

## CASE REPORT

### HEMOLYTIC ANEMIA ASSOCIATED WITH INGESTION OF ONIONS IN A DOG

R. N. SPICE\*

#### Introduction

Experimentally, the association of hemolytic anemia in the dog with the ingestion of onions was recognized long ago (4). However, the occurrence of onion poisoning as a clinical entity was only recently described (1). The purpose of this report is to describe a case of hemolytic anemia in a dog associated with ingestion of onions in the form of a portion of an onion soufflé. For the purposes of this report, April 24, 1975 will be considered to be day 1, since this was the date of ingestion of the onions.

#### History

On day 3, a telephone call was received from the dog's owner in the Northwest Territories. A fully vaccinated four year old male Yorkshire Terrier had developed polyuria, depression, and what was thought to be hematuria over the preceding 36 hours. Prior to this time the dog had been in good health. Arrangements were made to fly the dog to the hospital for examination.

#### Clinical Findings

Initial examination on the evening of day 4 revealed a mildly depressed dog with a rectal temperature of 38.4°C and slightly pale oral mucous membranes. Capillary refill time was within normal limits. No abnormalities were detected upon auscultation and palpation of the thorax and abdomen. Urine expressed from the bladder was very dark in colour. During the remainder of the night the dog was given free access to food and water but no specific treatment.

On day 5, blood and urine samples were obtained for laboratory analysis. Results of these and subsequent samples are summarized in Tables I and II. Abdominal radiographs taken at this time revealed no abnormalities. The dog was placed on a slow intravenous drip of Lactated Ringers Solution<sup>1</sup> to ensure

adequate renal perfusion. At this time a specific diagnosis had not been made.

The results of the initial hemogram and urinalysis were received during the afternoon of day 5, and a tentative diagnosis of hemolytic anemia, probably toxic in origin, was made. A telephone conversation with the owner at this time revealed that the dog had been fed approximately one-tenth of an onion soufflé which was made with one cup of dehydrated onion, two days prior to the onset of clinical signs. A diagnosis of hemolytic anemia due to ingestion of onions was then made.

On day 6, the dog was bright and alert, and was eating and drinking normally. The gross appearance of the urine indicated an ongoing hemolysis through the presence of hemoglobinuria. Treatment was limited to the administration of mineral oil orally as a laxative to hasten elimination of any onion particles remaining in the intestinal tract.

During the period from days 7 to 10 repeated hemograms revealed an anemia of increasing severity. A regenerative left shift was also present, the leukocytosis being due to a marked neutrophilia. A subtle cardiac murmur thought to be anemic in origin was detected on day 8. One ml of a multiple vitamin and iron preparation<sup>2</sup> was given intramuscularly every second day for a total of three treatments. The dog's rectal temperature remained in the range of 38.4 to 38.8°C during the entire period of hospitalization, and he remained bright and alert, eating and drinking well on each day. A serum sample submitted on day 5 for leptospirosis titres was negative to *Leptospira icterohemorrhagica*.

#### Outcome

The dog improved steadily from day 8 through day 12, and was released to a boarding kennel on day 13. At this time his urine had been clear for three days, and there were few Heinz bodies in peripheral blood smears indicating an end to the hemolytic process.

\*Pembina Veterinary Hospital (1970) Ltd., 400 Pembina Highway, Winnipeg, Manitoba R3L 2E7.

<sup>1</sup>Lactated Ringers Solution U.S.P., Diamond Laboratories (Canada) Ltd., Toronto, Ontario.

<sup>2</sup>Vitamaster, J. Webster Laboratories Ltd., Downsview, Ontario, Canada.

TABLE I

HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS OF A FOUR YEAR OLD YORKSHIRE TERRIER DURING TREATMENT FOR HEMOLYTIC ANEMIA DUE TO INGESTION OF ONIONS

Day	5	7	8	11	12
<b>Erythron:</b>					
Hemoglobin (Hb) (gm/100 ml)	13.2	6	5	6.7	6.4
Packed cell volume (PCV) %	35	18	18	23	25
Red blood cell count $\times 10^6/\text{mm}^3$	5.2	3.0	2.1	2.85	2.9
Polychromasia	1-2+	1+	2+	2+	2+
Anisocytosis	1+	2-3+	3+	2+	2+
Metarubricytes	2/100	7/100	4/100	4/100	3/100
Reticulocytes	—	—	—	34.6%	30.1%
Heinz bodies	4+	4+	2+	few	few
Total protein (gm/100 ml)	6.6	6.7	—	6.7	6.7
<b>Leukon:</b>					
White blood cell count/mm <sup>3</sup>	20,200	35,300	48,300	27,000	21,600
Neutrophils	15,958	29,652	33,810	21,060	13,824
Bands	808	3,530	8,694	2,700	3,240
Lymphocytes	1,616	1,412	4,187	2,160	2,592
Monocytes	1,616	706	1,449	1,080	1,944
Eosinophils	0	0	0	0	0
<b>Biochemistry:</b>					
Blood urea nitrogen (mg/100 ml)	38	34	36	19	20
Creatinine (mg/100 ml)	—	0.2	—	—	—

TABLE II

RESULTS OF URINALYSIS ON A FOUR YEAR OLD YORKSHIRE TERRIER WITH HEMOLYTIC ANEMIA DUE TO INGESTION OF ONIONS

Day	5	8
<b>Urinalysis:</b>		
Colour	dark	dark
Turbidity	2+	1+
Specific gravity	1.050	1.042
pH	6	6
Bilirubin	—	crystals present
Urobilinogen (Ehrlich units)	8	1
WBC/high power field	4-6	4-6
RBC/high power field	many	4-6
		amorphous sediment occasional renal tubular epithelial cells

### Discussion

A severe case of hemolytic anemia began to develop in this dog approximately 48 hours following the ingestion of onions in the form of an onion soufflé. Although the dog was mildly depressed and was passing dark coloured urine within 48 hours of ingesting the onions, laboratory evidence of anemia was not present for 96-120 hours. However, the numbers of Heinz bodies seen in peripheral blood smears in combination with the presence of hemoglobin and its metabolic by-products in the urine were strong evidence that an anemic state would develop. The presence of hemoglobin, bilirubin, and urobilinogen in the urine was a reflection of the metabolism of

large quantities of hemoglobin released by destruction of Heinz body bearing erythrocytes within the reticuloendothelial system.

The toxic factor in onions is reported to be n-propyl disulphide, and apparently only has an influence on erythrocytes (2). The toxic dose of onions for the dog is an amount equal to or greater than 0.5% of the animal's weight (3).

In this case, only supportive treatment was given while the progression of the anemia was monitored. In spite of the rapid increase in severity of the anemia from days 5 to 8, whole blood transfusion was not seriously considered. The basis for this decision was the evidence of intense regeneration in the erythro-

cytic series in the form of metarubricytes and polychromatophils. The large number of young erythrocytes produced over a short period of time can be appreciated upon consideration of the reticulocyte counts on days 11 and 12. Reticulocytes were detected using a new methylene blue stain to precipitate remnants of nuclear protein present in young erythrocytes. This intense production of young erythrocytes together with decreasing numbers of erythrocytes bearing Heinz bodies in the peripheral blood indicated a satisfactory response to the anemia and an end to the toxic insult of the onions.

In spite of the high leukocyte count and regenerative left shift, antibiotic therapy was not instituted in this case. The basis for this decision was the absence of any clinical evidence of infection upon repeated examination of the dog. A large part of the leukocyte response was thought to be due to the strong diffuse stimulus presented to the bone marrow by the severe anemia, plus the stimulus presented by massive hemolysis.

Fluid therapy was given initially to support renal function before a definite diagnosis could be made, but was discontinued after the first day in spite of elevated blood urea nitrogen levels since the dog was alert, drinking normal volumes of water, and urinating several times daily. The normal serum creatinine level on day 7 indicated adequate glomerular filtration. The correlation of decreasing blood urea nitrogen levels with decreasing numbers of Heinz bodies in peripheral blood smears leads one to wonder about a transient hemoglobinemic nephrosis as a cause for the elevated blood urea nitrogen values.

### Summary

A case of hemolytic anemia in a four year old Yorkshire Terrier due to ingestion of onions in the form of an onion soufflé is reported. Laboratory results and response to conservative treatment are discussed.

### Résumé

Les auteurs rapportent un cas d'anémie hémolytique, chez un chien "Yorkshire Terrier" âgé de quatre ans, à la suite de l'ingestion d'oignons, sous la forme d'une soufflé à l'oignon. Ils commentent les résultats d'épreuves de laboratoire et la réponse de l'animal au traitement conventionnel.

### Acknowledgments

Thanks are due to Dr. J. L. Neufeld and the staff of the clinical pathology section of the Veterinary Diagnostic Laboratory, Agricultural Services Complex, University of Manitoba, Winnipeg, Manitoba for their assistance in the work-up of this case, and Dr. G. P. Searcy, Department of Pathology, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan for telephone consultation on the case.

### References

1. FARKAS, M. C. and J. N. FARKAS. Hemolytic anemia due to ingestion of onions in a dog. *J. Am. anim. hosp. Ass.* 10: 65. 1974.
2. JUBB, K. V. F. and P. C. KENNEDY. *Pathology of Domestic Animals*, Volume 1, p. 304. New York: Academic Press. 1970.
3. KINGSBURY, J. M. *Poisonous Plants of the United States and Canada*, p. 447. Prentice-Hall Inc. 1964.
4. SEBRELL, W. H. An anemia of dogs produced by feeding onions. *Publ. Hlth Rep., Wash.* 24: 1175. 1930.

## BOOK REVIEW

*Fundamental Techniques in Veterinary Surgery.* C. D. Knecht, J. R. Welsler, A. R. Allen, D. J. Williams and N. N. Harris. Published by W. B. Saunders, Toronto. 1975. 194 pages. Price \$15.45.

This text is adequately illustrated to depict basic instrumentation and suture materials. This should provide adequate material to train both surgeons, ancillary personnel and animal health technicians.

The preparation of materials and operative sites as well as draping techniques are illustrated. Various forms of body and extremity

dressings and bandages are very thoroughly illustrated and described. External fixation of limb fractures including splinting techniques, Robert Jones dressings and Thomas splint manufacture are thoroughly reviewed.

This book could serve as a primer for the junior veterinary surgeon or A.H.T. It would be of limited value to the medical student. The section on repair of fractured femur does not stress the importance of anatomical exposure. The latter is the only criticism one can make of the material covered by the authors. Recommended reading for the veterinary student. *W. G. Whittick.*