Acute Renal Failure and Laminitis Following Cesarean Section in a Friesian Mare. A Case Report

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SHORT COMMUNICATION

Abstract

The term dystocia refers to an abnormal birth and the most common cause is an abnormal alignment of the head or forelimbs in the birth canal. Usually in adult horses, acute renal failure occurs as a complication of another disease process that causes hypovolemia. Diarrhea and severe laminitis may develop in more serious cases. The aim of this case report was to present a cesarean section in the mare that evolved with renal failure and subsequent with laminitis. A nine year old Friesian mare was referred to the Veterinary teaching hospital FMV Cluj-Napoca, after a dystocia that could not be resolved conservatively. During surgery, profuse hemorrhage was noticed during the incision and suture of the uterine wall. Hypovolemia was corrected and recovery was uneventful. Two days after surgery, the mare developed acute hyposthenuric renal failure. After 3 days of intensive therapy, kidney function started to improve but the mare developed laminitis. The mare improved over a few weeks and was discharged after orthopedic shoeing. According to the author's knowledge, this is the first case report of a cesarean section in the mare that evolved into this cascade of sequelae.

Keywords: dystocia; mare; laminitis; renal failure.

INTRODUCTION

Dystocia in the mare is a rare event but a true emergency. The most common cause of dystocia in the mare is an abnormal alignment of the head or forelimbs of the foal in the birth canal (McCue and Ferris, 2011). Friesian mares appear to be particularly prone to dystocia due to fetal ankylosis or transverse presentation (Maaskant et al., 2010). Survival rate of mares significantly improves with cesarean section (Norton et al., 2007). At this stage the main goal is to save the mare, because the foal is no longer viable more than 20 minutes after the second stage of delivery is initiated (McCue and Ferris, 2011). Acute renal failure (ARF) in adult horses can be prerenal or renal in origin and it is often secondary to hemodynamic changes or a nephrotoxic insult (Savage et al., 2019). ARF can develop as a complication of another disease process that causes hypovolemia including colic, colitis, hemorrhage, sepsis (Harold, 2009). Clinically, the patients show signs of marked depression, anorexia and oliguria. Anuric renal failure has a poor prognostic factor (Divers et al., 1987). In severe cases, horses may also be ataxic or show neurologic signs. Also, diarrhea and severe laminitis may develop in more serious cases (Savage et al., 2019). In laminitic hoofs, the blood flow to the laminae is affected, resulting in inflammation and swelling of the tissues within the hoof and is an extremely painful condition. This results in mechanical collapse of the foot. Laminitis can affect any of the feet but is more commonly seen in the front feet (O'Grady and Parks, 2008). Starting a multimodal treatment in the acute phase helps give the horse the best chance of recovery. An evaluation method has been described to classify and understand the progression of laminitis in horses. The Obel grading system also creates a benchmark for monitoring the improvement or worsening of the disease and the efficiency of the

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treatment (Menzies-Gow et al., 2010). According to the Obel Grading System in grade 1 Horses shift weight from one foot to the other or incessantly lift feet, lameness is not evident at a walk, but at the trot horses will have a shortened stride; Grade II - horses move willingly at a walk and trot but with a noticeably shortened and stabbing stride, a foot can be lifted off the ground without difficulty; Grade III - Horses move reluctantly and resist attempts to lift affected or contralateral feet; Grade IV - Horses express marked reluctance or absolute refusal to move.

The aim of this case report was to present a case of a cesarean section in a Friesian mare that evolved with renal failure and subsequent with laminitis. To the author's knowledge, this is the first case report of a cesarean section in the mare that evolved into this cascade of sequelae

MATERIALS AND METHODS

History

A nine-year-old Friesian mare was referred to the Veterinary teaching hospital in Cluj-Napoca, after a dystocia that could not be resolved conservatively. The owner reported the mare had started foaling approximately 20 hours prior. At presentation, the mare was alert and responsive and one foetal forelimb was visible outside the vulva. The heart rate at presentation was 52 beats per minute, respiratory rate 26 per minute pulse was weak with low amplitude and rectal temperature 38,2 degrees Celsius. Mucous membranes were slightly pale and capillary refill time was less than 2 seconds. Peristaltic movements were present on all four abdominal quadrants. Upon palpation, absence of fetal pedal reflex confirmed the death of the fetus and the left anterior limb and head were retained under the pelvic brim. The head of the fetus was laterally deviated and was only slightly mobile and a diagnosis of arthrogryposis was established. A decision was made to perform a caesarean section with the aim to save the mare. Venous and arterial blood was collected prior to surgery and a venous catheter was placed at the level of the left jugular vein. After routine aseptic preparation of the left jugular vein, a 14 G x 133 mm catheter (High Flow IV Cannula, Fionia vet) was placed. The results of the blood tests showed a severe metabolic acidosis (pH 6.95, HCO₃- 40,1 mmol/l, BE-ecf 7.9 mmol/L), a deficit of tissue oxygenation (pCO₂ 177.2 mmHg, pO₂ 113.0 mmHg) and hyperglycemia (Glu 316 mg/dl). Activated partial thromboplastin time (aPTT) and prothrombin time (PT) were within limits (aPTT 72, PT- 17.2).

Surgery

Surgery was performed under general anesthesia by a veterinary anesthetist. The mare was premedicated with 0,03 mg/kg acepromazine (Calmivet 0,500 g/100 ml, Vétoquinol) followed after 3 minutes by 1.1 mg/kg xylazine (Xylazine Bio 2%, Bioveta), 10 µg/kg butorfanol (Butomidor 10 mg/ml, Richterpharma ag), 1,1 mg/kg flunixin meglumine (Niglumine 50 mg/ml, Dopharma), 0,05 mg/kg diazepam (Diazepam 5 ml/kg, Terapia). Induction was done after another 3 minutes with 2,2 mg/kg ketamine (Narkamon Bio 100 mg/ml, Bioveta). Anesthesia was maintained with 2 % isofluran (Isoflutek 1000 Exp, Alpha-Vet) in 100 % oxygen at a rate of 5 L/min and 0,1 mg/kg xylazine or 0,8 mg/kg ketamine when necessary. Local anesthesia was realised with 10 ml bupivacaine 0,5 % (Infosint, Infomed Fluids) on the incision site.

Following aseptic surgical preparation, a midline laparotomy was performed with the mare in dorsal recumbency. The left uterine horn was exposed and the left hock of the foal was palpated through the uterine wall. A blunt incision was made at this level and the fetus was successfully retrieved by two assistants. Profuse hemorrhage was noticed during the incision and suture of the uterine wall. Hypovolemia was corrected with the infusion of a bolus of 20 ml/kg Ringers lactated solution (B Braun) and a continuous rate infusion of 2,5 ml/kg/hour Ringers lactated. The placenta was adherent to the uterine endometrium and complete detachment was not possible. The uterine wall was sutured using an USP 2/3 polyglycolic acid suture (PGA) (Surgicryl, SMI) in three layers: simple continuous suture and a double layer inverted pattern using the Lembert pattern (fig. 1). Peritoneum and linea alba were sutured together with a single layer USP 2/3 PGA in a simple interrupted pattern. A simple continuous subcutaneous suture was performed using the same suture material and the skin incision was closed using a USP 3/4 supramid suture material (Supramid, SMI), in an interrupted horizontal mattress pattern. A compressive Equine Post Colic Surgery Kit size L (Kruuse) was applied immediately after recovery from anaesthesia. Recovery was uneventful. After surgery, the mare was medicated with Flunixin Meglumine 1.1 mg/kg intravenously (I.V.) (Niglumine 50 mg/ml, Dopharma), cefquinome 1 mg/kg intramuscularly (I.M.), (Cobactan 2,5% , MSD), tetanus toxoid 6000 units subcutaneously (S.C.) (Clostetan, Bioveta). Two amoxicillin tabs were administered to the uterine body by vaginal approach (Veyxyl Tabs, Veyx). Metronidazole (Metronidazole 500 mg/100 ml, B Braun) was administered as a 15 mg/kg loading dose IV, continued with seven 7,5 mg/kg administrations every 6 hours IV. The mare recovered well and regained peristaltic movements 4 hours after surgery.

Post-operative care

The following day, the mare regained appetite for food and water. A uterine lavage was performed each day for 5 days with a 0,5% povidone iodine solution, aiming to retrieve any left placenta. Two amoxicillin tabs were administered after each lavage, one in each uterine horn prophylactically. Twenty unit's oxytocin (Oxytocin Vet, Veyx) were administered intramuscularly, three times per day in the following three days. Fluid administration continued and 10 ml/kg polyionic isotonic solution (Ringer lactate, B Braun) was administered two times per day. Antibiotherapy with cefquinome 1 mg/kg continued in the following 7 days. Fourteen days after surgery the skin suture was removed.

Two days after surgery, the mare developed anorexia and was apathetic. We diagnosed acute hyposthenuric renal failure - BUN 41 mg/dl, Creatinine 9,1 mg/dl, USG 1010; (reference range - BUN 7-25 mg/dL, CRE 0,6-2,2 mg/dL, USG 1.012

– 1.030) (Edwards et al., 1989). An infusion of a polyionic isotonic solution (Ringer, B Braun) was started as a 10 ml/kg bolus continued with a constant rate infusion of 2,5 ml/kg/hour saline. A single dose of 0,2 mg/kg furosemide was administered (Furosemid 1%, Romvac) together with ascorbic acid 10 mg/kg intravenously (Vitamina C 10%, Romvac) and a preparation containing vitamins, amino acids and micro minerals (Hemo 15, Equimed USA) 20 ml intramuscularly.

After 3 days of intensive therapy, kidney function started to improve significantly (CRE 2,7 mg/dL, BUN 88,1 mg/dL) but the mare started to shift her weight (Grade I Obel grading system) on the anterior limbs frequently. A strong digital pulse was detected and the diagnosis of laminitis was established. The treatment was applied gradually. The laminitis was managed with continuous cryotherapy (fig.2) for the first three days to limit the action of the matrix metalloproteinase at this level. In order to obtain better peripheric blood flow acepromazine maleate 0,05 mg/kg IM (Trankilrom, Romvac) was administered three time per day for the following 3 consecutive days. Inflammation and pain were managed with a non-steroidal anti-inflammatory drug, 1,1 mg/kg flunixin meglumine (Niglumine 50 mg/ml, Dopharma) for 14 consecutive days. The mare became more lame, up to a grade IV Obel grading system and we decided to cast both anterior limbs (Plaster of Paris Bandage, Cellona) and we managed the pain with 4,4 mg/kg phenylbutazone (Butagran Equi 200 mg/kg, Dopharma) two times per day for 7 days. 14 days after surgery kidney function normalised (CRE 2.2 mg/dL, BUN 26 mg/dL).

Supportive therapy consisted of 60 ml Vivatol liquid vitamin (Medihorse, Medistar) orally (PO) and Detox liquid 20 ml (Lencare, Lehring) PO three times a day for 5 days. Digestive Muesli (Cavalor) was offered to supplement caloric intake.

RESULTS AND DISCUSSIONS

Clinical outcome and follow up

Total admission time was 43 days. Kidney function normalised after 14 days of treatment. The acute phase of laminitis was managed in the clinic, until the mare was able to return home after orthopaedic shoeing. At the three months' follow-up the mare presented a Grade 2 (Obel Grading System) lameness on both anterior limbs but was comfortable. Kidney function was normal and the uterus was completely healed by transrectal ultrasound.

Figure 1. Sutured uterine wall. (original)

Figure 2. Cryotherapy in laminitis. (original)

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Conflicts of Interest

The authors declare that they do not have any conflict of interest

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