



Case Report



Baclofen Toxicity in Dogs

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ABSTRACT

Introduction: Baclofen is a centrally-acting skeletal muscle relaxant used to control spasticity and pain in humans. In an overdose situation, the onset of clinical signs, such as vocalization, vomiting, ataxia, disorientation, salivation, coma, weakness, recumbency, and seizures, is usually noticed.

Case report: The first case was a two-month-old female Spitz pup weighing 5 kg, which was brought to the Small Animal Medicine unit of Veterinary Clinical Complex (VCC), Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Puducherry, India, with a history of vomiting, vocalization, and restlessness for the past hour. After recording the history, it was revealed that the dog had accidentally consumed four Baclofen tablets (10 mg each). The animal was immediately treated with fluids, activated charcoal, and Kaolin mixed with water (orally). The gradual reduction in clinical signs was noticed by the lower of 12 hours, and a dramatic improvement was noticed the day after, and the pup recovered completely. The second case was a six-month-old male Labrador dog weighing 20 kg, which was brought to the Small Animal Medicine unit of VCC, RIVER, Puducherry, India, with a history of vocalization, restlessness, and salivation for the past two hours. After considering the history, it was revealed that the dog had accidentally ingested eight Baclofen tablets of 10 mg. The animal was immediately treated with fluids (Injection) Atropine sulfate and activated charcoal mixed with water (orally). The gradual reduction of clinical signs was noticed in less than 12 hours, dramatic improvement was noticed the next day, and the dog recovered completely.

Conclusion: Timely diagnosis and proper management of the toxicity with drugs can eliminate the clinical signs, and fluid therapy can help the animal's recovery.

1. Introduction

Baclofen is a centrally-acting skeletal muscle relaxant that stimulates gamma amino butyric acid (GABA) within the spinal cord. Baclofen is used to control spasticity and pain in people with multiple sclerosis and spinal disorders¹. Baclofen has also been used extra-label in dogs (1 to 2 mg/kg orally) to treat urinary retention by reducing urethral resistance². Baclofen is first renally excreted, with only a small portion (15%) being metabolized by the liver. Small amounts of baclofen can cross the blood-brain barrier at therapeutic doses; however, significant drug

concentrations can accumulate within the cerebrospinal fluid at higher doses, leading to coma and respiratory depression³. Baclofen is available in 10 and 20 mg tablets and as a parenteral injection. Baclofen undergoes first-order elimination kinetics at therapeutic doses with a half-life of 2-6 hours.

In first-order elimination kinetics, a constant fraction of the drug is eliminated per unit of time. The time required for the drug concentration to fall by one half-life ($t_{1/2}$) is regular, and over 95% of the drug should be eliminated

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within five t½. A transition to zero-order kinetics may occur when first-order elimination mechanisms become saturated. In zero-order kinetics, a constant amount, rather than a constant fraction of the drug, is eliminated per unit of time. Therefore, the serum half-life of the medication is constantly changing. In drug overdoses, this can result in prolonged drug elimination. Baclofen may transition to zero-order elimination kinetics in high-dose ingestion, which might explain a prolonged duration of clinical signs following ingestion³. The onset of clinical signs after acute oral exposure may be rapid (within 30 to 60 minutes) or delayed for several hours⁴. Common clinical signs are vocalization, vomiting, ataxia, disorientation, salivation, depression, coma, weakness, generalized flaccid paralysis, recumbency, seizures, and hypothermia. Life-threatening signs involve dyspnoea, respiratory depression, and respiratory arrest secondary to paralysis of the diaphragm and intercostal muscle¹. The current treatment recommendations include gastrointestinal decontamination, intravenous fluid therapy, intravenous lipid emulsion (ILE, Baxter Healthcare, Deerfield, IL), hemodialysis, haemoperfusion, and mechanical ventilation. Dogs with persistent neurologic abnormalities may still have an excellent prognosis despite the lack of initial response³.

2. Case report

2.1. Case one

A two-month-old female Spitz pup was brought to the Small Animal Medicine Unit, Veterinary Clinical Complex, Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry, India, with a history of vomiting, vocalization, and restlessness for the past hour. The pup had accidentally consumed four Baclofen 10 mg tablet, which was kept for use by the owner, who was suffering from spinal problems. On clinical examination, the signs observed were vocalization, restlessness, disorientation, salivation, ataxia, rectal temperature of 38.7°C, heart rate of 167 bpm, and respiratory rate of 46/minute. History, clinical signs, and symptoms were suggestive of Baclofen toxicity.

The animal was immediately treated with Furosemide (Lasix®, India) at the dosage of 2-4 mg/kg body weight (intramuscular injection)⁴. Dextrose normal saline 80 ml (intra Venus injection) and activated charcoal 5 g (Myka Organics, India), and kaolin 5 g (Bharat Pharmaceuticals, India) mixed with water (orally)⁴ were used. Gradual reduction in clinical signs was noticed in less than 12 hours, a dramatic improvement was noticed the next day, and the pup recovered completely.

2.2. Case two

A six-month-old male Labrador dog was brought to the Small Animal Medicine Unit, Veterinary Clinical Complex, Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry, India, with a history of vocalization,

restlessness, and salivation for the past two hours. The dog had accidentally ingested eight Baclofen tablets 10 mg, which were kept for use by the owner suffering from some sclerosis. On clinical examination, the signs observed were vocalization, restlessness, salivation, disorientation, rectal temperature of 39.2°C, heart rate of 171 bpm, and respiratory rate of 45/minute. History and clinical signs were suggestive of Baclofen toxicity. The animal was treated with Atropine sulphate (Atropine, USA) at the dosage of 0.04 mg/kg body weight (intravenous injection)⁴. Dextrose normal saline 150 ml (intra Venus injection) and activated charcoal 5 g mixed with liquid paraffin at the amount of 6 ml (orally)⁴ were used. Moreover, 5 ml of Syrup Liv 52 (Himalaya, India) was prescribed for the animal. Gradual reduction in clinical signs was noticed in less than 12 hours, dramatic improvement was noticed the next day, and the dog recovered completely.

3. Discussion

Baclofen intoxication has caused clinical signs, including vocalization and restlessness⁵, in the cases mentioned above. Baclofen is a human medication suggested for treating spasticity brought on by multiple sclerosis, spinal cord injuries, and other spinal cord diseases³. Baclofen is a highly effective medication and is being used more frequently outside of its approved uses to treat various conditions, such as musculoskeletal pain, gastric reflux, and alcohol use disorder⁶. In cases of accidental consumption, the duration of clinical signs varies from several hours to several days due to the slow clearance from the central nervous system. Toxicity occurs at a dose as low as 1.3 mg/kg and causes vomiting, depression, and vocalization. Deaths have occurred with doses between 8-16 mg/kg¹. Baclofen is excreted in urine⁷. No specific antidote is available. Atropine 0.02-0.04 mg/kg may be required in bradycardia and to reduce salivation⁸. Furosemide (Lasix®, India), at the dosage of 2-4 mg/kg, is a diuretic used to increase the excretion of the drug in the urine. Adsorbent, such as activated charcoal at the dosage of 2 g/kg body weight, orally binds the drug, reduces the absorption, and further toxicity^{7,9}.

4. Conclusion

Baclofen toxicity can be efficiently treated when diagnosed promptly. Fluids and diuretics play a major role in eliminating the drug from the body system. The treatments done in the present case has aided in the animal's recovery.

Declarations

Competing interest

The authors declared that they have no conflict of interest.

Authors' contribution

Abiramy Prabavathy Arumugam diagnosed the case.

Vanmathi Arulselvam, Devadharshini Kamalakannan, and Agnishwaran Ramajothi conducted the treatment. Vijayalakshmi Padmanadan supervised the whole procedure. All authors read and approved the final version of the manuscript for publication in the present journal.

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Ethical considerations

The authors confirm that the manuscript has been read and approved by all the named authors. All authors consented to publish this article and confirm that there is no plagiarised information in the article. All sentences are written originally and all available data are published in this article.

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References

1. Osweiler GD, Hovda LR, Brutlag AG, Lee JA. Blackwell's Five-Minute Veterinary Consult Clinical Companion: Small Animal Toxicology. 1st ed. Germany: Wiley; c 2011. p. 142-147. Available at: <https://www.wiley.com/learn/5mvc/pdf/blackwells-five-minute-veterinary-consult-clinical-companion.pdf>
2. Torre, D. M. Labato M. A., Rossi T., Foley C., O'Tolle T.E.. Treatment of a dog with severe baclofen intoxication using haemodialysis and mechanical ventilation. *J. Vet. Emerg. Crit. Care*, 2008, 18:312-318. DOI: <https://doi.org/10.1111/j.1476-4431.2008.00310.x>
3. Fox CM, Daly ML. Successful treatment of severe baclofen toxicosis initially refractory to conventional treatment. *Clin Case Rep*. 2016 ;5(1):44-50. DOI: <https://doi.org/10.1002/ccr3.736>.
4. BSAVA Small Animal Formulary Part A: Canine and Feline. Edition 10, 2020. Available at: <https://www.bsavalibrary.com/content/formulary/canine-and-feline>
5. Tina Wismer. Baclofen overdose in dogs. *Veterinary Medicine*. United States: Veterinary Medicine Publishing Company; c 2004. p. 406. Available at: https://www.aspcapro.org/sites/default/files/g-toxbrief_0504.pdf
6. Romito JW, Turner ER, Rosener JA, Coldiron L, Udipi A, Nohrn L, Tausiani J, et al. Baclofen therapeutics, toxicity, and withdrawal: a narrative review. *SAGE open medicine*. 2021 Jun; 9: 20503121211022197. DOI: <https://doi.org/10.1177/20503121211022197>
7. Campbell A, Chapman M. *Handbook of Poisoning in Dogs and Cats*. 1st ed. United Kingdom: Wiley; c 2000. p. 74-76. Available at: <https://www.wiley.com/en-us/Handbook+of+Poisoning+in+Dogs+and+Cats-p-9780632050291>
8. Ko JC, Fox SM, Mandsager RE. Effects of preemptive atropine administration on incidence of medetomidine -induced bradycardia in dogs. *Journal of the American Veterinary Medical Association*. 2001 Jan 1; 218(1): 52-58. DOI: <https://doi.org/10.2460/javma.2001.218.52>
9. Diuretics- Pharmacology. *MSD Veterinary Manual*; 2015 Nov [cited on 5th December 2022]. Available at: <https://www.msdsvetmanual.com/pharmacology/systemic-pharmacotherapeutics-of-the-cardiovascular-system/diuretics>