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Case Report

Glucocorticoid-induced laminitis with hepatopathy in a Thoroughbred filly

Seung-ho Ryu[1], Byung-sun Kim[1], Chang-woo Lee[2,*], Junghee Yoon[3], Yonghoon Lyon Lee[4]

[1]*Equine Hospital, Korea Racing Association, Kwachon 427-070, Korea*
[2]*Department of Clinical Pathology, College of Veterinary Medicine, Seoul National University, Seoul 151-742, Korea*
[3]*Department of Radiology, College of Veterinary Medicine, Seoul National University, Seoul 151-742, Korea*
[4]*Department of Anesthesia, Pain Management and Perioperative Medicine, Boren Veterinary Medical Teaching Hospital and College of Veterinary Medicine, Oklahoma State University, Stillwater, OK 74074, USA*

A 3-year-old Thoroughbred filly was referred to the Equine Hospital, Korea Racing Association for evaluation of hematuria, inappetite, weight loss and depression. From 25 days prior to admission, the horse was treated for right carpal lameness with 20 mg intramuscular administration of triamcinolone acetonide per day for consecutive 10 days by a local veterinarian. Clinical and laboratory findings included vaginal hyperemia, flare in bladder wall, neutrophilia, lymphopenia, polyuria, polydipsia and laminitis in the end. High activities of aspartate transaminase and gamma glutamyltransferase and high concentration of total bilirubin indicated hepatopathy. Further hematology, serum biochemistry and urinalysis did not reveal any abnormalities. Medical history, physical and clinicopathologic findings suggest that the laminitis and hepatopathy in this horse were most likely induced by repeated administration of exogenous corticosteroid. However, guarded prognosis of treating laminitis undermined the benefit of improvement of hematuria following electroacupuncture stimulation. The combined stimulation of kidney related acupoints (Shen Peng, Shen Shu), lumber related acupoints (Yao Qian, Yao Zhong) and associate acupoints (Guan Yuan Shu, Bai Hui) at 5Hz, 1-2V, for 40 minutes was of value in the treatment of hematuria. This case shows that horses under steroids may exhibit laminitis and steroid hepatopathy. Early recognition and good management of laminitis are important in the limitation of complications.

Key words: hematuria, hepatopathy, laminitis, Thoroughbred, triamcinolone acetonide

*Corresponding author
Phone: 82-2-880-1273; Fax: 82-2-880-8662
E-mail: anilover@snu.ac.kr

Laminitis is recognized as a potentially crippling condition in the horse that frequently progressed to euthanasia for humane reasons. It is believed that inflammatory mediators and other unknown local factors associated with these systemic diseases alter the hemodynamics within the digit and this alteration leads to laminitis [13].

There is no data reporting clinical case of laminitis in horses in Korea. The purpose of this report is to describe the first case of glucocorticoid-induced laminitis with hepatopathy and hematuria in a Thoroughbred filly in Korea.

Clinical findings and clinical pathology: A 3-year-old Thoroughbred filly was referred to the Equine Hospital, Korea Racing Association for evaluation of hematuria, inappetite, weight loss and depression. From 25 days prior to admission, the horse was treated for right carpal lameness with 20 mg (10 ml) intramuscular administration of triamcinolone acetonide (Retardoesterode, Laboratorios Calier, Barcelona, Spain) per day for consecutive 10 days (total amount: 200 mg) by a local veterinarian.

When admitted, the horses rectal temperature, heart rate and respiratory rate were 39.2°C, 60 beats/min and 36 breaths/min, respectively. The mucous membranes were congested and slightly cyanotic. There was severe thrombophlebitis on both jugular veins. Decreased intestinal sounds were auscultated in all 4 abdominal quadrants. There was vaginal hyperemia in speculum examination. Flare in bladder wall (Fig. 1) and hematuria in bladder (Fig. 2) were observed in endoscopic examination. No cystic calculi or neoplasia was observed in ultrasound examination. Radiograph of thorax was normal.

The horse had mild neutrophilia (14,852 neutrophils/μl) and lymphopenia (948 lymphocytes/μl). Abnormal serum biochemical values were high activities of aspartate transaminase (558 IU/L), gamma glutamyltransferase (39 IU/L), creatine phosphokinase (493 IU/L), lactic dehydrogenase (814 IU/L) and high concentration of total bilirubin (3.8 mg/dl). Urinary specific gravity and RBC

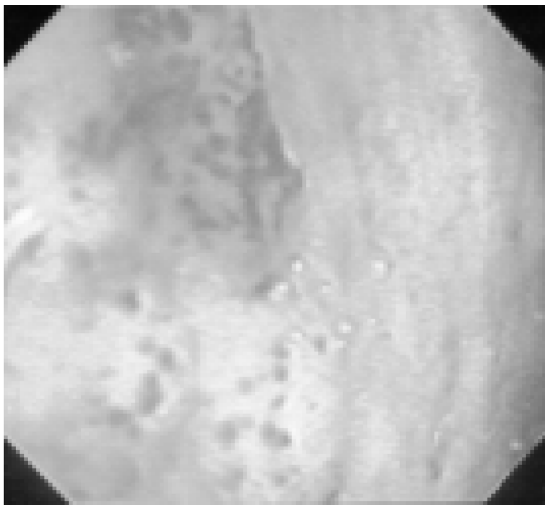

Fig. 1. Endoscopic findings of urinary bladder, there was flare in bladder wall.

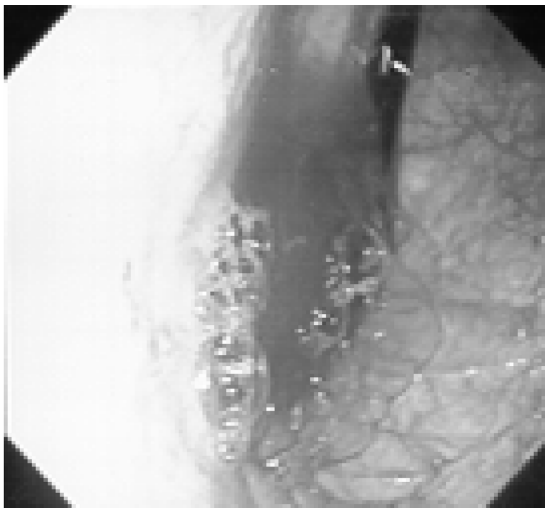

Fig. 2. Endoscopic findings of urinary bladder, there was hematuria in bladder.

counts were 1.023 and 190,000/μl, respectively. No abnormality in renal function was indicated by urinary specific gravity and within normal range concentrations of BUN (2 weeks after admisson 11 mg/dl: on admission 9 mg/dl) and creatinine (2 weeks after admisson 1.3 mg/dl: on admission 1.4 mg/dl) and no glucose and ketone in urine. Polydipsia was observed. Polyuria was presumed on the basis of wetter bedding in the horses stall.

Therapy and course of condition: There was a difficulty in medical treatment because of severe thrombophlebitis on both jugular veins, and therefore a decision to treat the filly with electroacupuncture therapy was made. Kidney related acupoints including Shen Peng (kidney shelf) and Shen Shu (kidney association point), and associate acupoints including Guan Yuan Shu (association point of enclosed original energy, BL-26), Bai Hui (hundred meetings, GV-20), Yao Qian (cranial lumber) and Yao Zhong (Middle lumber) were selected for the treatment of hematuria and stimulated at 1-2V and 5Hz, for 40 minutes. Color of urine changed gradually into almost normal yellow color and RBC counts in urine gradually decreased (from 190,000/μl to 8,000/μl) by the 2 weeks of electroacupuncture therapy.

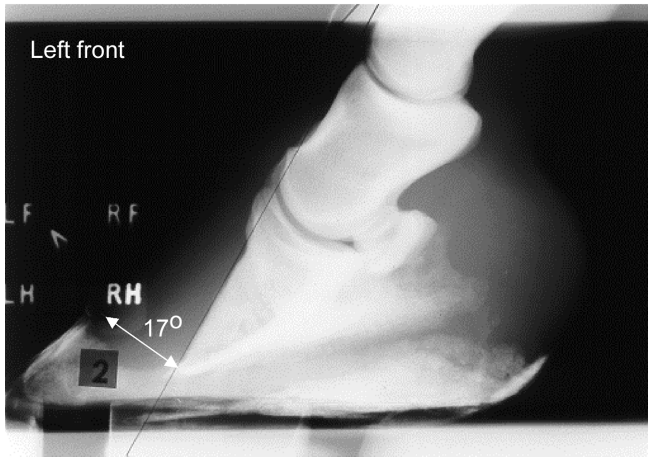

Fig. 3. Lateromedial projection of left 3rd phalanx, 17 degrees of ventral deviation of the third phalanx is shown.

On the 8th day of hospitalization, the horse became lame and showed signs of laminitis in the front feet. Lateral radiography of the front feet revealed 17 degrees of ventral deviation of the third phalanges of both front feet (Fig. 3). Extra-deep bedding was placed in the stall. Medical treatment with mineral oil, flunixin meglumine and antihypertensive such as acepromazine and both front Qian Ti Tou (toe of the hoof) and Qian Jiu (central bulb) hemoacupuncture for 4 days failed to alleviate clinical signs.

Serum chemical values were evaluated daily; serum activities of AST (542 IU/L: on admission 558 IU/L), CPK (296 IU/L: on admission 493 IU/L) and LDH (786 IU/L: on admission 814 IU/L) remained high for KRA reference range 2 weeks after admisson. Activity of GGT (30 IU/L: on admission 39 IU/L) and concentration of total bilirubin (1.2 mg/dl: on admission 3.8 mg/dl) were within KRA reference range 2 weeks after admisson. Urinary specific gravity and RBC counts were 1.025 and 8,000/μl (on admission 1.023 and 190,000/μl), respectively 2 weeks after admisson. Glucose and ketone remained not detected in urine. Polydipsia and polyuria were almost resolved at that time. Radiography of the front feet was repeated after approximately 1 month; perforated soles by the toes of third phalanges were detected (Fig. 4). The filly retired from race because of guarded prognosis of laminitis.

Medical history, physical and clinicopathologic findings suggest that the laminitis and hepatopathy in this horse were most likely induced by repeated administration of exogenous corticosteroid. Because of the manifold

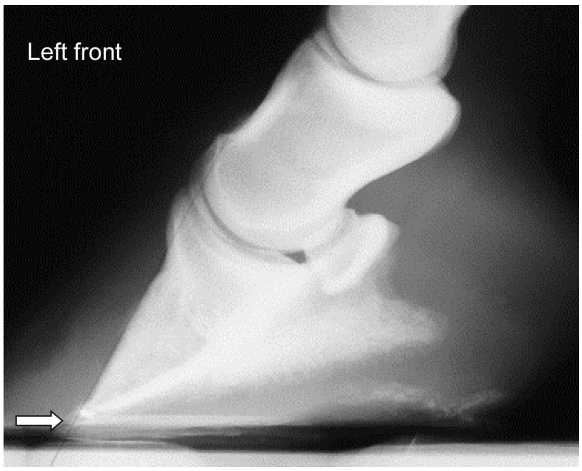

Fig. 4. Lateromedial projection of left 3rd phalanx, perforated soles by the toe of third phalanx is detected (arrow).

physiologic processes affected by glucocorticoids, a wide variety of clinical and laboratory findings have been reported including polyuria, polydipsia, laminitis, hyperglycemia, glucosuria, neutrophilia, lymphopenia [3,8, 15,18]. High activities of AST and GGT and high concentration of total bilirubin indicated hepatopathy. Hepatic disease following exogenous administration or endogenous production of excess glucocorticoids had developed in people and dogs [7,21]. The condition has been termed steroid hepatopathy [21]. The condition most often develops subsequent to administration of exogenous glucocorticoids. High concentration of glucocorticoids in blood also was considered to have caused neutrophilia and lymphopenia in this horse. Corticosteroid-induced neutrophilia is attributed to decreased ability of neutrophils to adhere to vascular endothelium [5,16] resulting in decreased margination of neutrophils in vascular channels and reduced diapedesis of neutrophils from blood into tissues [4,5,16]. The mechanism of corticosteroid induced lymphopenia is believed to be diminished recirculation or redistribution into lymphoid tissue of recirculating lymphocytes.

Hematuria was considered to originate from flare of the mucosa by cystitis rather than nephritis.

Glucocorticoids are known to potentiate vasoconstriction caused by catecholamines [9] Digital vasoconstriction and subsequent diminished laminar perfusion is believed to be an important factor in the pathogenesis of laminitis [14]. Signs of laminitis in this horse developed around 30 days after initial administration of glucocorticoid, either because of delayed onset or slow progression of disease. Laminitis is reportedly more common after triamcinolone acetonide, compared with other corticosteroids [11]. Adams theorized laminar necrosis was caused by laminar edema after demonstrating increased blood flow through the digital arteries [2]. The edema led to necrosis when the laminae were compressed between bone and the noncompliant hoof wall. Using digital angiography, Garner and Coffman showed decreased arterial flow in the circumflex and laminar vessels during acute and chronic laminitis [1,6]. Hood and Galey, using scintigraphy, demonstrated decreased laminar capillary blood flow during acute laminitis [10,12]. Many of these studies converged upon the theory that during the development of acute laminitis blood flow to the digit increased, but was shunted through arteriovenous shunts resulting in decreased laminar capillary blood flow. The presence of arteriovenous shunts is supported by studies of Molyneux and Pollitt, who demonstrated anatomic arteriovenous shunts in the equine digit [17,19].

However, guarded prognosis of treating laminitis undermined the benefit of improvement of hematuria following EA stimulation. The combined stimulation of kidney related acupoints (Shen Peng, Shen Shu), lumber related acupoints (Yao Qian, Yao Zhong) and associate acupoints (Guan Yuan Shu, Bai Hui) at 5 Hz, 1-2 V, for 40 minutes was of value in the treatment of hematuria. It is probable that electroacupuncture enhanced the healing rate of flare. Acupuncture or electroacupuncture by needles around the edge of trophic ulcers, including postphlebitis ulcers, cured most cases. Acupuncture cured thromboangitis obliterans. Acupuncture with anticoagulant therapy (heparin) resolved thrombophlebitis. Pain and bleeding improved or stopped after the first session in 82% of cases [20].

This case shows that horses under steroids may exhibit laminitis and steroid hepatopathy, and warrants judicious usage of such agents. Early recognition and good management of laminitis are important prerequisites in the limitation of complications.

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