



## Original Contribution

## The value of point-of-care ultrasound for detecting nail bed injury in ED



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## ABSTRACT

**Objective:** The aim of this study is to detect the value of point-of-care ultrasound (POCUS) for diagnosing a nail bed injury and fracture of distal phalanx in patients presenting with distal finger trauma to the emergency department (ED).

**Methods:** Patients, 18 to 65 years old, presenting with a blunt trauma of distal finger and diagnosed with subungual hematoma were eligible for the study. Subungual hematoma extending over more than 50%, fracture of distal phalanx, and disruption of periungual tissue or nail integrity were accepted as the indications for nail bed inspection. All the study patients underwent POCUS to detect the existence of a distal phalanx fracture or nail bed injury. X-ray was also obtained from all the patients.

**Results:** Nail bed was visualized in 45 patients. Squeezing and crush injury were the most reported trauma mechanism in study patients (66.7%). The sensitivity and specificity of POCUS in detecting nail bed injury were 93.4% (95% CI, 80%–99%) and 100% (95% CI, 74%–100%), respectively. The sensitivity was 100% (95% CI, 79%–100%), and specificity was 98.4% (95% CI, 91%–100%) for distal phalanx fracture.

**Conclusion:** Point-of-care ultrasound is a promising tool in detecting the nail bed injury and distal phalanx fractures in patients presented with distal finger trauma. Further studies with bigger sample size are needed to reveal the diagnostic ability of POCUS before using it regularly in the ED.

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## 1. Introduction

Nails are substantial part of fingers that are improving hand function by aiding to grasp objects and tactile sensation. Besides its cosmetic significance, they are also of importance for fingertip stability and gripping function of 2 fingers [1].

Injuries to the nail are usually caused by direct forces toward the dorsum of the fingertip leading to crushing or breaking of the nail. Subungual hematoma is the collection of the blood between the nail bed and the nail secondary to the trauma over the nail. A wide range of injuries such as punctate injuries, laceration, and contusion of the nail bed may lead to collection of the blood over the nail bed. Various type of injuries of nail bed differ in treatment options where a laceration requires a repairment but a punctuate injury not.

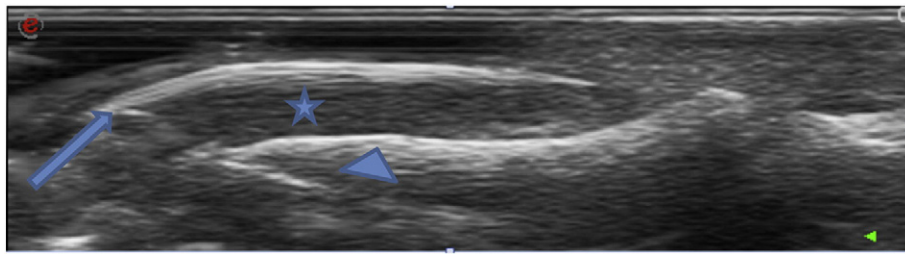
Subungual hematoma, fractures, and nail bed injuries may accompany nail injuries. Subungual hematoma, which is one of the most common nail injuries, increases the risk of pain and infection [2]. Fracture may accompany subungual hematoma in many patients [3]. Subungual hematoma that is extending over more than 50%, fracture of distal phalanx, and corruption of periungual tissue and nail are commonly related to nail bed injuries [4–6].

The current recommended treatment to repair nail bed injuries requires visual inspection of the injury [7]. Inspection of a nail bed can be achieved by lifting the nail up; however, this is an invasive procedure with the risk of complications, such as a germinal matrix injury and pain. An injury to the germinal matrix is of particular concern for repair [6,7]. Any tissue with contusion should be repaired by careful debridement, and also, grafts may be used for tissue defects. [1,8]. Nevertheless, there are conservative approaches for nail bed injuries if the nail and the surrounding nail margins are intact.

Point-of-care ultrasound (POCUS) has been gaining a wide range of indication in emergency department (ED) for detecting extremity injuries such as shoulder dislocation, tendon injuries, and metacarpal fractures [9–11]. It is an easy tool to learn with the ease of being performed bedside without radiation exposure.

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**Fig. 1.** Normal ultrasound view of nail, nail bed, and distal phalanx. Arrow indicates the nail; the star shows nail bed; and the arrow head, distal phalanx.

The aim of this study is to detect the diagnostic accuracy of POCUS for diagnosing a nail bed injury and fracture of distal phalanx in patients presented with distal finger trauma to the ED.

## 2. Materials and methods

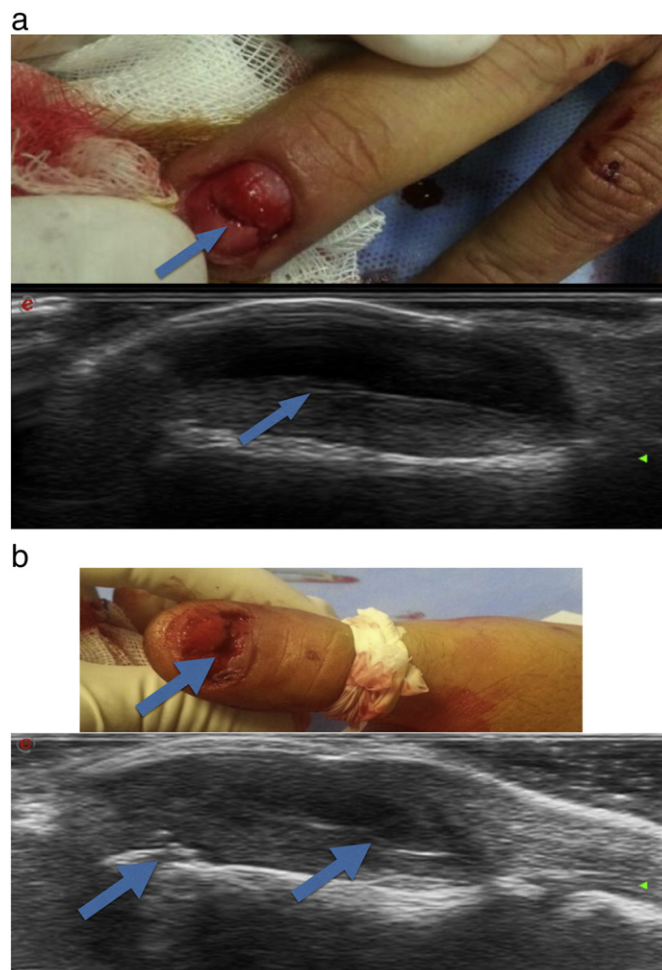
### 2.1. Study design and setting

This prospective cross-sectional pilot study with a convenience sampling was conducted between November 2013 and May 2014 in an ED of a tertiary care hospital with an annual census of 200 000 patients. Antalya Research and Training Hospital Ethical Committee approved the study, and written informed consent was obtained from all the study patients.

### 2.2. Selection of participants

Patients between 18 and 65 years old presented with blunt distal finger trauma and diagnosed with subungual hematoma were accepted as eligible for the study. Patients with subungual hematoma were screened for a hematoma extending over more than 50% of the nail bed, fracture of distal phalanx, and disruption of periungual tissue or nail integrity. If the patient had 1 of these 3 aforementioned pathologies, the patient was accepted as having an indication for a nail bed inspection and enrolled to the study. Patients refusing to give informed consent and patients with a subungual hematoma of less than 50% and no existing injury depicted above were excluded from the study.

Patients eligible for the study were initially evaluated by a resident who also recorded the injury mechanism and physical



**Fig. 2.** A, The arrow above shows the nail bed injury and arrow below displaying the ultrasound view. Hematoma formation may also be seen over the nail bed injury. B, The arrow above shows the nail bed injury of the patient. The arrows below display the phalanx fracture and nail bed injury.

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