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Red Urine in Horses: Causes and Diagnostic Methods

Monali B. Bhesaniya[1*], Umang. J. Dubariya[2], S. H. Zalavadiya[3]

[1]Department of Veterinary Anatomy, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Junagadh, Gujarat-362001, India

[2]Department of Veterinary Surgery & Radiology, College of Veterinary Science &Animal Husbandry, Kamdhenu University, Navsari, Gujarat--396450, India

[3]Department of Veterinary Surgery & Radiology, College of Veterinary Science &Animal Husbandry, Kamdhenu University, Junagadh, Gujarat-362001, India

INTRODUCTION

Urine is a liquid byproduct of the body secreted by the kidneys through a process called urination and excreted through the urethra. The normal chemical composition of urine is mainly water content, but it also includes nitrogenous molecules, such as urea, as well as creatinine and other metabolic waste components. Urine is an aqueous solution of greater than 95% water. Normal horse urine is cloudy. This is due to the calcium carbonate crystals present in urine. Normal horse urine is foamy. This is due to the presence of totally normal mucus in urine. The mucus helps to prevent calcium carbonate crystals from forming stones. Normal horse urine can vary in colour, from light yellow to dark yellow. The colour can vary within the amount that is voided at one time. This means that it can start out dark, and end up clear. Sometimes, you may notice that after exercise the urine is darker. Usually no worries there, darker urine can be normal or it can be a sign of tying up and some other serious diseases. Horses also have varying amounts of compounds called urocatechins in their urine. These can be oxidized by light after they are passed and turn orange to red in colour, thereby discolouring shaving.

Chemical characteristics of normal equine urine and changes associated with disease

Red Urine in Horse

There is various disease condition in which red discoloration of urine is seen, condition may be self-resolving or may need special therapeutic management. The red discoloration is mainly due to the presence of blood in urine which is termed as hematuria. According to symptoms the accurate diagnosis should made and preferred medicinal or surgical treatment assessed.

Parameter	Normal range
pH	7.5-8.5 (in adult horse), 5.5-8.0 (in foals)
Protein	Usually <100 mg%
Glucose	None
Ketone	None
Bilirubin	None
Hemoglobinuria	None
Myoglobinuria	None

There are following conditions in which red discoloration of urine is seen:

1) Urethral rents:

Hematuria that occurs at the end of urination in geldings is typical of a condition in which a defect in the urethra mucosa allows blood within the corpus spongiosum penis (CSP) to enter the urethra at the end of urination. Urethral rents occur on the convex surface of the urethra of male horses at the level of the ischial arch. Some horses with urethral rents display signs of dysuria (e.g. tenesmus, grunting). Hemorrhage through the rent into the urethral lumen occurs when pressure within the CSP increases at the end of urination or during ejaculation. This high

pressure may cause a "blow-out" tear in the urethral mucosa. The bulbospongiosus muscle causes this increase in pressure as it contracts to expel the contents of the urethra at the end of urination or during ejaculation. The difference in clinical symptoms between stallions and geldings is due to the fact that geldings' CSP achieves a higher-pressure during urination than stallions' CSP. The CSP of geldings is lower than that of stallions, therefore applying pressure to a smaller space causes more pressure within that space than applying pressure to a wider space.

Diagnosis:

Endoscopic examination of the urethra is required.

2) Urethritis

Although urethritis may be an actual cause of hematuria or hemospermia, a diagnosis of urethritis as a cause of hematuria could be an erroneous interpretation of the endoscopic appearance of the normal male urethra.

Etiology:

Larvae of Draschia and Habronema spp have preferential sites for development in moist areas, such as the urethral process, where they are deposited by flies attracted to moisture. A granuloma involving the urethral process, caused by infestation of these larvae, can be a cause of hematuria in horses. Erosion of the CSP by the granuloma results in hemorrhage when pressure within the CSP increases at the end of urination.

3) Bacterial cystitis

Cystitis is a rare cause of hematuria in horses.

Etiology:

Cystitis in the horse is usually secondary to urine retention caused by paresis or paralysis of the bladder or by a urocystolith. Vaginitis and repeated or prolonged indwelling catheterization are other predisposing causes of bacterial cystitis. Primary or idiopathic cystitis in the horse is rare. In addition to hematuria, other clinical signs of cystitis include dysuria and frequent urination (i.e., pollakiuria). The bladder usually feels normal during palpation per rectum, but thickening and erosions of the bladder mucosa may be seen during cystoscopy.

Diagnosis:

For horses with cystitis, bacterial culture of urine and antimicrobial sensitivity testing of cultured bacteria are indicated.

4) Urolithiasis

Hematuria caused by cystic calculi is likely to be more pronounced near the end of urination. Other clinical signs of cystic or urethral calculi include pollakiuria, dribbling of urine, dysuria, and prolonged periods of penile protrusion. The hind limbs are often urine or blood stained. A cystic calculus may cause a stilted hind limb gait. These signs may help to distinguish horses with a cystic calculus from horses with a urethral rent because a urethral rent usually causes no signs of pain. Cystic uroliths are found more frequently in male horses than in mares.

Diagnosis:

Cystic calculus can usually be confirmed by palpation of the bladder per rectum or by observing the calculus during endoscopic examination of the bladder. A cystic calculus is more likely to be detected by using ultrasonography and endoscopy.

Because almost all uroliths of horses are composed of calcium carbonate a low-calcium diet is recommended to prevent recurrence.

5) Pyelonephritis:

Pyelonephritis, which is a suppurative bacterial infection of the renal pelvis and parenchyma. Predisposing causes are urethral trauma, sorghum cystitis, uroliths, or other causes of obstruction of the flow of urine.

Diagnosis:

Characteristic changes seen during ultrasonography of equine pyelonephritis include increased renal echogenicity, abnormal renal outline, loss of corticomedullary distinction, detection of a large amount of echogenic to hyperechoic debris in the renal pelvis, and pyelectasia (dilatation of the renal pelvis). Biopsy of a kidney with an abnormal ultrasonographic appearance would likely aid in the diagnosis of pyelonephritis.

6) Idiopathic hematuria

A syndrome of idiopathic hematuria that primarily affects Arabian horses has been described that closely resembled the clinical findings of horses with hematuria suspected to be caused by pyelonephritis (most of which were also Arabian). Horses with idiopathic hematuria had severe renal hemorrhage that was usually unilateral but was occasionally bilateral, with no other signs of disease.

Diagnosis:

The diagnosis was made by exclusion of known causes of renal hemorrhage.

7) Verminous nephritis

Hematuria in horses caused by renal infection with Halicephalobus gingivalis or Strongylus vulgaris has been reported. H.

gingivalis is a saprophytic nematode that rarely causes disease in horses. The nematode can invade the central nervous system to cause neurologic signs; bone to cause osteomyelitis; and the kidneys, wherein it creates granulomas that may cause hematuria.

Diagnosis:

The nematode may be found during urinalysis of affected horses or during histologic examination of renal tissue obtained by biopsy. Horses with renal disease caused by H gingivalis often have signs of neurologic disease or osteomyelitis. Ultrasonographic appearance of renal granulomas caused by H gingivalis has been described as similar in echogenicity to the renal cortex.

8) Renal and vesicular neoplasia

Neoplastic invasion of the renal vasculature is an uncommon cause of hematuria of horses.

Etiology:

Adenocarcinoma (also known as a renal cell carcinoma) and lymphosarcoma are the most common tumors affecting the kidney, but adenocarcinoma is more likely than lymphosarcoma to cause Hematuria. Squamous cell and transitional cell carcinomas are reported to cause hematuria in horses.

Diagnosis:

An antemortem diagnosis of renal neoplasia is unlikely if ultrasonographic examination of the neoplastic kidney is not possible, unless the left kidney is affected and has a change in its palpable characteristics. Clinical findings of horses with bladder tumors are similar to those of horses with cystic calculi (i.e. hematuria and stranguria with a palpable mass in the bladder). Bladder tumors are readily diagnosed by identifying neoplastic cells during urinalysis or by endoscopic examination of the bladder.

9) Blister beetle (cantharidin) toxicosis

Hematuria is not a common clinical finding in horses with blister beetle toxicosis but this condition should be considered as a cause of hematuria for horses fed alfalfa hay that have concurrent signs of abdominal pain. Hematuria caused by ingestion of blister beetles occurs late in the syndrome. Cantharidin, the toxic principle of blister beetles, is irritating to the digestive and urinary tracts. Clinical signs depend on the amount of cantharidin ingested and range from signs of severe abdominal pain and shock to mild colic and depression. Irritation of the urinary tract may cause pollakiuria and hemorrhage of the urinary mucosa

Diagnosis:

Typical and significant clinicopathologic findings in horses with blister beetle toxicosis are increased serum CK activity and decreased serum concentrations of calcium and magnesium. Beetles are not always found during a search of the contaminated hay; thus, the condition is definitively diagnosed by finding cantharidin in the urine, stomach contents, or contaminated hay using high-pressure liquid chromatography, gas chromatography, or mass spectrometry. To detect cantharidin, at least 500 mL of urine or 200 g of stomach contents should be submitted to a toxicology laboratory in a refrigerated container.