

CLINICAL IMAGE

A possible association between the resumption of agricultural activities and a venomous snakebite after Fukushima nuclear crisis

Akihiko Ozaki^{1,*}, Tetsuya Tanimoto², Claire Leppold³, Masaharu Tsubokura⁴, Shigeaki Kato⁵, Manabu Tsukada¹, Masahiro Kami⁴, and Hiromichi Ohira¹
¹Department of Surgery, Minamisoma Municipal General Hospital, Fukushima, Japan,

²Department of Internal Medicine, Jyoban Hospital of Tokiwakai Group, Fukushima, Japan, ³Department of Research, Minamisoma Municipal General Hospital, Fukushima, Japan, ⁴Division of Social Communication System for Advanced Clinical Research, Institute of Medical Science, University of Tokyo, Tokyo, Japan, and ⁵Department of Radiation Protection, Soma Central Hospital, Fukushima, Japan

*Correspondence address. Department of Surgery, Minamisoma Municipal General Hospital, 54-6 Takamicho 2 chome, Haramachi, Minamisoma, Fukushima 975-0033, Japan. Tel: +81-244-223181; Fax: +81-244-228853; E-mail: ozakiakihiko@gmail.com

A 42-year-old male was brought to our hospital in Fukushima, Japan, due to a snakebite by a Mamushi (*Gloydius blomhoffii*) on his right index finger (Fig. 1). The bite occurred while he was cutting bushes in Iitate village, a mountainous area originally famous for agriculture but contaminated by radioactive agents following Fukushima nuclear crisis in 2011. Evacuation orders led to mass evacuation and abandonment of the village. However, in the past year, there has been a slow resumption of agricultural activities.

There may be an increased risk of venomous snakebites after natural disasters, due to infrastructural damage, as well as poor knowledge regarding possibly dangerous native fauna among local residents and emergency personnel [1]. Moreover, rapid environmental changes may contribute to the destruction and invasion of snake habitats, possibly increasing their encounters with humans [2]. On the other hand, after nuclear disasters, damage to infrastructure in surrounding areas is usually less than would occur after natural disasters [3]. Additionally, nuclear disasters can lead to evacuation of local residents [3, 4], lessening the chance of human–snake interactions. Therefore, immediate risk of snakebites after nuclear disasters may be lower than that after natural disasters. However, little is



Figure 1: Ecchymosis exists around the bite site at the distal interphalangeal joint of his right index finger, with swelling around his right hand and forearm.

known about long-term risk of snakebites after nuclear disasters.

The present venomous snakebite may be associated with the resumption of agriculture, 3 years after the disaster. Post-evacuation,

Received: November 21, 2015. Revised: January 5, 2016. Accepted: January 12, 2016

© The Author 2016. Published by Oxford University Press.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

Mamushi habitats may have expanded due to increased amounts of fallen debris on farming fields, where they prefer to live [5]. While a range of physiological, developmental, genetic, morphological and behavioral consequences of radiation exposure have been investigated in flora and fauna in Fukushima [6], there is little information on potential effects on reptiles, calling for further research. We should be aware of an increased risk of snakebites in previously abandoned areas of Fukushima, and other long-deserted post-disaster areas.

CONFLICT OF INTEREST STATEMENT

None declared.

FUNDING

None.

ETHICAL APPROVAL

The study was reviewed and approved by the Minamisoma Municipal General Hospital Institutional Review Board.

CONSENT

The study participant provided informed written consent prior to the submission.

GUARANTOR

A.O. is a guarantor of the study.

REFERENCES

1. Wozniak EJ, Wisser J, Schwartz M. Venomous adversaries: a reference to snake identification, field safety, and bite-victim first aid for disaster-response personnel deploying into the hurricane-prone regions of North America. *Wilderness Environ Med* 2006;**17**:246–66.
2. Chaves LF, Chuang TW, Sasa M, Gutiérrez JM. Snakebites are associated with poverty, weather fluctuations, and El Niño. *Sci Adv* 2015;**1**:e1500249.
3. Morita T, Tanimoto T, Hori A, Kanazawa Y. Alcohol use disorder due to social isolation after a nuclear disaster in Fukushima. *BMJ Case Rep*; doi:10.1136/bcr-2015-209971.
4. Nomura T, Gilmour S, Tsubokura M, Yoneoka D, Sugimoto A, Oikawa T, et al. Mortality risk amongst nursing home residents evacuated after the Fukushima nuclear accident: a retrospective cohort study. *PLoS One* 2013;**8**:e60192.
5. Hifumi T, Sakai A, Kondo Y, Yamamoto A, Morine N, Ato M, et al. Venomous snake bites: clinical diagnosis and treatment. *J Intensive Care* 2015;**3**:16.
6. Aliyu AS, Evangelidou N, Mousseau TA, Wu J, Ramli AT. An overview of current knowledge concerning the health and environmental consequences of the Fukushima Daiichi Nuclear Power Plant (FDNPP) accident. *Environ Int* 2015;**85**: 213–28.