BMC Veterinary Research

CASE REPORT

Open Access

Multiple cesarean section in Jenny

Cheru Telila Feyisa[1*], Yobsan Degefa Dadi[2] and Jiregna Dugassa Kitessa[1]

Abstract

Background Jenny dystocia occurs very rarely and is associated mainly with postural defects due to long fetal extremities. However, the management of dystocia in equines is relatively difficult compared with that in other large animals. Owing to the absence of well-described published papers on cesarean section in donkeys, this condition remain life-threatening after unsuccessful surgical intervention.

Patient presentation A 4-year-old Jenny with a difficult birth due to a previous car accident presented for 3 consecutive years at different stages of labor onset. Upon early presentation, there was straining and frequent aggressive rolling. Further examination also revealed a fully dilated cervix and narrow pelvic cavity due to the downward bending of the iliac wing. Surgical sites (lower flank, ventral midline, and paramedian) were used for each cesarean section. General anesthesia was used in all three procedures. Additionally, local infiltration of 2% lidocaine along with light general anesthesia was used when the patient presented with a live fetus. In all approaches, surgical sites were prepared for cesarean section, and dead fetuses were removed at the first and third parity due to delayed presentation. However, in the second parity, a live female foal was delivered. In all the approaches, the first layer of uterine closure was made by using a simple continuous suture pattern (biting all the layers of the uterine wall). The sutures were then oversewed with a Cushing suture pattern using # 0 polyglycolic acid. The skin was closed in different suture patterns during each technique using nonabsorbable suture material # 1 silk. Postoperative subcutaneous swelling was observed and regressed gradually in all surgical approaches. The duration of skin suture removal was determined based on the extent of wound healing and the site of the incision.

Conclusion This is the first ever report describing 3 consecutive cesarean sections in the same donkey with pelvic deformity. Thus, this study was able to indicate different approaches for cesarean section in equines. Moreover, owing to the bleeding nature of the equine uterus, simple continuous suturing was the pattern of choice for 1st layer uterine closure. It was also concluded that subcutaneous edema is unavoidable in donkeys.

Keywords Cesarean section, Dystocia, Jenny, Pelvic deformity, Surgical approaches

*Correspondence:
Cheru Telila Feyisa
telilacheru@gmail.com; cheru.telila@aau.edu.et
[1]College of Veterinary Medicine and Agriculture, Addis Ababa University, Bishoftu, Ethiopia
[2]College of Agriculture and Environmental Science, School of Veterinary Medicine, Arsi University, Asela, Ethiopia

Background

Equine species are long-day seasonal breeders, and their parturition process is very similar to that of other domestic animals in many ways [1]. The length of the pregnancy period is 365 to 376 days, but extreme variations range from 340 to 395 days, and parturition is a rapid and violent feature [2]. Foaling is the process of giving birth to a foal and is a prompt and forceful event in equine breeding [3]. During normal foaling, the mare becomes restless, sweats, urinates frequently, and the fetus changes position following uterine contraction so that her head and forelimbs are in the birth canal as stage I progresses, which can last between 1 and 4 h [3, 4]. Stage II is the time of fetal delivery, which usually lasts less than 40 min. It is characterized by the appearance of a water bag or the commencement of forcible straining, active abdominal contractions, and the appearance of the fetal leg, and mothers may choose to stand or lie down for birth [5]. Delivery of the fetal membranes was considered stage III, and the patient was considered to be in normal condition if it was expelled within the first 3 h after parturition [4].

Dystocia is defined as a difficult birth that reduces neonatal viability, causes maternal injury/death, or requires assistance during delivery [6, 7]. However, this procedure is challenging for many equine practitioners [3]. Dystocia in jenny is very rare and is estimated to account for 1–4% of foals, and it can be caused by maternal problems such as abnormal pelvic conformation as a result of a previous injury, exhaustion or uterine inertia, equine herpesvirus infection which causes abortion in late pregnancy; or the absence of expulsive forces. The major fetal problems related to dystocia include fetal malposition, size, malformation, and twins [3]. Among these abnormalities, malposture of long fetal extremities are considered the most common cause of dystocia in equines, although positional and presentational abnormalities occur to a lesser extent [5].

In mares dystocia was declared when the 2nd stage of parturition exceeded 20 min without fetal expulsion. Thus, fetal mortality and future mare fertility depend on the time and decisions made during foaling [3]. A delay in labor may result in deterioration of fetal health when oxygen delivery decreases as the placenta begins to separate from the uterus. Equine dystocia is regarded as a true emergency because it threatens the dam and fetus [8]. The risks are increased in small donkeys because of the large, domed forehead of some foals [2].

The choice of management may depend on the status of the fetus, duration and severity of dystocia, economic value of the dam and fetus, clinician expertise, client preference, and facilities available. Prompt assessment of the cause of dystocia is important for rapid decision-making [4]. If a fetus is alive, vaginal delivery may be attempted. However, if a live foal in an abnormal position and cannot be repositioned per vagina, a cesarean section should be chosen as soon as possible [9].

An equine cesarean section is an emergency procedure in which a veterinarian should decide on the need for general anesthesia. The choice is made after considering the safety and comfort of the patient and fetus and the comfort of the surgeon so that the surgery can be completed rapidly [8]. Equine patients are at greater risk of mortality and morbidity related to general anesthesia than other domestic animal and humans [10]. Therefore, for cesarean section, local anesthesia is considered a life-saving procedure in very high-risk patients [8].

The management of dystocia in equines is relatively difficult compared to that in other large animals. Additionally, due to the absence of well-documented published papers on cesarean section in donkeys, this procedure has been threatening both the life of the dam and the fetus after unsuccessful manual or surgical intervention. Therefore, the present case report aims to describe different cesarean section approaches and their outcomes in jenny.

Case presentation

A 4-year-old local breed jenny weighing approximately 140 kg was used for surgical intervention for dystocia for three consecutive years. The jenny has faced a car accident, and her pelvic bone was damaged when she was 2 years old. At the first parity, signs of labor were noticed during the first 4 h of labor. However, she became exhausted and lay down (Fig. 1A) after being manipulated by two different para veterinarians at different times before reporting to a veterinary teaching hospital (VTH). During the 2nd (Fig. 1B) and 3rd parity, she was directly presented to the hospital without any prior intervention. At these times, she was straining, lying down and getting up frequently. There were also externally noticeable clinical signs that indicated the occurrence of a previous car accident. These included asymmetrical tuber coxae and slight crippling while she was walking.

Upon further examination, her rectal temperature was 38.7 °C, respiration rate 16 breaths/minute, and heart rate 52 beats/minute. The cervix was fully dilated, and the pelvic cavity was narrowed due to the downward bending of the iliac wing. The fetal forelimbs were lodged in the cervix, and could not be expelled by traction. The viability of the foal was assessed per-vagina during each presentation. On the basis of the patient's history and clinical findings, a decision was made to perform a cesarean section under general anesthesia while the patient was in a recumbent position.

The exhausted jenny was stabilized with lactated Ringer's solution at a drip rate of 10 ml/kg/hr, and fortified procaine penicillin G at 25,000 IU/kg was administered intramuscularly as a prophylactic aid. Then, she was

Fig. 1 Case presentation and surgical delivery of the fetus. **A** and **B)** Jenny presentation during 1st and 2nd parity respectively. **C)** Midline incision and fetal hind limb locked in the incision site. **D)** Live fetus trying to stand just after delivery

premedicated with IV xylazine hydrochloride at 1.1 mg/kg and induced with ketamine hydrochloride at 2.2 mg/kg after 5 min of xylazine injection. Just after ketamine injection and loss of body balance, she assisted in lying down in lateral recumbence, and her legs were tied with rope for additional safety.

Maintenance anesthesia was achieved with constant-rate infusion (CRI) with a combination of ketamine (7.2 mg/kg/hr) and xylazine (2.1 mg/kg/hr) added to normal saline solution at a rate of 6 drops/second. In all approaches, the surgical sites were then widely shaved, washed, and scrubbed with tincture iodine solution as quickly as possible to reduce the time at the recumbent position and anesthetic exposure of the live fetus. Local infiltration of lidocaine was additionally used on the incision line when light general anesthesia was used (during the delivery of a live fetus). The animal was subsequently shifted to the dorsolateral position with the help of assistants during midline and paramedian approaches whereas, right lateral recumbence was used for the lower left flank approach.

For each cesarean section (CS), different surgical sites were selected. Accordingly, the left lower flank, ventral midline, and left paramedian approaches were used. After proper disinfection, skin incisions were made on the selected sites. During the 1st CS, a 25 cm long oblique skin incision was made on the lower left flank. At the 2nd CS, the incision was made on the midline approximately 10 cm from the cranial base of the udder and extended cranially for approximately 30 cm. During the 3rd CS, a 25 cm long skin incision was made on the left paramedian 5 cm away from the ventral midline. Except during the lower flank approach, after the incision of the subcutaneous tissue and abdominal muscles, a large amount of subperitoneal fat was trimmed off to expose the peritoneum. Finally, the peritoneum was incised, and the gravid uterus was exteriorized (Fig. 1C), while the remaining abdominal organs were packed with sterile drapes to prevent evisceration and contamination of the abdominal cavity. After the uterus was exteriorized and locked into the incision line, a small incision was made parallel to the uterine vasculature, and the incision was extended sufficiently with scissors for easy removal of the fetus and to avoid irregular tearing during fetal removal.

In all approaches, the foal's hind legs were straightened and passed to an assistant surgeon for fetal removal while the surgeon was stabilizing the uterus. During live fetus delivery on the 2nd CS, the foal was immediately passed to the attendant to clean and keep harming herself while trying to stand and search for a dam (Fig. 1D). Following the removal of the live fetus, an easily accessible fetal membrane was gently detached and trimmed. However, at the 1st and 3rd parturitions, owing to late presentation, the fetal membrane was already detached from the uterus and removed, as was the dead fetus, without additional effort.

Before uterine closure, 4,000,000 I.U. of procaine penicillin powder was sprinkled into the uterus and

abdominal cavity to control possible intrasurgical infection. The uterine incision was closed with a simple continuous suture (biting all layers of the uterine wall) to ensure adequate hemostasis. Simple continuous suturing was oversewed with a Cushing suture pattern using # 0 polyglycolic acid (PGA). The drape packed in the abdominal cavity was subsequently removed, and the first layer of the abdominal wall was closed with a simple interrupted suture pattern in all the approaches. The subcutaneous tissue was closed with a continuous interlocking pattern by # 2 PGA, USP 2, Huaian Angel Medical Instruments Co., Ltd., Jiangsu, China). The skin was closed by a horizontal mattress during midline and paramedian approaches, while a ford interlocking pattern was used for the lower flank approach. Finally, the surgical site was cleaned with 2% tincture iodine. Upon successful completion of the procedure, jenny recovered from anesthesia and met her foal.

Postoperatively, bright and alert foal on the 2nd CS was assisted in sucking her milk by positioning her mouth on the dam's teat and milking her milk into her mouth until she became strong. Jenny and her foal were kept in the Donkey Health and Welfare Project patient follow-up room and followed there until full recovery. Treatment with fortified procaine penicillin G at 25,000 IU/kg, IM was continued for 5 days, and diclofenac sodium at 1.5 mg/kg was administered for 2 days to relieve postoperative pain. The surgical wound was cleaned daily with tincture iodine (Fig. 2A&B) until healing was confirmed at 14 and 21 days of operation during the flank approach and during later two approaches, respectively. According to the owner, the jenny started mating on the 12th day of the first CS. Accordingly, she was able to give birth to a female foal after 384 days of mating. Despite being advised to keep the jenny indoors until she was permanently sterilized, the owner failed to do so, and her 3rd CS was conducted after 417 days of her 2nd surgery.

In all surgical approaches, subcutaneous swelling was observed on the most ventral part of the incision line, starting from the 2nd to 4th day of operation, and regressed within 9 days of onset. The skin sutures were removed on the 14th and 21st days after complete wound healing during the flank and ventral abdominal wall approaches, respectively (Fig. 3A&B). The jenny was in good health 35 days after the third cesarean section.

Discussion

Dystocia in equines is an emergency because of the powerful uterine and abdominal contractions involved in fetal expulsion, resulting in rapid placental separation. As a result, dystocia significantly increases the risk of fetal hypoxia and reduces the likelihood of foal survival [9]. The present case of dystocia was associated with previous pelvic bone damage due to a car accident. As a result, multiple cesarean sections were performed in three consecutive years in the same animal. This finding is in line with that of Purohit [5], who reported that pelvic deformities are among the possible indications for cesarean section. During the 1st parity, it was confirmed that jenny could not give birth without CS due to a previous pelvic bone damage caused by a car accident. Therefore, at the 2nd and 3rd parity, the animal was presented without prior manipulation for pervaginal delivery. Vaginal fetal viability assessments were made on each presentation. Therefore, a timely cesarean section was chosen to save both the life of the mother and foal during the 2nd case. However, during the 3rd visit, the foal died as the dam was too late for surgery, as she was in the grazing field without close supervision from the owner.

Fig. 2 Postoperative wound management and patient care in the Donkey Sanctuary and Animal Welfare Project during 2nd and 3rd parity. **A)** Ventral midline approach CS. **B**) left paramedian approach CS

Fig. 3 Recovery status of the jenny. **(A)** On the 14th day of left flank CS when she was presented for suture removal and after started mating. **(B)** On the 8th day of ventral midline CS with her cute foal

A combination of xylazine, ketamine, and diazepam can be used for induction, while inhalation anesthesia is used for maintenance purposes. However, in the absence of inhalation anesthesia, it can be further maintained by xylazine, ketamine, diazepam, and guaifenesin [5]. In equine patients, anesthetic induction with a combination of ketamine and diazepam produces a fast and safe means of recumbency in emergency or elective procedures. However, diazepam is believed to accumulate in the fetal compartment and cause respiratory depression in the fetus at birth [11]. On the other hand, local anesthesia for cesarean section is considered a lifesaving procedure in very high-risk patients [8]. The present surgical procedure was performed under general anesthesia with a combination of xylazine and ketamine. However, to reduce the fetal concentration of general anesthesia, the anesthesia was kept at the light stage until live fetal delivery, and line infiltration of lidocaine was used concurrently to reduce pain during the incision.

Equine dystocia can be managed via different surgical techniques, including ventral flank laparotomy and the paramedian and ventral midline approaches. Most surgeons choose the ventral midline approach under general anesthesia, with the mare in dorsal recumbence tilted slightly toward the surgeon because this approach allows easy exteriorization of the uterus and considerably reduces the intra-abdominal pressure; additionally, the wound can be easily repaired without excessive tension on the sutures [5, 12]. Fortunately, in the present case, all three approaches were used consecutively because of their comparative advantages and disadvantages. The ventral midline approach was chosen because of the above-listed advantages and because of the previous cesarean section on the ventral flank. However, during midline and paramedian approaches, control of the animal in dorsolateral recumbence requires additional man power. Additionally, the ventral midline approach causes more stress to animals than the flank approach when performed under light general anesthesia. Surgeons also need to trim excessive subperitoneal fat in well-conditioned animals.

Postoperatively, these two approaches were associated with relatively greater ventral edema than was the lower flank approach. Swelling during the flank approach occurred at the ventral part of the surgical site without the involvement of the incision line. However, swelling in the other two approaches extended to the incision line and took a relatively longer time to disappear. As indicated [5], other approaches apart from the midline necessitate muscle division, which results in greater hemorrhage and postoperative edema. Similarly, it was observed that there were various large blood vessels encountered during the dissection of the abdominal muscles via the flank approach compared with the remaining approaches. However, swelling may not only be associated with the surgical approach but also with the animal species, as it similarly appeared in all the other approaches. Subcutaneous swelling is greater in equines than in other animal species because of their relatively less efficient lymphatic system and loose attachment of the skin to underlying abdominal muscle.

With respect to the current midline approach, the risk of incisional hernia was prevented by using an appropriate closure technique and suture material of an appropriate size and strength. Dutt et al. [13] reported that midline incisions can be easily repaired without excessive tension on the sutures and the risk of incisional hernia is negligible. Similarly, during the current midline closure, there was no excessive tension when the patient was in dorsal or dorsolateral recumbency. However, suture tension increases when the animal moves into the lateral position and is expected to increase when the animal is in the standing position because of the full intestinal load. Therefore, it is difficult to exclude incisional hernias or

evisceration unless suture materials of appropriate size and strength are used. Dorsal recumbency during anesthesia in the mare is more likely to cause hypotension due to aortocaval compression by the gravid uterus than is lateral recumbency [8]. Even though dorsal recumbency allows sufficient space during uterus exteriorization and can reduce tension during wound closure, the current cesarean sections were conducted using dorsolateral recumbence to reduce hypotension and pressure on the vertebral column.

If the placenta remains attached to the endometrium, it is better not to attempt manual separation, as this may lead to profuse bleeding. Rather, in such case to promote uterine involution and placental passage oxytocin is suggested after uterine closure [5, 14]. In the present live fetus delivery time, an easily accessible part of the fetal membrane was removed to promote easier uterine closure by avoiding the incorporation of the placenta in the suture line. The remaining part was easily removed per vagina after 9 h of operation following complete detachment by uterine contraction without oxytocin injection. Therefore, if the patient presented with a fully dilated cervix, vaginal removal of the remaining placenta some hours after the procedure was found to be effective at minimizing the operation time.

Foal survival is high (38%) when the operation is performed early, while terminal CS carry a poor prognosis for foal survival, as the foal suffers from fetal anoxia caused by dehiscence of the allantochorion within 1–2 h of second-stage labor. Hence, if the foal is alive, the operation should be performed with minimal delay [5]. Likewise, in the present case, the foal was found to be alive during early presentation. In this report, no dam survival problems occurred regardless of the multiple cesarean section performed. However, Dubbin et al. [14] reported the death of a jenny from an unknown cause on the 9th day after the operation. Another study also revealed that all mares that underwent partial fetotomies prior to cesarean section died, while all those with no fetotomy survived [15].

According to Juzwiak et al. [16], a substantial reduction in fertility was resulted in 36% collective foaling rate in mares after cesarean section. A reduction in fertility can occur because of trauma to the genital tract incurred by attempts to achieve vaginal delivery. Another report also indicated a reduction in foaling rate when dystocia exceeds 90 min [15]. However, in the current report, the jenny was able to give birth within 396 and 417 days of previous operation during the 2nd and 3rd parities, respectively. These findings indicate the absence of fertility problems postoperatively irrespective of prolonged dystocia and vaginal delivery attempts prior to the 1st cesarean section.

Conclusions

This is the first ever-described 3 consecutive cesarean sections in the same donkey with pelvic deformity. Additionally, we were able to describe different approaches for cesarean section in equines. It was also identified that due to the anatomic nature of the equine uterus, bleeding from hysterotomy incisions is more challenging than in other animal species. Because in equine, endometrium is loosely attached to the myometrium and causes lower natural hemostasis of large subendometrial veins. Therefore, in all approaches, the first layer of the uterine incision should be closed with simple continuous sutures (biting all uterine layers) to prevent diffuse bleeding from the hysterectomy incision line. It was also concluded that subcutaneous edema is unavoidable in donkeys compared to other animal species.

Abbreviations

CS	Cesarean section
DHWP	Donkey Health and Welfare Project
PGA	Polyglycolic acid
VTH	Veterinary Teaching Hospital
CRI	Constant-rate infusion

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12917-025-04552-y.

Supplementary Material 1

Acknowledgements

Not applicable.

Author contributions

C.T.F and Y.D.D: conducted surgical procedures and wrote the main manuscript. J.D.K: participated in the final edition of the manuscript. All authors read and approved the final manuscript submission for publication.

Funding

Not applicable.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Informed consent for case handling and consent for publication provided.

Competing interests

The authors declare no competing interests.

Received: 30 August 2024 / Accepted: 31 January 2025
Published online: 26 February 2025

References

1. Thangamani A, Srinivas M, Prasad B, Kumar L. Periparturient Event and Dystocia in Equine- A review. Int J Sci Environ. 2018;7:648–58.
2. Chauhan PM, Sindhi SH, Thakor KB. Fetal Dystocia due to Dorso-pubic position and postural defects in a Jenny: a Case report. Vet World. 2013;6:116–7.

3. Dipl. KG, Bonnie A, Dip S, Barbara E. Dipl.V. Dystocia—A true equine emergency. Clin Tech Equine Pr. 2006;5:145–53.
4. Samper JC, Act D, Plough TA. How to deal with dystocia and retained placenta in the field. In: AAEP Proceedings. Vol. 58. 2012. p. 359–61.
5. Purohit GN. Dystocia and its management in the mare. J Livest Sci. 2019;2.
6. Sheetal SK, Patil AD, Sahatpure SK, Gahlod BM, Akhare SB, Registrar H, Superintendent H. Management of Dystocia due to primary uterine inertia. J Obstet Gynaecol India. 2018;7:584–7.
7. Purohit GN. Intra-partum conditions and their management in mare. Purohit J Livest Sci. 2019;2:20–37.
8. Ninu R, Abhishek chandra SaxenaKrishnan B, Maiti S. Caesarean in mare by Marcenac Incision under Local Anaesthesia. Iran J Vet Res. 2015;16:117–9.
9. Maaskant A, de Bruijn CM, Schutrups AH, Stout TAE. Dystocia in Friesian mares: Prevalence, causes and Outcome following caesarean section. Equine Vet Educ. 2021;190–5.
10. Rioja E, Cernicchiaro N, Costa M, Valverde A. Perioperative Risk factors for mortality and length of hospitalization in mares with Dystocia Undergoing General Anesthesia: a retrospective study. Canadain Vet J. 2012;53:502–10.
11. Bidwell L, Embertson R, Bone N, Ru M. Diazepam levels in foals after dystocia birth. In: Proceedings of the 54th Annual Convention of the American Association of Equine Practitioners; San Diego, California, December 6-10, 2008. 2008;54:286–7.
12. Sharma A, Negi V, Sharma P, Kumar H, Sharma A, Singh M, Kumar P. Dystocia due to Breech Presentation and Caesarean under Local Anaesthesia and Sedation in a mare. SVU-International J Vet Sci. 2021;4:16–21.
13. Dutt R, Niwas R, Kumar S, Saini D, Dangi A. Surgical Management of Dystocia due to foetal deformity in a mare. Vet Resear Inter. 2020;8:41–3.
14. Dubbin ES, Welker FH, Veit HP, Modransky PD. Dystocia Attributable to a fetal monster resembling Schistosomus Reflexus in a donkey. J Am Vet Med Assoc. 1990;197:605–7.
15. Abernathy-Young KK, Leblanc MM, Embertson RM, Pierce SW, Stromberg AJ. Survival rates of mares and foals and postoperative complications and fertility of mares after cesarean section: 95 cases (1986–2000). J Am Vet Med Assoc. 2000;241:927–34.
16. Juzwiak JS, Slone DE, Sanntschi, Elizabet M, Moll HD. Cesarean section in 19 mares results and postoperative fertility. Vet Surg. 1990;19:50–2.

Publisher's note