

Case report

Stress fracture of the first metatarsal after total knee arthroplasty: Two case reports using gait analysis



Kengo Harato ^{a,b,*}, Masahiro Ozaki ^b, Aiko Sakurai ^c, Yutaka Kudo ^c, Toshiro Otani ^d

^a Department of Orthopedic Surgery, Kawasaki Municipal Kawasaki Hospital, Kanagawa Prefecture, Japan

^b Department of Orthopedic Surgery, International University of Health and Welfare, Mita Hospital, Tokyo, Japan

^c Department of Physical Therapy, International University of Health and Welfare, Mita Hospital, Tokyo, Japan

^d Faculty of Nursing and Medical Care, Keio University, Tokyo, Japan

ARTICLE INFO

Article history:

Received 5 May 2012

Received in revised form 13 October 2012

Accepted 10 November 2012

Keywords:

Stress fracture

First metatarsal

Total knee arthroplasty

Gait analysis

Center of pressure

ABSTRACT

Stress fractures after total knee arthroplasty (TKA) occur mainly in patients with considerable deformity of the knee. In addition, the majority of these fractures after TKA involve the hip joint. We present two cases of stress fractures of the first metatarsal after TKA in patients with severe varus deformity. Correction of leg alignment and pain reduction obtained by TKA lead to stress fracture of the bone. Gait analysis was carried out for both cases in order to clarify the gait characteristics of the stress fracture. As a result, side-to-side differences of the distance between first metatarsal and foot center of pressure in the coronal plane were observed using gait analysis in these patients. Fortunately, conservative treatment was successful for these patients. Stress fractures should be considered when a patient who had a considerable severe deformity of the knee preoperatively complains of foot pain on the affected side. Contrary to stress fractures at the hip joint, patients with the fracture of the first metatarsal can be treated without surgery.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

Total knee arthroplasty (TKA) is one of the most successful surgeries to treat knee OA, and it has at least 90% of patients obtaining good or excellent scores at long-term follow-up [1,2]. Basically, postoperative complication rate is low. Stress fractures after TKA are a very rare complication and occur mainly in patients with considerable deformity of the knee as previously reported [3–13]. In addition, the majority of these fractures after TKA involve the hip joint. So far, unfortunately, the true mechanism of the postoperative stress fracture is still unknown, as the incidence of stress fractures after TKA is very low [2,3]. Here, we present two cases of stress fracture of the proximal first metatarsal after unilateral total knee arthroplasty without major trauma which is the first to be described in the English literature, and furthermore, gait analysis was performed to investigate the gait characteristics of the fracture.

2. Case report

2.1. Case 1

2.1.1. Patient information

A 64-year-old female (height 150 cm, weight 48 kg) came to our hospital on September, 2009, with a chief complaint of right knee

* Corresponding author at: Department of Orthopedic Surgery, Kawasaki Municipal Kawasaki Hospital, 12-1, Shinkawadouri, Kawasaki City, Kanagawa Prefecture, 210-0013, Japan. Tel.: +81 44 233 5521; fax: +81 44 245 9600.

E-mail address: kharatoh@yahoo.co.jp (K. Harato).

pain. She had been taking non-steroidal anti-inflammatory drugs without relief. She was ambulatory without any supportive tools. Any medical history was not seen. On physical examination, she had local tenderness over the medial joint line of the right knee and severe pain under weight bearing condition. Range of motion was from 15 to 120° on the right knee. Radiographs and MRI of her right knee showed osteonecrosis of medial tibia plateau, and her femorotibial angle (FTA) was 191° (Fig. 1a). Radiographs of her left knee revealed moderate osteoarthritis (Kellgren–Lawrence grade 2), and FTA was 179°. She underwent right-sided total knee arthroplasty with Balanced Knee System®, posterior stabilized design (Ortho Development, Draper, UT). There were no intraoperative complications. On postoperative day 21, she was discharged to home. Range of motion of her right knee on postoperative day 21 was from 5 to 120°. Radiographs revealed a well-fixed, well-aligned total knee arthroplasty, and postoperative FTA was 174° (Fig. 1b). Patient's bone mineral density (BMD) was 0.75 g/cm³ and the percentage of this patient's BMD divided by the BMD of young adult mean (YAM) (% of YAM) was 74.6.

On postoperative week 7, she came back to our hospital with chief complaint of first metatarsal pain during gait. On physical examination, her knee condition was perfect. However, she had local tenderness over the first metatarsal and moderate pain during gait, while she did not have any foot deformity. Radiographs revealed sclerotic change of first metatarsal base (Fig. 1c). She was treated with rest and received non-steroidal anti-inflammatory drugs (loxoprofen sodium; 60 mg) three times a day for pain reduction. Two weeks later, she was allowed to walk as tolerated with use of the arch support. At three months after

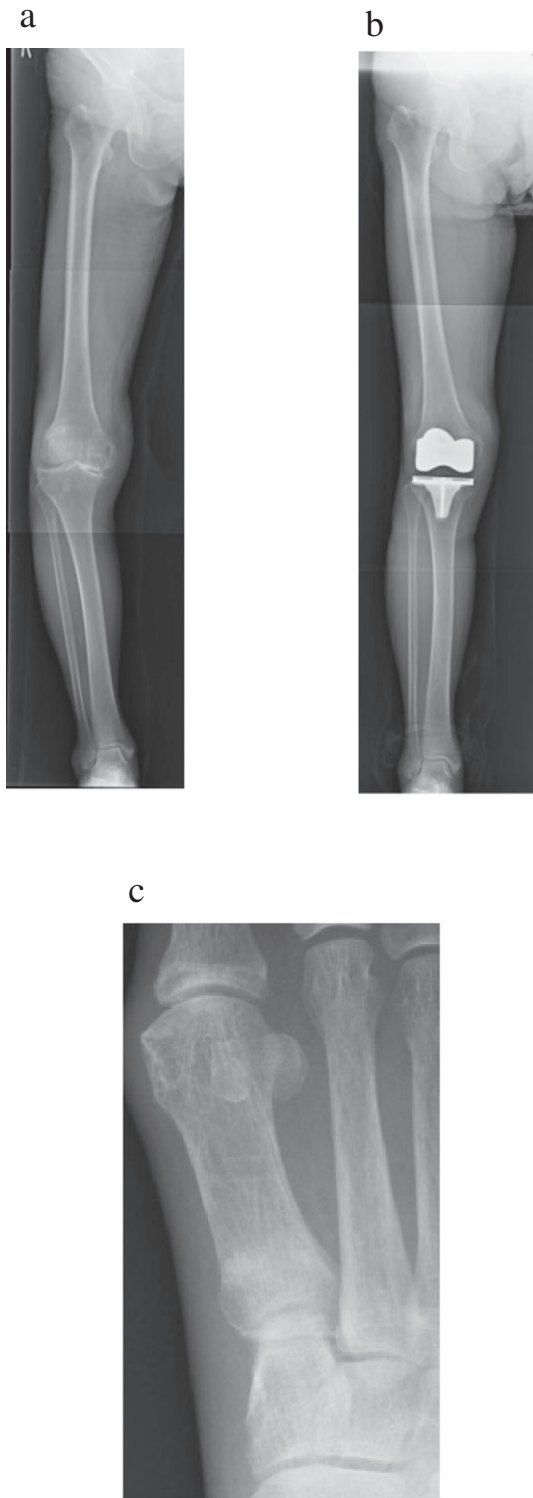


Fig. 1. Radiographic findings in Case 1. a. Preoperative FTA. b. Postoperative FTA. c. Sclerotic change was observed at the proximal first metatarsal.

the right total knee arthroplasty, she could walk without pain around her knee and foot. Sclerotic change of first metatarsal improved on radiographs at that time. At the latest follow-up time (two years after right TKA), she reports no further episodes of any pain.

2.1.2. Gait analysis

After informed consent, gait analysis was carried out, using seven retro-reflective markers, a ten camera system (Vicon MX, Vicon

Motion Systems, Oxford, UK) and six force plates (sample frequency 600 Hz, AMTI, Advanced Mechanical Technology, Watertown, MA), at 15 months postoperatively. She could walk without pain at that time. Seven markers were placed at lateral aspect of the iliac crest, greater trochanter, lateral joint line of the knee, lateral malleolus, calcaneus, medial aspect of the first metatarsal and lateral aspect of the fifth metatarsal. All methods and procedures were approved by our institution's ethics committee. She was asked to walk on a level floor about 10 m at their preferred speed. Two trials were done until clear contact with the force plate was achieved. We evaluated ground reaction force, position of the foot center of pressure (COP) and first metatarsal bone in the coronal plane during stance phase bilaterally. Thereafter, we compared the average of those trials between right and left side. As a result, the peak value and the pattern of the ground reaction force were similar between both sides. However, the distance between COP and first metatarsal bone in the coronal plane was closer on the operated (TKA) side than on the non-operated (OA) side (Fig. 2).

2.2. Case 2

2.2.1. Patient information

A 65-year-old female (height 155 cm, weight 43 kg) came to our hospital on April, 2010, with a chief complaint of right knee pain. She was ambulatory without any supportive tools. Her medical history was type 2 diabetes mellitus. On physical examination, she had local tenderness over the medial joint line of the right knee. Range of motion was from 5 to 130° on the right knee. Radiographs of her right knee showed osteonecrosis of medial tibia plateau, and FTA was 192° (Fig. 3a). Radiographs of her left knee revealed moderate osteoarthritis (Kellgren–Lawrence grade 2), and FTA was 180°. She underwent right-sided total knee arthroplasty in the same way. On postoperative day 24, she was discharged to home. Range of motion of her right knee on postoperative day 24 was from 0 to 120°.

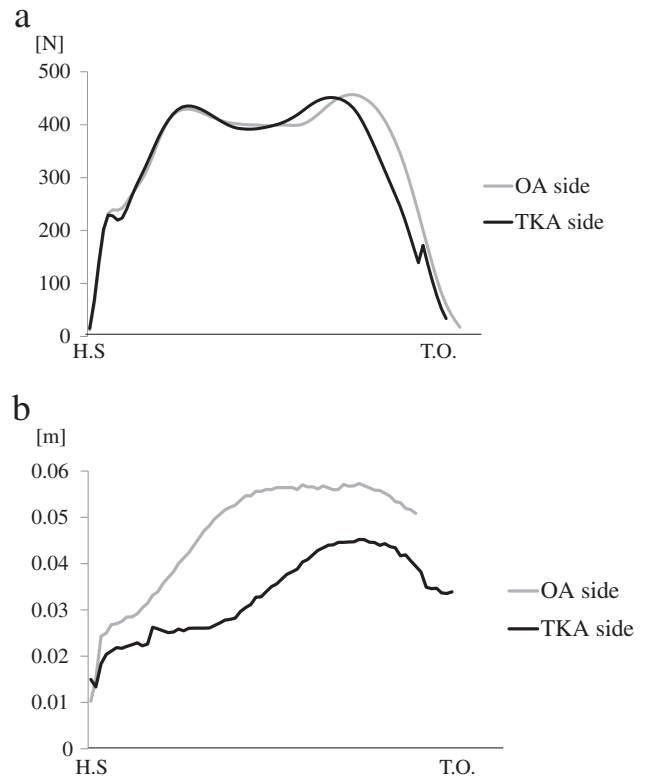


Fig. 2. Result of gait analysis in Case 1. H.S.: heel strike, T.O.: toe off. a. Ground reaction force. b. Distance between COP and first metatarsal in the coronal plane.

Download English Version:

<https://daneshyari.com/en/article/6211292>

Download Persian Version:

<https://daneshyari.com/article/6211292>

[Daneshyari.com](https://daneshyari.com)