



Case report

Electric shock sign after digital nerve injury; report of a case and review of literature

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ARTICLE INFO

Keywords:
Digital nerve
Neuroma
Outcomes
Lacerations

ABSTRACT

Introduction and importance: Digital nerve lacerations are rationally common, especially following penetrating injuries. The majority of patients suffer from numbness as the main complaint. However, electric shock pain is a rare manifestation of partial nerve injury.

Case presentation: A 65-year-old woman with partial digital nerve injury and an electric shock sign due to a 1 cm laceration on the volar side of the proximal phalanx three weeks earlier. The surgical exploration revealed a neuroma-like mass in the digital nerve; however, the continuity of the nerve was grossly intact.

Clinical discussion: Due to the superficiality of digital nerves, penetrating nerve injuries are rationally common in this area. Laceration of the digital nerve could lead to loss of sensation, clumsiness, and even loss of function. Gradually, neuroma formation would add a local pain and electric shock sign to the mentioned symptoms.

Conclusion: Electric shock sign is characteristic for partial digital nerve injury with unknown mechanism. It seems the symptoms would be progressive and more complicated with neuroma formation.

Level of evidence: V.

1. Introduction

Digital nerves are the terminal sensory branches of the upper limb nerves which run down each side of finger. Due to the superficial anatomic location of these nerves, they are susceptible to injury caused by blunt or penetrating trauma [1–3]. Detection of numbness on examination is the primary diagnostic tool, and often the only valuable preoperative assessment. Lack of sensation can significantly impair the hand function and make the finger prone to a variety of further injuries, such as burn and ulceration [1]. Numbness is the most common complaint in patients with digital nerve injury [1,4]. Local pain may be presented in less than 20% of patients due to neuroma formation [5]. Partial nerve injuries, however, can have a variable clinical presentation, including local pain in combination with numbness. Previously “electrical shock” sensation along the injured finger has been reported in a case series of partial digital nerve injuries with an electric, shock-like sensation radiating down the digit with active or passive extension, a feature unique to partial digital nerve injuries [2,6]. Herein, there is another report of electrical shock sensation with simultaneous local

painful mass in the finger after penetrating injury. This case presentation has been presented in line with the SCARE Criteria [7].

2. Case presentation

A 65-year-old woman was referred to our center with a complaint of lancinating pain in her right hand-third finger due to a 1 cm laceration on the volar side of the proximal phalanx three weeks earlier. The patient ignored it during the past three weeks because she assumed a superficial wound. The main complaints were progressive electric-like pain along with the finger and painful local swelling at the margin of the previous laceration. The patient expressed that painful local swelling has appeared in recent days. On examination, the scar of the healed wound was observed and a small fixed, firm and rubbery mass with local tenderness was detected at the ulnar side of the third finger-proximal phalanx. Although the total active motion was normal, all movements were mildly painful. The electric-like pain was provoked with active and passive extension of the injured finger. Two-point discrimination was significantly increased at the ulnar side of the finger and was recorded

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<https://doi.org/10.1016/j.ijscr.2022.107156>

Received 14 March 2022; Received in revised form 26 April 2022; Accepted 30 April 2022

Available online 3 May 2022

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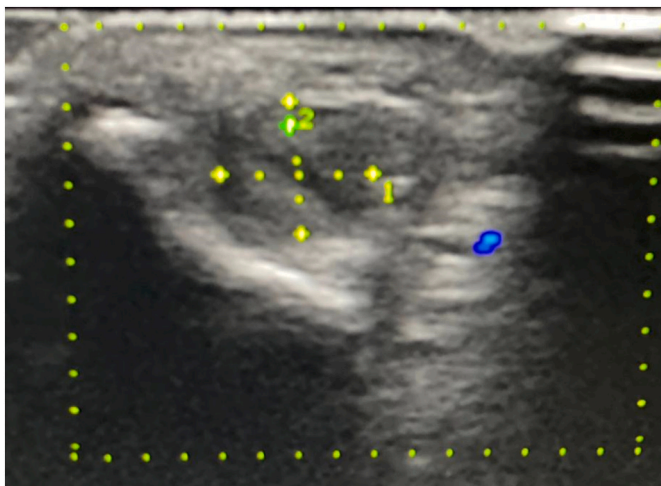


Fig. 1. Sonographic view of digital neuroma.

>15 mm. It was 4 mm at the radial side of the finger.

The injured site was assessed with sonography as for contraindication of Magnetic Resonance Imaging (MRI) due to previous artificial cardiac valve implantation. Sonography revealed a digital neuroma at the ulnar side of the finger (Fig. 1).

Therefore, the patient was a candidate for surgical treatment. Surgery was proceeded under local anesthesia and via a Brunner-type incision (Fig. 2).

The surgical exploration revealed a neuroma-like mass in the digital nerve; however, the continuity of the nerve was grossly intact (Fig. 3).

Although it seemed a partial nerve injury, the exact measurement wasn't possible due to neuroma formation. The mass was excised and sent for histopathological studies. The remained defect of the nerve was repaired with the end-to-end neurorrhaphy technique (Fig. 4).

Range of motion was restricted in a dorsal splint for three weeks, while active flexion was permitted immediately in the postoperative period. The electric shock sensation was completely recovered after surgery. The pathology report confirmed the diagnosis of neuroma (Fig. 5).

Follow-up visits were continued for six months after surgery. Range of motion of interphalangeal joints was full, 2-point discrimination was 4 mm, and the patient reported no pain and dysfunction.

3. Discussion

Due to the superficiality of digital nerves, penetrating nerve injuries are rationally common in this area [1]. Laceration of the digital nerve could lead to loss of sensation, clumsiness, and even loss of function. Gradually, neuroma formation would add a local pain to the mentioned symptoms [1]. Electric shock sensation is another manifestation of digital nerve injury which is rationally rare. As we know there are few reports of this finding in the literature [2,6]. Amaro et al. reported three cases of penetrating digital nerve injuries with electric shock signs [2]. In all the cases, the digital nerve was injured partially and was repaired acutely with the simple epineurial technique within a week after injury. The authors assumed that electric shock pain could be considered a sign of partial nerve injury. Neuroma formation was not reported in any of these patients. The final reported outcomes were satisfactory and all the three patients gained normal arch of motion and either normal or protective sensation. Electric shock sensation was eliminated in all of the patients after nerve repair. In the current case, the patient was referred to our center with a delay of three weeks after injury. She was suffered from progressive electric-like pain and a local pain was added due to neuroma formation. It seems provocation of the electric-like pain with passive and active stretching of the nerve is characteristic for partial nerve injury. However, the exact mechanism of this phenomenon is unknown. In another study, Watson et al. report a case of partial injury of the infraorbital nerve in a 14-year-old boy with a sharp, stabbing, and shock-like pain following surgical fixation of an orbital fracture [6]. The pain was continued for 14 months when surgical treatment with grafting of the sural nerve was done. It seems the electric shock sign will be continued until the proper surgical treatment and could be even more complicated due to neuroma formation. The surgical exploration revealed partial injury of digital nerve and neuroma. These findings were compatible with the pattern of the patient's pain and previous studies. Moreover, proper surgical intervention could be effective for obviation of electric shock pain. However, sensory recovery following surgical repair would be variable [8].

4. Conclusion

Electric shock sign is characteristic for partial digital nerve injury with unknown mechanism. It seems the symptoms would be progressive and more complicated with neuroma formation. Although surgical nerve repair could be effective for obviation of electric shock pain, sensory



Fig. 2. Photography of injured finger shows surgical incision line and location of neuroma.



Fig. 3. Intraoperative photography of injured finger shows continuity of digital nerve besides neuroma formation.

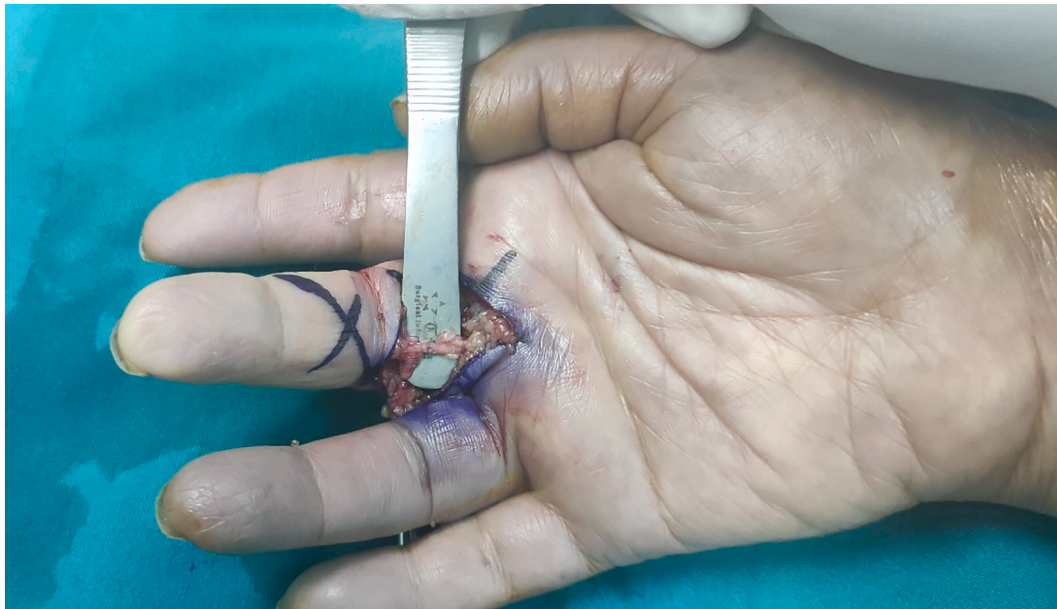


Fig. 4. Intraoperative photography shows the repaired digital nerve after excision of the digital mass.

recovery would be unpredictable.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Sources of funding

There was no funding source for this study.

Ethical approval

Ethical approval not required for emergent operations due to electrical shock sign.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

All authors made a major contribution to prepare the manuscript.

Research registration

Not relevant.

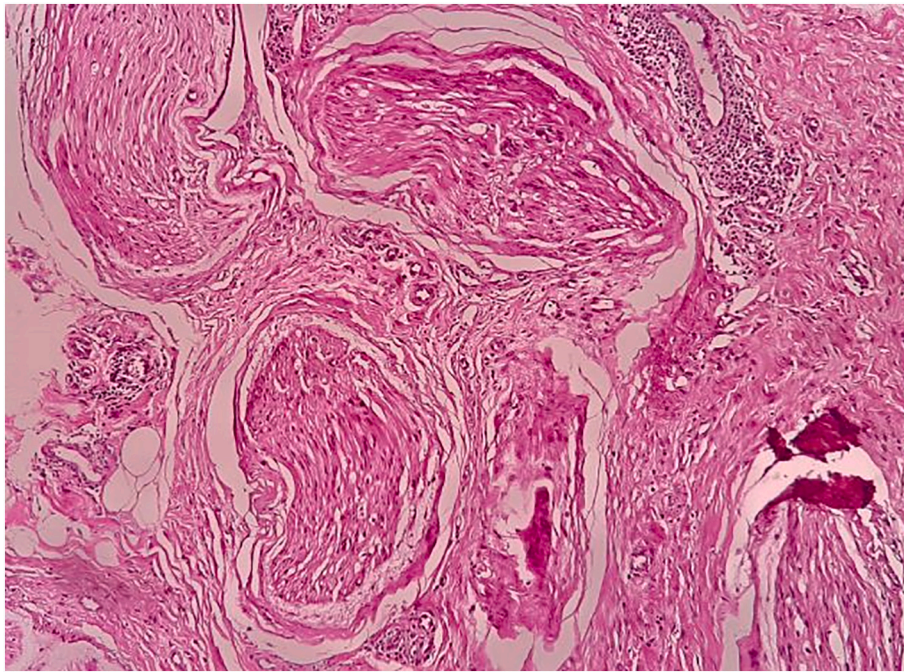


Fig. 5. Pathology shows proliferation of peripheral nerve with a haphazard distribution of nerve trunks including all the elements of a nerve (axons, Schwann cells, perineurial cells) and fibroblasts in fibrosis and scar tissues.

Guarantor

Dr. Farsad Biglari.

Research location

Shohada-e Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Declaration of competing interest

The author(s) declare no potential conflicts of interests with respect to the research, authorship, and/or publication of this article.

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