

# Broken Bioabsorbable Tibial Interference Screw after Anterior Cruciate Ligament (ACL) Reconstruction using a Semitendinosus-gracilis Graft: A Case Report

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## ABSTRACT

When a patient presents with knee pain and locking after an anterior cruciate ligament (ACL) reconstruction, a new meniscal injury or an osteochondral loose body are usually considered for differential diagnosis. We present the case of a 22-year-old female with just these complaints 6 months after ACL reconstruction surgery. Magnetic resonance imaging (MRI) of the knee showed a broken screw tip which was later arthroscopically removed. At arthroscopy, an 11mm long broken bioabsorbable interference screw tip was found lying in the intercondylar notch; this resulted in a 0.5cm Outerbridge grade II chondral ulcer located at mid-patella. Both menisci and cruciate ligaments were intact and no other loose bodies were found in the knee joint.

## Key Words:

ACL reconstruction, bioabsorbable interference screw, chondral ulcer

## INTRODUCTION

Anterior cruciate ligament (ACL) rupture is a common injury seen especially in sportsmen and women, and often results in subsequent functional instability. ACL reconstruction surgery seeks to reduce the morbidity associated with this injury, such as progression to early osteoarthritis and a higher chance of subsequent meniscal injury. ACL reconstruction is most commonly performed using either a hamstring graft or bone-patella-bone graft. Other less commonly used options include quadriceps tendon grafts or allografts. Although ACL grafts eventually incorporate into their bony tunnels, initial fixation and knee stability is provided by mechanical devices such as interference screws, an IntraFix device, or an endobutton and staples, which allow for early patient mobilisation.

Over the years, interference screws, one of the commonly used mechanical devices, has progressed from metal to biodegradable formulations for graft fixation in anterior cruciate ligament (ACL) reconstruction as the fixation strength of bioabsorbable screws have been shown to be

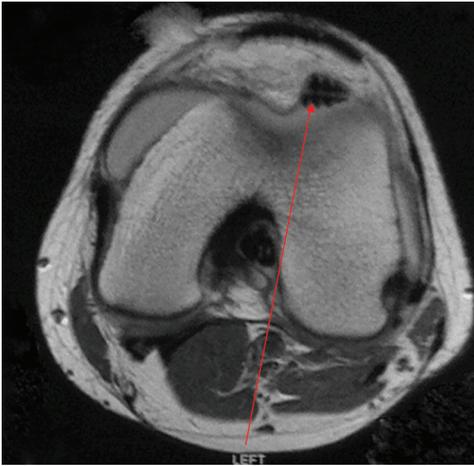
comparable to metal screws. Added advantages for the newer interference screws include lower artefact production during magnetic resonance imaging (MRI) examination, lower risks of graft laceration during screw insertion, and potentially easier revision should one be required.

The overall complication rate associated with the use of biodegradable screws is low, although some authors report pre-tibial cyst formation, mycobacterium infection, tunnel widening, aseptic effusion, screw breakage<sup>1</sup>, intra-articular screw migration<sup>2</sup> and foreign body reaction.

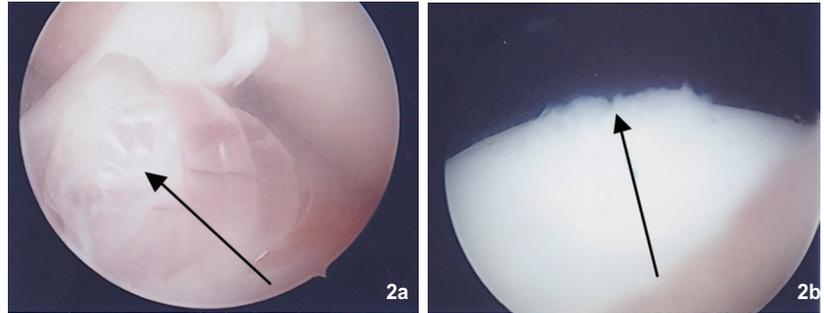
## CASE REPORT

We report the case of a 22-year-old female patient who presented with failure of a bioabsorbable tibial interference screw 6 months after left ACL reconstruction. A semitendinosus-gracilis graft was used in the reconstruction. This patient first presented with a month-long history of left knee pain after a twisting injury sustained during a netball match. Physical examination revealed positive Lachman test and MRI revealed a complete ACL tear. ACL reconstruction was carried out using a four-stranded hamstring graft. Tunnels were reamed at 7.5mm and 8mm and the graft was passed through and secured by a transfix pin for the femoral side and a 10mm by 35mm PLDLA cannulated delta tapered bio-interference screw by Arthrex on the tibial side. At arthroscopy after graft fixation, the graft had good position and tension, with the intercondylar notch clear of any protruding interference screw. Her postoperative rehabilitation and recovery was uneventful.

The patient presented to us 6 months postoperatively with knee pain and locking. She reported hearing a 'pop' sound after walking down a small step (about 5cm in height), with no history of twisting the knee. Since that incident, she had experienced a dull pain in the left knee that was worse on descending the stairs. There was an extension deficit of 5° on physical examination with negative Lachman, anterior drawer and pivot shift tests. Medial and lateral joint lines were non-tender. An MRI of the left knee performed a few



**Fig. 1:** T1 weighted MRI image of screw tip in the anterior condylar notch (red arrow points to screw tip).



**Fig. 2:** Interference screw tip measuring 11mm was found lying loose within intercondylar notch (see arrow in panel A) at arthroscopy. An Outerbridge II ulcer noted mid-patella (see arrow in panel B).

weeks later revealed a broken interference screw tip in the anterior condylar notch (Figure 1A), with ACL graft and menisci intact.

During arthroscopic removal, an 11mm broken screw tip was found lying loose within the intercondylar notch (Figure 2A), anterior to the ACL graft. The ACL graft was found to have good integration and tension, with both menisci fully intact. A 0.5cm Outerbridge grade II chondral ulcer was noted mid-patella (Figure 2B) with no other cartilaginous injury. The patient's symptoms resolved postoperatively and she recovered full range of motion in the operative knee.

## DISCUSSION

Interference screws allow direct fixation of soft-tissue grafts within the bone tunnel and their usage has gradually evolved from the use of metal screws to the current bioabsorbable screws (made of poly-L-lactic acid or poly-L-D-lactic acid) for arthroscopic anterior cruciate ligament reconstruction as the latter have been reported to have the same outcomes in terms of knee stability and function as metallic screws, with no increase in infection risk<sup>3</sup>; they also have the advantage of maintaining fixation during the healing process, gradually degrading and slowly transferring stress to the healing tissue so that no stress shielding occurs.

The earliest report of broken biodegradable tibial interference screws, to our knowledge, is 4 months, postoperatively. During any postoperative evaluation in a patient with pain or symptoms of locking, one must consider the possibility of screw breakage or intra-articular migration of the screw<sup>2</sup>, in addition to the possibility of new meniscal injuries. One must be wary of the possibility of chondral injury<sup>1</sup> resulting from this complication, noting that this can worsen if efficient investigation and treatment are not carried out at early stages of distress.

The postulated cause of tibial interference screw breakage in this case was the non-uniform degradation of the bioabsorbable screw, incomplete screw fragmentation and fragility of the screw<sup>4</sup>, which could possibly have led to fracture of the screw tip that then dislodged and migrated into the knee joint, causing mechanical symptoms and pain. However, the exact timeframe for complete resorption of bioabsorbable screws such as poly-L-lactic acid screws to take place is unknown, but it has been reported to span to 5 years<sup>5</sup>.

This case also reiterates the importance of accurate measurement of tibial tunnel length, precise placement of the ACL graft interference screw (tibial interference screw directed anterior to ACL) and thorough inspection of the intercondylar notch after tibial interference screw insertion as a protruding screw can be sheared off during joint movements, resulting in an intraarticular loose body and subsequent locking of the knee.

## REFERENCES

1. Hall MP, MD; Hergan DM, Sherman OH. Early fracture of a Bioabsorbable Tibial Interference Screw after ACL reconstruction with subsequent chondral injury. *Orthopedics* 2009; 32(3): 208.
2. Appelt A, Martin Baier. Recurrent locking of knee joint caused by intraarticular migration of bioabsorbable tibial interference screw after arthroscopic ACL reconstruction. *Knee Surg Sports Traumatol Arthosc.* 2007; 15: 378-80
3. Shen C, Jiang SD, Jiang LS, Dai LY. Bioabsorbable versus metallic interference screw fixation in anterior cruciate ligament reconstruction: a meta-analysis of randomized controlled trials. *Arthroscopy.* 2010; 26(5): 705-13.
4. Morgan CD, Gehrman RM, Jayo MJ, Johnson CS. Histologic findings with a bioabsorbable anterior cruciate ligament interference screw explant after 2.5 years in vivo. *Arthroscopy.* 2002; 18(9): 47.
5. Martinek V, Seil R, Lattermann C, Watkins SC, Fu FH. The fate of the poly-L-lactic acid interference screw after anterior cruciate ligament reconstruction. *Arthroscopy.* 2001; 17(1): 73-6.