

Treatment of Herpes Zoster-Associated Neurological Complications with High-Dose Intravenous Ascorbic Acid: Two Case Reports

Raushan Auezova¹, Assem Adirakhan¹, Kamila Mussabekova¹, Nurgul Aldiyarova², Serik Akshulakov¹, Lizette Auezova³

¹Department of Pathology of the Central Nervous System, National Center for Neurosurgery, Astana, Kazakhstan; ²Professional Association of Clinical Pharmacologists and Pharmacists, Astana, Kazakhstan; ³Bioactive Molecules Research Group, Department of Chemistry and Biochemistry, Faculty of Sciences-II, Lebanese University, Beirut, Lebanon

Correspondence: Lizette Auezova, Bioactive Molecules Research Group, Department of Chemistry and Biochemistry, Faculty of Sciences-II, Lebanese University, Fanar, Jdaidet el Matn, PO Box 90656, Beirut, Lebanon, Email auezova_l@hotmail.com

Background: Herpes zoster (HZ), caused by reactivation of the varicella zoster virus, can be associated with serious and difficult-to-treat neurological complications, especially in immunocompromised people. Ascorbic acid (Asc) administered intravenously in high doses has been shown to possess immunomodulatory and anti-inflammatory effects. Here, we report two cases of patients: 1) with postherpetic neuralgia (PHN) and 2) with myelitis presumably caused by HZ, who were successfully treated using this approach as adjunctive therapy. Regarding HZ-related myelitis, this is the first reported case to our knowledge.

Cases Presentation: A 72-year-old male came to the clinic with treatment-resistant postherpetic trigeminal neuralgia and cervical sympathetic ganglionitis. He rated pain intensity as 10 on the visual analogue scale (VAS). The second patient, a 34-old female, was referred with a preliminary diagnosis of cervical myelitis. She suffered from right-sided sensory-motor impairments and urinary retention. Previous treatment did not result in improvement. Neurological and MRI findings were typical of cervico-thoracic myelitis associated with right-sided hemiparesis. Two months before the onset of the first symptoms, she developed a HZ rash in the cervico-occipital region on the right, suggesting an association between HZ and myelitis. Both patients received two courses of Asc (each course consisting of 20 g administered intravenously daily for five days). The male noted a gradual pain relief from the initial 10 to 2 points on the VAS, with only a slight increase at night. In the female's case, hemiparesis regressed and bladder function was restored. Only mild neurological deficits remained.

Conclusion: This study supports the use of high-dose intravenous Asc as adjunctive therapy for HZ-associated neuralgia and myelitis, especially in treatment-resistant cases. In order to determine the optimal dosages, it is necessary to perform clinical trials. Furthermore, it would be interesting to study the potential use of Asc therapy for other HZ-related complications.

Keywords: varicella zoster virus, herpes zoster, myelitis, neuralgia, ascorbic acid

Introduction

Herpes zoster (HZ) is caused by reactivation of varicella zoster virus, which lies latent in sensory neurons following primary infection from varicella. The disease is typically characterized by a painful unilateral vesicular eruption in one or several dermatomes. The incidence rate of HZ ranges from 3 to 6 per 1000 person-years and is much higher in older and immunocompromised individuals,¹ who also have a high risk of developing neurological complications, including postherpetic neuralgia and motor dysfunction.²

Postherpetic neuralgia (PHN), the most common neurological complication of HZ, is defined as pain persisting for more than 30 days after the onset of the rash in the same affected dermatome.³ Motor dysfunction is a rare neurological complication of HZ, although perhaps underestimated due to diagnostic difficulties.⁴ Both conditions seriously reduce

patients' quality of life and work ability and can lead to disability. Despite several therapeutic options for HZ complications, treatment remains challenging.

In recent years, there has been growing interest in intravenous (IV) high-dose ascorbic acid (Asc), also known as vitamin C, as an adjuvant therapy in the treatment of many pathologies, including viral infections.^{5,6} Asc, administered IV in high (multigram) doses, has been shown to have potent antioxidant, anti-inflammatory, and immunostimulating properties that are clearly superior to those associated with the oral route.⁷

Here, we report the successful treatment with high IV doses of Asc of one patient with PHN and another patient with hemiparesis associated with myelitis (presumably caused by HZ). Several reports have been published using this therapy to treat PHN;⁸ regarding HZ-related hemiparesis, this is the first reported case to our knowledge.

Case Presentation

Case 1

First visit (24.04.24): a 72-year-old male presented with persistent burning pain on the right side of the head and neck, facial numbness on the right side, and severe shooting pain when turning the head or upon being touched (eg, by a shirt collar). The patient rated pain intensity as 10 on the visual analogue scale (VAS). According to the patient, in March he developed an itchy rash on the right side of the back of his head. He was diagnosed with HZ by a dermatologist and was prescribed 400 mg of acyclovir five times per day for 7 days and an antiviral ointment. About two weeks later, severe pain developed and the dermatologist prescribed ketoprofen 150 mg per day for 7 days and pregabalin 150 mg per day until pain relief, but the pain persisted.

Neurological examination revealed severe hyperesthesia on the right half of his head. Palpation of the exit sites of the trigeminal nerve on the right, as well as of the cervical spine, was painful. There was some swaying in Romberg's position. Due to the pain, rotation of the head, especially leftwards, was severely limited. The MRI was unremarkable. The patient has a history of type 2 diabetes, chronic pancreatitis, and sclerosing cholangitis. His complete blood count was normal except for elevated lymphocyte count of $3.65 (1.2\text{--}3.0) \times 10^9/\text{L}$, which is typical for viral infection. Biochemical analyses revealed elevated levels of glycosylated hemoglobin – 8.6 (4.0–6.5%) and LDL cholesterol – 4.34 (>4.1 mmol/L), in accordance with his medical history. The patient was diagnosed with postherpetic trigeminal neuralgia and cervical sympathetic ganglionitis.

The patient was prescribed IV injections of Asc 20 g (in 200 mL of saline) at a rate of 60 drops per minute daily for 5 days. Asc therapy resulted in significant pain relief (pain intensity decreased to 5 points on the VAS), with rare attacks of shooting pain at night up to 6–7 points. A second 5-day Asc treatment was recommended, but the patient, due to personal circumstances, was unable to begin it and left with recommendations to take vitamin C orally 2 g per day for 1 month, pregabalin (increasing dose gradually up to 300–450 mg per day) and, if pain persists, add amitriptyline 0.5–1 tablet at night. However, due to poor tolerability of pregabalin, the patient was forced to stop taking it.

Second visit (19.07.24): The patient returned to our clinic to receive a second course of Asc therapy (20 g IV daily for 5 days). After the treatment, he felt clear relief; namely, the pain decreased down to 2 points on the VAS, intensifying slightly at night, and remains at this level to this day (last contact was 11/20/24 by phone). The patient does not take analgesics. The numbness of the face went away and he turns his head normally. There is still slight pain in the area of the right ear and cheekbone, especially at night. The patient was recommended to take oral vitamin C regularly.

Case 2

First visit (07.03.24): A 34-year-old female was referred to a neurosurgeon at our clinic with a suspected mass in the cervical spinal cord. She was then referred to our neurologist with a preliminary diagnosis of cervical myelitis.

According to the patient, in September 2023 she suffered from HZ with abundant rash in the cervico-occipital region on the right (Figure 1). In addition, carriage of cytomegalovirus and herpes simplex virus was detected. Following the dermatologist's prescriptions, she underwent antiviral and vitamin therapy. In November 2023, numbness and gradually increasing weakness appeared in the right limbs. Despite the treatment (details of the treatment were not provided), her condition worsened. There were new complaints of tightness in the right chest area, sensations of electric current in the



Figure 1 Rash in the cervico-occipital region on the right in the second patient.

right clavicle and shoulder, as well as urinary retention. The patient has a history of iron deficiency anemia, chronic pancreatitis and chronic cholecystitis, and she receives suitable treatment.

On neurological examination, muscle strength in the right arm and leg was 3/5 and 2/5 according to the Medical Research Council (MRC) scale, respectively. There was hyperesthesia on the right side of the neck, limbs, and chest. MRI revealed hyperintense lesions with signs of edema at C2–T2 levels on T2 and STIR images, and small syringomyelic cysts (Figure 2A–D). These findings were consistent with cervicothoracic myelitis (presumably caused by HZ) complicated by right-sided hemiparesis (more pronounced in the leg) and neurogenic bladder dysfunction. She was prescribed Asc therapy

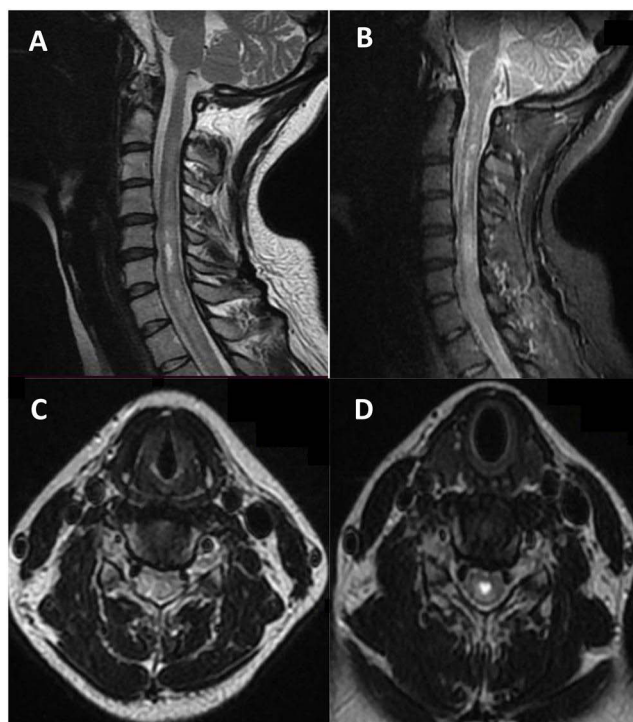


Figure 2 (03/24): Sagittal T2-weighted (A) and STIR (B) MR images showing cord enlargement with intramedullary hyperintensity extending over more than 5 levels. Axial T2-weighted MR images showing abnormal bilateral enlargement of the cervical spine at the C4–C5 level (C) and intramedullary hyperintense signal at the C5–C6 level (D).

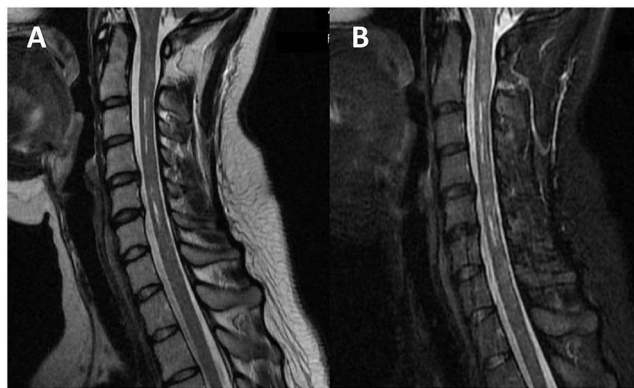


Figure 3 (11/24): Sagittal T2-weighted (A) and STIR (B) MR images showing a clear reduction in spinal cord edema and cysts size after IV administration of ascorbic acid 20 g daily for 5 days.

(20 g IV daily for 5 days). After the treatment, the patient felt significant relief, namely a surge of strength, a decrease in numbness, and an increase in strength in the right limbs. The patient returned to her home with recommendations to continue Asc therapy (20 g per day IV twice a week for 1 month), followed by oral Asc 2 g per day for 1 month.

Second visit (24.07.24): The hemiparesis completely regressed (muscle strength 5/5), and bladder function was restored. Periodically there was a sensation of electric current in the right shoulder, itching in the right chest area, and numbness in the right arm when tilting the head. The patient received the second course of Asc treatment (20 g IV daily for 5 days). After completing the course, the feeling of itching in the chest went away and the sensations of electric current in the right shoulder decreased. She left with recommendations to take oral vitamin C regularly. In November 2024, the patient sent an MRI disk, which showed signs of clear improvement, namely a noticeable decrease in swelling of the cervical spinal cord and the size of the cysts (Figure 3A and B). Only mild neurological deficits remained (as determined by follow-up telephone call).

Discussion

Both of our patients, who had a history of a number of chronic diseases, were at risk of HZ development and its neurological complications. Both patients have not responded to previous treatment with conventional drugs.

The first patient, a 72-year-old male was diagnosed with PHN, the most common complication of HZ. The second patient, a 34-year-old female, presented with right-sided motor and sensory dysfunctions and urinary retention. The severity of symptoms increased gradually over about two months. MRI findings were typical of myelitis of the predominantly cervical spinal cord with associated small syringomyelic cysts. As noted in the literature, the development of syringomyelia may be associated with myelitis.⁹ Two months before the onset of the first symptoms, the patient developed a HZ rash in the cervico-occipital region on the right. The same (right-sided) localization of HZ lesions and sensory-motor impairments suggested an association between HZ and myelitis. It should be noted that the onset of myelitis two months after the acute period of HZ is not typical, but can occur.¹⁰

The use of high-dose IV Asc led to a rapid recovery in our patients. Immediately after the first 5-day treatment, both patients felt significant relief. Given that they had different diagnoses, this result is consistent with the nonspecific mechanism of action of Asc as a potent antioxidant, anti-inflammatory, and immunostimulatory agent.⁷ The successful use of Asc therapy was reported in various diseases, including viral infections.^{5,6} Several articles have been published on the treatment of acute and postherpetic neuralgia. Thus, Schencking et al reported rapid and complete pain relief in two patients with acute herpetic neuralgia using 15 g of Asc IV every second day over a period of two weeks.⁸ Our protocol (20 g daily IV for 5 days) is similar to that of these authors; in addition, it is also based on our preliminary data.

Choosing the dose and route of administration (oral or IV) of Asc is a key consideration.¹¹ To treat an infection characterized by a high level of oxidative stress, millimolar plasma concentrations of Asc are required. Such high concentrations are only achieved with IV Asc in high (multigram) doses.¹² The relationship between dose and concentration is linear.¹³ It should be added that a high prevalence of Asc deficiency was observed in patients with PHN.¹⁴

Conclusion

This study supports the use of high-dose intravenous Asc treatment as adjunctive therapy, especially in treatment-resistant cases. Clinical trials are needed to clarify dosages in the treatment of neuralgia and myelitis associated with HZ.

Consent Statements

The patients have approved and written informed consent for the publication of these case reports including the images. The National Center for Neurosurgery (Astana, Kazakhstan) has also approved the publication of this article.

Acknowledgments

The authors are grateful to the patients who participated in the study and to the National Center for Neurosurgery for the financial support granted to cover the publication fees of this work.

Disclosure

The authors declare no conflicts of interest in this study.

References

1. Steinmann M, Lampe D, Grosser J, et al. Risk factors for herpes zoster infections: a systematic review and meta-analysis unveiling common trends and heterogeneity patterns. *Infection*. 2024;52(3):1009–1026. doi:10.1007/s15010-023-02156-y
2. Nagel MA, Gilden D. Neurological complications of varicella zoster virus reactivation. *Curr Opin Neurol*. 2014;27(3):356–360. doi:10.1097/WCO.0000000000000092
3. Saguil A, Kane S, Mercado M, Lauters R. Herpes zoster and postherpetic neuralgia: prevention and management. *Am Fam Physician*. 2017;96(10):656–663.
4. Mondelli M, Romano C, Rossi S, Cioni R. Herpes zoster of the head and limbs: electroneuromyographic and clinical findings in 158 consecutive cases. *Arch Phys Med Rehabil*. 2002;83(9):1215–1221. doi:10.1053/apmr.2002.33989
5. Polireddy K, Dong R, Reed G, et al. High dose parenteral ascorbate inhibited pancreatic cancer growth and metastasis: mechanisms and a Phase I/IIa study. *Sci Rep*. 2017;7(1):17188. doi:10.1038/s41598-017-17568-8
6. Biancatelli RMLC, Berrill M, Marik PE. The antiviral properties of vitamin C. *Expert Rev. Anti Infect Ther*. 2020;18(2):99–101. doi:10.1080/14787210.2020.1706483
7. Carr AC, Maggini S. Vitamin C and immune function. *Nutrients*. 2017;9(11):1211. doi:10.3390/nu9111211
8. Schencking M, Sandholzer H, Frese T. Intravenous administration of vitamin C in the treatment of herpetic neuralgia: two case reports. *Med Sci Monit*. 2010;16(5):CS58–61.
9. Ravaglia S, Bogdanov EI, Pichiechio A, Bergamaschi R, Moglia A, Mikhaylov IM. Pathogenetic role of myelitis for syringomyelia. *Clin Neurol Neurosurg*. 2007;109(6):541–546. doi:10.1016/j.clineuro.2007.03.007
10. Kennedy PGE. *Neurological Complications of Varicella-Zoster Virus Infections*. In *Infections of the Nervous System*. Kennedy PGE, Johnson RT, Eds.. London, UK: Butterworths; 1987:177–208. doi:10.1016/B978-0-407-02293-5.50015-5
11. Wang LK, Chuang CC, Chen JY. Relief of acute herpetic pain by intravenous vitamin C: the dosage may make a difference. *Ann Dermatol*. 2018;30(2):262–263. doi:10.5021/ad.2018.30.2.262
12. Padayatty SJ, Levine M. Vitamin C: the known and the unknown and Goldilocks. *Oral Dis*. 2016;22(6):463–493. doi:10.1111/odi.12446
13. de Grooth HJ, Manubulu-Choo WP, Zandvliet AS, et al. Vitamin C pharmacokinetics in critically ill patients. *Chest*. 2018;153(6):1368–1377. doi:10.1016/j.chest.2018.02.025
14. Wang LK, Lin YT, Hung KC, et al. Plasma vitamin C concentrations were negatively associated with tingling, prickling or pins and needles sensation in patients with postherpetic neuralgia. *Nutrients*. 2020;12(8):2384. doi:10.3390/nu12082384

International Medical Case Reports Journal

Publish your work in this journal

The International Medical Case Reports Journal is an international, peer-reviewed open-access journal publishing original case reports from all medical specialties. Previously unpublished medical posters are also accepted relating to any area of clinical or preclinical science. Submissions should not normally exceed 2,000 words or 4 published pages including figures, diagrams and references. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/international-medical-case-reports-journal-journal>

Dovepress
Taylor & Francis Group