

# Tutorial Article

## Fetotomy technique in the mare

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### Introduction

Malposture of the long fetal extremities is the major cause of dystocia in the mare (Vandeplasse 1987; Frazer *et al.* 1997a). Many of these cases can be resolved safely and rapidly by fetotomy if the fetus is determined to be dead. One or 2 well-placed fetotomy cuts can dramatically shorten the intervention time and permit atraumatic delivery of a nonviable fetus. **However, if the obstetrician is not familiar with correct fetotomy technique then the best option for the mare's reproductive future may well be a caesarean section** (Frazer 1997).

The economic value of the mare, expertise, equipment and facilities available to the veterinarian, and owner's preference determine which method is ultimately chosen as the method of resolution for those cases where attempts at manual correction of malpositions and malpostures have failed. **Economic considerations** include the future use of the mare (breeding vs. performance value), veterinary fees (anaesthesia and surgery vs. fetotomy) and the extended hospitalisation required for postsurgical management (Vandeplasse 1988; Youngquist 1988). Prominent veterinary obstetricians have made an important point in stating that, although some dystocias may be best resolved by surgical intervention, the expense of the procedure and aftercare exceed that of fetotomy (Vandeplasse *et al.* 1972; Vandeplasse 1980; Bierschwal and de Bois 1972). **Therefore, the value of the mare is a significant factor to be considered prior to resorting to surgery.**

**To be proficient** with a fetotome the veterinarian must be able to recognise **when the procedure is indicated, and have the technical knowledge to know where the cut or cuts should be made.** However, the technical expertise necessary to manipulate the equipment and to perform the cut(s) required without traumatising the mare's reproductive tract is achieved only with practice.

**Experience with bovine obstetrics provides a distinct advantage** when it comes to performing a fetotomy in the mare. The procedure is not as easy as in the cow due to the longer equine birth canal and the impediment posed by the rapidly detaching fetal membranes (Frazer 1997). Therefore, this procedure should not be performed on a broodmare until the veterinarian has become proficient at bovine fetotomies and/or has worked under the supervision of an equine obstetrician who is experienced in the technique. For those

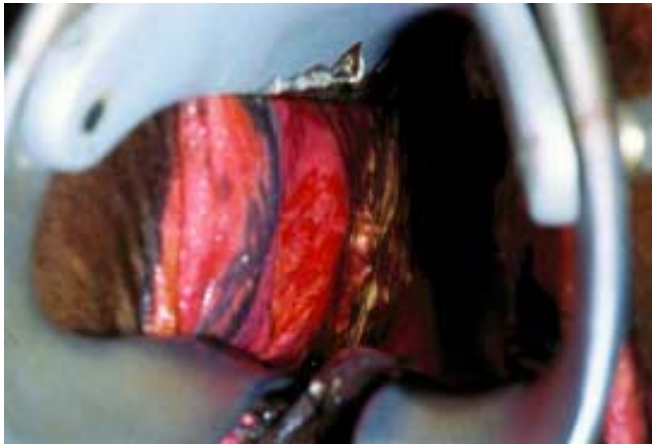
who work exclusively on horses, the cases which provide an ideal learning opportunity are those where caesarean section is not an option, and the alternative to an attempted fetotomy would be euthanasia. **It is the author's opinion** that, once perfected, this technique definitely has its place as a viable alternative to surgery in the management of certain equine dystocia cases, irrespective of the value of the mare.

**This article discusses the recommended approach to fetotomy in the mare.** The reader is referred to previous volumes of this journal for articles on the correction of dystocia by vaginal (Frazer *et al.* 1999a,b) and caesarean section (Embertson 1992) delivery. Only the most commonly utilised fetotomy cuts will be described. Although more experienced clinicians may be able to perform the necessary cuts for correction of transverse presentations, 'dog-sitting' posture and 'breech' presentations, these complicated cuts are beyond the scope of this article (Bierschwal and de Bois 1972; Frazer 1997).

### Vaginal trauma

**Dystocia in the mare is an emergency situation.** It is well known that time is not on the obstetrician's side as separation of the fetal membranes begins soon after the onset of second stage labour, making fetal hypoxia a common complication. The obvious goal is not only to deliver a live foal whenever possible, but also to preserve the life and fertility of the mare. Therefore, practitioners should remember that the duration of vaginal intervention should be kept to a minimum even **if the fetus is dead** (no limb withdrawal, no ocular reflex, no swallowing reflex, no heart beat, no anal reflex) (Frazer *et al.* 1999a).

**Repeated in-and-out arm movements are contraindicated,** as the mucous membranes of the mare's vagina and cervix are easily abraided (**Fig 1**). If the surface epithelium of the vagina is destroyed, then exposure of the underlying tissue results in adhesions that can adversely affect fertility. **Cervical adhesions are almost inevitable after prolonged intervention.** An irritated equine vagina takes on the texture of sandpaper, and the scar tissue laid down during the healing process results in what can best be described as a 'stovepipe vagina' (Frazer 1997). **In the author's opinion, much of the damage attributed to fetotomy use is often a direct result of inappropriate, prolonged vaginal manipulations,** not the technique itself. Similarly, the reduced fertility that has been reported in mares after a caesarean section may have more to do with the cause and



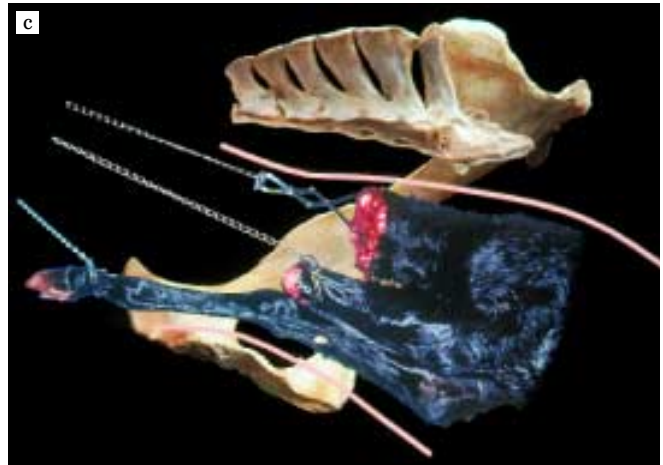
**Fig 1:** When managing an equine dystocia it is important to keep in-and-out arm movements to a minimum. Cervical and vaginal adhesions are almost inevitable after prolonged intervention. Cleanliness and lubrication are essential.



**Fig 2:** The author's obstetrical kit contains the following items: (1) Eye hooks (seldom used); (2) Obstetrical chains; (3) Chain handles; (4) Chain attached to Krey hook; (5) Fetotomy knife; (6) Curved introducer; (7) Saw wire handles; (8) Saw wire and cutters; (9) Rope snare; (10) Sterile rubber sleeves; (11) Obstetrical lubricant; (12) Fetotome with cleaning brush/threader; (13) Clean bucket, pump and tube.

initial management of the dystocia than the actual surgery (Vandeplasseche *et al.* 1972; Vandeplasseche 1973, 1989; Juzwiak *et al.* 1990; Embertson *et al.* 1995). Fertility studies on dystocia cases that have been resolved by fetotomy or caesarean section after minimal prior vaginal manipulation are needed. Variable management practices can make it difficult to obtain reliable data. Owners should be advised that *postpartum* metritis and laminitis are potential complications following either procedure.

If optimal fertility is desired, then neither caesarean section nor fetotomy should be preceded by prolonged attempts at manual correction. In the author's hospital environment, if the birth canal of a referral case



**Fig 3: a)** If the fetus is dead, then a single fetotomy cut can rapidly and atraumatically resolve a carpal flexion. The saw wire is attached to one end of a curved introducer and this is passed around the flexed carpus. It is important not to drag the wire over the vaginal and cervical tissue.

**b)** Once the second channel of the fetotome is threaded, the clinician places the head of the instrument against the distal carpal joint. This ensures that the distal radius remains as a traction point and that there are no sharp bones.

**c)** In this case, the foal had a ventral flexion of the head and neck as well as unilateral carpal flexion. A Krey hook is attached to the neck stump. The increased diameter of the distal radius prevents the obstetrical chain from slipping off.

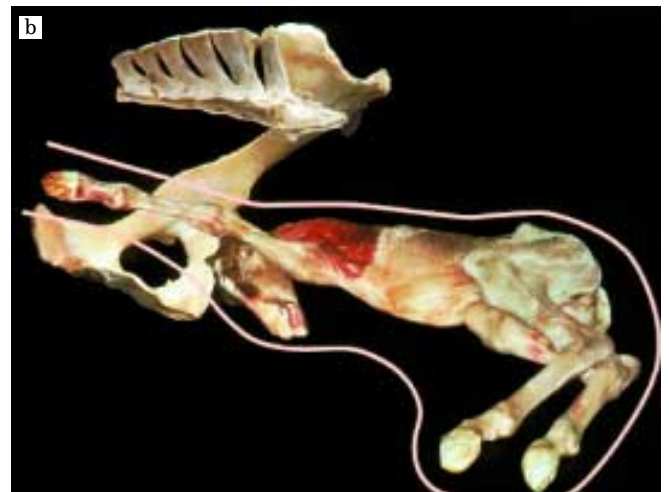


**Fig 4:** This mare was referred after an unsuccessful attempt at fetotomy. The referring veterinarian could not reach the laterally displaced head and neck. A single cut had been made several inches above the flexed carpal joint; therefore, there was no longer a suitable traction point on which to anchor the chain. During transport, the sharp bone of the proximal limb caused a severe laceration of the genital tract.

is already severely traumatised then the owner is advised that the best option may be an immediate caesarean section, even though a single fetotomy cut may have been all that was necessary initially. In such cases, further vaginal intervention is considered only when the owner has declined the surgical option (economics). In rare instances, the emphysematous condition of the fetus may pose an excessive surgical risk.

**Prior to the initial examination**, the mare's tail is wrapped and tied to one side and the perineal region thoroughly cleansed. The author routinely wears a sterile rubber sleeve on each arm. A well-lubricated arm is inserted to determine the condition of the genital tract (lacerations, presence of a pelvic mass, degree of cervical relaxation, presence of uterine muscular spasm). Careful thought should be given prior to all manipulations. Repeated vaginal entry and internal manoeuvres serve only to traumatise the birth canal and increase the level of bacterial contamination. **Application of copious volumes of lubricant is essential**, because the mare's genital tract is very sensitive to trauma and the uterus is easily ruptured (Vandeplassche *et al.* 1972; Vandeplassche 1987, 1993; Hawkins 1988; Frazer *et al.* 1999a).

The author uses a polyethylene polymer powder (J-Lube)<sup>1</sup>, mixed with clean water. This product is extremely slippery and good footing is essential. A clean stomach tube and pump are used gently to instill the mixture into the uterine lumen as often as necessary during the procedure to keep the tract coated with lubricant (**Fig 2**). If the uterus is contracted, the lubricant tends to induce some uterine relaxation and thereby create additional room between the uterus and fetus (Frazer *et al.* 1999a). In countries where they are available, **systemic spasmolytic agents** (isoxsuprine; clenbuterol) relax the uterine smooth muscle and therefore provide more space for manipulations.



**Fig 5:** a) If it is not possible to reach a laterally flexed head and neck, then removal of one entire forelimb (shoulder joint) often permits passage of the clinician's forearm into the uterus. b) Once a forelimb has been removed, the fetus may be pulled further into the pelvic canal such that the head and neck are accessible.

## Preparation for a successful fetotomy

The author prefers to perform most fetotomy procedures on a tranquilised, standing mare in a large stall bedded with nonslip material, preferably clean straw (Bierschwal and de Bois 1972; Vandeplassche *et al.* 1972; Vandeplassche 1987, 1988, 1992, 1993; Roberts 1986; Youngquist 1986, 1988; Frazer 1997). The presence of a dead fetus means that only the mare need be considered when administering chemical restraint. The author routinely uses low doses of xylazine (0.3–0.5 mg/kg bwt

i.v.) and butorphanol (0.01–0.02 mg/kg bwt i.v.) in conjunction with judicious use of a twitch or lip chain.

**Epidural anaesthesia** may not eliminate the abdominal contractions of mares, but it does provide analgesia to the perineal region; and it is useful to reduce the reflex straining initiated by manipulations within the birth canal (Roberts 1986; LeBlanc and Norman 1992; Vandeplassche 1992, 1993). The author prefers a xylazine (0.17 mg/kg bwt) and carbocaine (2 or 3 ml) combination q.s. 8–10 ml in normal saline, to reduce the likelihood of hindlimb weakness (LeBlanc and Norman 1992).

Some cases require either short-term or prolonged general anaesthesia. **General anaesthesia** provides excellent muscle relaxation; and hoisting of the hindquarters provides additional free space within the uterus such that the fetus may be repelled and obstetrical manipulations performed. It should be remembered, however, that prolonged intervention can generally be expected to result in severe trauma to the genital tract, even if performed by a skilful and experienced operator (Vandeplassche 1980, 1988, 1992, 1993; Roberts 1986; Asbury 1987; Hawkins 1988; Youngquist 1988; Frazer 1997; Frazer *et al.* 1999a).

To perform a fetotomy successfully, the clinician must have access to the correct equipment (Bierschwal and de Bois 1972). All equipment is readily available through veterinary supply catalogues (**Fig 2**).

- **Fetatome and threader:** double barrelled instrument with a hand grip and notched oval plate for anchoring obstetrical chains.
- **Fetatome saw wire:** available in spools (approximately 4.6 m [15 feet]) are required to double thread the fetatome, pass around the fetus, and still provide the assistant with sufficient length to saw).
- **Sterile wire cutters** should be kept in the obstetrical kit.
- **Wire saw handles** that permit the wire to be quickly attached and securely held.
- **Wire introducer:** curved instrument for passing the wire over or around a fetal part.
- **Krey hook:** this expandable, two-armed hook comes with a stop that prevents over-closure of the instrument should it become disengaged from the fetus.
- **Fetotomy (palm) knife:** used to seat the wire for some cuts and to remove bone fragments prior to fetal extraction.
- **A complete obstetrical kit should include bucket liners, lubricant and a sterile stomach tube with pump.**

Once the wire has been threaded around the fetal part to be amputated, sufficient tension is applied to the wire to ensure that it is not crossed or kinked. **The veterinarian must ensure that the head of the fetatome is in the correct position and then cover it with a hand, while using the other arm to hold the fetatome securely during the cutting procedure.** An assistant is instructed to start the cut by slow, short, to-and-fro arm movements. Once the wire is seated, the

length of the arm movements is increased, as is the amount of pressure. Longer movements decrease the amount of heat generated and spread the wear on the wire. Excessive tension on the wire may cause it to snap (Frazer 1997). **Although a correctly performed cut can be completed very quickly, the obstetrician should not then rapidly extract the fetus.** Since the normal dilation processes of stage I and II have been compromised, **it is important to apply copious lubrication**, and then to proceed slowly such that the cervical and vaginal tissues can stretch without tearing.

## Anterior presentation

### Carpal flexion

Although most carpal flexions are relatively easy to correct manually, the clinician should consider the possibility of contracted tendons when difficulties arise (Vandeplassche 1987, 1993; Frazer *et al.* 1999a,b). If the fetus is dead, a fetotomy cut through the distal row of carpal bones is preferable to prolonged attempts at manual correction which, in the case of contracted tendons, may be impossible (Bierschwal and de Bois 1972; Vandeplassche 1993; Frazer 1997). To perform this cut, one channel of the fetatome is threaded and the free end attached to a curved wire introducer. This is passed around the joint of the flexed limb and the wire returned to the outside (**Fig 3a**). The second channel of the fetatome is then threaded and the head of the instrument held firmly against the distal carpal joint (**Fig 3b**). Cutting through the intercarpal joint ensures that the increased diameter of the distal radius in the area of the growth plate remains. This then acts as an anchor point for the obstetrical chain, thereby preventing it from slipping off as traction is applied (**Fig 3c**). **Apart from loss of an anchor point (too high), an incorrectly placed cut (above or below the joint) will result in a sharp stump of bone that can easily lacerate the uterus and/or vagina (Fig 4)** (Frazer 1997). The amputated distal limb should always be removed from the uterus before the fetus is extracted (Bierschwal and de Bois 1972).

### Deviation of the head and neck

Deviation of the head and neck either laterally alongside the thorax, or ventrally between the forelimbs, can be very difficult to correct. In fact, it is the major reason for referral of equine dystocias to specialist hospitals (Vandeplassche 1987; Frazer *et al.* 1997a). It is important to be able to differentiate a wry neck from a mere lateral deviation. A wry neck cannot be straightened, and prolonged unproductive manipulations serve only to traumatise the genital tract (Youngquist 1986; Frazer 1999b). If the fetus is dead, then a single fetotomy cut can rapidly correct this malposture (Vandeplassche 1987).

**Two options are possible;** either direct amputation of the flexed head and neck, or amputation of the opposite forelimb. Removing the entire forelimb may permit the

obstetrician to advance a forearm deeper into the uterus such that the head can be reached. Alternatively, the extra space in the pelvic canal now permit the fetus to be extracted several inches further such that the retained head can be reached (**Figs 5a,b**).

**If the malposture cannot be corrected**, then the extra space facilitates passage of the curved wire introducer and a second cut can then readily remove the retained head and neck (Bierschwal and de Bois 1972; Roberts 1986; Youngquist 1986; Vandeplassche 1987, 1988, 1993; Frazer 1997). In Vandeplassche's dystocia population, 89% (154/173) of the anteriorly-presented cases (head and neck reflection) that were not amenable to manual correction were subsequently resolved by predominately one (40%) or 2 (30%) cut fetotomies (Vandeplassche 1987, 1992, 1993).

### (i) Neck amputation

One channel of the fetatome is threaded and the wire introducer attached to the free end is passed between the neck and chest wall. The head of the fetatome is held as close to the thoracic cavity as possible so that amputation is near the base of the neck (**Fig 6a**). A Krey hook may be attached to the exposed vertebra to facilitate extraction of the severed extremity. The hook is then anchored to the vertebral stump of the fetus and, together with traction on leg chains, extraction is readily achieved (Bierschwal and de Bois 1972; Frazer 1997) (**Fig 6b**).

### (ii) Extended forelimb

After both channels of the fetatome are threaded, the wire loop is moved up the limb until the head of the fetatome is positioned dorsocaudal to the cartilaginous part of the fetal scapula. It is essential that the wire is not dragged over the vaginal and cervical mucous membranes. Once tension is applied to the wires, the loop should be seated in the axilla such that the ventral wire passes between the fetal elbow joint and chest, and the dorsal wire rests medial to the humeroscapular joint.

**A chain attached to the fetlock** is then anchored to the fetatome such that the limb is held in extension. **The veterinarian must ensure that the head of the fetatome remains deep in the uterus** (dorsocaudal to the scapula) during the sawing process (**Fig 7a**). A correctly placed cut will remove the entire forelimb by dissecting up through the muscular attachments between the scapula and chest wall (**Figs 5b, 7b**). The obstetrician should endeavour to remove the scapula in its entirety, but the length of the fetal limb means that it is common to have a dorsal remnant of the scapula remaining attached to the fetal trunk. **It is critical that this portion be removed by hand (palm knife) before fetal extraction is attempted**, since sharp edges may lacerate the already friable tissues of the cervix and vagina (Bierschwal and de Bois 1972; Frazer 1997). A serious complication occurs if the head of the fetatome is permitted to move caudally such that the shoulder joint

remains attached to the fetus and the cut occurs through the proximal humerus. No extra space has been created, the cut edge is extremely sharp and there is nothing to which a chain can be attached.

### Retained forelimb

Uni- or bilateral shoulder flexion inevitably causes dystocia (Vandeplassche 1993; Frazer 1997). Manual correction alone is possible but may take some time to achieve due to the long limbs of the equine fetus (Vandeplassche 1993; Frazer *et al.* 1999a,b). Once again, a dead fetus may be more rapidly delivered by a one or 2 cut fetotomy. If the mare is presented with only the fetal head protruding through the vulvar lips then sectioning the neck may permit repulsion of the fetus and correction of the malposture (**Fig 8**).

If not, further cuts may be indicated to remove one, or both, forelimbs (Roberts 1986). When removing a retained forelimb, a palm knife is used to make an incision along the dorsal border of the scapula prior to introduction of the saw wire. One channel of the fetatome is threaded and the free end then attached to a curved wire introducer. The introducer is passed over the scapula and then pushed down between the limb and chest wall until it can be picked up ventrally and withdrawn under the humeroscapular joint. The second channel of the fetatome is threaded and the head of the instrument advanced until it rests medial to the humeroscapular joint. The head should be held here and the wire loop seated in the dorsal incision. The sawing action will then cut down through the muscular attachments that hold the scapula to the body wall (Bierschwal and de Bois 1972; Frazer 1997) (**Fig 9**).

### Posterior presentation

In Vandeplassche's dystocia population, 78.6% (44/56) of posterior presentations not amenable to manual correction were subsequently resolved by fetotomy (mean 2.8 cuts) (Vandeplassche 1987, 1992, 1993). In referral hospital populations, approximately 50% of posteriorly-presented cases have bilateral hip flexion (breech presentation) (Vandeplassche 1987; Frazer *et al.* 1997a). These cases are not readily amenable to fetotomy, since introduction of the wire is not easily performed. Caesarean section is the best option if the fetus is alive, and often even when the fetus is dead (Bierschwal and de Bois 1972; Roberts 1986; Vandeplassche 1987; Frazer *et al.* 1999a,b). **If an attempt at correction is made, the malposture must first be converted into hock flexion.** Anaesthetising the mare, hoisting the hindquarters, then instilling copious amounts of lubricant will eliminate straining and increase the abdominal space (Vandeplassche 1987; Frazer *et al.* 1999a). Even if the hip flexion is corrected, the uterine body can still easily be ruptured at its dorsal aspect as the hock is then straightened. Therefore, correction of the flexed hock posture by a fetotomy cut may entail less risk (Bierschwal and de Bois 1972; Vandeplassche 1987, 1993; Frazer 1997).



**Fig 6: a)** To amputate a laterally displaced head and neck, the curved wire introducer is passed down between the neck and chest wall. The introducer is retrieved ventrally and the second channel of the fetatome threaded. The head of the instrument is then held close to the base of the neck. **b)** Extra lubricant may need to be pumped around the fetus during extraction. The Krey hook is anchored to the vertebral stump.

### Hock flexion

Approximately 25% of posteriorly-presented cases referred to equine hospitals involve bilateral hock flexion (Vandeplassche 1987; Frazer *et al.* 1997a). The fetotomy technique is essentially the same as that described for amputation of a flexed carpus. One channel of the fetatome is prethreaded, a curved wire introducer is passed around the hock joint and the second channel threaded. The head of the fetatome is then positioned such that the limb is sectioned through the distal row of tarsal bones (**Fig 10a**). Once the amputated portion has been removed, an obstetrical rope or chain can then be fixed above the *os calcis* and use it as a point of traction (Bierschwal and de Bois 1972; Roberts 1986; Frazer 1997). The comments about



**Fig 7: a)** The clinician **MUST** ensure that the head of the fetatome remains dorsocaudal to the scapula. **b)** A correctly placed cut will remove the entire forelimb by dissecting UP through the muscular attachments between the scapula and chest wall. If the fetatome is pulled caudally the wire may cut through the proximal humerus, leaving a sharp bone stump and shoulder joint attached to the fetus.

adverse effects of high or low cuts at the carpus also apply to hock joint fetotomy cuts (**Fig 10b**).

### Fetal abnormality

#### Hydrocephalus

This condition is common in equine fetuses, especially those of the pony breeds (Vandeplassche 1993). In the author's referral hospital caseload, approximately 5% of dystocias involve a hydrocephalic fetus (Frazer *et al.* 1997a). In many cases, the extremely thin skull bones can be crushed manually to facilitate delivery. When this is not possible, a single fetotomy cut from behind the ears across to the eyes will permit removal of the dorsal half of the



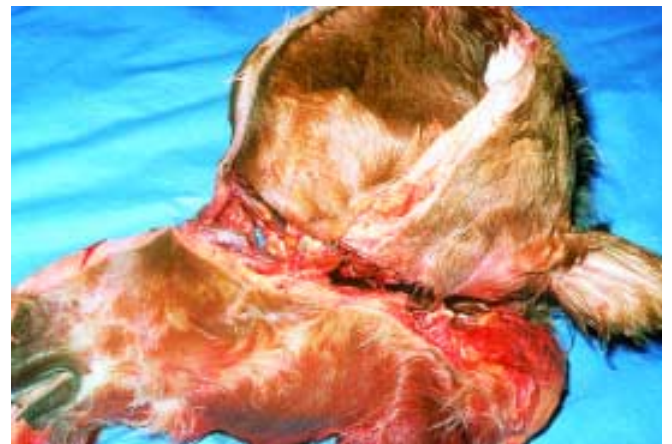
**Fig 10:** a) To amputate a flexed hock, the curved wire introducer is passed around the joint and the second channel of the fetatome threaded. The head of the instrument is then positioned such that the limb is sectioned through the distal row of tarsal bones. b) Cutting above the hock joint leaves a sharp stump of bone and nothing to anchor the chain on. If the cut is made below the joint, then the sharp bone can easily cause a laceration during fetal extraction.



**Fig 8:** If a dead fetus is presented with bilateral shoulder flexion, then removing the head and neck may permit correction of the limb malposture. The prethreaded loop of the fetatome is carefully passed over the fetal head and seated around the neck.



**Fig 9:** To remove a retained forelimb, it is necessary to make an incision along the dorsal border of the scapula prior to introduction of the fetatome. The curved wire introducer is then passed down between the retained limb and chest wall, and the second channel of the fetatome threaded. The head of the instrument **must** be held medial to the shoulder joint while the wire loop is seated in the dorsal incision. The sawing action then cuts **down** through the muscular attachments.



**Fig 11:** When it is not possible manually to collapse a hydrocephalic skull, a prethreaded fetatome loop can be placed behind the ears. The head of the fetatome is then placed near the eyes such that the dorsal half of the fetal head is removed (photo courtesy of Dr W. Beard).

fetal head, thereby permitting assisted vaginal delivery of the fetus (Bierschwal and de Bois 1972; Roberts 1986; Frazer 1997) (**Fig 11**). The trunk of a hydrocephalic fetus is generally smaller than normal and therefore seldom interferes with delivery (Youngquist 1986).

## Conclusions

The author and others consider a dead fetus to be an indication for fetotomy, provided that the clinician is experienced in the technique (Bierschwal and de Bois 1972; Vandeplassche 1987;

Frazer 1997). The aim of a fetotomy is rapidly to decrease the size of a fetus such that safe extraction can proceed. This avoids the stress and injury that follows prolonged manipulations and excessive traction, and also the additional expense and risks inherent in performing a caesarean section (Bierschwal and de Bois 1972; Vandeplassche 1987; Frazer 1997). **The results from fetotomy can vary tremendously, dependent to a large extent upon the level of expertise offered by the obstetrician and the facilities available** (Blanchard *et al.* 1983; Vandeplassche 1988, 1993). Certainly injudicious use of a fetotome can jeopardise the fertility and, possibly, the life, of a mare (Blanchard *et al.* 1983; Freeman *et al.* 1999).

**A common fault is to choose fetotomy only after the birth canal has already been traumatised by unproductive attempts at manual correction** (Bierschwal and de Bois 1972; Frazer 1997). A recent study demonstrated that when a fetotomy is performed correctly there should be no damage to the uterus, as indicated by changes in the protein composition and cellularity of the peritoneal fluid (Frazer *et al.* 1997b).

Vandeplassche has reported on a series of partial and complete fetotomies (Vandeplassche *et al.* 1972; Vandeplassche 1980, 1987). Partial fetotomy (one, 2 or, exceptionally, 3 cuts) permits repositioning of the fetus such that controlled vaginal delivery is possible (Vandeplassche 1987; Youngquist 1988; Frazer 1997). In Vandeplassche's experience, partial fetotomy was the method of choice to resolve rapidly and safely over 80% of cases that were not amenable to manual correction alone (Vandeplassche 1980). The only alternative in such cases is a caesarean section. In another study, 66% of cases not resolved by manual correction alone were corrected by fetotomy and 34% by caesarean section (Frazer *et al.* 1997a). One or 2 cuts were sufficient to correct the majority of cases, typically flexion of the head and neck and/or limbs (Frazer 1997). Greater than 3 cuts may be performed when economics of the case preclude the expense of caesarean section, or where, in the opinion of the clinician, the autolysed state of the fetus presents too great a surgical risk. Although these extra cuts are not ideal, the reality is that many owners will not commit to the expense of surgery.

Vandeplassche has stated that an experienced obstetrician should be able to resolve over 90% of equine dystocias by manual correction and traction, coupled with the judicious use of the fetotome when indicated (Vandeplassche 1987). Therefore, in this renowned obstetrician's opinion, caesarean section may only be indicated as the primary approach in less than 10% of cases where a dead fetus is present (Vandeplassche 1987, 1988, 1992). Fetotomy should not, however, be considered as a substitute for caesarean section, even though veterinarians unfamiliar with fetotomy techniques may be more inclined to perform surgery (Bierschwal and de Bois 1972; Vandeplassche *et al.* 1977; Frazer 1997). **The good obstetrician should be skilled in the former, but have recourse to the latter, and should use both techniques at the appropriate time.** A poor prognosis

for future fertility can be expected if surgery is attempted after the mare has been subjected to prolonged vaginal manipulations and/or attempts at fetotomy (Roberts 1986; Vandeplassche 1992, 1993; Frazer 1997; Freeman *et al.* 1999).

## Manufacturer's address

<sup>1</sup>Jorgensen Laboratories, Loveland, Colorado, USA.

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