



ISSN: 2091-2749 (Print)  
2091-2757 (Online)

#### Correspondence

Dr. Sumana Bajracharya,  
Lecturer, Department of  
General Practice and  
Emergency Medicine, Patan  
Academy of Health Sciences,  
Nepal

Email:

sumanabajracharya@pahs.edu.np

#### Peer Reviewers

Dr. Nabees MS Pradhan  
Patan Academy of Health  
Sciences

Dr. Jay N Shah  
Patan Academy of Health  
Sciences

## Keraunoparalysis, a neurological manifestation after lightning strike: a case Report

Sumana Bajracharya,<sup>1</sup>Ashis Shrestha,<sup>1</sup>Sajan Shrestha, <sup>2</sup>Sitaram Shrestha, <sup>3</sup>Samita Acharya,<sup>4</sup>Yagya Raj Pokharel, <sup>1</sup>Yogendra Amatya, <sup>1</sup>Srijana Gauchan, <sup>1</sup>Rose House<sup>5</sup>

<sup>1</sup>Lecturer, <sup>2</sup>Medical Officer, <sup>3</sup> Professor, <sup>4</sup> Associate Professor, Department of General Practice and Emergency Medicine, Patan Academy of Health Sciences, Lalitpur, Nepal; <sup>5</sup>Consultant, Emergency Pediatrician, Indiana University, USA

### ABSTRACT

Lightening strike can have wide range of physical and neuropsychiatric symptoms. Burn, extensive tissue damages, cardiac rhythm disturbances and secondary injuries are well described and observed. The patient may also go through transient neurological symptoms, which may go unseen in some cases while in some cases it may get extra attention and series of investigations. Keraunoparalysis is one of the immediate neurological complications encountered after lightning strike. This manifests as transient self-limiting symptoms.

**Keywords:** keraunaparalysis, lightning, neurological symptoms

## INTRODUCTIONS

Lightning is one of the deadliest natural disasters and Nepal is no exception. It could be due to climate change or increasing population.<sup>1</sup> Maximum number of human deaths due to lightning was recorded in year 2013.**Error! Bookmark not defined.** Lightning strikes can lead to multiorgan injuries like cutaneous, cardiac, renal and neuropsychological complications.<sup>2</sup> Lightning inflicts serious injuries due to high amperage of the electrical current produced.<sup>2</sup> It can cause various neurological complications which can range from immediate and transient symptoms to permanent and delayed syndromes. Keraunoparalysis is one of the immediate neurological complications encountered after lightning strike. Secondary brain injuries are also possible.<sup>3</sup> Here we report a clinical case of lightning strike victim who presented in the emergency department of Patan hospital with soft tissue injury and transient neurological complications.

## CASE REPORT

A 35 years female from Makwanpur district of Nepal, presented to the emergency department following lightning strike. The primary lightning strike was at her house and she was at the porch area of her house. She was unresponsive for around two hours. On regaining her consciousness, she had no memories of the events. She had pain and swelling around her left eye and weakness in all her four limbs. On presentation to the emergency, she was conscious but confused and had delayed verbal response. Her left eye was swollen and tender. But her vision and eye movements were normal. Her pulse was 84 beats per minute, regular and good volume; blood pressure was 110/80mmhg; Temperature 97 degrees Fahrenheit and bed side blood sugar was 110mg/dl. She was confused with impairment of short term memory; however, her long-term memory was intact. Speech and sensory examinations were normal. Motor examination showed muscle power of 4/5 in bilateral upper limbs and 3/5 in bilateral lower limbs. Planters

were mute on both side, deep tendon reflexes were intact and muscle tone was normal. Cranial nerves were intact. Her total count was  $15 \times 10^3/\mu\text{L}$ , creatinine phosphokinase 205 U/L, blood sugar 128 mg/dl, creatinine 0.4 mg/dl, potassium 3.6 mMol/L and sodium 135 mM/L. Her ECG was normal with sinus rhythm. Urine routine examination showed white blood cells 6-8, red blood cells 4-6, albumin and sugar were nil.

She was admitted to the general practice unit. She was managed conservatively with continuous reassessment of vitals and neurological symptoms. Her power of upper and lower limbs was 4/5 within twelve hours of presentation. She started showing improvement in her memory after 24 hours of presentation. She was managed conservatively. On third day of admission, she had fully recovered from her motor weakness and amnesia. Her soft tissue injury also recovered. So, she was discharged from hospital on fourth day.

## DISCUSSIONS

Lighting is a climate related, highly localized natural phenomenon where electrical charges generated due to cloud /air movement or dust storms and volcanic eruptions or other turbulent atmospheric conditions get discharged to earth through a conductive path with disastrous, direct and indirect effect.<sup>3</sup> Lighting can have multi system involvement, amongst which, keraunoparalysis is also one .

Keraunoparalysis is a temporary paralysis of the limbs which is pathognomonic of lightning.<sup>4</sup> It is a term referred to neurologic and muscular stunning following lightning strike. It might cause sudden cardiorespiratory arrest with successful resuscitation. In keraunoparalysis the muscle weakness resolves within an hours.<sup>5</sup> There is more of lower limb weakness than upper limb.<sup>3</sup> Similar findings was observed in our case as well, where muscle power was 4/5 in upper limb and 3/5 in lower limb. The weakness resolved within first 12 hours. Such patient needs observations; advanced radiological

investigations like CT and MRI should be done in selected cases only.<sup>3,6</sup> Paralysis, sensory loss and circulation disturbances usually disappear within 12-24 hours; majority within one hour. Some authors believe that the flaccid paralysis and sensory disturbances possibly due to impaired peripheral circulation since this return is seen directly related to restoration of peripheral limb circulation.<sup>6</sup>

Cherington et al. in 1995 reported 13 patients with neurological complications following lightning injuries over ten years. All patients eventually recovered.<sup>7</sup>

Mohammad Gouse et al. reported a case of 75 years male with inability to move both lower limbs following a lightning strike. His MRI scan was normal. His power gradually improved by 24 hours and later he completely recovered.<sup>8</sup>

Ashis Kumar et al. in 2012 reported a case of 50-year-old male with history of lightning strike while he was standing under a tree. He was unconscious for 15 minutes. When he regained his consciousness, he was unable to move both his lower limbs. His power gradually recovered to grade four by the third day of hospital admission, and eventually he recovered. His brain MRI was normal. So, they concluded that if the possible cause of weakness is Lightning then rushing to brain scans may not be necessary unless you are suspicious about secondary brain injuries.<sup>9</sup>

Immediate and transient symptoms include brief loss of consciousness, amnesia, confusion, headache, and paresthesia. It may be accompanied by sensory loss, pallor, vasoconstriction and hypertension.<sup>6</sup> It usually resolves by itself within hours.<sup>3,6</sup> Our patient also had brief loss of consciousness with loss of short-term memory. Motor power started to recover first, followed by memory. Full recovery of muscle power took longer than memory.

Mainstay of treatment is close observation and conservative management.<sup>3,6,7</sup> Secondary injuries should be carefully excluded by detail clinical examinations. Our patient had injury to

her jaw as she fell down on her chin. There was no obvious fracture; however, this was patient's major concern during admission. Pain was well controlled with analgesia.

## CONCLUSIONS

A 35 years female had Keraunoparalysis, the transient neurological syndrome after lightning strike. She recovered on conservative management and was discharged home in four days. Brain imaging was not required as there was no suspected secondary brain injury.

## REFERENCES

1. Nepal disaster report 2015: Government of Nepal, Ministry of Home Affairs. <http://www.drrportal.gov.np/uploads/document/329.pdf>
2. Marlene Tadler, Eva Ruegg, Marc Niquille, Baris Gencer, Oliver PGautshi, Brigitte Pittet-Cuenod and Ali Modrarressi. Multi-organ injuries due to a lightning strikes: a case report highlighting the importance of a multi-disciplinary approach. *Case reports in plastic and hand surgery*. 2017;4:1-4. DOI: 10.1080/23320885.2016.1275646
3. Jera Kruja, Altin Kuqo, Seria Grabova, Arben Rroji, Gjentian Vyshka. Right hemispheric leukoencephalopathy as an incidental finding following lightning strike. *Open Access Macedonian Journal of Medical Sciences*. 2016 Dec;4(4):692-4. DOI: 10.3889/oamjms.2016.141
4. Faisal T Illiyas, Keshav Shibu K Mani, A P Pradeep Kumar. Lightning Risk in India: Challenges in Disaster Compensation. *Economics and Political weekly*. 2014 June;49(23):23-7. Available from: [http://www.academia.edu/7473608/Lightning\\_Risk\\_in\\_India\\_Challenges\\_in\\_Disaster\\_Compensation](http://www.academia.edu/7473608/Lightning_Risk_in_India_Challenges_in_Disaster_Compensation) <http://www.epw.in/journal/2014/23/commentary/lightning-risk-india.html>

5. Whitcomb D, Martinez JA, Daberkow D. Lightning injuries. South Med J. 2002 Nov;95(11):1331-4. <https://sma.org/southern-medical-journal/article/lightning-injuries-2/>
6. Seyed Hesam Rahmani, Ghomareza Faridaalae. Acute Transient Hemiparesis induced by Lightning strike. The American Journal of Emergency Medicine. 2015;33(7):984.e1-3. DOI: <http://dx.doi.org/10.1016/j.ajem.2014.12.031>
7. Cherington M, Yarnell PR, London SF. Neurologic complications of Lightning injuries. West J Med. 1995;162(5):413-7. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1022790/>
8. Mohamad Gouse, Justin Arockiaraj, Ronald Khanapur, Gangadaran Srinivasan. Transient paraplegia in an elderly due to lightning strike: an unusual cause. Journal of Emergency Trauma Shock. 2015 Oct-Dec;8(4):238-9. DOI: [10.4103/0974-2700.166743](https://doi.org/10.4103/0974-2700.166743)
9. Ashis Kumar, Vinjamari Srinivas, Barada P. Sahu. Keraunoparalysis: what a neurosurgeon should know about it? J Craniovertebr Junction spine. 2012;3(1):3-6. DOI: [10.4103/0974-8237.110116](https://doi.org/10.4103/0974-8237.110116)