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Field Caesarean Section in Seven Miniature Horses and Ponies (2009-2012)

This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/127097> since 2016-10-05T15:23:19Z

Published version:

DOI:10.1111/rda.12158

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1 **Field caesarean section in seven miniature horses and ponies (2009-2012)**

2

3 **Introduction**

4

5 While in cattle emergency- and elective caesarean sections are commonly performed in the field,
6 either with the animal recumbent or standing (Newman, 2008), in the horse there are very few
7 reports of field caesarean sections (Gillespie 1962; Graff 1963; Leibrecht and Watt 1964; Cohen
8 1975) and all required general anaesthesia. It is therefore considered a procedure to be performed
9 in a hospital setting.

10 Furthermore, while the second stage of labour lasts as long as 6 hours, it lasts only 20 minutes in
11 horse, which, together with the fact that mares usually need to be transported to the hospital,
12 makes it very difficult deliver live foals. A study reports that no foals have been delivered alive
13 after 90 minutes from the rupture of the allantochorion (Freeman et al, 1999a).

14 Other techniques like Assisted Vaginal Delivery or Controlled Vaginal Delivery may be useful,
15 although the latter could carry more complications than a caesarean section in a hospital setting
16 (Freeman et al, 1999a).

17 An option to resolve dystocias in the field when the foal is dead is certainly represented by
18 fetotomy. In some breeds like miniature horses or Shetland ponies this is very difficult to
19 achieve, if not impossible in some cases, and only with great distress to the mare. Furthermore,
20 in some settings fetotomy or mare euthanasia could be unacceptable for owners, thus forcing
21 veterinarians to find a different solution.

22 The aim of the present report is the description of a low left flank celiotomy technique for
23 caesarean section, performed under sedation and local anaesthesia in lateral recumbency and
24 applied to miniature horses and ponies.

25 **Materials and methods**

26 Two female miniature horses and five ponies, all presented at full term, in labour with a dystocia
27 and visited in an outpatient setting, were included in this report. Veterinary intervention was
28 sought by all owners after having found the mares in labour in the early morning hours. All
29 mares presented with dystocia and parturition had presumably been in progress for several hours.
30 All mares resulted distressed presenting depression, high heart (mean 60, range 40-84 beats per
31 minute) and respiratory rate (mean 16, range 12-36 breaths per minute), capillary refill time
32 equal or more than to 2 seconds, pink-red mucous membranes.

33 In four cases foals presented with lateral deviation of the head, in the remaining three with lateral
34 deviation of the head and malposture of a at least one front limb. After clinical examination,
35 sedation with acetylpromazine^a (0.02–0.04 mg/kg IV) and epidural anaesthesia administration
36 (2–3 ml lidocaine^b 2% added with xylazine^c 0.17 mg/kg), vaginal manipulation was attempted
37 and no resolution of the dystocia was possible in all cases. All foals were dead on presentation
38 but fetotomy was not performed, due to the small dimensions of mares (Brinsko et al , 2010), the
39 dryness of the vaginas despite lubrication , the long lasting contraction of the uterus around the
40 foal, and due to poor experience with fetotomy (Freeman, 1999). Referring the mares for
41 emergency caesarean section was denied by all owners due to financial constraints. A field
42 emergency caesarean section was therefore proposed and accepted. An intravenous catheter was
43 placed and Ringer Lactate Solution^d was administered at a rate of 2 ml/kg/h. Mares were
44 administered flunixin meglumine^e (1.1 mg/kg IV), penicillin/streptomycin^f (10000 IU IM) and
45 clenbuterol^g (0.4 mg/kg IV).

46 Mares were brushed and cleaned of straw or dust and brought to the cleanest place available on
47 the premises to decrease the risk of contamination. This was a grass field in three cases and a
48 clean, empty stable in all others. In all cases no bedding was provided in order to avoid a dusty
49 environment.

50 A second sedation with acetylpromazine^a (0.02–0.04 mg/kg IV) was sufficient to manipulate the
51 horse and achieve right lateral recumbency on a clean towel. The front limbs were tied together

52 and distended forward, while the hind limbs were distended backwards (LeBlanc, 1991). After
53 clipping and surgical preparation, local anaesthesia was performed either in the form of an
54 inverted L anesthetic block (4 cases), extending vertically along the caudal aspect of the last rib
55 and horizontally ventral to the crus of the internal abdominal oblique muscle as it goes from the
56 last rib to the tuber coxae, or by local infiltration (three cases) of the intended incision site.
57 Both forms of local anaesthesia were performed administering 20 to 40 ml of 2% lidocaine
58 subcutaneously and in the abdominal muscles, taking care to avoid intraperitoneal
59 administration. The site was draped with a large (140 x 100 cm) drape held in place by adhesive
60 tape and a low left flank celiotomy (Marcenac approach) was performed (LeBlanc, 1991).
61 Briefly, the skin was incised starting approximately midway along the last rib and continuing
62 down towards the flank (stifle) fold. The deep abdominal fascia and the external oblique
63 abdominal muscle were incised following the direction of the fibres. The fibres of the
64 aponeurosis of the internal oblique abdominal muscle presented perpendicular to the incision and
65 the aponeurosis was bluntly dissected in the direction of its fibres. The fibres of the transverse
66 abdominal muscle, oblique to the incision, were also bluntly dissected. The peritoneum was then
67 bluntly perforated, allowing access to the abdominal cavity. In all cases control of the intestine
68 was easily achieved, the gravid horn of the uterus was exteriorized, the hind limbs of the foal
69 were palpated and a 15-20 cm incision made in correspondence of the hock on the uterine wall,
70 in order to deliver the dead foal.

71 The umbilical cord was ligated and dissected. The placenta was not removed except for the parts
72 3 to 5 cm on each side of the hysterotomy (Embertson, 2006). Sectioned large vessels, if present,
73 were ligated separately with 4 metric polyglactin 910^f.

74 The uterine wall was closed using a Lembert suture with 3 metric polyglactin 910^f oversewn
75 with a Cushing suture with 3 metric polyglactin 910^f (Freeman et al, 1999b).

76 The muscular layers were individually closed with simple continuous sutures using 5 metric
77 polyglactin 910^f and the skin layer with 5 metric nylon^g. No stent was applied on the suture line.

78 The surgical procedure lasted between 30 and 45 minutes and all the mares recovered
79 uneventfully after 15 to 30 minutes from the end of surgery.

80 Procaine penicillin^h was administered IM for the following 4 days and flunixin meglumine^e for a
81 further two days at antiendotoxic dosage (0.5 mg/kg IV single dose, then 0.25 mg/kg IV tid).

82 The wound was cleaned with betadine solution by the owners every day until the sutures were
83 removed, 10–12 days after surgery.

84 **Results**

85 Case data are reported in Table 1. Mares recovered uneventfully after a few minutes (15–30 min)
86 from the end of the procedure and the placenta was delivered in the following 24 hours in all
87 cases. In four cases oxytocin^l was administered (3 doses of 10 IU IV q20minutes) because
88 placenta was not delivered in the first 12 hours from surgery.

89 One incision site infection occurred and it was treated by drainage, cleaning and systemic
90 antibiotic (ceftiofur sodium^m, 2.2 mg/kg IM sid). Laminitis was reported in one case that had
91 previous history of chronic laminitis. The acute phase was treated and resolved after a few
92 weeks.

93 All mares underwent at least a vaginal inspection and palpation at a minimum of six months
94 postoperatively and no caesarean section related complications were diagnosed

95 Three mares had at least one subsequent uneventful gestation and labour, resulting in the
96 delivery of a live foal without intervention.

97 **Discussion**

98 The aim of a caesarean section should be the preservation of the life of both the mare and the
99 foal. Should this not be possible, it is then paramount to preserve the life and reproductive
100 soundness of the mare. In horses, a caesarean section rarely allows the delivery of a live foal
101 because of the short duration of stage 2 of labour in mares, because it is considered a technique
102 to be performed in a hospital setting and partly to the fact that horse owners are generally not
103 accustomed to foaling problems and tend to call for veterinary advice when it is too late. Field

104 caesarean section performed via a left oblique flank celiotomy could be a valid option in selected
105 cases. In our cases, the mares were attended to several hours from the start of labour. The uteri
106 were tightly contracted and the mucous membranes were very dry, making attempts at assisted
107 vaginal delivery unsuccessful. In the horse, the decision to perform a caesarean section is taken
108 as a last option, following an attempt at manual resolution or eventually a fetotomy, and this
109 increases the risk to the mare (Slone 1990). For these reasons, together with the small size of the
110 dams in our study (Brinsko et al 2010), fetotomy was not attempted in any of our cases, as it was
111 deemed too taxing for the distressed and tired mares, although in more experienced hands this
112 technique has proven rapid and safe (Vandplassche 1993). Due to the extremely distressed
113 condition of the animals, total intravenous field anaesthesia was considered too dangerous. No
114 attempts were made at controlled vaginal delivery due to anesthesiological considerations and
115 the higher mortality rates associated with this procedure compared to a caesarean section
116 (Freeman et al 1999a).

117 A cesarian section requires a level of uterine exposure that could not be obtained through a
118 standing right flank laparotomy, reported for the correction of uterine torsion (Jones 1976), or a
119 left paralumbar fossa laparotomy, reported for ovariectomy in horses (Ross 1991). A low left
120 flank oblique approach (Marcenac approach)(Emberson 2006) grants adequate dimensions of
121 the surgical breach without the need for dorsal recumbency and general anaesthesia, necessary
122 for a ventral midline or paramedian approach. Furthermore, the low flank approach allows
123 uterine manipulation, reducing the risk of abdominal contamination with fetal fluids. A lateral
124 recumbency can easily be obtained and maintained in small ponies and miniature horses through
125 sedation alone, without the need for general anaesthesia and avoiding complications associated
126 with dorsal recumbency. In our cases this lateral recumbency was well tolerated, as the distressed
127 mares were in fair condition. The mares showed some discomfort only when the uterus was
128 exteriorized or upon dilation of the surgical opening. The former could be due to traction applied
129 to the broad ligament, as is the case in cattle (Newman 2008). This led to the adoption of the

130 inverted “L” block to provide local anaesthesia in the last four cases, while the first three had
131 received a local infiltration of the incision site. Infections, whether systemic, peritoneal or
132 incisional, could certainly be a weak point of this procedure, but in our experience this
133 complication can be minimized even in non-optimal settings by employing a sterile technique.
134 No particular difficulty was experienced in handling the intestine upon entering the abdomen.
135 This was easily controlled by the assistant surgeon, despite being a reported issue in other cases
136 of field caesarean section (Cohen 1975). Adhesions could be another issue arising from this
137 procedure. It should be noted however that dystocia itself carries a high incidence of vaginal and
138 uterine adhesions that can increase the potential for relapse due to the narrower birth canal. The
139 incidence of these adhesions can also be increased by vaginal manipulation, while it could be
140 reduced by performing a caesarean section immediately after diagnosing dystocia, helping to
141 maintain the breeding soundness of the mare. Abdominal adhesions remain a difficult issue to
142 prevent. As reported by Freeman, hemorrhage from the uterine incision can be a common and
143 serious complication of caesarean sections (Freeman et al 1999b). To avoid this we elected to
144 ligate large vessels separately if they were severed during surgery. A caesarean section must
145 always be considered a major surgical procedure in horses. By employing some precautions, it
146 could safely be performed in the field under sedation in small horses, avoiding euthanasia in
147 those cases where referral to a clinic for surgery is not an option, but where manual vaginal
148 resolution of the dystocia is not possible.

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179 and Febinger, Philadelphia, PA, USA.

180 **Notes**

181 a: Prequillan, Fatro , Ozzano Emilia (BO), Italy

- 182 b: Lidocaina 2% , Esteve Italia , Milan, Italy
- 183 c: Megaxilor, Bio98, Milan, Italy
- 184 d: Ringer Lattato, Galenica Senese, Siena, Italy
- 185 e: Finadyne, Schering-Plough Santè Animale , France
- 186 f: Vicryl, Ethicon, Johnson&Johnson Italia, Pomezia Terme (RM) ,Italy
- 187 g: Monosof, Covidien Italia, Milano, Italy
- 188 h: Depomicina, Intervet Italia, Milan, Italy
- 189 i: Ventipulmin iniettabile, Boehringer Ingelheim Italia , Firenze, Italy
- 190 l: Izoossitocina, Izo, Brescia, Italy
- 191 m: Excenel Cavalli, Pfizer Animal Health Italia, Rome, Italy
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