Hepatogenous Photosensitization in Cattle – A Case Report

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Introduction

Photosensitization is a biophysical phenomenon takes place when skin becomes sensitized to certain wavelengths of sunlight, particularly within the ultraviolet range of the spectrum, in the presence within skin cells of specific photodynamic agents [1] or also known as cutaneous disease caused by the activation of different photodynamic agents by long wave ultraviolet light that can result in dermatitis, hyporexia, weight loss, and eventually death of affected animals [2-5]. This disease has been described in different animal species worldwide [6-8].There are four forms of photosensitization: Primary photosensitization (Type 1 photosensitization), aberrant pigment synthesis (Type 2 (congenital) photosensitization), hepatogenous photosensitization (Type 3 photosensitization) and photosensitization of uncertain etiology (Type 4 photosensitization) [5]. The primary (Type 1) manifestation arise due to the ingestion of exogenous photodynamic substances contained in plants [4,5].Congenital photosensitization (Type 2) is rare in domestic animals, being associated with the aberrant metabolism of porphyrins resulting in the accumulation of photodynamic substances within the blood and tissues [4]. Hepatogenous photosensitization (Type 3) occurs when the capacity of the liver to excrete phylloerythrin, derived from the catabolism of alimentary chlorophyll, is impaired [4]. This occurs due to any hepatic injury that interferes with the chlorophyll metabolism leading to accumulation of abnormal by-product that should be excreted in the bile [3].Photosensitization of uncertain etiology (Type 4) has not been possible to ascertain whether the photosensitization is primary or due to hepatic insufficiency [5].

Case History and Clinical Observations

Seeno is a two years old male Hereford cross cattle weighing 463 kg and deworming status are up to date was presented to University Veterinary Hospital, Faculty of Veterinary Medicine, Universiti Putra Malaysia with the history of dull, depressed, lethargy, pale and icteric mucous membrane, hyperkeratosis and necrotized skin on the muzzle, necrotized scab at the tail end, pasty faeces and tick infestation. Upon physical examination, the temperature, pulse and respiration (TPR) were within normal range. Blood and faecal samples were taken for parasitology workout and the results revealed negative for blood protozoa infection and liver fluke infestation. During hospitalization, 5 blood samples were collected at different intervals for the period of two months of hospitalization via jugular venipuncture for complete blood count and serum biochemistry analyses. Seeno was diagnosed to have anemia from the first 3 blood results where the 1st blood results indicate PCV level of 0.22L/L (normal range 0.24-0.46 L/L) and the anemia resolved after treatments where during the 4th blood sampling the PCV improved to 0.32 L/L. Seeno was diagnosed also to have jaundice and hyperbilirubinemia where the icteric index from the first blood sampling was 50 Units (normal < 15 Units), total bilirubin was 178.4 µmol/L (normal: 1.7-27.2 µmol/L) and conjugated bilirubin 108.2 µmol/L (normal: <10.2 µmol/L) and markedly reduced after treatments where the icteric index from 5th blood sampling was 15 units, total bilirubin was 15.7 µmol/L and conjugated bilirubin was 16.1 µmol/L. The y-GT was markedly increased where in the 1st blood sample was 407 U/L (normal <25 U/L), the second blood sample was 432 U/L, third blood sample was 549 U/L, the fourth blood

sample was 241 U/L and the last blood sample was 27 U/L. The y-GT level improved markedly after treatment at the end of the second month of hospitalization. Two urinalysis was done during hospitalization where the first urinalysis was done at the time of hospitalization and the results were slight proteinurua and bilirubinuria. The second urinalysis was done at end hospitalization and the results were no proteinuria and no bilirubinuria was observed and the condition of Seeno improved after the treatments.

Treatment

On the first day of presentation in farm, the treatments given were Oxytetracycline (20mg/kg), Diminazene Aceturate (1ml/20kg), Flunixin meglumine (1.1mg/kg), Fercobsang (1ml/10kg) and Stress Vitam (1.1mg/kg) via intramuscular route and Cydectin (Moxidectin) (1ml/10kg) was poured on. On the second day, Seeno was transported into University Veterinary Hospital ward to provide shade and to prevent from the exposure of sunlight. Fercobsang (1ml/10kg), Flunixin meglumine (1.1mg/kg) and Stress Vitam (1.1mg/kg) was continued for another 4 days via intramuscular route. The feed for Seeno was changed to commercial pellet, molasses as supplement and pasture was not given for the first 2 weeks and then small proportion of pasture were given once daily and Seeno was maintained on commercial pellet and molasses. During hospitalization routine wound cleaning was done on the affected region (muzzle, nostril, and ear and tail area). After 2 weeks of hospitalization, the icteric condition improved, the mucous membrane become pink and Seeno was bright and alert. The skin lesion of Seeno markedly improved where there were no signs of hyperkeratosis and necrotized skin and the lesions around the muzzle dried and heal. After a month of hospitalization, Seeno's condition improved markedly and Seeno was further hospitalized to observed liver parameters and the icteric index. At the end of second month of hospitalization the liver parameters and icteric index back to normal and Seeno was doing well.

Discussion

In this case, Seeno had Type 3 photosensitization where hepatic involvement. When green pasture is consumed, breakdown of chlorophyll by micro-organisms present in the gastrointestinal tract will produce phylloerythrin (photosensitizing agent). The accumulation of photosensitizing agent in the liver will cause hepatic injury and result to liver enzyme leakage [9]. Damaged liver cannot properly metabolize phylloerythrin, which then accumulates in peripheral blood. Circulating phylloerythrin causes the photosensitization reaction in nonpigmented skin [4,10,11]. In hepatogenous photosensitization, the y-GT levels of the affected animals are normally elevated above reference values [8,12], and in this case, y-GT levels of Seeno markedly increased above the normal level upon presentation. After Seeno was removed from the exposure of sunlight and kept under the shade and treatments were given, the condition improved after a month of hospitalization. This treatment is agreement with treatment suggested by others [2,5]. The recommended treatment for hepatogenous photo-sensitization is removal of direct solar exposure [5] was effective since the skin lesions disappeared, and the appetite and body condition of the affected animals returned to normal after 30 days [2]. After a month of hospitalization, the y-GT levels of Seeno was still high and only showed low value after two months of hospitalization. This findings is agreement with [13] stated that some study have reported that most animals that recover from the acute phase of photosensitization will have reduced liver enzymes but the y-GT level still high. The prognosis for Seeno was good based on the therapeutic response. Seeno should be shaded fully or housed to prevent hepatic photosensitization reoccur. Seeno can be released for grazing only during darkness [9].

Conclusion

This article reports the successful management of hepatogenous photosensitization in cattle. The successful outcome of this case suggests that early intervention and treatment is important for better prognosis of the case. This report indicates also that management of the case required period of two months.

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