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Technical note

A novel technique for bone debris clearance during anterior cruciate ligament reconstruction

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ABSTRACT

Background: Anterior cruciate ligament (ACL) reconstruction using hamstring graft or bone-patella-bone graft results in the accumulation of bone debris within the knee joint. This has been identified as a causative factor in post-operative complications, including knee effusion and osteophyte generation. This technical note describes a technique aiming to reduce the accumulation of bone debris within the knee joint following ACL reconstruction.

Method: Following creation of the femoral tunnel using a retrograde reamer during ACL reconstruction, the reamer is removed and the femoral tunnel guide left in place. In the attempt to reduce the presence of bone debris, a 20 ml syringe of sterile saline is then injected at high pressure through the guide and femoral tunnel from outside to in.

Results: In our experience, this additional operative step significantly reduced the accumulation of bone debris within the femoral canal during ACL reconstruction.

Conclusions: We conclude that this simple additional step can reduce bone debris left within the joint during ACL reconstruction.

1. Introduction

Anterior cruciate ligament (ACL) reconstruction using hamstring graft or bone-patella-bone graft results in the accumulation of bone debris within the knee joint. This is as a result of drilling the femoral and tibial tunnels into which the graft is placed. The clinical significance of this bone debris is uncertain, but its continued presence in the joint after surgery has been linked to the development of several post-operative complications.[1,3–5]

Imam et al. described a 5-step protocol for debridement of bone debris from the knee joint during ACL reconstruction which significantly reduced the rate of bone debris detected on post operative X-Ray from 69% to 15%.[2] Their technique applied to cases in which the femoral tunnel was created using a retrograde reamer and tibial tunnel created using an anterograde reamer. The graft was positioned in the femoral tunnel using a tightrope technique and in the tibial tunnel using an interference screw. To clear tibial debris, they described insertion of a shaver into the tibial tunnel from outside to in to clear. For clearance of femoral debris, the protocol suggested placement of a shaver at the femoral tunnel aperture using the accessory medial or standard anteromedial arthroscopic portals.

2. Technique

We have found that it is not possible to remove all debris from the retrograde reamed femoral tunnel using this technique (Fig. 1), and propose a simple additional surgical tip which we have found to be successful. Following creation of the femoral tunnel using a retrograde reaming Flipcutter® (Arthrex, Munich, Germany), the Flipcutter® is removed and the femoral tunnel guide left in place. A 20 ml syringe of sterile saline is then injected at high pressure through the guide and femoral tunnel from outside to in (Fig. 2). This dislodges debris within the femoral tunnel into the knee joint where it can then be easily removed using a shaver (Fig. 3). We have found that this reliably removes bone debris from the femoral

Abbreviations: Anterior cruciate ligament, ACL.

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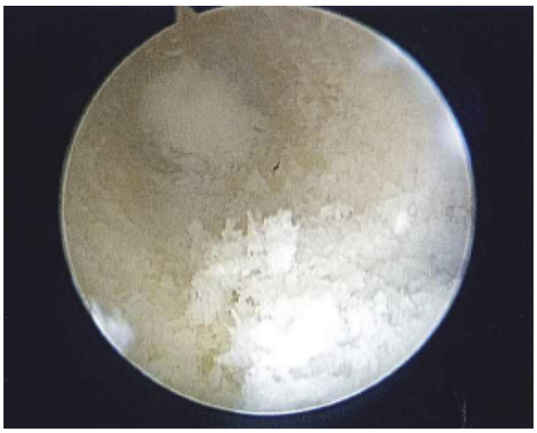

Fig. 1. Femoral tunnel before saline injection.

Fig. 2. Injection of sterile saline into femoral tunnel.

canal. Furthermore this technique can be readily modified for use in the tibial tunnel for reconstruction techniques using a retrograde reamer, and tightrope fixation for both tunnels.

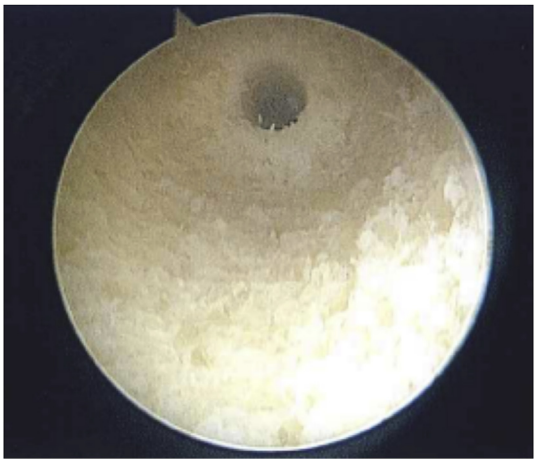

Fig. 3. Femoral tunnel after saline injection.

3. Discussion

It is important that bone debris is thoroughly cleared from the knee joint during ACL reconstruction, as the presence of bone debris within the knee has been associated with several complications. These include persistence of knee effusion post operatively[5] and the generation of osteophytes which can subsequently resulting in a falsely high diagnosis rate of osteoarthritis on X-Ray.[1] It has also been suggested that early tunnel enlargement after ACL reconstruction may be due to bone necrosis and compacted bone debris created during tunnel drilling.[4] Jackson and Shaefer proposed that cyclops lesions were the result of a fibroproliferative process from accumulated bone debris, and dramatically reduced the rate of cyclops lesions in their patients by debriding the tissue at the articular side of the tibial tunnel and avoiding anterior placement of the tunnel.[3]

Imam et al. described a protocol for clearance of bone debris resulting in reduced radiographic detection of bone debris post operatively. This technique is adequate to ensure clearance of debris if a shaver can be directly inserted into both tibial and femoral tunnels as can be done in many ACL reconstruction techniques. However we have found that the technique does not adequately clear bone debris from a tunnel created using a retrograde reamer. We have shown that this technical tip allows thorough clearance of debris from the joint in ACL reconstruction techniques using a retrograde reamer and tightrope fixation. This may further improve rates of debris detection post operatively.

Ethics

The patient was informed that data from the case would be submitted for publication, and gave their consent to images being viewed and published.

Author's contributions

DM and IS innovated and described the technique, identifying it as a surgical tip. EB was a major contributor in writing the manuscript. All authors read and approved the final manuscript.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jajs.2018.12.002.

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