Cesarean section in alpacas and llamas at a referral center - technique, survival, and postoperative fertility: 24 cases (2000-2012)
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Cesarean section may be indicated during late gestation in alpacas and llamas to resolve dystocia or remove a non-viable fetus. The objective of this retrospective study was to evaluate indications for cesarean section in alpacas and llamas, surgical techniques employed, dam and cria survival rates, and postoperative fertility. Additional data included time to presentation, anesthetic protocol used, parity, and gestational age.

Twenty-one alpacas and three llamas met the inclusion criteria for the study. Mean (± SD) age of females was 5.1 ± 2.3 years (range 2-10). There was not a significant difference between maiden females (45.8%, n=11) and multiparous females (54.2%, n=13) (p>0.05). The mean gestational age at the time of presentation was 353.8 ± 11.8 days (range 329-376). The time to referral ranged from 0-72 hours.

Cesarean section was performed due to dystocia (95.8%; n=23) or concurrent maternal disease (4.2%; n=1). Uterine torsion (60.9%; n=14) was identified as the predominant cause of dystocia. Other causes of dystocia identified were bilateral hip flexion (21.7%; n=5), posterior presentation (4.3%; n=1), failure of cervical dilation (8.7%, n=2), and the presence of twins (4.3%; n=1).

Cesarean section was performed via ventral midline approach (79.2%; n=19) or left paralumbar fossa approach (20.8%; n=5); two of the cases utilizing a paralumbar fossa approach were llamas. The most common anesthetic protocols used butorphanol, diazepam, and propofol. All cases were intubated and maintained on isoflurane or sevoflurane in oxygen.

Overall survival rate was 91.2% (n=22) for females and 45.8% (n=11) for crias. One female alpaca died during recovery from anesthesia and one was euthanized postoperatively.

The most frequent postoperative complication was retained placenta (8.3%; n=2). Other complications included one case each (4.2%) of radial nerve paralysis, sepsis, and anemia. Radial nerve paralysis and sepsis occurred in the same case. All postoperative complications were resolved prior to discharge from the hospital. Of the surviving females (n=22), reproductive records were available for 11 alpacas and two llamas following cesarean section (50%). Ten females were bred at least once following cesarean section, and seven of those (70%) delivered at least one cria. No breedings were attempted in three females following cesarean section.

In the authors’ referral center, dystocia due to uterine torsion or bilateral hip flexure is the most common indication for cesarean section in alpacas and llamas. Survival of the dam is excellent. Postoperative fertility following cesarean section is generally good but more observations are needed to determine risk factors for loss of fertility and cria survival.

**Keywords:** Camelid; uterine torsion; dystocia; retained placenta; surgery