARS) cohort. *The American Journal of Sports Medicine* **38**(10) 1979-1986.
- Qi, W., Liu, Y., Xue, J., Li, H., Wang, J., & Qu, F. (2015).** Applying Cross-Pin System in Both Femoral and Tibial Fixation in Anterior Cruciate Ligament Reconstruction Using Hamstring Tendons. *Arthroscopy techniques* **4**(5) e397-e402.
- Boden, R. A., Razak, A., Hussain, S. M. A., & McLoughlin, S. J. (2013).** Loose body following cross-pin fixation for anterior cruciate ligament reconstruction. *Journal of Orthopaedics and Traumatology* **14**(2) 155-157.
- Drogset JO, Strand T, Uppheim G, Ødegård B, Bøe A & Grøntvedt T (2010).** Autologous patellar tendon and quadrupled hamstring grafts in anterior cruciate ligament reconstruction: a prospective randomized multicenter review of different fixation methods. *Knee Surgery, Sports Traumatology, Arthroscopy* **18**(8) 1085-1093.
- Ibrahim SAR, Abdul Ghafar S, Marwan Y, Mahgoub AM, Al Misfer A, Farouk H & Khirait S (2015).** Intratunnel versus extratunnel autologous hamstring double-bundle graft for anterior cruciate ligament reconstruction: a comparison of 2 femoral fixation procedures. *The American journal of sports medicine* **43**(1) 161-168.
- Tan L, Sun DH, Yu T, Wang L, Zhu D & Li YH (2016).** Death due to intra-aortic migration of kirschner wire from the clavicle: A case report and review of the literature. *Medicine* **95**(21) 34-39.
- Zacharia B, Puthezath K & Varghees I (2016).** Kirschner wire migration from subcapital humeral fracture site, causing hydropneumothorax. *Chinese Journal of Traumatology* **19**(5) 305-308.
- Kawano CT, Fucs PMDMB & Severino NR (2011).** Pretensioning of quadruple flexor tendon grafts in two types of femoral fixation: quasi-randomised controlled pilot study. *International orthopaedics* **35**(4) 521-527.

Case Report

Webster KE, Feller JA, Hartnett N, Leigh WB & Richmond AK (2016). Comparison of patellar tendon and hamstring tendon anterior cruciate ligament reconstruction: a 15-year follow-up of a randomized controlled trial. *The American Journal of Sports Medicine* **44**(1) 83-90.

Wylie JD, Marchand LS & Burks RT (2017). Etiologic factors that lead to failure after primary anterior cruciate ligament surgery. *Clinics in Sports Medicine* **36**(1) 155-172.