



## Case Report

## Radiographic features of teriparatide-induced healing of femoral fractures



Youngwoo Kim \*, Chiaki Tanaka, Hiroshi Tada, Hiroshi Kanoe, Takaaki Shirai

Department of Orthopaedics, Kyoto City Hospital, 1-2 Mibu, Higashitakada-cho, Nakagyo, Kyoto, Japan

## ARTICLE INFO

## Article history:

Received 22 January 2015

Received in revised form 15 April 2015

Accepted 23 April 2015

Available online 27 June 2015

## Keywords:

Teriparatide

Femoral fracture

Callus formation

Remodeling

## ABSTRACT

Teriparatide is a drug that is used to increase bone remodeling, formation, and density for the treatment of osteoporosis. We present three cases of patients with a femoral insufficiency fracture. The patients were administered teriparatide in an attempt to treat severe osteoporosis and to enhance fracture healing. We found several radiographic features around the femoral fractures during the healing period. 1) Callus formation was found at a very early stage in the treatment. Teriparatide substantially increased the unusually abundant callus formation around the fracture site at 2 weeks. Moreover, this callus formation continued for 8 weeks and led to healing of the fracture. 2) Abundant callus formation was found circumferentially around the cortex with a 'cloud-like' appearance. 3) Remodeling of the teriparatide-induced callus formation was found to be part of the normal fracture healing process. After 1 year, normal remodeling was observed on plain radiographs. These findings indicate that teriparatide can be used as an adjuvant therapy in the management of femoral insufficiency fractures.

© 2015 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

Teriparatide is a synthetic polypeptide hormone that contains the 1–34 amino acid fragment of the human parathyroid hormone. It has been shown to increase bone remodeling, formation, and density for the treatment of osteoporosis, and it reduces the risk of vertebral and nonvertebral fractures (Neer et al., 2001; Jiang et al., 2003). Moreover, it has been shown that teriparatide also accelerates fracture healing by improving the biomechanical properties of the fracture callus, increasing bone remodeling (Bukata and Puzas, 2010; Reynolds et al., 2009). This effect has been observed in several clinical case reports and prospective randomized control studies (Aspenberg et al., 2010; Peichl et al., 2011); however, the radiographic features of teriparatide-induced fracture healing have not been precisely described. We report the radiographic features of teriparatide-induced healing of femoral insufficiency fractures, including periprosthetic fractures.

## 2. Case reports

## 2.1. Case 1

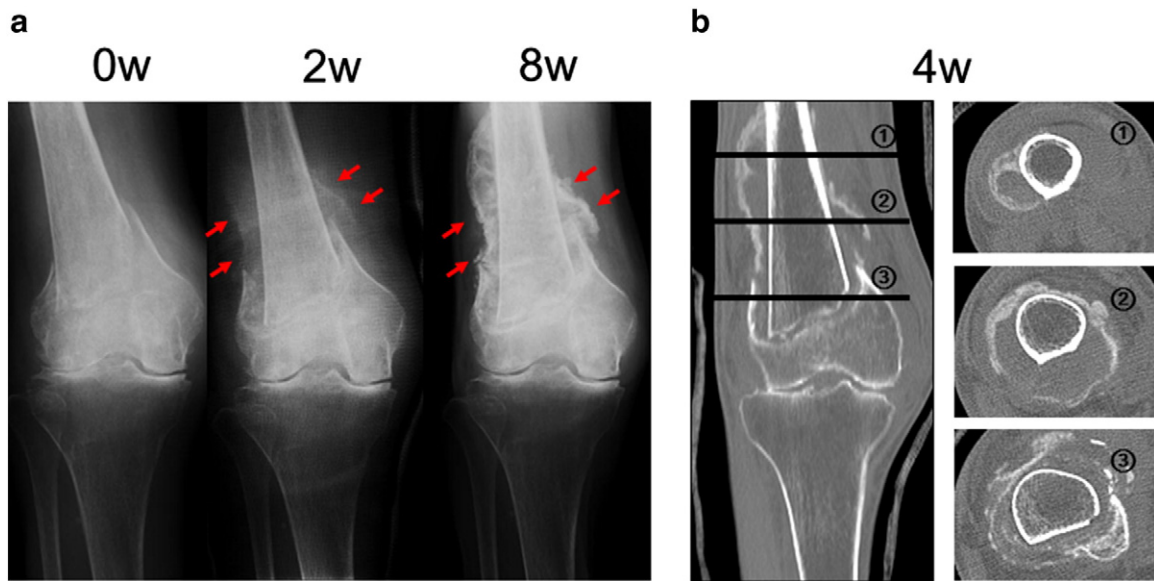
An 88-year-old woman sustained a supracondylar fracture of her right femur after falling from the bed. She had a previous history of thoracic and lumbar spine multiple compression fractures, which were treated conservatively. She had no history of treatment for osteoporosis.

\* Corresponding author at: Department of Orthopaedic Surgery, Kyoto City Hospital, 1-2, Higashitakada-cho, Mibu, Nakagyo-ku, Kyoto, 604-8845, Japan.  
E-mail address: [woochan76@hotmail.co.jp](mailto:woochan76@hotmail.co.jp) (Y. Kim).

We started to treat this fracture conservatively and initiated administration of teriparatide (20 µg subcutaneous injection daily) in an attempt to treat severe osteoporosis and to enhance fracture healing. A plain radiograph after 2 weeks showed obvious callus formation around the fracture site, and after 8 weeks, abundant 'cloud-like' bridging callus formation was observed (Fig. 1a). Callus formation with a 'cloud-like' appearance was clearly visualized around the fracture site by CT scan taken at 4 weeks (Fig. 1b). We allowed the patient to start range-of-motion exercises for the right knee joint after 5 weeks and partial weight bearing after 7 weeks. No side effects attributable to the drug were observed during treatment.

## 2.2. Case 2

A 96-year-old woman sustained a right periprosthetic femoral fracture of type B1 (according to the Vancouver classification (Duncan and Masri, 1995)) after she fell and landed her right side. She had previously undergone a right bipolar hemiarthroplasty 10 years earlier for a femoral neck fracture and had been ambulating well prior to her fall. Medical history was significant for diabetes mellitus. She had a previous fracture of left femur, which was treated with surgical treatment. She had no history of treatment for osteoporosis. This periprosthetic fracture was treated with locking compression plate fixation. After surgery, we initiated administration of teriparatide to treat severe osteoporosis and to accelerate fracture healing. Two weeks after initiation of teriparatide therapy, a plain radiograph showed obvious callus formation around the fracture site, and after 8 weeks, abundant callus formation was observed (Fig. 2a). Again, callus formation with a 'cloud-like' appearance was observed around the fracture site by CT scan taken at



**Fig. 1.** Case 1. An 88-year-old woman who sustained a supracondylar fracture of the right femur. (a) Anteroposterior radiograph of the right knee soon after the fracture, and 2 weeks and 8 weeks after initiation of teriparatide therapy. Obvious callus formation was visualized around the fracture site was observed at 2 and 8 weeks after treatment (arrow). (b) CT scan of the right knee taken 4 weeks after initiation of teriparatide therapy.

4 weeks (Fig. 2b). After 1 year, the initial callus diminished its volume and replaced by a hard bony callus. We allowed the patient to start partial weight bearing after 4 weeks. No side effects attributable to the drug were observed during treatment.

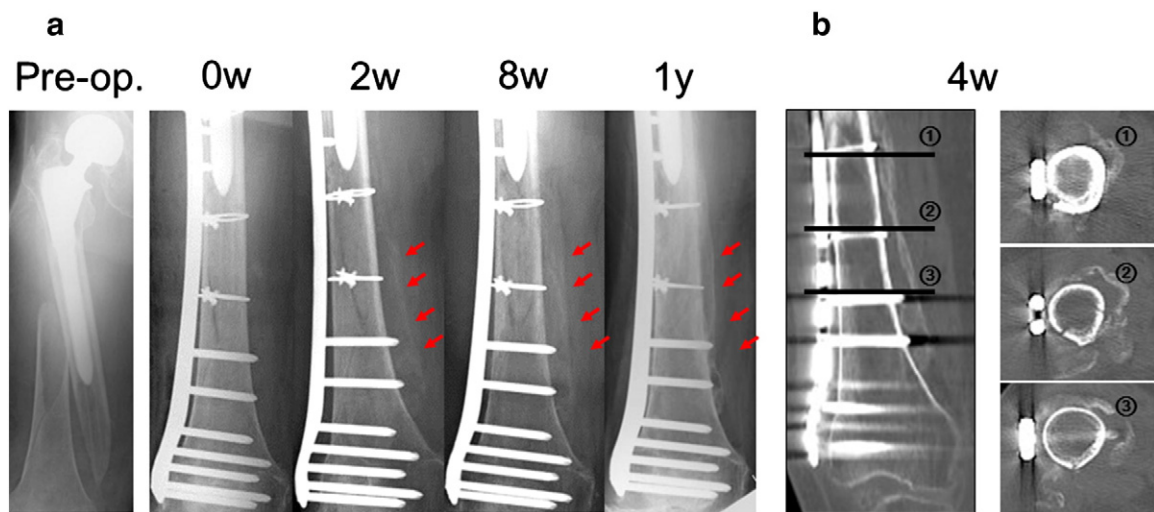
### 2.3. Case 3

A 78-year-old man sustained a periprosthetic femoral fracture of Vancouver type B2 after he fell and landed on his left side. He had previously undergone a left bipolar hemiarthroplasty 9 years earlier to treat a femoral neck fracture and had been ambulating well. He had a previous history of thoracic and lumbar spine multiple compression fractures, which were treated conservatively. He had no history of treatment for osteoporosis. The patient was treated with stem revision using a cemented long stem and cerclage wiring. After surgery, we administered teriparatide. From 2 weeks after initiation of teriparatide

therapy, a plain radiograph showed obvious callus formation, and after 8 weeks, abundant callus formation was observed. After 1 year, the initial callus diminished its volume and replaced by a hard bony callus (Fig. 3). No side effects attributable to the drug were observed during treatment.

### 3. Discussion

Our study is among the first to report on the radiographic features of teriparatide-induced healing of femoral insufficiency fractures. Most previous case reports of teriparatide-induced fracture healing dealt with the nonunion or delayed union of fractures (Chintamaneni et al., 2010; Tamai et al., 2013; Ochi et al., 2013). Aspenberg et al described a prospective, randomized, double blind study in postmenopausal women who underwent conservative treatment for distal radial fractures (Aspenberg et al., 2010). However, these authors did not precisely



**Fig. 2.** Case 2. A 96-year-old woman who sustained a periprosthetic femoral fracture of the right femur. (a) Anteroposterior radiograph of the right femur taken preoperatively, postoperatively, and 2 weeks, 8 weeks, and 1 year after initiation of teriparatide therapy. Obvious callus formation around the fracture site was observed at 2 and 8 weeks after treatment (arrow). After 1 year, remodeling of the fracture callus was complete (arrow). (b) CT scan of the right knee taken 4 weeks after initiation of teriparatide therapy.

Download English Version:

<https://daneshyari.com/en/article/2792357>

Download Persian Version:

<https://daneshyari.com/article/2792357>

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