Case Report

Snapping Phenomenon after Revisional Total Knee Arthroplasty

Abstract

The cases of revision total knee arthroplasty (TKA) are increasing. In this report, snapping phenomenon after final implantation of revision TKA has been presented. Snapping was caused by adhered iliotibial band (ITB) impinging against the lateral part of femoral component. Fractional lengthening the ITB by puncture resolved the snapping phenomenon. Surgeons should be aware of the presence of such a case which should be identified during operation to avoid secondary operations.

Keywords: *Iliotibial band, revision total knee arthroplasty, snapping*
MeSH terms: *Arthroplasty, replacement, knee, revision, surgical, ligaments*

Jae-Hyuk Yang, Jung-Ro Yoon[1]

Department of Orthopedic Surgery, Hanyang University Guri Hospital, Guri, [1]Department of Orthopedic Surgery, Veterans Health Service Medical Center, Seoul, South Korea

Introduction

Snapping syndrome is defined as a feeling of joint snapping or popping while performing an activity. Snapping primarily occurs around the hip, ankle, shoulder, elbow, and wrist and may be observed in the knee joint. Although rare, few pathologies of snapping syndrome around the medial aspect of the knee such as hamstring subluxation over the posteromedial corner of the tibia[1,2] and hamstring tendons moving back and forth over osteochondroma of the medial aspect of the proximal tibia[3] have been reported.

In cases after total knee arthroplasty (TKA), one case of snapping pes has been reported after TKA.[4] They suggested that snapping was caused by a residual bony prominence of the proximal tibia and a change in alignment after TKA. In this particular report, a case of snapping phenomenon during revision TKA has been described. Snapping was caused by adhered and tightened iliotibial band (ITB) which was relieved by gradual release of ITB by multiple puncture. Informed consent was taken from patients for publication of data concerned.

Case Report

An 86 year old man who had undergone bilateral primary TKA at another institution 10 years ago visited our outpatient clinic complaining of pain and swelling in his left knee joint. He had no history of trauma. He had medical history of hypertension which was controlled with anti-hypertensive medications. Physical examination revealed heating sense, swelling and draining sinus at anteromedial aspect of proximal tibia [Figure 1a]. Radiographs did not demonstrate any lucency [Figure 1b and c]. The aspirated joint fluid showed plenty of polymorph nuclear leukocytes and Gram-positive cocci. The culture yielded methicillin-resistant *staphylococcus aureus*.

Two-stage procedure including articulated antibiotic-impregnated cement spacer was planned [Figure 2]. Thorough debridement and irrigation were performed. The patient was maintained on an antibiotic regimen (Vancomycin 500mg IV bid) as recommended by the infectious disease consultants for 6 weeks. The eradication of infection was suggested by the return of inflammatory markers to normal. There was no patella subluxation or dislocation.

During the second stage operation (3 months after cement spacer insertion), rectus snip was performed for the extended surgical approach. Specimens of intraarticular soft tissue were taken for frozen biopsy analysis. After confirming that all specimens had <10 polymorph nuclear leukocytes/high power field, the articulating cement spacers were then removed, followed by debridement, and reimplanted using the constrained condylar knee (LCCK, Nexgen® Legacy®, Zimmer, Warsaw, IN). The tibial cut was made perpendicular to

How to cite this article: Yang JH, Yoon JR. Snapping phenomenon after revisional total knee arthroplasty. Indian J Orthop 2018;52:434-7.

Address correspondence :
Prof. Jae-Hyuk Yang, Department of Orthopedic Surgery, Hanyang University Guri Hospital, 153, Gyeongchunro, Guri, Gyeonggi-Do, 11923, South Korea.
E-mail: jaekorea@gmail.com

Videos Available on: www.ijoonline.com
Access this article online
Website: www.ijoonline.com
DOI: 10.4103/ortho.IJOrtho_314_17
Quick Response Code:

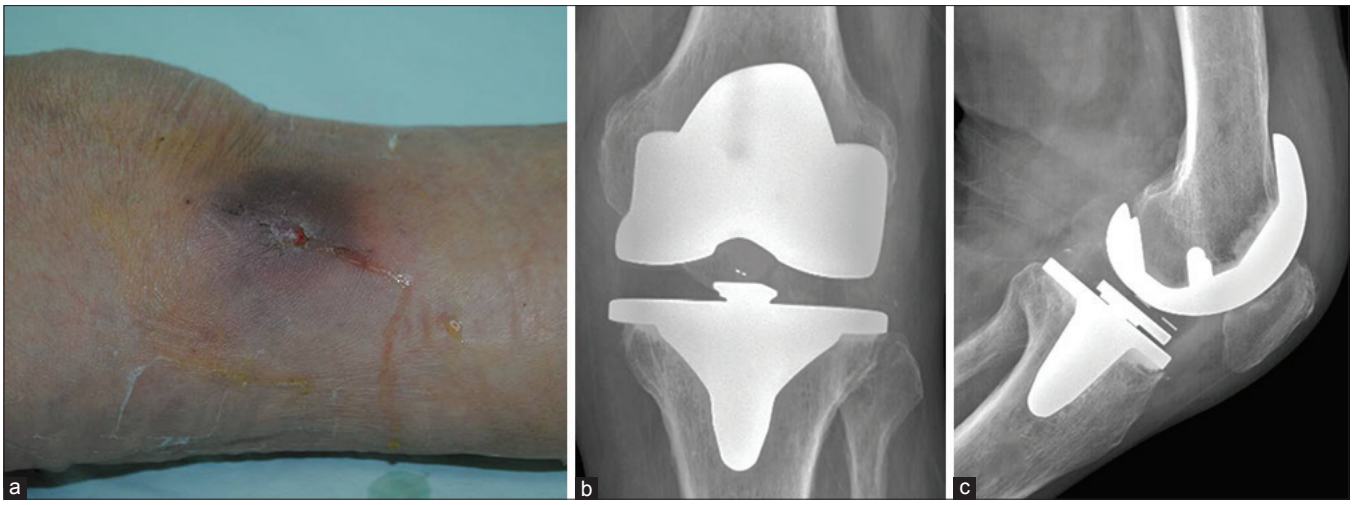

Figure 1: (a) Preoperative clinical photograph showing draining sinus at anteromedial aspect of left knee joint and radiographs; (b) anteroposterior, (c) lateral views showing implant *in situ*

the intramedullary canal of the tibia. The reconstruction was commenced by reestablishing the proximal tibia because any change in the tibial height would affect the extension and flexion symmetrically. The goal of the tibial reconstruction was to place the tibial tray within the planned distance proximal to the two anatomic landmarks; the tibia tubercle and the fibular head. It was planned to place the joint line at around "2 finger breadths proximal to the tibia tubercle" and "about 20 mm proximal to the fibular head."[5] The distal femur was resected at 6° valgus angulation to the femoral shaft, using intramedullary alignment guides. Rotational positioning of the femoral component was guided by the epicondylar axis. Trying to manage the gap mismatch and maintain the joint line, the additional 10 mm femoral block in both distal and posterior femur was placed and increased the femoral component to one size up (size E: Width of 68 mm [the femoral component width was 64 mm at primary surgery], which corresponds to 4 mm increase in antero-posterior length). Slight overhanging was visible on the lateral aspect (2 mm). For the tibia side, bone defect in proximal tibia was managed using the additional 10 mm tibia block. Finally, 14 mm tibia insert was decided. The estimated joint line elevation was about 10 mm. The stems were planned for both femoral and tibial side.

After placing the trial implants, knee range of motion (ROM) was checked for patella tracking. At this stage, snapping was palpated from the lateral aspect [Video 1]. Hypertrophied thick band-like structure was recognized at the lateral aspect of knee joint during ROM. The snapping was evident at around 20°-30° of knee flexion. This band was identified as ITB which was adhered to the distal insertion site. Even after the release of the fibrotic tissue surrounding the ITB, it was tightened and was caught during knee ROM on the femoral component which was overhanging laterally (anterior and distal aspect) by about 2 mm. To manage snapping, 8-10 times of multiple transverse puncture was made using No. 11 blade. The punctures were made at the joint line level of the ITB. After multiple attempts, snapping disappeared intraoperatively [Video 2]. Postoperatively, the patient received graduated compression stockings and intermittent pneumatic calf pumps as prophylaxis against deep vein thrombosis. Postoperative analgesics regime was given. The ROM exercise using continuous passive motion devices, an isometric/isotonic quadriceps exercise, a straight leg raising exercise and a walking exercise were initiated under the control of a physiotherapist. Varus-valgus constraint knee brace was worn during rehabilitation which was removed after 6 weeks. At 5 years after revision TKA [Figure 3], the knee ROM was 0-110 without snapping [Video 3]. There was no varus instability. There was no patella subluxation or dislocation. The final knee society score[6] was 92.

Figure 2: (a) Anteroposterior (b) lateral view of knee joint showing articulating spacer with cement beads

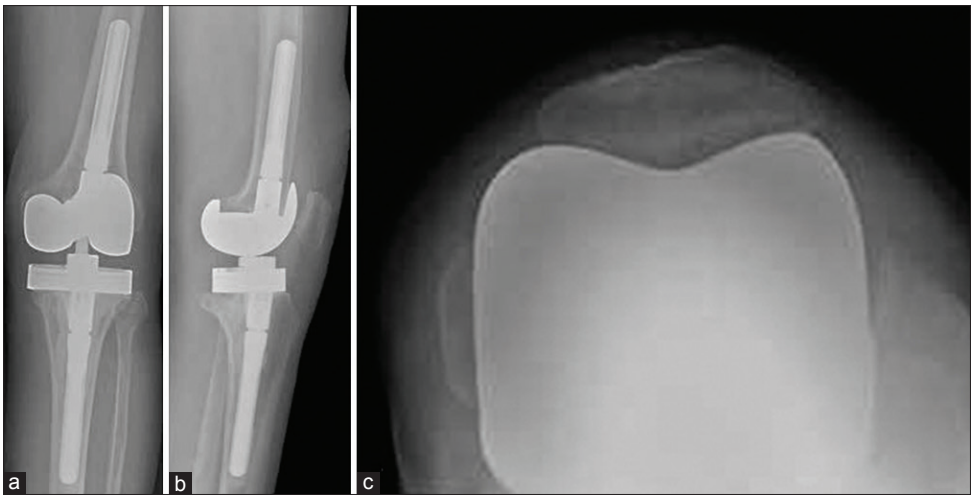

Figure 3: (a) Anteroposterior (b) lateral and (c) Merchant's view of knee joint showing postoperative radiographs after staged revision total knee arthroplasty

Discussion

The most important finding of this study is that snapping phenomenon can be found during revision TKA. Snapping can be felt during knee ROM after trial components insertion, therefore should always be checked intraoperatively. In this particular case, snapping was caused by hypertrophied adhered ITB which was caught by lateral femoral component. Multiple puncture of the ITB relieved snapping without varus instability. The satisfactory clinical outcome was achieved after 5-year postoperatively.

Complications associated with revision TKA should be noted. A frequent complication is elevation of the joint line, and it is known to be associated with anterior knee pain, patellar instability, decreased ROM, lowered extensor strength and mid-flexion instability.[7-9] Commonly in revision TKA, there is a larger flexion space after component removal compared with the extension space.[10] To obtain a balanced flexion and extension gap, the surgeon may, therefore, decide to fill up the flexion space by using a thicker insert and perform a compensatory increase of the extension space by proximalizing the femoral component, resulting in elevation of the joint line.[11] Figgie *et al*.[7] have shown that elevation of the joint line by >8 mm at primary TKA is associated with an inferior clinical result. Partington *et al*.[12] found that elevation of the joint line occurred in 79% of revision TKAs and reduced clinical score if the elevation exceeded 8 mm. The estimated joint line elevation, in this case, was 10 mm. Various possible problems caused by elevation of the joint line[8,13] after TKA are patella infera, impingement of the patellar button and accelerated wear, mid-flexion laxity, weakness of quadriceps, anterior knee pain and hyperextension instability. Snapping phenomenon, as presented in this report, should also be recognized as a possible condition after joint line elevation.

The ITB is one of the primary lateral stabilizing ligaments of the knee.[14] With the dense central insertion to the Gerdy tubercle and the deep fascia of the leg, broad band attaches to the quadriceps tendon, the patella, and the patella tendon anteriorly with thin portion attaching to the biceps femoris muscle and tendon posteriorly. These attachments work together in flexion and extension providing a complex stability to the lateral side.[14] In this particular case, as a consequence of septic condition of the knee joint and multiple knee joint operations, adhesion and fibrotic band formation may have occurred surrounding the ITB.

In some cases of TKA for valgus knees, contracture of ITB is of great significance and variety of different techniques including distal detachment, Z-plasty, or multiple puncture have been proposed for lengthening the ITB.[15] Multiple puncturing techniques have been applied to this particular case which released the tightened ITB.

Medio-lateral overhangs of femoral component are previously known to be a potential risk of soft tissue irritation and inferior clinical outcome.[16,17] Recently, Mahoney and Kinsey[16] presented the clinical observable effect of femoral component overhang. In their study, the presence of an overhang of >3 mm in at least one zone of femoral component was associated with a 90% increase in the odds of a patient reporting clinically important knee pain 2 years after surgery (age-adjusted odds ratio, 1.9). In this particular case, to overcome the gap difference, upsized femoral component (increased mediolateral length by 4 mm) was used. Slight overhanging was visible on the lateral aspect (2 mm). This factor, in addition to the tightened ITB could have contributed to snapping phenomenon. Prosthesis option as narrower version of femoral component as in primary implants (so-called the Asian version) in TKA revision system could help prevent such consequences.

In conclusion, snapping phenomenon can occur during revision TKA by multiple causes such as elevation of joint line, tightened ITB and slight overhang of the femoral

component. Surgeons should be aware of such complication during revision TKA operation and if identifiable, multiple puncture of the ITB can relieve snapping without further complications.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Karataglis D, Papadopoulos P, Fotiadou A, Christodoulou AG. Snapping knee syndrome in an athlete caused by the semitendinosus and gracilis tendons. A case report. Knee 2008;15:151-4.
2. Geeslin AG, LaPrade RF. Surgical treatment of snapping medial hamstring tendons. Knee Surg Sports Traumatol Arthrosc 2010;18:1294-6.
3. Yoong-Leong Oh J, Tan KK, Wong YS. 'Snapping' knee secondary to a tibial osteochondroma. Knee 2008;15:58-60.
4. Tensho K, Aoki T, Morioka S, Narita N, Kato H, Saito N. Snapping pes syndrome after total knee arthroplasty. Knee Surg Sports Traumatol Arthrosc 2014;22:192-4.
5. Mason M, Belisle A, Bonutti P, Kolisek FR, Malkani A, Masini M. An accurate and reproducible method for locating the joint line during a revision total knee arthroplasty. J Arthroplasty 2006;21:1147-53.
6. Insall JN, Dorr LD, Scott RD, Scott WN. Rationale of the Knee Society clinical rating system. Clin Orthop Relat Res 1989; 248:13-4.
7. Figgie HE, 3rd, Goldberg VM, Heiple KG, Moller HS, 3rd, Gordon NH. The influence of tibial-patellofemoral location on function of the knee in patients with the posterior stabilized condylar knee prosthesis. J Bone Joint Surg Am 1986;68:1035-40.
8. Laskin RS. Joint line position restoration during revision total knee replacement. Clin Orthop Relat Res 2002; 404:169-71.
9. Porteous AJ, Hassaballa MA, Newman JH. Does the joint line matter in revision total knee replacement? J Bone Joint Surg Br 2008;90:879-84.
10. Innocenti M, Matassi F, Carulli C, Soderi S, Villano M, Civinini R. Joint line position in revision total knee arthroplasty: the role of posterior femoral off-set stems. Knee 2013.
11. Bellemans J. Restoring the joint line in revision TKA: does it matter? Knee 2004;11:3-5.
12. Partington PF, Sawhney J, Rorabeck CH, Barrack RL, Moore J. Joint line restoration after revision total knee arthroplasty. Clin Orthop Relat Res 1999; 367:165-71.
13. Hofmann AA, Kurtin SM, Lyons S, Tanner AM, Bolognesi MP. Clinical and radiographic analysis of accurate restoration of the joint line in revision total knee arthroplasty. J Arthroplasty 2006;21:1154-62.
14. Whiteside LA, Roy ME. Anatomy, function, and surgical access of the iliotibial band in total knee arthroplasty. J Bone Joint Surg Am 2009;91 Suppl 6:101-6.
15. Zenz P, Huber M, Obenaus CH, Schwagerl W. Lengthening of the iliotibial band by femoral detachment and multiple puncture. A cadaver study. Arch Orthop Trauma Surg 2002;122:429-31.
16. Mahoney OM, Kinsey T. Overhang of the femoral component in total knee arthroplasty: Risk factors and clinical consequences. J Bone Joint Surg Am 2010;92:1115-21.
17. Hitt K, Shurman JR, 2nd, Greene K, McCarthy J, Moskal J, Hoeman T, *et al*. Anthropometric measurements of the human knee: Correlation to the sizing of current knee arthroplasty systems. J Bone Joint Surg Am 2003;85-A Suppl 4:115-22.