

## Treatment of Ankle Fracture with Delayed Union in COVID-19 Age

Peter A Nolte<sup>1\*</sup>, Rachid Rassir<sup>2</sup>, Marjolein Schager<sup>3</sup>, Inger N Sierevelt<sup>4</sup> and HJ Michiel van der Rest<sup>5</sup>

<sup>1</sup>*Spaarne Gasthuis Hoofddorp and Chair Research Department Orthopedic Surgery, Spaarne Gasthuis Academy, Hoofddorp, The Netherlands*

<sup>2</sup>*Research Department Orthopedic Surgery, Spaarne Gasthuis Academy, Hoofddorp, The Netherlands*

<sup>3</sup>*Senior Research Nurse, Research Department Orthopedic Surgery, Spaarne Gasthuis Academy, Hoofddorp, The Netherlands*

<sup>4</sup>*MSc, Clinical Epidemiologist, Research Department Orthopedic Surgery, Spaarne Gasthuis Academy Hoofddorp and Specialized Center of Orthopaedic Research Education (SCORE) Xpert Orthopedie, Amsterdam, The Netherlands*

<sup>5</sup>*MD, Radiologist, Spaarne Gasthuis, Hoofddorp, The Netherlands*

**\*Corresponding Author:** Peter A Nolte, Spaarne Gasthuis Hoofddorp and Chair Research Department Orthopedic Surgery, Spaarne Gasthuis Academy, Hoofddorp, The Netherlands.

**Received:** June 25, 2021; **Published:** August 30, 2021

### Abstract

Many countries find themselves in a lockdown situation at this time, related to the Covid-19 pandemic. As a result of this lockdown, most non-life-threatening medical treatments have been cancelled with immediate effect.

Many fractures heal without complications, even when not treated surgically. Delayed union fractures can cause significant issue for individual patients. The at-home treatment of these delayed unions, which has become underutilized, deserves renewed attention as shown through the story of the following patient.

**Keywords:** Ankle Fracture; Delayed Union; Covid19 Era; Conservative Treatment; LIPUS

### Abbreviations

SE: Supination/Exorotation; LIPUS: Low Intensity Pulsed Ultrasound; ADL: Activities in Daily Living

### Introduction

Many countries find themselves in a lockdown situation at this time, related to the Covid-19 pandemic. As a result of this lockdown, most non-life-threatening medical treatments have been cancelled with immediate effect.

### Case Report

A, the patient, a 54-year-old female, no comorbidities. In August 2019 the patient suffered a traumatic fall while mountain climbing in Italy, resulting in a Weber B/Lauge Hansen supination/exorotation (SE) ankle fracture (Figure 1). Treatment was conservative, consisting of lower extremity immobilization using a plaster cast for a period of six weeks. However, this did not resolve the complaint.



**Figure 1:** Anterior posterior X ray of the Ankle fracture Weber B or Lauge Hansen SE lesion.

### Materials and Methods

Persistent issues were diagnosed as delayed union six months post the original treatment, by CT scan (Figure 2). One of the treatments considered, consisted of removal of fibrotic tissue at the place of the fracture and fixation by plate and screws, with possible bone graft. However, treatment with LIPUS (low-intensity pulsed ultrasound) was started, using an Exogen® device which was given for at-home use to the patient (Figure 3). This device is suitable for treatment at home, recommended use is 20 minutes, once daily. The device emits a low-density ultrasound signal (30 mw) and using contact gel, a transducer is placed at the site of the fracture externally on the skin.



**Figure 2:** Coronal computed tomography scan of delayed union of fibular fracture before LIPUS treatment.



Figure 3: LIPUS device.

Concurrent with the start of the LIPUS treatment, the Covid19 lockdown in the Netherlands began. Therefore, the patient was left with the alternative treatment only, as operations were cancelled nationwide. Two months post commencing at home treatment with LIPUS the patient was as good as free of complaint and at a CT scan complete consolidation was seen (Figure 4).



Figure 4: Coronal computed tomography scan of consolidated fibular fracture after 2 months of LIPUS treatment.

## Results and Discussion

### Consideration

Union of bone is a multifaceted process. The healing of fractures considers four phases: inflammation, soft callus, hard callus, and remodeling. Most fractures heal within four months. Risks for delayed union are to be considered for both patient and fracture related issues. Increased age, malnutrition, smoking and excessive use of alcohol are some of the determining factors related to the patient. Factors related to fractures are diaphyseal fractures, hypo vascularity, and soft tissue damage can cause delayed union [1].

Patient A had no predisposing factors which would cause delayed union. Treatment of delayed union consists of conservative and operative options. Operative treatment consists of removing scar tissue, rigid fixation by osteosynthesis and bone grafting with autologous spongiosa tissue. However, these types of traumatic injury can be treated by stimulation of ossification [2]. Meta-analysis of LIPUS treatment has shown a significant acceleration of bone ossification [3]. However, negative press related to LIPUS treatment over the past few years [4] has been at the forefront. The TRUST trial [5] had a direct role in this development. In this multicenter randomized trial, the effect of LIPUS on the healing of cruris fractures was compared to intramedullary pin osteosynthesis. There was enough power to judge the result, however, the study consisted mostly of young patients without additional risk factors which would lead to delayed union, and the follow up intervals were too broad to determine results, and lastly, treatment adherence to use of the LIPUS device was remarkably low [6].

The LIPUS treatment for patients with delayed union is at risk of being lost to medicine. Between 10 and 30% of all fractures are delayed union [1]. The patient with a delayed union fracture is at risk for pain, inability for full weight-bearing on the affected leg, and therefore has an impact on both the patient's ability to return to work and participate with sports.

The conclusion can be drawn that LIPUS has no effect on regular union but does likely have an effect by non-unions [2].

Patients who suffer a delayed union 6 months post fracture, can expect a spontaneous remodeling at approximately 50% after one year [7]. If LIPUS is used during this same interval, a rate of 80% union can be reached [8]. Our patient suffered few complications but was unable to participate in sport and was limited in her daily activities (ADL). After the fracture was healed, the patient wanted to resume her IC Nurse job, even amid the COVID-19 lockdown.

Alternative conservative treatment consists of immobilization with a walker or a plaster cast. This causes a marked decrease in weight-bearing, limitation in mobility and an increased change of osteoporosis and atrophy of the muscles.

Would it be possible that the patient would be healed within two months?

Little data is known about spontaneous healing of non-unions. Spontaneous healing (often with some immobilization) is approximately 50% [7].

Are there risks or potentially dangerous effects of the LIPUS treatment?

No, given no allergy to the gel, and the price of the treatment (1500 - 2000 euro). However, the price of the LIPUS treatment pales in comparison to the price of an operation, admission to hospital and follow-up of a standard operative treatment.

Recently more attention has been directed to a non-invasive treatment option, both nationally and internationally as alternatives to the standard treatment in the COVID-19 time we find ourselves in [9].

### Conclusion

During this COVID-19 time and the resulting lockdown, when we are forced to keep in hospital interventions to a minimum, it is useful to consider a renewed look to the LIPUS treatment at home, and so to aid the patient who suffers a fracture with delayed union.

### Conflict of Interest

There are no conflicts of interest.

### Bibliography

1. Nolte PA, *et al.* "Normal and impaired fracture healing". In: Concepts and cases in nonunion treatment (Editions. R.K. Marti, P. Kloen). AO Trauma. Georg Thieme Verlag, Stuttgart, Germany (2011): 49-55.
2. Kok G., *et al.* "Bone growth stimulators for fractures; sensible or not?" *Nederlands Tijdschrift voor Geneeskunde* 164 (2020): D4122.
3. Rutten S., *et al.* "Enhancement of Bone-Healing by Low-Intensity Pulsed Ultrasound: A Systematic Review". *JBJS Reviews* 4.3 (2016): 01874474.
4. Maillette de Buy Wenniger L. "Bone growth stimulation does not work". *Nederlands Tijdschrift voor Geneeskunde* 160 (2016): C3240.
5. Busse JW., *et al.* "Re-evaluation of low intensity pulsed ultrasound in treatment of tibial fractures (TRUST): randomized clinical trial". *British Medical Journal* 355 (2016): i5351.
6. Nolte PA, *et al.* "Bone growth stimulation does work".
7. Nolte PA, *et al.* "Ultrasound in osteotomies and nonunions". In: Concepts and cases in nonunion treatment (eds. R.K. Marti, P. Kloen). AO Trauma. Georg Thieme Verlag, Stuttgart, Germany (2011): 93-96.
8. Nolte PA, *et al.* "Low-intensity pulsed ultrasound in the treatment of nonunions". *Journal of Trauma* 51.4 (2001): 693-702.
9. Phillips MR., *et al.* "Impact of COVID-19 on orthopaedic care: a call for nonoperative management". *Therapeutic Advances in Musculoskeletal Disease* 12 (2020): 1759720X20934276.

**Volume 12 Issue 9 September 2021**

**©All rights reserved by Peter A Nolte., *et al.***