Hand-Assisted, Laparoscopic Ovariectomy Technique to Remove Granulosa-Theca Cell Tumors in Four Mares

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The standing, hand-assisted, laparoscopic ovariectomy technique is technically easy to perform, can be used for large pathologic ovaries, allows direct visualization of the target tissues, allows accurate placement of the staple line without placing tension on the mesovarium, and eliminates the potential risks and costs associated with general anesthesia. Authors’ address: Department of Large Animal Clinical Sciences, University of Florida, College of Veterinary Medicine, P.O. Box 100136, Gainesville, FL 32610-0136. © 2001 AAEP.

1. Introduction
Granulosa-theca cell tumors are the most common ovarian neoplasia afflicting the equine species. In the mare, this sex cord stromal cell neoplasia is generally benign and is associated with anestrus, and in certain cases, with aggressive/stallion-like behavior. Unilateral ovariectomy is required to potentially restore future fertility and to eliminate the aggressive/stallion-like behavior that may be associated with this type of ovarian neoplasia.

In the mare, bilateral and unilateral ovariectomy procedures have been associated with an increased morbidity.1–3 Traditional celiotomy approaches involve exteriorizing the enlarged ovary from the abdominal cavity before applying either the ligatures or staples and transecting the mesovarium. Reported complications with traditional ovarioectomy techniques have included: myopathies, neuropathies, postoperative pain and hemorrhage, incisional infections, incisional dehiscence, eventration, peritonitis, and death.1–3 Myopathies and neuropathies have been reported when the ovariectomy was performed under general anesthesia to remove granulosa-theca cell tumors. Tension on the mesovarium to exteriorize the ovary is speculated to decrease arterial blood pressure and potentially lead to inadequate peripheral circulation.3 Tension-free ligation and transection of the mesovarium could potentially decrease the occurrence rate of intraoperative and postoperative complications.

The purpose of this report is to describe a hand-assisted, laparoscopic ovariectomy technique to directly visualize the affected ovary and remove granulosa-theca cell tumors in standing mares using a tissue anastomosis-stapling device.

2. Materials and Methods
In 4 mares, a standing, hand-assisted, laparoscopic ovariectomy technique was performed. The mares (3 Thoroughbreds and 1 American Quarter Horse), ages 3–19 years, weighed 500–530 kg. Mares were
initially evaluated by referring veterinarians for infertility and changes in behavior, and the left ovary was enlarged in all mares.

All mares were taken off feed 24 hours before the surgical procedure. Each mare was sedated with 2.5–5 mg of detomidine hydrochloride (administered intravenously [IV]) and restrained in a set of stocks with cross-ties. Mares received perioperative broad spectrum antibiotics and flunixin meglumine (1.1 mg/kg, q 12 h, IV). The left paralumbar fossa was clipped and prepped using either a povidone-iodine or chlorhexidine scrub. The laparoscopic portal site and a 15–20 cm vertical line 2–4 cm ventral to the laparoscopic portal was infiltrated with 2% mepivacaine. Following infiltration of the local anesthetic, the paralumbar fossa was draped. In 3 mares, a Veress-type needle was then passed through the paralumbar fossa, and the abdominal cavity was insufflated with CO2 before placing the laparoscopic trocar-cannula unit. The laparoscope was inserted before making the larger flank celiotomy incision. In the fourth mare, the flank incision was made before inserting the laparoscopic trocar-cannula unit, which facilitated the placement of the trocar-cannula unit. For the laparoscope portal, a 15 mm incision was made dorsal to the crus of the internal abdominal oblique muscle; distanced equally from the tuber coxae and last rib.1 A 10 mm trocar-cannula unit was inserted through the incision perpendicular to the flank musculature, followed by removal of the trocar and insertion of the laparoscope through the cannula for observation of the ipsilateral ovary. The insufflation tubing was then attached to the laparoscopic cannula. A 20 cm skin incision was made 2–4 cm ventral to the location of the laparoscopic portal. The external abdominal oblique muscle was sharply incised. The internal abdominal oblique and transverse abdominal muscles were divided in the direction of their fibers, and the peritoneum was bluntly entered. The diameter of the opening through the peritoneum was minimal to decrease CO2 loss during digital manipulation of the cranial reproductive tract. Infiltration of 10–15 ml of 2% mepivacaine into the mesovarium was performed using either a spinal needle or laparoscopic injection needle inserted through the flank incision. Digital manipulation of the ovary and mesovarium facilitated accurate infiltration of the local anesthetic. While an assistant manipulated the laparoscope, hemostasis of the mesovarium was achieved using a TA-90 abdominal stapling device. This was performed by passing the jaws of the stapling instrument into the abdominal cavity while the handle of the instrument remained outside the abdomen. The accurate positioning of the stapling instrument was facilitated by digital manipulation of the mesovarium. Before application of the stapling instrument, the mesovarium and ovary were digitally manipulated to ensure no intestinal or mesenteric entrapment occurred during the process of positioning the stapling instrument. Separate linear staple lines (1–2) were applied across the mesovarium. Using digital manipulation of the mesovarium, the mesovarium was accurately transected between the ovary and staple line using either laparoscopic scissors or long-handled scissors. Aspiration of the cystic fluid within the ovary, stay sutures, large-grasping forceps, and digital manipulation facilitated the removal of the ovary in 3 mares. In the fourth mare, the ovary was placed within a sterile plastic bag within the abdomen. Placement of the transected ovary within a sterile plastic bag allowed the free edges of the bag to be exteriorized from the abdominal cavity. Tension on the free, open edges of the plastic bag helped retract the incision edges and brought the ovary up to the level of the incision. The ovary was then sharply incised using a scalpel blade to decompress the cystic fluid within the ovary. The release of the cystic fluid and tension on the free edges of the plastic bag enabled easy exteriorization of the enlarged ovary. The abdominal musculature and skin were closed routinely. Postoperative treatment with broad spectrum antibiotics and flunixin meglumine was continued. Mares were discharged between the 3rd and 8th days postoperatively.

3. Results

All transected ovaries ranged from 20 to 30 cm in diameter and were confirmed to be granulosa-theca cell tumors by histopathology. Abdominal insufflation with CO2 was performed in all mares, and loss of abdominal insufflation from the paralumbar incision did not adversely affect the ovarioectomy procedure. On entering the abdominal cavity, digital manipulation of the ovary caused some discomfort (shifting their weight, looking back at their flank) in the mares. However, once the mesovarium was infiltrated with local anesthesia, minimal to no change was observed in the behavior of the mares during the application of the linear abdominal stapling instrument and transection of the mesovarium. Directly visualizing the affected ovary throughout the procedure was successful in all cases. In 1 mare, mild hemorrhage from the mesovarium occurred after transection of the ovary. The size of the staples used in this mare (3.5 mm compared with 4.8 mm) was believed to be associated to the lack of hemostasis. A hemoclip was applied and prevented further hemorrhage. In 3 mares, incisional drainage was observed postoperatively, and in 2 mares, partial skin dehiscence occurred postoperatively. All mares recovered well in the short term. One mare died 4 months postoperatively because of cardiac failure related to sustained ventricular tachycardia. In this mare, the ventricular tachycardia had been diagnosed preoperatively, and the owner elected to have the ovary removed by laparoscopy to avoid general anesthesia. The remaining 3 mares recovered completely and uneventfully.
4. Discussion

A recent case report described a laparoscopic technique to remove small granulosa-theca cell tumors in 2 mares.4 The procedure was performed under general anesthesia, and a ventral abdominal approach was used with the mares positioned in a Trendelenburg position to facilitate ligation of the mesovarium and transection of the ovary. This particular technique was suggested to be limited to ovaries less than 20 cm because of the size of the suture loop required to pass over the ovary. Cardiovascular derangements have been noted when horses are in a Trendelenburg position.5

In the standing mare, hand-assisted laparoscopic removal of enlarged ovarian granulosa-theca cell tumors has a number of advantages. This technique eliminates the potential risks and costs associated with general anesthesia. In traditional celiotomy approaches, the mesovarium may not be adequately visualized if the ovary is difficult to exteriorize because of tension on the mesovarium. Visualization of the ovary and mesovarium during laparoscopic procedures facilitates the application of either staples or ligatures and enhances the surgeon’s ability to achieve secure hemostasis. In these cases, direct visualization of the target tissues was greatly enhanced by using the laparoscope. However, the temperament of the mare may limit the effectiveness of laparoscopic procedures in the standing position.

In 3 mares, incisional drainage was observed, and in 2 mares partial incisional dehiscence occurred postoperatively. Incisional complications have been associated with ovariectomy techniques to remove granulosa-theca cell tumors.3 A higher incidence of incisional complications have been observed with approaches through the paralumbar fossa.6 This may be associated with the increased amount of dead space and possible muscle necrosis that may occur with the paralumbar approach.6 In the cases described in this report, the incisional edges sustained the most trauma during the attempts to remove the transected ovaries manually. In 1 mare, the placement of the ovary within a plastic bag facilitated easier removal and prevented ovarian cystic fluid from being released into the abdominal cavity.

In conclusion, the standing, hand-assisted, laparoscopic ovariectomy is technically easy to perform, can be used for larger ovaries, allows direct visualization of the target tissue, allows for accurate placement of the staple line without placing tension on the mesovarium, and eliminates the potential risks and costs associated with general anesthesia.

References