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# Surgical Correction of Uterine Torsion and Mare–Foal Survival in Advance Pregnant Equine Patients

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ABSTRACT

This article describes the surgical management of uterine torsion by midline celiotomy and cesarean section on 12 mares presented with signs of colic to a teaching veterinary hospital. The mares were either in full term of gestation (n = 7) or in advanced stage of pregnancy (n = 5). Six mares were in first parity. Uterine torsion was diagnosed by per rectal and per vaginal examinations. For surgical intervention, mares were anesthetized using a combination of xylazine (1.1 mg/kg) and ketamine (2.2 mg/kg), intravenously. After intubation, the animals were maintained on halothane (n = 4) or isoflurane (n = 8) inhalation anesthesia. Midline celiotomy was performed, and foals were delivered by cesarean section. In 11 mares, before closing the abdominal wound, the uterus was detorted manually and confirmed for its normal position. Both anesthetic protocols using halothane and isoflurane were found satisfactory for surgical correction of uterine torsion. After long-term follow-up, the study reported 75.0% (9/12) survival rate for mares. One mare was euthanized because of devitalized, necrosed, and adhered uterus to the abdominal wall. Of the nine surviving mares, seven were successfully bred. Three foals were born alive, and only one could survive on long-term basis. Of the nine dead foals, two had umbilical cord torsion.



## 1. Introduction

Uterine torsion is an infrequently occurring but serious complication in pregnant mares [1]. Mares suffering from uterine torsion exhibit signs of colic, and the condition occurs most commonly in the advanced stage of gestation [2,3]. Different techniques have been suggested to correct equine uterine torsion, and the method of preference should be based on the degree of torsion, severity of pain, fetal viability, and the client's financial constraints [4]. Various techniques such as manual rotation through cervix, rolling, standing flank laparotomy, and ventral midline celiotomy have been reported for managing uterine torsion in mares [1]. Majority of these reports reveal detortion of uterus by surgical/nonsurgical means and then delivering the fetus through the birth canal. However, in advanced stage of gestation and in cases of chronic uterine torsion carrying dead fetus, it may not be possible to detort the uterus without evacuating the fetus [5]. Prognosis for survival of mares and foals after uterine torsion varies greatly from 60% to 70% and 30% to 70%, respectively [3,6,7]. The present report describes correction of uterine torsion after evacuation of foal through cesarean section, using mid-ventral celiotomy and postoperative mare–foal survival in 12 equine patients.

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## 2. Material and Methods

Twelve mares with signs of colic of varying duration were referred to the teaching veterinary hospital that formed a part of this study. At the time of presentation, signalment, gestation period, clinical signs, site, and degree of uterine torsion were recorded. In addition to this survival of fetus, postoperative recovery and reproductive health of the mares were also recorded.

After confirmation of uterine torsion on per rectal and per vaginal examination, all the 12 mares were subjected to midline celiotomy and cesarean section. For surgical intervention, mares were premedicated with xylazine (1.1 mg/kg body weight [bwt], intravenously [IV]) followed by induction of anesthesia, after 10 minutes, with ketamine (2.2 mg/kg bwt, IV). Endotracheal intubation was done, and anesthesia was maintained with halothane (n = 4) or isoflurane (n = 8). The mares were positioned in dorsal recumbency, and ventral midline area was prepared for aseptic surgery. A 25-30-cm-long midline celiotomy incision was made on the skin, subcutaneous fascia, and the linea alba. The uterus was examined for any adhesions and gross changes. The abdominal cavity was packed with sterile drapes, and the uterus was incised to perform cesarean section. To control bleeding from uterine wall, incised ends of uterus were sutured using simple continuous pattern with No. 1 polyglactin 910. The foals were removed manually from the uterus after doubly ligating the umbilical cord.

Incision of the uterus was then closed using No. 1 polyglactin 910 in two layers with Lambert and Cushing Pattern. The uterus was then detorted manually to its normal position. The normal position of the uterus was confirmed by per vaginal and intra-abdominal examination simultaneously. The abdominal incision was closed using No. 2 polyglactin 910 thread with simple interrupted sutures on linea alba and simple continuous sutures on subcutaneous tissue. Skin was closed using polyamide No. 2 in horizontal mattress fashion. Postoperatively, mares were given analgesic meloxicam (0.2 mg/kg, bwt, intramuscularly [IM], once daily; Neovet, Intas pharmaceutical Ltd., Matoda, Ahmedabad, India) for 3 days, a combination of antibiotics ampicillin and cloxacillin (10 mg/kg, bwt, IM; twice daily; Neovet, Intas Pharmaceutical Ltd.) for 7 days, gentamicin (4 mg/kg, bwt, IM, twice daily; Neovet, Intas Pharmaceutical Ltd.) for 5 days, and metronidazole (10 mg/kg, bwt, IV, twice daily; Pfizer Animal Health Ltd., Haridwar, India) for 3 days. The wounds were dressed daily with povidone-iodine, and the sutures were removed on the 14th postoperative day. Uterine biopsy was done on two mares with visibly compromised uterine wall and subjected to histopathological examination using hematoxylin and eosin staining procedure. The surviving mares were periodically followed up to record any complications and reproductive status. Various parameters were analyzed by *t* test to compare the difference between survivor and nonsurvivor mares.

## 3. Results

The age of mares suffering from uterine torsion ranged from 3 to 12 (6.4 ± 0.8) years (Table 1). In seven of 12 mares, the gestation period was complete, and the remaining 5

**Table 1**
Signalment, history, hematology, clinical findings, and postoperative reproductive status of the mares with uterine torsion

| Group | Mare | Age (Years) | Hb (g%) | TLC (/μL) | N (%) | L (%) | HR (/Min) | Temperature (°C) | Parity | Gestation | Duration of Colic Signs | Rotation | | Reproductive Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Direction | Degree | |
| Survivors (n = 9) | 1 | 3.5 | 12 | 8,150 | 66 | 34 | 42 | 37.2 | 1 | Full-term | 48 hours | Clockwise | 180 | Successfully bred |
| | 2 | 10 | 12.9 | 8,150 | 66 | 34 | 52 | 37.9 | 3 | Last trimester | 36 hours | Clockwise | 180 | Successfully bred |
| | 3 | 3 | 11.8 | 9,300 | 78 | 22 | 48 | 38.6 | 1 | Full-term | 38 hours | Clockwise | 180 | Successfully bred |
| | 4 | 3.5 | 11 | 9,100 | 76 | 24 | 38 | 37.9 | 1 | Full-term | 24 hours | Clockwise | 180 | Successfully bred |
| | 5 | 12 | 12 | 7,200 | 82 | 18 | 46 | 36.1 | 5 | Full-term | 12 hours | Clockwise | 180 | Data not available |
| | 6 | 4 | 10 | 9,180 | 78 | 22 | 50 | 38.3 | 1 | Full-term | 36 hours | Clockwise | 180 | Successfully bred |
| | 7 | 8 | 13 | 7,550 | 82 | 18 | 42 | 37.6 | 3 | Last trimester | 12 hours | Counter Clockwise | 180 | Successfully bred |
| | 8 | 6 | 12 | 9,200 | 80 | 20 | 70 | 37.8 | 1 | Last trimester | 36 hours | Clockwise | 180 | Data not available |
| | 9 | 5 | 12.4 | 12,300 | 78 | 22 | 50 | 38.9 | 1 | Full-term | 24 hours | Clockwise | 360 | Successfully bred |
| | Mean ± SE | 6.1 ± 1.1 | 11.9 ± 0.3 | 8,903 ± 497 | 76.2 ± 2.0 | 23.8 ± 2.0 | 48.7 ± 3.1 | 37.8 ± 0.3 | 1.9 ± 0.5 | NR | NR | NR | NR | NR |
| Nonsurvivors (n = 3) | 10 | 6 | 11 | 9,040 | 80 | 20 | 40 | 37.9 | 3 | Last trimester | Mild colic for 2 months | Clockwise | 180 | NA |
| | 11 | 7 | 5.5 | 11,000 | 76 | 24 | 60 | 38.3 | 2 | Last trimester | 72 hours | Clockwise | 180 | NA |
| | 12 | 9 | 12 | 11,000 | 82 | 18 | 85 | 38.3 | 5 | Full-term | 24 hours | Clockwise | 180 | NA |
| | Mean ± SE | 7.3 ± 0.9 | 9.5 ± 2.0 | 10,347 ± 653 | 79.3 ± 1.8 | 20.7 ± 1.8 | 61.7 ± 13 | 38.2 ± 0.1 | 3.3 ± 0.9 | NR | NR | NR | NR | NR |
| Overall (n = 12) | Mean ± SE | 6.4 ± 0.8 | 11.3 ± 0.6 | 9264 ± 435 | 77.0 ± 1.6 | 23.0 ± 1.6 | 51.9 ± 4.0 | 37.9 ± 0.2 | 2.2 ± 0.5 | NR | NR | NR | NR | NR |

Hb, hemoglobin; TLC, total leukocyte count; N, neutrophil; L, lymphocyte; HR, heart rate; NA, not applicable; NR, not required.