# Neonatal uroperitonium in female equine: Case report

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**ABSTRACT**

Uroperitonium is defined by the accumulation of urine in the abdominal cavity, mostly being generated by the rupture of the urinary gallbladder, affecting young foals. The clinical symptoms of the disease include apathy, dyspnea, tachypnea, abdominal distension, discomfort and can cause death due to imbalance due to intense uremia. The diagnosis is made through complementary tests, together with the clinic. Complementary tests include abdominal ultrasound and laboratory tests, such as: blood count, biochemistry, analysis of abdominal fluid and urinalysis. The prognosis is poor and depends on the clinical evolution and degree of contamination. The objective of this study is to report a case of uroperitonium in a female neonate, received at the Unifeob Veterinary Center, presenting dyspnea, hyperthermia, apathy and abdominal discomfort. Complementary tests were of paramount importance for the final diagnosis. Due to the time of evolution associated with the severe degree of contamination, the patient died before the surgical intervention.

**Keywords:** Neonatology, Ultrasonography, Uremia.

## INTRODUCTION

Uroperitonium is defined by the concentration of urine in the abdominal cavity, and is predominantly caused by the rupture of the urinary vesicle (Aguilar, 2019). Urine retention in the peritoneal cavity is one of the urogenital conditions that affect young foals, being detected in up to 2.5% of hospitalized neonates (Kablack et al., 2000).

Most of the published studies on uroperitonium describe the urinary gallbladder defect as the main cause, and only a few studies describe the primary urachal defect as the cause of the pathology, both in horses and in other animals (Muller, Gregory, 1978; Baxter et al., 1992; Braunet al., 2009).

The manifestation of the disease occurs more frequently in male foals after birth (Bain, 1954). The frequent occurrence in male foals is related to the wider urethra and narrower lumen, which compromises proper emptying of the bladder. The anatomical difference makes males more susceptible to complete bladder rupture when subjected to the focal pressures of labor (Bain, 1954; Rooney, 1971; Hackett, 1984).

The dorsal region of the bladder wall is the most common site for rupture to occur, with the urachus being the second most affected structure (Hackett, 1984; Adams, 1988). Among the various causes that can result in abdominal pain in the neonate, uroperitonum can be considered the earliest (Souza, Sacco, Pereira, 2008). Its manifestation is possible in the first days of life due to the compression of the bladder and the traction of the umbilical cord during childbirth, which causes traction and, in some cases, leads to the rupture of the urachus (Gomes et al., 2022). Symptoms in newborn animals include weakness, difficulty suckling, dysuria, dyspnea, hypovolemia, tachycardia, tachypnea, metabolic and respiratory acidosis due to considerable abdominal distension caused by urine accumulation. This can result in signs of intoxication, stupor, coma, and eventual death due to uremia (Thomassian, 2005).

Uroperitonium may result in a large volume of peritoneal anechogenic fluid, containing echogenic calcium carbonate crystals. Visceral structures may be delimited by anichogenic fluid and the urinary vesicle may be seen folded and collapsed, however, this lesion is not often visualized (Kidd, Lu, Frazer, 2022).

Patients with uroperitonium may present with leukocytosis with neutrophilia (> 15,000/mL) and metabolic acidosis. Presenting high levels of urea and creatinine, mostly above 66 mg/dL and 4.1 mg/dL (Thomassian, 2005).

One of the most sensitive laboratory tests for diagnosing uroperitonium is the relationship between creatinine levels in peritoneal fluid and blood serum. To confirm the diagnosis, the ratio of creatinine concentration in abdominal fluid to serum must be 2:1 or greater (Thrall et. al., 2015).

The concentration of urine in the abdominal cavity causes it to have high concentrations of creatinine and potassium, being low in sodium, thus leading to an increase in the osmolarity of the

peritoneal fluid (Butters, 2008). The accumulation of creatinine in the peritoneal fluid evolves into chemical peritonitis, first leading to the release of vasoactive and chemotactic amines, thus increasing vascular and plasma permeability (Knottenbelt, Holdstock, Madigan, 2004). In addition to the fact that inflammatory diseases can develop a systemic inflammatory response (SIRS), defined by a dysfunction caused by a dysregulated inflammatory response of the host to infection, the symptoms may involve: leukocytosis or leukopenia, tachycardia, tachypnea, and fever (Melo et. al., 2021).

Celiotomy is considered the resolutive intervention, and should be performed when the patient is stabilized (Thomassian, 2005).

The surgical procedure is performed with a midline incision, identification of the structures involved, inverted suture in the urinary gallbladder and the abdomen must be washed. The residual part of the umbilical tissue is removed, the placement of a drain may be an option. The prognosis is directly related to the degree of contamination present (Du Plessis, 1958; Adams, 1988; Richardson, 1983).

The objective of this study is to report the case of uroperitonium due to urachal rupture in a filly, pointing out the alterations found in the diagnostic methods of the disease and its complications.

## CASE REPORT

A filly, quarter horse, approximately 4 days old, was referred to the Unifeob Veterinary Center, in São João da Boa Vista-SP, presenting in the clinical examination: heart rate 144 bpm, respiratory rate 128 mpm, dyspnea, prostration, abdominal discomfort, hyperthermia 40.7°C, normocored mucous membranes, blood lactate 16.0 mmol/L, glycemia 345 mg/dL.

To correct the electrolyte imbalance and minimize potassium concentration, fluid therapy with isotonic saline solution, intravenous administration of dipyrone for temperature control, hydrocortisone 4 mg/kg (single dose), as a cephalosporin antibiotic with bactericidal activity against gram-negative and gram-positive bacteria was used, ceftiofur 10 mg/kg BID and selective anti-inflammatory for cox-2, firocoxib 0.2 mg/kg SID for control of inflammation.

Complementary tests were performed on a complete blood count (Table 1), a biochemical test (Table 2), and abdominal and thoracic ultrasound. In the blood count, it was possible to observe an evident leukocytosis due to neutrophilia and monocytosis, in addition to changes in biochemistry, especially in renal functions (urea and creatinine). Abdominal ultrasonography evaluated the presence of free fluid in the abdomen with fibrinous cellularity (Figure 1), fluctuating urinary vesicle wall (Figure 2), slender voids with a rough wall. On thoracic ultrasound, no significant pleural alteration.

For the laboratory analysis of the free fluid present in the abdomen (Table 3), ultrasound-guided abdomenycosis was performed (Figure 3), thus providing greater safety in the collection, concomitantly, urethral probing was performed to collect urine (Table 4) and compatibility analysis between the samples. It was noted that there was a great compatibility between both, odor, density, pH, color, and a large presence of red blood cells.

The compilation of laboratory and ultrasound findings led to the diagnosis of uroperitonium, with emergency surgical referral. Until the arrival of the surgical staff, the patient in question had an evident clinical worsening, presenting dyspnea, tachypnea and cyanotic mucosa (at which time hydrocortisone was administered), the patient was in intensive oxygen therapy. The patient died during anesthetic induction, before intubation, due to its severe degree of contamination, leading to septicemia and systemic inflammatory response.

TABLE 1: Complete blood count, showing leukocytosis.

| Material: Sangue Total | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Equipamento: Bioquímico BIOPLUS 200 | | | | | | Vlr. de Referência | | |
| Eritrograma | | | | | | | | |
| Eritrócitos | 8,19 | milhões/mm³ | | | 7,40 | a | 10,60 |
| Hemoglobina | 11,10 | g/dl | | | 10,70 | a | 15,80 |
| Hematócrito | 29,20 | % | | | 28,00 | a | 43,00 |
| RDW | 17,50 | % | | | 15,00 | a | 21,00 |
| V.C.M | 35,65 | u³ | | | 35,00 | a | 44,00 |
| H.C.M | 13,55 | pg | | | 0,00 | a | 0,00 |
| C.H.C.M | 38,01 | g/dl | | | 35,00 | a | 40,00 |
| Proteína total | 6,60 | g/dl | | | 6,20 | a | 7,50 |
| Eritroblastos | 0,00 | % | | | | | |
| Observação série vermelha: | | | | | | | | |
| Leucograma | | | | Vlr. Ref. Relativo | Vlr. Ref. Absoluto | | |
| Leucócitos | 38000 | | /mm³ | | 6300 | a | 13600 |
| Mielócitos | 0 | % | 0 /mm³ | 0-0 % | 0 | a | 0 |
| Metamielócitos | 0 | % | 0 /mm³ | 0-0 % | 0 | a | 0 |
| Bastonetes | 0 | % | 0 /mm³ | 0-1 % | 0 | a | 240 |
| Segmentados | 85 | % | 32300 /mm³ | 69-77 % | 4350 | a | 10550 |
| Eosinófilos | 0 | % | 0 /mm³ | 0-0 % | 0 | a | 90 |
| Basófilos | 0 | % | 0 /mm³ | 0-1 % | 0 | a | 180 |
| Linfócitos típicos | 4 | % | 1520 /mm³ | 22-16 % | 1430 | a | 2280 |
| Linfócitos atípicos | 0 | % | 0 /mm³ | 0-0 % | 0 | a | 0 |
| Monócitos | 11 | % | 4180 /mm³ | 4-3 % | 300 | a | 540 |
| Outros | 0 | % | 0 /mm³ | | | | |
| Observação série branca: | | | | | | | |
| Contagem plaquetária | 327000 mil/mm³ | | | | 100000 | a | 350000 |
| Avaliação plaquetária | | | | | | | |

Source: Authors, 2024.

TABLE 2: Results of the biochemical examination.

**Albumina**

Material: Soro
Metodologia: Verde de Bromocresol
Equipamento: Bioquímico BIOPLUS 200

| | | | Valores de Referência | | |
|---|---|---|---|---|---|
| Resultado.....: | 2,10 | g/dL | 2,00 | a | 3,50 |

**Creatinina**

Material: Soro
Metodologia: Cinético Colorimétrico
Equipamento: Bioquímico BIOPLUS 200

| | | | Valores de Referência | | |
|---|---|---|---|---|---|
| Resultado.....: | 11,30 | mg/dL | 1,00 | a | 1,70 |

**Uréia**

Material: Soro
Metodologia: Cinético UV
Equipamento: Bioquímico BIOPLUS 200

| | | | Valores de Referência | | |
|---|---|---|---|---|---|
| Resultado.....: | 201,00 | mg/dL | 4,00 | a | 20,00 |

**AST**

Material: Soro
Metodologia: Cinético UV
Equipamento: Bioquímico BIOPLUS 200

| | | | Valores de Referência | | |
|---|---|---|---|---|---|
| Resultado.....: | 291,00 | UI/L | 200,00 | a | 450,00 |

**Fibrinogênio**

Material: Plasma
Metodologia: Precipitação em banho maria
Equipamento: Bioquímico BIOPLUS 200

| | | | Valores de Referência | | |
|---|---|---|---|---|---|
| Resultado.....: | 400,00 | mg/dL | 100,00 | a | 400,00 |

Source: Authors, 2024.

TABLE 3: Results of the urinalysis test, urinalysis.

| Urina | | | Referência | | |
|---|---|---|---|---|---|
| Material: Urina | | | | | |
| Exame Físico | | | | | |
| Método de Obtenção | Cateterismo | | | | |
| Volume | 6,00 | mL | | | |
| Cor | Amarelo Palha | | | | |
| Aspecto | Límpido | | Límpido | | |
| Densidade | 1010 | g/ml | 1020 | a | 1050 |
| Exame Químico | | | | | |
| pH | 7,00 | | 7,00 | a | 8,00 |
| Bilirrubina | Ausente | | Ausente | | |
| Urobilinogênio | Normal | | Normal | | |
| Proteínas | ++ | | Ausente a Traços | | |
| Glicose | +++ | | Ausente | | |
| Corpos Cetônico | Ausente | | Ausentes | | |
| Sangue Oculto | ++++ | | Ausente | | |
| Nitrito | Negativo | | Negativo | | |
| Sedimentoscopia | | | | | |
| Hemácias | Campo Cheio | | Até 2/campo | | |
| Leucócitos | 6-20 | | Até 3/campo | | |
| Células | | | | | |
| Descamativa | Algumas | | 0 a + | | |
| Transição | + | | 0 a + | | |
| Outros | | | | | |
| Cilindros | | | Ausentes | | |
| Cristais | | | Ausentes | | |
| Outros Elementos | Odor: Sui generis. Sais biliares: Ausente. | | | | |

Source: Authors, 2024.

TABLE 4: Results of the analysis of free fluid, collected via the abdomenyx and ultrasound-guided procedure.

Exame Físico

Volume: 1,5ml
Cor: Amarelo Palha
Odor: Fermentado
Aspecto: Límpido
Densidade: 1.010,0

Exame Químico

pH: 8,0
Proteínas: 0,0 mg/dL
Glicose: +++
Sangue Oculto: +

Contagem

Hemácias: 10.000
Leucócitos: 800

Citologia %

Neutrófilos: 10%
Linfócitos: 0
Bastonetes: 0
Macrófagos: 90%
Eosinófilos:0

Observações

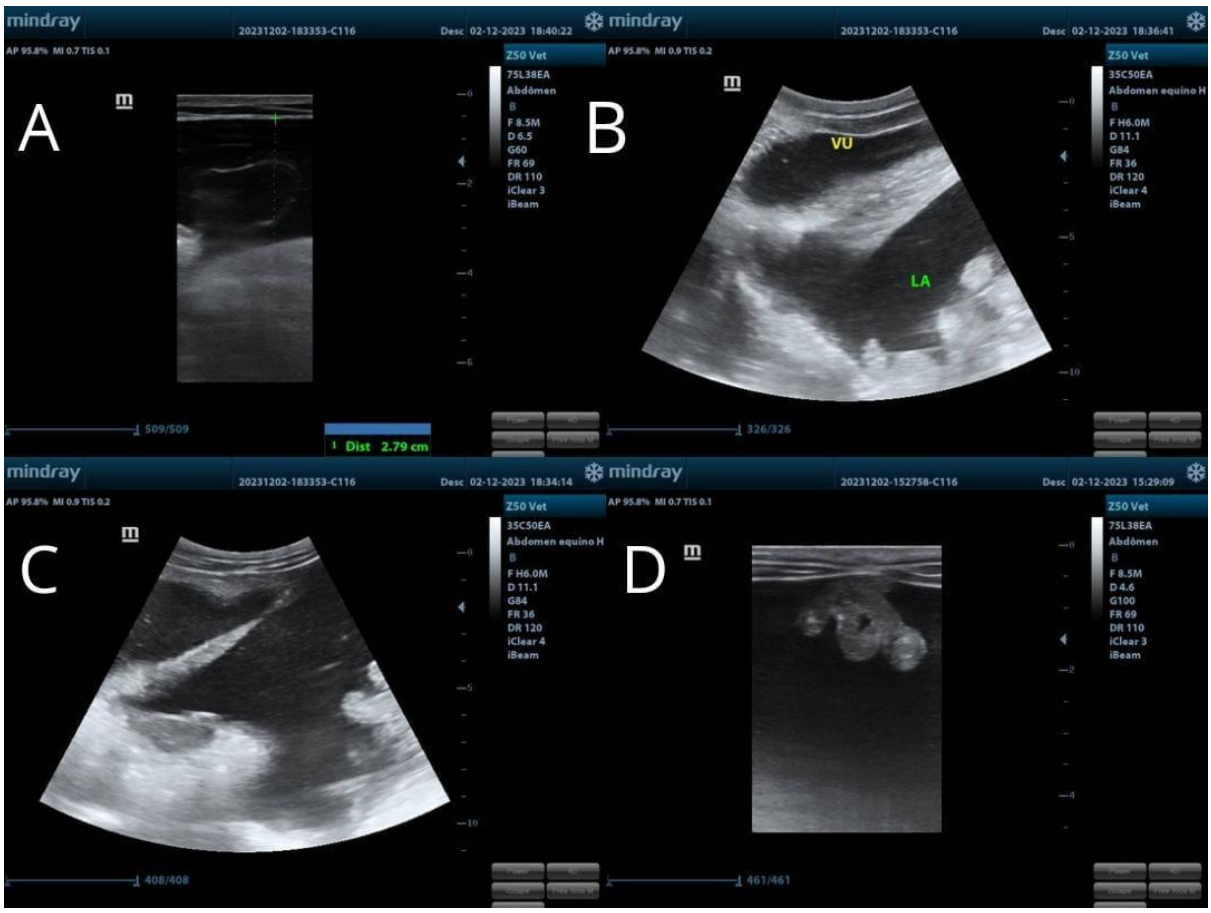
Foi realizado bioquímico do liquído, com os seguintes resultados:
Creatinina: 22,7 mg/dL
Albumina: 0,0 g/dL

Amostra

Tipo de coleta: Abdominocentese
Qualidade da amostra: Satisfatória

Source: Authors, 2024.

Ultrasound images: **A)**: Showing the presence of free fluid in the abdominal cavity and measuring the distance between the muscles and intestinal loops, thus collecting the fluid guided by ultrasound. Using linear probe, with frequency at 8.5MHz **B)**: VU: Urinary gallbladder. LA: Abdominal fluid. Using a linear probe, with harmonic frequency 6.0MHz **C)**: Subsequent image, showing communication between urinary vesicle and free fluid, through the floating wall between them. Using linear probe, with harmonic frequency 6.0MHz **D)**: Urace, vein and floating umbilical arteries. Using linear probe, with frequency at 8.5MHz.



Source: Authors, 2024.

## CONCLUSION

According to the present study, it is possible to conclude that even if uroperitonum due to urinary gallbladder rupture in females is poorly described, it may occur. Information from complementary exams, both ultrasonography and laboratory tests, added to the clinic are essential for a quick and accurate diagnosis. As described, the evolution time is crucial for the prognosis of the disease, so having tests that help us for the diagnosis, consequently we reduce the clinical evolution time of the disease, thus helping patients suffering from such a disease.

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