Received: 24 November 2020 | Revised: 2 February 2021 | Accepted: 11 February 2021

DOI: 10.1002/ccr3.3987

CASE REPORT

Clinical Case Reports Open Access WILEY

Fracture of the tibia after a fibula graft for mandibular reconstruction: A rare complication, report of a case

Ru-shan Goey[1] | **Bert van Drunen**[2] | **Enrike van der Linden**[3] | **J.P. Richard van Merkesteyn**[1]

[1]Department of Oral and Maxillofacial Surgery, Leiden University Medical Centre, Leiden, The Netherlands

[2]Department of Plastic Surgery, Leiden University Medical Centre, Leiden, The Netherlands

[3]Department of Orthopedic Surgery, Leiden University Medical Centre, Leiden, The Netherlands

Correspondence
Ru-shan Goey, Department of Oral and Maxillofacial Surgery, Leiden University Medical Centre, Leiden, The Netherlands.
Emails: r.goey@lumc.nl;r.goey85@gmail.com

Abstract

A tibia fracture after a fibula harvest is a rare and serious condition; however, when treated adequately, it has a good outcome. The possibility of a fracture should be kept in mind and other pathology and/or metastasis should be ruled out.

KEYWORDS

Free fibula flap, Morbidity of the donor site, Oral cancer, Stress fracture of the tibia

1 | INTRODUCTION

An uncommon complication after a fibula graft for a mandibular reconstruction is a fracture of the tibia. This report describes a case and the treatment of a fracture of the tibia after a partial mandibulectomy and neck dissection, followed by a mandibular reconstruction with a vascularized left fibula graft.

The use of a fibula graft for mandibular reconstruction has been described since the 1990s as one of the better alternatives and is one of the most frequently used free flaps in head and neck reconstructions. [1,2] The free flaps have been described as having a success rate up to more than 95%. The fibula graft has several advantages over other reconstructions like the scapula, radius, and iliac crest. It can measure up to a length of bone (up to 25cm which is sufficient for a whole mandible) and has a consistent shape with the possibility of a double barrel, leading to good vertical dimensions of the reconstruction. Adequate vascularity and skin can also be obtained for the reconstruction. Another advantage is that the transplant can be harvested simultaneously with a second team as there is enough distance from the team operating on the head-neck. Besides these advantages, donor-site morbidity can be described as relatively low by several authors. [1-3]

However, in the literature, donor-site morbidity of a free fibula flap ranges from 2 to 57 percent. [3-6] The morbidity can be divided into early and late complications. Early complications are wound infection, dehiscence or necrosis, compartment syndrome, delayed wound healing, partial or total skin graft loss, and abscesses. Late complications are chronic pain, considerable gait abnormality, ankle instability, sensory deficit, leg weakness, and limited ankle mobility. Other morbidities could be cold intolerance and poor esthetics. However, only a small percentage of these complications (about 3%) need surgical intervention and most patients have hardly any restrictions in their daily activities. [1,3,6,7]

A less known complication after harvesting a free fibula flap can be a stress fracture of the tibia. Stress fractures

are the cause of the inability of the skeletal bone to withstand repetitive loading and are often seen in the lower extremities. They are relatively common among athletes and military recruits and are most frequently seen at the tibia, metatarsals, and the fibula. The location of the stress fracture depends on the sort and the level of activity, gender, and age. Patients complain about a sudden onset of pain, which is increased by activity and subsides with rest. Besides pain, they usually present with swelling and/or tenderness. [8,9]

The literature describes 14 cases of tibia fractures after a fibula graft excluding this report, which makes it a rare complication. Durst has described and reviewed all cases thus far. [10] The fractures occurred from 6 weeks till 16 months after the operation. The treatments ranged from conservative therapy by resting, using plaster, splint, or a splint to a tibial osteotomy by Durst. [10] In a systematic review of Ling with a total of 2534 fibula flaps, the tibia fracture was not described over a 10-year period of time. [7] Durst concluded that an estimation of the incidence would be hard because of the very low numbers. [10] The very low incidence makes it a nonstandard complication to consent, though it must be kept in mind with the surgeons if symptoms do occur. The aim of this paper is to give a description of the possible complication of a tibia fracture after harvesting a fibula graft with a case report.

2 | CASE REPORT

A 58-year-old man, known with Diabetes Mellitus type II, obesity, a knee prosthesis on the right side, hypertension, and renal dysfunction, presented with a T4N1M0 squamous cell carcinoma in the left mandible in November 2006. He underwent a partial mandibulectomy and neck dissection on the left side in January 2007, followed by a mandibular reconstruction with a vascularized left fibula graft fixated with a 2.4 AO plate with 4 screws on both sides (Figure 1). Postoperatively, the patient developed renal failure for which he was treated with hemodialysis. Afterward, he was treated postoperatively with 66 Gy of loco-regional radiotherapy.

Eight months later in September 2007, the patient heard a crack in his left leg while elevating out of a sofa and could not use his leg anymore. He had already been complaining about pain in the lower left leg for a few weeks. Radiological investigation showed a midshaft fracture of the tibia without osteolysis (Figure 2). A possibility for other pathology like a metastasis was ruled out by x-rays and a skeletal scintigraphy. No medication was found that could relate to a medication-related fracture, for example, Prednisone. Thus, he was diagnosed with a tibia stress fracture on the left side. The patient was operated and an 36cm unreamed tibia nail diameter 10 was placed (Figure 3).

Three months later in December 2007, the patient heard another crack while walking in the living room and was

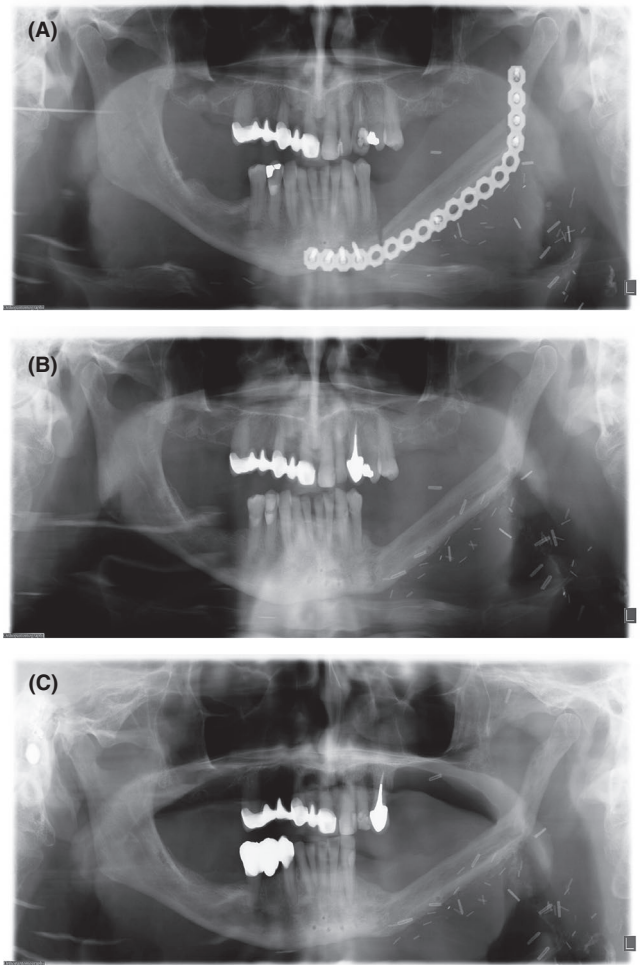

FIGURE 1 A,B and C, Radiographic follow-up with orthopantomographs showing the mandible after the partial mandibulectomy in respectively 2007, four years later in 2011 after removal of the AO plate and 10 years postoperatively in 2017

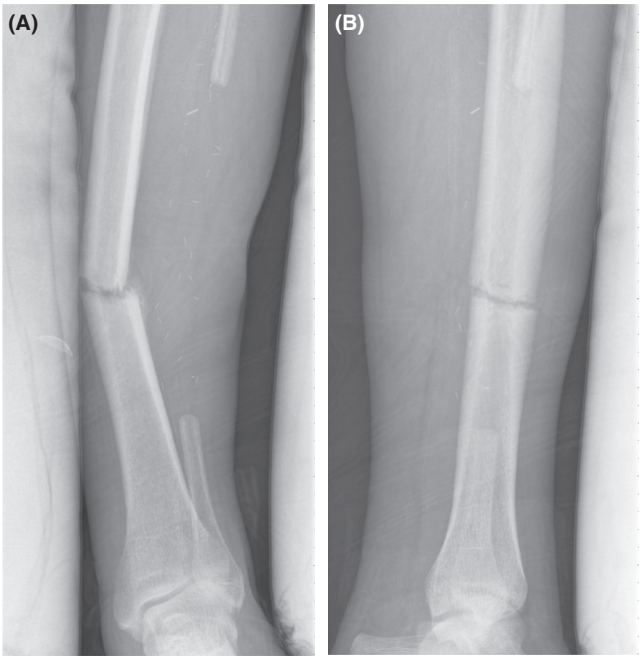

FIGURE 2 A and B, Anteroposterior and lateral radiography with a tibia fracture 8 months after a free fibula flap preoperatively

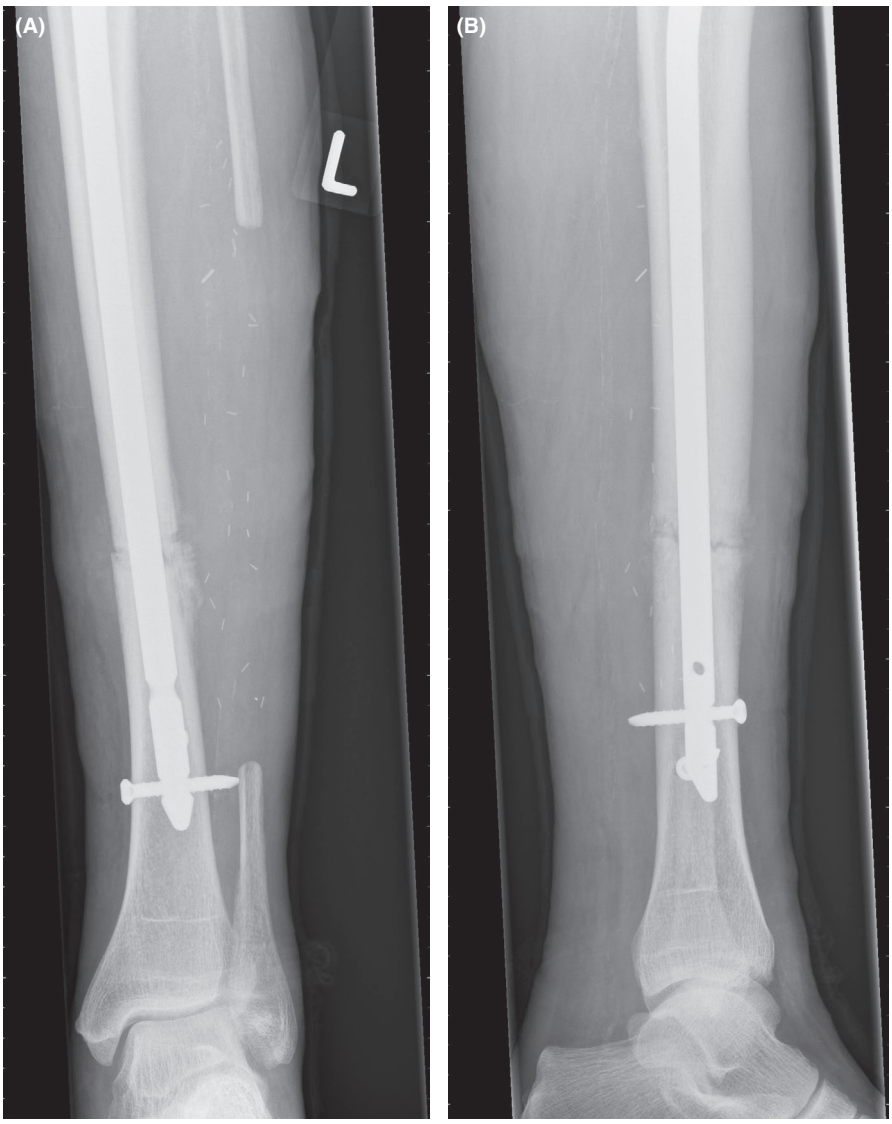

FIGURE 3 A and B, Anteroposterior and lateral radiography following a unreamed tibia nail

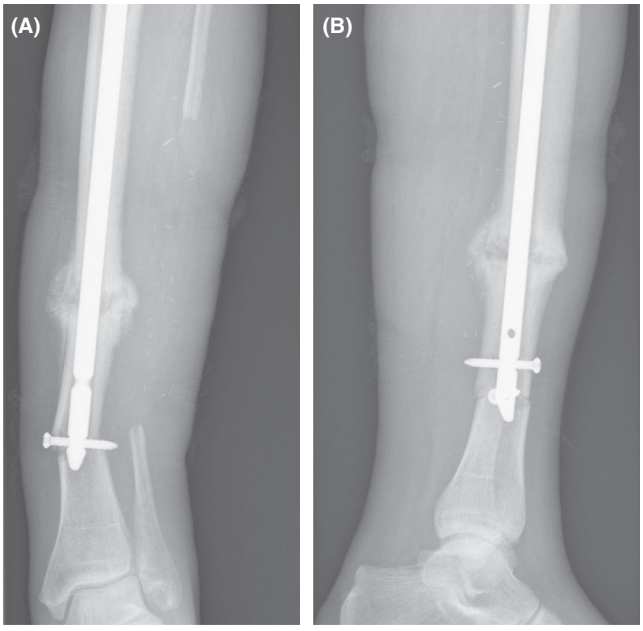

FIGURE 4 A and B, Anteroposterior and lateral radiography showing a distal fracture of the tibia at the end of the unreamed tibia nail

unable to walk after this. The x-ray showed a fracture of the distal part of the tibia at the end of the nail (Figure 4). The nail was revised to a longer one from 36 to 38cm, and the patient was treated with a cast (Figure 5).

After 3 months in March 2008 during a check-up, it appeared there was a malposition of the distal tibia (Figure 6). The distal screws were removed, and the tibia was repositioned and casted again (Figure 7). Follow-up was done till December 2008 until the patient recovered without any further complications and was able to mobilize fully.

During the follow-up from 2010 till 2016, the patient presented with a second and third primary tumor respectively of the left maxillary tuberosity and of the left lateral side of the tongue, without any concept of field of cancerization or inadequate tumor resection. Both the second and the third primary tumor were adequately treated. In May 2018, the tumor recurred on his tongue. The patient refrained from further treatment. Follow-up was done till September 2018, after which he passed away in November 2018.

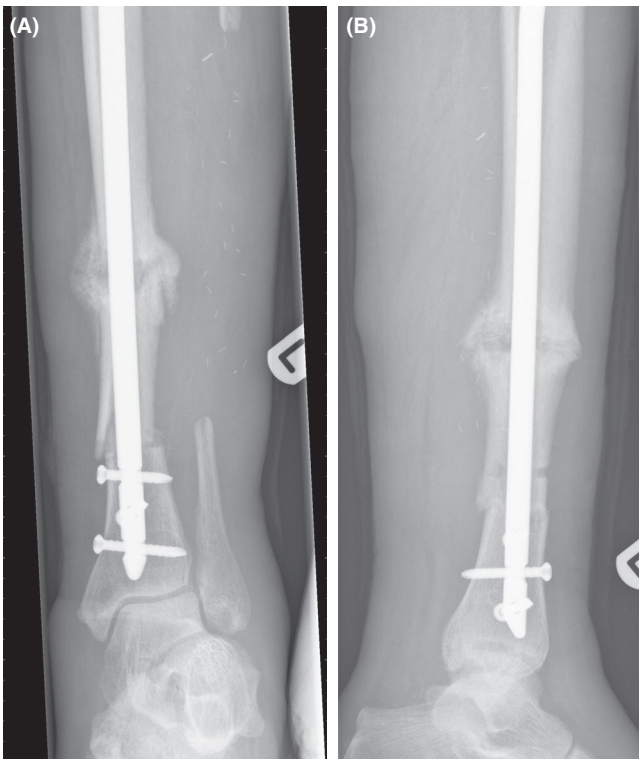

FIGURE 5 A and B, Anteroposterior and lateral radiography after revision of the unreamed tibia nail

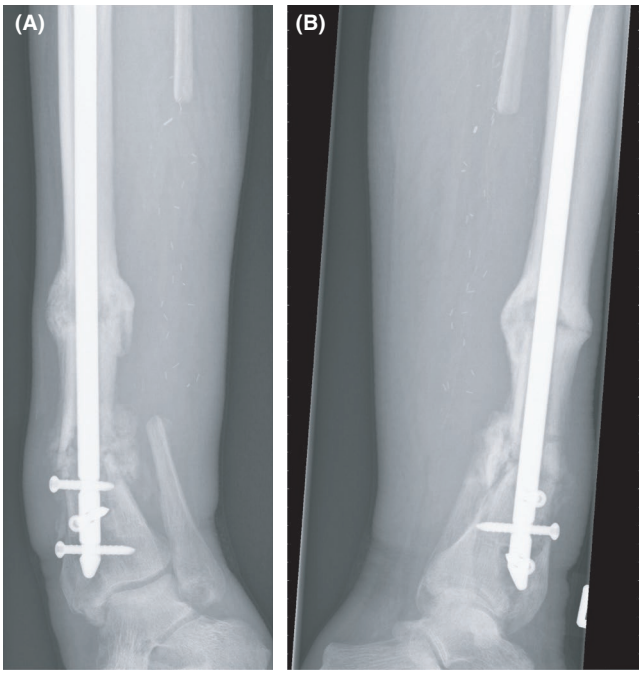

FIGURE 6 A and B, Anteroposterior and lateral radiography demonstrating the malposition of the distal tibia

3 | DISCUSSION

A tibia fracture after a fibula harvest is rare complication and has only been described 14 times in the literature. The possibility for a metastasis in this case report had to be ruled, which was done by x-rays and a skeletal scintigraphy. After ruling out the diagnosis of a metastasis or a medication-related fracture, a tibia fracture after a fibula harvest can generally considered as a stress fracture. This is regarded as a serious complication. Physicians have to keep this complication in mind if symptoms do occur like pain, swelling, or tenderness of the lower leg. It would be advised to warn patients with a very active lifestyle or that are sporty or that are overweight to inform them about the risks and this complication. Although the fibula holds many advantages, these patients might need to be informed about the other possible harvests besides the fibula, so they can make a well-informed decision. Postoperatively, patients should slowly increase their activity, as to not putting much stress immediately after the operation. A physiotherapist could also be considered in preventing a tibia stress fracture.

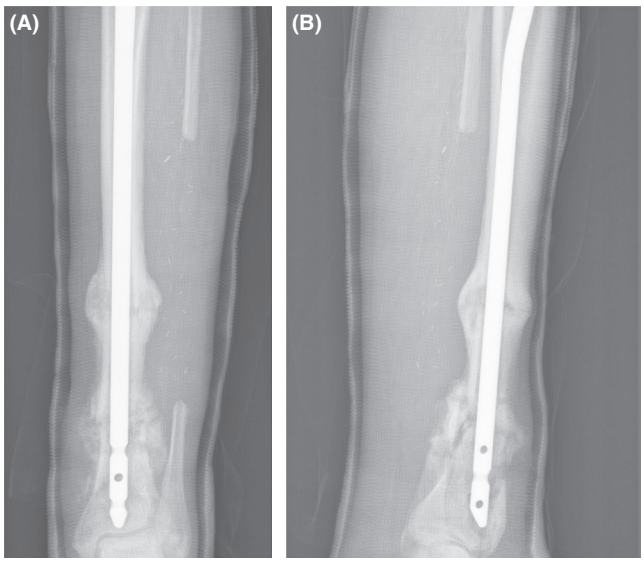

FIGURE 7 A and B, Anteroposterior and lateral radiography following repositioning and casting of the tibia

A fracture can occur immediately postoperatively till even after 16 months of the operation. Treatment is usually conservative by resting or using a plaster. In the reported case, the patient even had 2 fractures which were treated first by using a unreamed tibia nail and secondly by changing the pen and using a cast. A possible cause for the second fracture might have been the usage of a too short of a nail. After these treatments, the patient did not have any other complications in the lower leg after a follow-up of about one year, showing that treatment eventually can be successful. Another cause in this case report for the tibia fracture could have been overweight. The patient weighed preoperatively 116 kg, which resulted in a BMI of 31.5 kg/m^2. However, postoperatively the patient lost a lot of weight (more than 15%) due to discomfort during mastication/

eating and because of radiotherapy, which brought his BMI down to 28.9 kg/ m^2. He was continuously monitored by a dietician, but the overweight might have played a role with the tibia fracture in this case report.

In conclusion, a tibia fracture after a fibula harvest is a rare and serious condition; however, when treated adequately, it has a good outcome.

ACKNOWLEDGEMENT

None

CONFLICT OF INTEREST

The author and the co-author do not have any conflict of interests.

AUTHOR CONTRIBUTION

RG: wrote and edited all aspects of the manuscript. RM: was a major contributor in writing the manuscript. RM, BD, and EL: were the attending physicians and operators of this patient and provided critical review of the manuscript. All authors read and approved the final manuscript.

ETHICAL STATEMENT

The manuscript has been submitted solely to this journal and is not published, in press, or currently submitted elsewhere. Written informed consent was obtained from the deceased patient's healthcare proxy for publication of this case report and accompanying images.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author, RM, upon reasonable request.

ORCID

Ru-shan Goey https://orcid.org/0000-0001-8448-8426

REFERENCES

1. Harris BN, Bewley AF. Minimizing free flap donor-site morbidity. *Curr Opin Otolaryngol Head Neck Surg*. 2016;24(5):447-452.
2. Hidalgo DA. Fibula free flap mandibular reconstruction. *Clin Plast Surg*. 1994;21(1):25-35.
3. Li P, Fang Q, Qi J, Luo R, Sun C. Risk factors for early and late donor-site morbidity after free fibula flap harvest. *J Oral Maxillofac Surg*. 2015;73(8):1637-1640.
4. Zimmermann CE, Borner BI, Hasse A, Sieg P. Donor site morbidity after microvascular fibula transfer. *Clin Oral Invest*. 2001;5(4):214-219.
5. Shpitzer T, Neligan P, Boyd B, Gullane P, Gur E, Freeman J. Leg morbidity and function following fibular free flap harvest. *Ann Plast Surg*. 1997;38(5):460-464.
6. Momoh AO, Yu P, Skoracki RJ, Liu S, Feng L, Hanasono MM. A prospective cohort study of fibula free flap donor-site morbidity in 157 consecutive patients. *Plast Reconstr Surg*. 2011;128(3):714-720.
7. Ling XF, Peng X. What is the price to pay for a free fibula flap? A systematic review of donor-site morbidity following free fibula flap surgery. *Plast Reconstr Surg*. 2012;129(3):657-674.
8. Feldman JJ, Bowman EN, Phillips BB, Weinlein JC. Tibial Stress Fractures in Athletes. *The Orthopedic clinics of North America*. 2016;47(4):733-741.
9. Bennell KL, Brukner PD. Epidemiology and site specificity of stress fractures. *Clin Sports Med*. 1997;16(2):179-196.
10. Durst A, Clibbon J, Davis B. Distal tibial fractures are a poorly recognised complication with fibula free flaps. *Ann R Coll Surg Engl*. 2015;97(6):409-413.

How to cite this article: Goey R-S, van Drunen B, van der Linden E, van Merkesteyn JPR. Fracture of the tibia after a fibula graft for mandibular reconstruction: A rare complication, report of a case. *Clin Case Rep*. 2021;9:e03987. https://doi.org/10.1002/ccr3.3987