Knee Squeaking in Native Joint after Anterior Cruciate Ligament Reconstruction

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Abstract
Articular squeaking sounds cause discomfort, frustration, and embarrassment for affected patients, especially in social contexts. Postsurgical native knee squeaking is rare, and only limited data are available in the literature. This study presents a case of knee squeaking after anterior cruciate ligament (ACL) reconstruction. A 22-year-old woman underwent reconstructive ACL surgery for an isolated tear in her right knee using an outside-in bone-patellar tendon-bone technique. Two months after the surgery, squeaking sound at knee flexion in both weight-bearing and non-weight-bearing conditions appeared without any further symptoms. The audible squeaking sound was a source of frustration and embarrassment for the patient. Given the unsuccessful attempts at diagnostic imaging, a diagnostic arthroscopy was performed during which a multistrand, long-chain, ultra-high molecular weight polyethylene suture was found moving freely in the joint. This suture, originally attached to the patellar bone portion of the graft, was removed during the arthroscopy. After the procedure, the patient reported having no more knee squeaking sound episodes. Friction of a nonabsorbable suture between the cartilage of a femoral condyle and a tibial plateau can produce a characteristic articular high-pitch squeaking sound. This should alert the surgeon to the possible presence of a freely moving fixation material in the knee. Diagnosis is clinical, as diagnostic imaging techniques have poor sensitivity.
Introduction

Most squeaking sounds heard after orthopedic surgeries have been reported to occur after total hip arthroplasties. Indeed, the best known squeaking sound associated with ceramic components (head and liner) in hip arthroplasty [1, 2] is usually caused by implant mispositioning. A similar phenomenon has also been observed, although less frequently, after total knee arthroplasties [3].

The audible articular squeaking sound is the result of a prosthetic material amplifying vibration resonance, bringing the vibration into a frequency range within the audible spectrum. It can occur every time the joint moves, under weight-bearing conditions exclusively or, independently of these factors, only occasionally. The articular squeaking sound can occur as an isolated symptom. However, it is most often found with other symptoms such as pain, joint effusion, and/or joint instability [4]. This postsurgical phenomenon can be a cause of discomfort, frustration as well as embarrassment for affected patients, especially in social contexts. Postsurgical squeaking in a native knee is rare, and only limited data on the subject are available in the literature [5]. This study presents a case of knee squeaking after anterior cruciate ligament (ACL) reconstruction.

Case Report/Case Presentation

A 22-year-old woman underwent reconstructive ACL surgery for an isolated tear in her right knee 6 months after a trauma. The patient had a slender silhouette, had a weight within normal range for her height, and did moderate physical activity every day. The surgical technique used for the ACL reconstruction was the outside-in bone-patellar tendon-bone (BPTB) autograft. The diameter of the graft was 11 mm both distal and proximal. We did tunnels of 12 mm in diameter at the femoral and at the tibial side. In this technique, to prepare the patellar tendon, two anchoring systems are created [1]: the bony part originating from the tibia on the patellar tendon is crossed by a metal wire [2], the bony part originating from the patella on the patellar tendon is crossed by two tissue sutures. The role of these tissue sutures was to guide the entry of the graft, in the femoral tunnel. During our patient’s BPTB, the suture wire used was made up of a multistrand, long-chain, ultra-high molecular weight polyethylene core covered by a woven polyester lining, and the ACL graft fixation was achieved with two 25 mm × 9-mm interference screws. The suture is cut as short as possible, in the soft tissues. The patient’s BPTB proceeded normally. The postoperative management of the patient included rehabilitation with free functional movements and increased loading as tolerated. There were no physical activity restrictions other than the patient was advised not to do any exercise that can put stress on the central pivot (which means no contact sports). The patient had her first postoperative follow-up appointment at 6 weeks postoperatively during which her knee showed a normal healing course. However, 3 months after the surgery, an articular squeaking sound appeared without any other symptoms (no episodes of pain, joint effusion, locking, or instability). The squeaking sound was occasional and occurred upon knee flexion, both in weight-bearing and non-weight-bearing conditions. The audible sound was a source of frustration and embarrassment for the patient. Between the follow-up appointment and the appearance of the articular squeaking sound, the patient did not suffer any trauma. The patient’s knee was re-examined at 6 months post-operatively. Physical examination of the knee showed no joint effusion, no tenderness at knee palpation, no crepitus, and full range of motion, from 0° to 140°. Nonetheless, a high pitch and loud squeaking sound could occasionally be heard in flexion. The sound was similar to that of someone stepping on an old wood floor and occurred between 60° and 110° of flexion. Control knee
radiographs (X-rays) showed the tibial and femoral tunnels to be adequately positioned, with no other anomalies. An ultrasound examination was requested to investigate whether scar alterations might explain the articular squeaking sound. In light of these investigations’ poor outcomes, the patient was referred for diagnostic knee arthroscopy. This procedure reused the same two parapatellar portals from the prior surgery. Upon surgical exploration, a 40-mm suture fragment was found on the anterior surface of the tibia, at the level of the intermeniscal ligament (shown in Fig. 1). The wire was safely removed with arthroscopic forceps. No further anomalies were identified. The graft was tense and properly positioned. There was no cyclops lesion or extension impingement. After the surgery, the patient pursued rehabilitation for 2 weeks without restrictions. After 6 weeks, at her first postoperative appointment, she reported no more knee squeaking episodes and reported having no pain.

Discussion/Conclusion

Although rare, complications reported after ACL surgery include those related to fixation devices (rupture, migration), fractures (tibial or femoral), infections, nerve and vascular injuries [6]. Cases of interference screws loosening and intra-articular migration are rare but possible, requiring screw removal [7]. Metal or absorbable interference screws are the most commonly used for bone graft fixation, in both soft tissue and BPTB grafts [8]. Recent reviews of the literature have shown no difference in postoperative complications between metallic or absorbable interference screws [9]. Other fixation devices, such as cortical buttons, can also have similar complications [10, 11]. However, no complications related to the migration of other joint fixation devices have previously been reported. The patient in our case report suffered a rare but different complication: the suture wire remained intra-articular, during the graft entry into the femoral canal, instead of going into the femoral canal. The thread used in our case is the same type as that used in the few case reports found in the literature [5].

The patient’s complaint in our case study was a squeaking sound originating from the knee after ACL reconstruction. After a thorough review of literature, only a small number of reports on squeaking in postsurgical native knees were found. For example, a study reported 2 cases of post medial patellofemoral ligament (MPFL) reconstruction squeaking sound caused by friction of a nonabsorbable suture. However, no articles on a squeaking sound after an ACL reconstruction specifically were found. It is known, mainly from previous hip squeaking studies, that a squeaking articulation is typically the result of vibrations generated by high friction between two articular components of an implant. This can be caused by component
malposition (the load being on the edges and wear of the strips), fracture of a ceramic component and ceramic debris, or loose bodies. The percentage of squeaking in ceramic-on-ceramic bearing implants varies between 0.3% and 24.6% [12].

The patient in our study did not have a magnetic resonance of her knee. Moreover, that magnetic resonance in the MPFL reconstruction case report [5] was nondiagnostic. In conclusion, friction of a nonabsorbable suture between the cartilage of a femoral condyle and a tibial plateau can produce a characteristic articular high-pitch squeaking sound. This should alert the surgeon to the possible presence of a freely moving fixation material in the knee. Diagnosis is clinical, as diagnostic imaging techniques have poor sensitivity. The knee ultrasound as well as the knee radiographs in our study case, and the magnetic resonance in the MPFL reconstruction case report, were not helpful in finding the cause of knee articular squeaking sound. A preoperative computed tomography scan was not done for our patient. Arthroscopic diagnostic and removal of the suture in our patient resulted in a definitive and complete resolution of her articular squeaking sound.

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Statement of Ethics

This study was granted an exception from requiring ethics approval. This decision was made by the Ethics Committee of the centre intégré universitaire de santé et services sociaux du Nord-de-l’île-de-Montréal on January 12, 2022. The authors state that written informed consent was obtained from the participant for publication of the details of her medical case as well as the accompanying image.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Dr. Matteo Izzo conceptualized and designed the study, coordinated and supervised the data collection, evaluated the data and variables, assessed the outcomes, drafted the initial manuscript, reviewed and revised the manuscript, and critically reviewed the manuscript for important intellectual content. Dr. Pierre Ranger conceptualized and designed the study and critically reviewed the manuscript for important intellectual content. Dr. Matteo Izzo and Dr. Pierre Ranger approved the final manuscript as submitted and agree to be accountable for all aspects of the work.
Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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