Case Report

Snapping Knee Syndrome of the Sartorius Accompanying Osteoarthritis Cured by Osteophyte Removal During Total Knee Arthroplasty

Koji Nomura, MD, PhD *, Takanori Shimizu, MD, Satoru Tamura, MD, PhD, Takashi Nishii, MD, PhD

Department of Orthopedic Surgery, Osaka General Medical Center, Osaka, Japan

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ABSTRACT

Snapping knee syndrome on the medial side is rare. Here, we report the case of a patient with snapping knee syndrome of the sartorius with knee osteoarthritis. A large osteophyte at the posteromedial femoral condyle impinged on the sartorius myotendinous junction, causing painless snapping. The patient was successfully treated with osteophyte removal and total knee arthroplasty while preserving the tendon. Hence, tendon release or resection to treat snapping syndrome is not always necessary if the underlying cause can be eliminated. Furthermore, we found that while tendon tension is important for the occurrence of snapping syndrome, the impingement site determines the occurrence of snapping pain.

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Introduction

Snapping phenomenon can occur in the shoulder, elbow, wrist, hip, ankle, and knee [1,2]. Snapping knee syndrome toward the medial side is rare because it usually occurs on the lateral side. This syndrome is also known as snapping pes syndrome and has been reported in only a few studies wherein it was usually caused by the subluxation of the gracilis or semitendinosus but not the sartorius [3,4]. Furthermore, there are no reports on snapping knee syndrome accompanying osteoarthritis (OA). Therefore, surgeons encountering such a rare disease find it challenging to treat snapping knee syndrome during total knee arthroplasty (TKA).

Here, we report the case of a patient with medial snapping knee syndrome of the sartorius and knee OA. Although the conventional manner of treating snapping knee syndrome involves the removal or release of the responsible tendon, in the present case, the syndrome was managed without treating the sartorius tendon [4-6]. We treated the snapping knee syndrome of the sartorius accompanied by OA with the careful removal of the responsible osteophytes during TKA while preserving the tendon.

Case history

A 72-year-old woman presented with bilateral OA of the knee and snapping syndrome on the medial side of the left knee. The snapping was easily noticeable during knee flexion to extension as the sartorius moves inside the knee (Video 1). Although she suffered from OA-related pain, she did not experience any snapping-related pain. During the physical examination, her left thigh muscles were observed to be slightly atrophied compared with her right thigh muscles. Swelling and redness were not detected around the left knee. The passive range of motion (ROM) was 10°-150° in the left knee, and no ligamentous instability was observed.

Preoperative radiographs showed large osteophytes on the medial side of the left femur and tibia (Fig. 1a and b). The femorotibial angle and hip-knee-ankle angle were 183° and 11°, respectively (Fig. 1c). Based on the computed tomography (CT) images, the sizes of the medial femoral and tibial osteophytes were 10 mm and 9.3 mm, respectively (Fig. 2a and b), which were approximately twice as large as those present in the right knee (femur, 4.9 mm; tibia, 4.1 mm). The 3D-CT images confirmed that...
the large femoral osteophyte was impinging upon the sartorius (Fig. 2c). Furthermore, magnetic resonance imaging (MRI) of the left knee showed a large amount of fluid around the osteophyte of the posteromedial femoral condyle. Conversely, no fluid accumulation was observed around the pes anserinus attachment of the tibia (Fig. 3).

Figure 1. Preoperative radiographs. Preoperative radiographs (a, b) indicated a large osteophyte on the medial side. (c) The femorotibial angle (FTA) and hip-knee-ankle angle (HKA) were 183° and 11°, respectively.

Figure 2. Preoperative computed tomography (CT) images. Preoperative CT images (a, b) revealed a large osteophyte (white arrow). (c) The huge femoral osteophyte impinged upon the sartorius (*) based on the 3D-CT results (black arrow).
To treat the OA-related pain in the left knee, TKA was planned, while to treat the snapping knee syndrome, sartorius tendon release was planned. Under general anesthesia, the snapping of the sartorius disappeared based on a passive ROM test. A left TKA (Vanguard PSRP; Zimmer-Biomet, Warsaw, IN) using portable navigation (iAssist Knee; Zimmer-Biomet, Warsaw, IN) was performed without intraoperative complications. During surgery, all osteophytes were resected; however, the pes anserinus, including the sartorius, was not cut or released. After the patient awoke from anesthesia, the snapping of the sartorius was observed to be ameliorated based on both active and passive ROM tests. A year after the operation, the patient could walk without a cane and experienced no knee pain. The ROM in the left knee improved to 0°-150°, with no recurrence of snapping (Video 2).

Based on the postoperative radiograph, femorotibial angle and hip-knee-ankle angle improved to 173° and 0°, respectively (Fig. 4). The femoral component was implanted parallel to the surgical epicondylar axis. The tibial component was implanted parallel to Akagi’s line without an overhang from the tibia, as observed on a CT scan. Most osteophytes were confirmed to be cleared.

Written informed consent and permission to submit the case for publication were obtained from the patient.

Discussion

Snapping knee syndrome is rare and usually occurs on the lateral side of the knee near the biceps tendon, popliteus tendon, and iliotibial band [1]. When snapping occurs on the medial side of the knee, it is reported to be caused by the gracilis or semitendinosus and not the sartorius. However, a few studies have reported the occurrence of snapping knee syndrome caused by the sartorius [7-9]. According to 1 report, a patient with a history of revision total hip arthroplasty and ipsilateral genu recurvatum showed snapping knee syndrome of the sartorius. This patient’s pain was tolerable; hence, conservative therapy was adopted without removing the tendon [7], which may be an exceptional condition. Another 2 cases of snapping knee syndrome of the sartorius were associated with medial meniscal cysts [8,9], wherein voluminous lobulated cysts 20-40 mm in size immediately below the sartorius blocked its normal movement and induced painful snapping. In both cases, the arthroscopic decompression of the cysts improved pain and ameliorated the snapping. In our case, a large osteophyte localized at the postero medial femoral condyle appeared to have caused the snapping knee syndrome of the sartorius. Although other patients with osteophytes larger than the one in our patient have been observed to have severe OA, the occurrence of snapping knee syndrome has been rarely observed. One study reported a case of snapping pes syndrome wherein a remaining osteophyte was observed to be overhung on the posterolateral side of the tibial component following a TKA, thereby causing the snapping pes syndrome of the semitendinosus and gracilis tendons [10]. The size of the overhung osteophyte was 4-5 mm, which is almost the size of the osteophytes found in the right knee in our case. The probable reason for the snapping knee syndrome to have occurred with a smaller-sized osteophyte is because of the positional relationship between the osteophyte and the tendon. Even if the osteophytes or cysts do not appear sufficiently large to cause snapping syndrome, snapping can still occur when they are proximal to the tendon attachment. Therefore, it is not the size but the positional relationship of any impingement, such as an osteophyte, a cyst, or a tumor, with the tendon, namely, tendon tension, which is critical for the occurrence of the snapping knee syndrome. According to Tensho et al., TKA changed the positional relationship between the semitendinosus tendon and osteophyte, causing snapping [10]. Thus, snapping knee syndrome is caused by the change in tendon tension rather than changes in alignment. General anesthesia eliminated the snapping phenomenon both in the abovementioned case and in our case. This implied the importance of tendon tension in relation to snapping.

Another interesting aspect of our case was that our patient experienced painless snapping. Generally, the main symptom of snapping syndrome is severe pain [1,4,6], which was not experienced by the patient in our case. Even if tendon tension is sufficiently severe to cause snapping, it is not always painful. Hence, factors other than tendon tension may be involved in the manifestation of pain in snapping. One factor could be the part of the

**Figure 3.** Preoperative magnetic resonance imaging (MRI) images. T1-weighted axial MRI confirmed osteophytes and pes anserinus around the femur (a) and tibia (b). (c) A large amount of fluid was observed around the osteophyte of the left posteromedial femoral condyle (white arrow). Conversely, no fluid was detected around the bilateral tibia (d) on the T2 short tau inversion recovery (STIR) axial MRI.
body where the tendon impinges. The study investigating the susceptibility to pain with hypertonic water reported that the tendon-bone junction (ie, enthesis) and tendon were more sensitive to pain than the muscle belly (ie, myotendinous junction) [11]. Thus, severe pain can occur if the pes anserinus impinges on the proximal tibia, whereas minor pain is induced if the distal femur is impinged. Another possible factor for the varying degrees of pain is the difference in the affected muscle. No study has reported a difference in pain sensitivity between the sartorius and the gracilis/semitendinosus. However, pain was reported when snapping due to the sartorius tendon impinging on a 20-mm medial parameniscal cyst at the proximal tibia [8,9]. Thus, the impingement site may be more important than the muscle type concerning the occurrence of snapping pain.

In our case, a large amount of fluid was observed around the osteophyte of the posteromedial femoral condyle based on MRI findings. A previous study reported similar findings for posteromedial knee friction syndrome [12]. This knee friction syndrome was reportedly characterized by edema between the posteromedial femoral condyle and the sartorius or gracilis as visualized by MRI. According to this study, the main symptom was medial joint line pain; however, the patient was often asymptomatic, and a snapping sensation was observed in only a few cases. Although posteromedial knee friction syndrome and snapping medial knee syndrome are similar in terms of symptoms and MRI findings, they show differences depending on the presence or absence of other factors, such as ganglion cysts and osteophytes. Interestingly, in many cases of posteromedial knee friction syndrome, wherein the friction site is the myotendinous junction, the patient is usually asymptomatic or has mild pain.

This study has several limitations. The snapping knee syndrome of the sartorius was diagnosed only by CT and MRI and not ultrasonography. It is undeniable that the snapping knee syndrome can be associated with the gracilis since the snapping could not be visualized timely. However, the belly size and its anatomical position in the video indicated that the snapping occurred in the sartorius rather than the gracilis. This is the first study to report a case of snapping knee syndrome of the sartorius caused by osteophytes in a patient with OA who was treated by osteophyte removal during a TKA while preserving the tendon. Based on past findings and our knowledge, removing the impingement was more important for treating the snapping syndrome than removing or releasing the responsible tendon. Although imaging tests are essential for detecting the impingement site, it can also be localized depending on the presence or absence of pain. Hence, surgeons should focus more on the location of the impingement site when treating snapping syndromes.

Summary

There are only a few reports regarding the snapping knee syndrome of the sartorius and no reports of the occurrence of OA with snapping knee syndrome. Therefore, when TKA is planned to treat OA in patients with snapping knee syndrome, surgeons may struggle with the therapeutic strategies for the same. Hence, it is necessary to clarify the cause of snapping before TKAs to ensure that the underlying issue is treated and there are no residual symptoms. This report investigated whether the impingement site can be clarified by the presence or absence of snapping pain in addition to imaging tests. Furthermore, we showed that the release or resection of the tendon responsible for pain is not always

Figure 4. Postoperative radiographs. The postoperative radiographs (a, b) showed that almost all the osteophytes were removed. (c) The femorotibial (FTA) and hip-knee-ankle (HKA) angles improved to 173° and 0°, respectively.
necessary if the underlying cause can be eliminated (eg, osteophyte removal). Hence, this report provides valuable knowledge regarding TKA for OA patients with snapping knee syndrome.

Conflicts of interest

The authors declare there are no conflicts of interest. For full disclosure statements refer to https://doi.org/10.1016/j.artd.2022.10.001.

Informed patient consent

The author(s) confirm that written informed consent has been obtained from the involved patient(s) or if appropriate from the parent, guardian, power of attorney of the involved patient(s); and, they have given approval for this information to be published in this case report (series).

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