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

Introduction

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

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

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

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

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

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

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

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

A second sedation with acetylpromazine\(^a\) (0.02–0.04 mg/kg IV) was sufficient to manipulate the horse and achieve right lateral recumbency on a clean towel. The front limbs were tied together 2
and distended forward, while the hind limbs were distended backwards (LeBlanc, 1991). After clipping and surgical preparation, local anaesthesia was performed either in the form of an inverted L anesthetic block (4 cases), extending vertically along the caudal aspect of the last rib and horizontally ventral to the crus of the internal abdominal oblique muscle as it goes from the last rib to the tuber coxae, or by local infiltration (three cases) of the intended incision site. Both forms of local anaesthesia were performed administering 20 to 40 ml of 2% lidocaine subcutaneously and in the abdominal muscles, taking care to avoid intraperitoneal administration. The site was draped with a large (140 x 100 cm) drape held in place by adhesive tape and a low left flank celiotomy (Marcenac approach) was performed (LeBlanc, 1991). Briefly, the skin was incised starting approximately midway along the last rib and continuing down towards the flank (stifle) fold. The deep abdominal fascia and the external oblique abdominal muscle were incised following the direction of the fibres. The fibres of the aponeurosis of the internal oblique abdominal muscle presented perpendicular to the incision and the aponeurosis was bluntly dissected in the direction of its fibres. The fibres of the transverse abdominal muscle, oblique to the incision, were also bluntly dissected. The peritoneum was then bluntly perforated, allowing access to the abdominal cavity. In all cases control of the intestine was easily achieved, the gravid horn of the uterus was exteriorized, the hind limbs of the foal were palpated and a 15-20 cm incision made in correspondence of the hock on the uterine wall, in order to deliver the dead foal. The umbilical cord was ligated and dissected. The placenta was not removed except for the parts 3 to 5 cm on each side of the hysterotomy (Embertson, 2006). Sectioned large vessels, if present, were ligated separately with 4 metric polyglactin 910. The uterine wall was closed using a Lembert suture with 3 metric polyglactin 910 oversewn with a Cushing suture with 3 metric polyglactin 910 (Freeman et al, 1999b). The muscular layers were individually closed with simple continuous sutures using 5 metric polyglactin 910 and the skin layer with 5 metric nylon. No stent was applied on the suture line.
The surgical procedure lasted between 30 and 45 minutes and all the mares recovered uneventfully after 15 to 30 minutes from the end of surgery.

Procaine penicillin was administered IM for the following 4 days and flunixin meglumine for a further two days at antiendotoxic dosage (0.5 mg/kg IV single dose, then 0.25 mg/kg IV tid). The wound was cleaned with betadine solution by the owners every day until the sutures were removed, 10–12 days after surgery.

Results
Case data are reported in Table 1. Mares recovered uneventfully after a few minutes (15–30 min) from the end of the procedure and the placenta was delivered in the following 24 hours in all cases. In four cases oxytocin was administered (3 doses of 10 IU IV q20min) because placenta was not delivered in the first 12 hours from surgery.

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

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

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

Discussion
The aim of a caesarean section should be the preservation of the life of both the mare and the foal. Should this not be possible, it is then paramount to preserve the life and reproductive soundness of the mare. In horses, a caesarean section rarely allows the delivery of a live foal because of the short duration of stage 2 of labour in mares, because it is considered a technique to be performed in a hospital setting and partly to the fact that horse owners are generally not accustomed to foaling problems and tend to call for veterinary advice when it is too late.
caesarean section performed via a left oblique flank celiotomy could be a valid option in selected cases. In our cases, the mares were attended to several hours from the start of labour. The uteri were tightly contracted and the mucous membranes were very dry, making attempts at assisted vaginal delivery unsuccessful. In the horse, the decision to perform a caesarean section is taken as a last option, following an attempt at manual resolution or eventually a fetotomy, and this increases the risk to the mare (Slone 1990). For these reasons, together with the small size of the dams in our study (Brinsko et al 2010), fetotomy was not attempted in any of our cases, as it was deemed too taxing for the distressed and tired mares, although in more experienced hands this technique has proven rapid and safe (Vandplassche 1993). Due to the extremely distressed condition of the animals, total intravenous field anaesthesia was considered too dangerous. No attempts were made at controlled vaginal delivery due to anesthesiological considerations and the higher mortality rates associated with this procedure compared to a caesarean section (Freeman et al 1999a).

A cesarian section requires a level of uterine exposure that could not be obtained through a standing right flank laparotomy, reported for the correction of uterine torsion (Jones 1976), or a left paralumbar fossa laparotomy, reported for ovariectomy in horses (Ross 1991). A low left flank oblique approach (Marcenac approach)(Embertson 2006) grants adequate dimensions of the surgical breach without the need for dorsal recumbency and general anaesthesia, necessary for a ventral midline or paramedian approach. Furthermore, the low flank approach allows uterine manipulation, reducing the risk of abdominal contamination with fetal fluids. A lateral recumbency can easily be obtained and maintained in small ponies and miniature horses through sedation alone, without the need for general anaesthesia and avoiding complications associated with dorsal recumbency. In our cases this lateral recumbency was well tolerated, as the distressed mares were in fair condition. The mares showed some discomfort only when the uterus was exteriorized or upon dilation of the surgical opening. The former could be due to traction applied to the broad ligament, as is the case in cattle (Newman 2008). This led to the adoption of the
inverted “L” block to provide local anaesthesia in the last four cases, while the first three had
received a local infiltration of the incision site. Infections, whether systemic, peritoneal or
incisional, could certainly be a weak point of this procedure, but in our experience this
complication can be minimized even in non-optimal settings by employing a sterile technique.
No particular difficulty was experienced in handling the intestine upon entering the abdomen.
This was easily controlled by the assistant surgeon, despite being a reported issue in other cases
of field caesarean section (Cohen 1975). Adhesions could be another issue arising from this
procedure. It should be noted however that dystocia itself carries a high incidence of vaginal and
uterine adhesions that can increase the potential for relapse due to the narrower birth canal. The
incidence of these adhesions can also be increased by vaginal manipulation, while it could be
reduced by performing a caesarean section immediately after diagnosing dystocia, helping to
maintain the breeding soundness of the mare. Abdominal adhesions remain a difficult issue to
prevent. As reported by Freeman, hemorrhage from the uterine incision can be a common and
serious complication of caesarean sections (Freeman et al 1999b). To avoid this we elected to
ligate large vessels separately if they were severed during surgery. A caesarean section must
always be considered a major surgical procedure in horses. By employing some precautions, it
could safely be performed in the field under sedation in small horses, avoiding euthanasia in
those cases where referral to a clinic for surgery is not an option, but where manual vaginal
resolution of the dystocia is not possible.

References
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Brinsko SP, Blanchard TL, Varner DD, 2010: Dystocia and postparturient disease. In Manual of
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Cohen J, 1975: Caesarian section in the mare. Vet Rec **97**: 369–370


Notes

a: Prequillan, Fatro , Ozzano Emilia (BO), Italy
b: Lidocaina 2%, Esteve Italia, Milan, Italy

c: Megaxilor, Bio98, Milan, Italy

d: Ringer Lattato, Galenica Senese, Siena, Italy

e: Finadyne, Schering-Plough Santé Animale, France

f: Vicryl, Ethicon, Johnson & Johnson Italia, Pomezia Terme (RM), Italy

g: Monosof, Covidien Italia, Milano, Italy

h: Depomicina, Intervet Italia, Milan, Italy

i: Ventipulmin iniettabile, Boehringer Ingelheim Italia, Firenze, Italy

j: Izoossitocina, Izo, Brescia, Italy

k: Excenel Cavalli, Pfizer Animal Health Italia, Rome, Italy