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Pressure distribution underneath the foot during walking in patients with a fracture of the tibia

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Introduction

The majority of tibial fractures require surgical fixation. Non-union is a frequent complication during the healing process of long bone fractures and occurs in about 14% of tibial fractures[1]. It would be desirable to be able to predict non-union at an early stage based on gait. To study how gait parameters develop in healthy healing, we assessed the pressure distribution underneath the foot throughout the healing process.

Methods

Three patients with a tibial fracture were measured multiple times with insoles (Moticon, Munich, Germany) during the healing process after surgery (data from more visits and more patients will be available at the time of the congress). Thirteen healthy controls (HC) were measured once. The insoles contain 16 pressure sensors, which were used to calculate the pressure distribution between the feet, the forefoot and hindfoot, the lateral and medial side of the foot.

Results

In the first few weeks after surgery, the load on the injured leg was lower compared to the non-injured leg. The pressure on the forefoot was higher compared to the hindfoot and the pressure on the lateral side of the (fore)foot was higher compared to the medial side (Fig 1). These findings could be influenced by restrictions in weight bearing and by perceived pain. About three months after the surgery, when fracture stiffness has increased again[2], it seems that the loading pattern of patients with successful healing has returned to similar values as HC. The pressure distribution seems to have potential as a tool to monitor the healing process.

References

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2. Claes, L. *et* al. Fracture healing under healthy and inflammatory conditions. *Nat. Rev. Rheumatol.* **8,** 133–143 (2012).
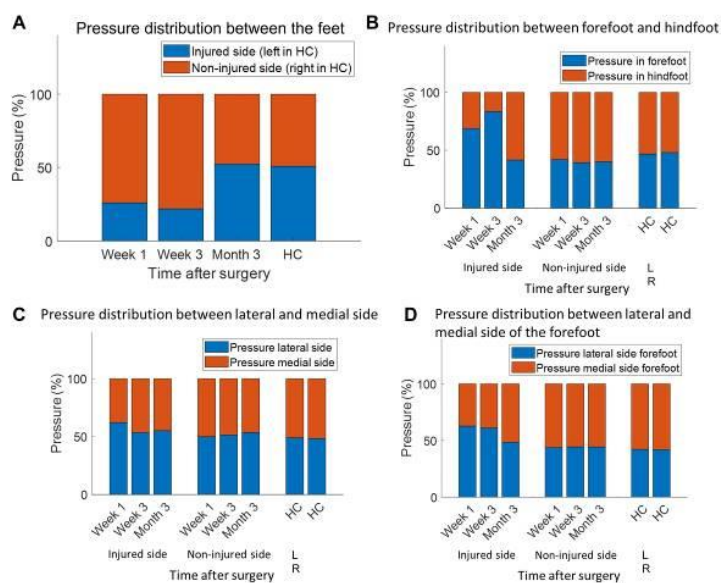
Abb. 1

Figure 1. Pressure distribution between the injured and non-injured side (A) and the pressure distribution in different parts of the foot (B-D). HC = healthy controls; L = left; R = right.