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Case Report

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Russell's Viper Envenomation Complicated by Delayed Hypopituitarism and Multiple Endocrine Dysfunction

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Abstract

Russell's viper envenomation can cause severe systemic complications, including a rare but significant long-term endocrine sequela: hypopituitarism. The delayed onset and non-specific nature of symptoms often lead to diagnostic challenges and prolonged patient morbidity. We report the case of a 32-year-old male farmer who presented with progressive and debilitating symptoms of fatigue, weight loss, and reproductive dysfunction 18 months following a severe Russell's viper bite complicated by acute kidney injury. A thorough endocrine evaluation confirmed pan hypopituitarism, with laboratory results demonstrating multiple anterior pituitary hormone deficiencies, including secondary adrenal insufficiency, hypothyroidism, and hypogonadism. This case highlights the critical importance of maintaining a high index of clinical suspicion for hypopituitarism in individuals with a history of severe Russell's viper envenomation. Long-term endocrine surveillance is essential for all survivors, as early recognition and timely hormone replacement therapy are crucial for preventing life-threatening adrenal crises and significantly improving long-term quality of life.

1. Introduction

Venomous snake bites represent a significant public health challenge in tropical regions, with Russell's viper (Daboia Russelii) being one of the most medically important species. While acute complications such as coagulopathy and acute kidney injury are well-recognized, delayed endocrine manifestations remain underdiagnosed. The pathophysiology involves venom-induced vascular damage leading to pituitary ischemia and subsequent hormonal deficiencies.

2. Case Presentation

2.1. Patient Information

A 32-year-old male farmer from a rural area presented to our endocrinology clinic with an 8-month history of progressive weakness, unexplained weight loss of 12 kg, cold intolerance, and loss of libido. His medical history was significant for a Russell's viper bite 18 months prior, which had required intensive care management for severe coagulopathy and acute kidney injury necessitating temporary hemodialysis.

2.2. Clinical Findings

On examination, the patient appeared chronically ill with a BMI of 18.2 kg/m². Vital signs showed blood pressure of 95/60 mmHg and heart rate of 58 beats per minute. Physical examination revealed pale, dry skin, sparse axillary and pubic hair, and testicular atrophy. There was no visual field defect or other neurological abnormalities.

3. Diagnostic Assessment

3.1 Initial laboratory Investigations Revealed:

Hormone	Patient Value	Normal Range	Interpretation
Morning Serum Cortisol	3.8 µg/dL	6.2-19.4 µg/dL	Low
ACTH	8.2 pg/mL	7.2-63.3 pg/mL	Normal
TSH	0.8 mIU/L	0.27-4.2 mIU/L	Normal
Free T4	0.6 ng/dL	0.93-1.7 ng/dL	Low
Free T3	1.8 pg/mL	2.0-4.4 pg/mL	Low
LH	0.9 mIU/mL	1.7-8.6 mIU/mL	Low
FSH	1.2 mIU/mL	1.5-12.4 mIU/mL	Low
Total Testosterone	185 ng/dL	264-916 ng/dL	Low
IGF-1	78 ng/mL	115-307 ng/mL	Low
Prolactin	3.2 ng/mL	4.0-15.2 ng/mL	Low

3.2. Cosyntropin Stimulation Test Results:

- **Baseline Cortisol:** 3.8 µg/dL
- **60-minute Cortisol:** 8.2 µg/dL
- **Interpretation:** Inadequate response, confirming secondary adrenal insufficiency.

3.3. Imaging Studies

MRI of the pituitary gland revealed an empty sella with remnant pituitary tissue along the sellar floor. The posterior pituitary bright spot was preserved, and there was no evidence of mass lesion or acute hemorrhage.

3.4. Treatment and Follow-Up

3.4.1. The Patient was Initiated on Hormone Replacement Therapy:

- Hydrocortisone 15 mg in the morning and 5 mg in the evening
- Levothyroxine 100 µg daily (started after cortisol replacement)
- Testosterone cypionate 200 mg intramuscularly every 2 weeks

Within 3 months of treatment, the patient showed remarkable improvement in energy levels, weight gain of 8 kg, and restoration of normal blood pressure. He reported significant improvement in quality of life and returned to his occupation.

3.5. Outcome and Follow-Up

At 12-month follow-up, the patient remained clinically stable on hormone replacement therapy. Repeat hormonal evaluation confirmed the need for continued treatment. Annual monitoring was established to assess for potential development of central diabetes insipidus or progression of existing hormonal deficiencies.

4. Discussion

Russell's viper envenomation represents a significant cause of delayed hypopituitarism, a rare but devastating long-term complication that exemplifies the complex pathophysiology of venom-induced systemic damage and the critical importance of long-term surveillance in snake bite survivors. The pathogenesis involves Russell's viper venom's multiple biologically active procoagulant enzymes that activate factors V and X in the coagulation cascade, leading to disseminated intravascular coagulation (DIC) and formation of microthrombi throughout the microvasculature, combined with metalloproteinase hemorrhagins that damage vascular endothelium, ultimately resulting in pituitary ischemia and necrosis [1,2]. Clinical presentation is characterized by insidious onset of non-specific symptoms including fatigue, weight loss, reproductive dysfunction, and secondary endocrine failures, with Shivaprasad et al. documenting a mean duration of 5.8 ± 4.6 years between snake bite and diagnosis in their analysis of 28 cases, while acute presentations during initial envenomation have been described by Saxena et al. with hypoglycemia, hypotension, and altered consciousness [3,4].

The most significant predictive factor for developing hypopituitarism is acute kidney injury during initial envenomation, reported in over 85% of cases and 68% in the Shivaprasad series, suggesting that severity of initial systemic involvement correlates with long-term endocrine complications, with patients requiring hemodialysis representing the highest risk group [1,3]. Hormonal patterns typically involve multiple anterior pituitary axes, with secondary hypothyroidism and hypogonadism occurring in 96.4% and 100% of cases respectively, growth hormone deficiency in 77%, and secondary adrenal insufficiency in 82% of patients, while posterior pituitary involvement remains rare at only 7%, though isolated cases of diabetes insipidus have been reported [3,5,6]. Radiological findings reveal empty or partially empty sella in 61.6% of cases, though normal pituitary imaging does not exclude the diagnosis, contrasting with classical Sheehan's syndrome where structural abnormalities are more consistently observed [3]. Diagnostic challenges are exemplified by cases like that of Kamath and Kumar, where misinterpretation of secondary hypothyroidism as primary thyroid dysfunction led to a 10-year diagnostic delay, emphasizing the critical importance of proper hormone interpretation in patients with severe envenomation history [7].

Treatment outcomes are consistently favorable, with all 11 patients with chronic hypopituitarism showing marked improvement following appropriate hormone replacement therapy, though sequential replacement with cortisol preceding thyroid hormones is crucial to prevent adrenal crisis [1]. The geographic restriction of reported cases to India, Burma, and Sri Lanka despite wider Russell's viper distribution raises concerns about potential underdiagnosis in other endemic regions, while the rarity of this condition limits understanding of true prevalence and natural history. This body of evidence supports a paradigm shift from viewing snake

envenomation as purely an acute emergency to recognizing its potential for serious long-term sequelae, necessitating structured follow-up protocols for high-risk patients, enhanced educational training for healthcare providers in endemic regions, and comprehensive management programs extending beyond initial hospitalization to improve long-term outcomes for snake bite survivors through early recognition and treatment of this underdiagnosed but highly treatable complication.

4.1. Clinical Implications

- **Surveillance Strategy:** All patients with severe snake envenomation, particularly those requiring hemodialysis or with evidence of disseminated intravascular coagulation, should undergo long-term endocrine monitoring.
- **Diagnostic Approach:** Clinical suspicion should remain high even in the presence of normal pituitary imaging, as hormonal deficiencies can occur despite radiologically normal glands.
- **Treatment Priorities:** Cortisol replacement must precede thyroid hormone replacement to prevent precipitating adrenal crisis.

5. Conclusion

This case report demonstrates that delayed hypopituitarism represents a significant but underrecognized long-term complication of severe Russell's viper envenomation. The 18-month diagnostic delay experienced by our patient underscores the insidious nature of this condition and highlights critical deficiencies in current post-envenomation surveillance protocols. The presence of acute kidney injury during initial envenomation emerged as a key predictive factor, consistent with literature reporting this complication in over 85% of affected patients. Despite the absence of characteristic radiological findings, comprehensive hormonal evaluation confirmed panhypopituitarism, emphasizing that biochemical assessment supersedes imaging in diagnostic accuracy. The patient's dramatic clinical recovery following sequential hormone replacement therapy demonstrates the excellent prognosis when appropriate treatment is initiated, despite irreversible pituitary damage.

These findings necessitate a paradigm shift in snake bite management from viewing envenomation as solely an acute medical emergency to recognizing its potential for devastating long-term endocrine sequelae. Implementation of structured follow-up protocols for high-risk patients, enhanced physician education regarding this complication, and systematic endocrine surveillance programs are essential to prevent diagnostic delays and improve long-term outcomes. This case advocates for comprehensive management strategies extending beyond initial hospitalization to ensure early recognition and treatment of this rare but highly treatable complication that significantly impacts quality of life when left undiagnosed [8-11].

References

1. Antonypillai, C. N., Wass, J. A. H., Warrell, D. A., & Rajaratnam, H. N. (2011). Hypopituitarism following envenoming by Russell's vipers (Daboia siamensis and D. russelii) resembling Sheehan's syndrome: first case report from Sri Lanka, a review of the literature and recommendations for endocrine management. *QJM: An International Journal of Medicine, 104(*2), 97-108.
2. Francis, N., Phillips, R. E., & Warrell, D. A. (1989). Contribution of focal haemorrhage and microvascular fibrin deposition to fatal envenoming by Russell's viper (Vipera russelli siamensis) in Burma. *Acta Tropica, 46*(1), 23-38.
3. Shivaprasad, C., Aiswarya, Y., Sridevi, A., Anupam, B., Amit, G., Rakesh, B., ... & Anish, K. (2019). Delayed hypopituitarism following Russell's viper envenomation: a case series and literature review. *Pituitary, 22*(1), 4-12.
4. Saxena, A., Srivastava, A. K., Rajput, A. S., Tiewsoh, I., & Jajoo, U. N. (2014). Acute hypopituitarism-a rare complication of vasculotoxic snake bite: A case report. *Journal of Mahatma Gandhi Institute of Medical Sciences, 19*(2), 144-147.
5. Krishnan, M. N., Kumar, S., & Ramamoorthy, K. P. (2001). Severe panhypopituitarism and central diabetes insipidus following snake bite: unusual presentation as torsades de pointes.
6. Gupta, U. C., Garg, O. P., & Kataria, M. L. (1992). Cranial diabetes insipidus due to viper bite. *The Journal of the Association of Physicians of India, 40*(10), 686-687.
7. Kamath, A. T., & Kumar, S. S. (2013, March). Snake bite and hypopituitarism: ignorance or incompetence?. In *Endocrine Abstracts* (Vol. 31). Bioscientifica.
8. Bhattacharya, S., et al. (2020). Snake venom-induced pathophysiology and complications. *American Journal of Tropical Medicine and Hygiene, 103*(4), 1388-1396.
9. Burke, C. W. (1990). The anterior pituitary, snakebite and Sheehan's syndrome. *QJ MED, 75*(276), 331-3.
10. Srinivasan, K. G., Srividya, S., Nandhini, K. U., & Ramprabananth, S. (2010). Chronic Pituitary Failure Resembling Sheehan's Syndrome following a Bite of Russell's Viper: A Case Report. *The Neuroradiology Journal, 23*(1), 38-41.
11. Pe, T., Phillips, R. E., Warrell, D. A., & Moore, R. A. (1987). Acute and chronic pituitary failure resembling Sheehan's syndrome following bites by Russell's viper in Burma. *Lancet, 2*, 763-7.