

Reproductive performance following unilateral ovariectomy for treatment of ovarian tumors in 7 mares

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Abstract: Unilateral ovariectomies were performed on 7 mares under inhalation anesthesia for treatment of ovarian tumors. All mares were evaluated for a 2-year history of infertility; 6 mares showed persistent anestrus while 1 mare showed persistent estrus. The presumptive clinical diagnosis of the tumors was made by rectal palpation and ultrasonographic imaging of the ovaries. The affected ovaries were large, spherical, and hard, and the contralateral ovaries were small and inactive. The flank approach technique was used for all of the mares. All mares were operated on successfully. One of the mares had delayed healing and abscess formation in the incision line. In one postovariectomy mare, the contralateral ovary remained small and inactive; the histopathological diagnosis for the ovarian tumor was fibrothecoma and the mare remained infertile after the ovariectomy. The other 6 mares returned to estrus (average: 154 ± 30 days), were capable of breeding, and exhibited normal behavior after the surgery. These mares were diagnosed histopathologically with ovarian granulosa theca cell tumors (GTCT). These mares were not bred until the next breeding season. After breeding (average time to successful conception: 296 ± 20 days after surgery), these mares became pregnant and gave birth to normal foals uneventfully.

Key words: Ovariectomy, GTCT, fibrothecoma, mare

Yedi kısrahta ovarium tümörü tedavisi için yapılan unilateral ovariektomi sonrasında reproduktif performans

Özet: Yapılan çalışmada yedi kısrağa ovarium tümörü sebebiyle inhalasyon anestezisi altında tek taraflı ovariektomi operasyonu yapıldı. Değerlendirilen tüm kısrakların 2 senelik infertilite geçmişi bulunmakta idi. Bu kısraklardan 6 tanesi kalıcı anöstrus gösteriyorken, bir tanesi kalıcı östrus gösteriyordu. Tümörlerin klinik tanısı rektal palpasyon ve ovariumların ultrasonografik gözlemi ile yapıldı. Tüm kısraklarda flank yaklaşım tekniği kullanıldı. Tüm kısraklar başarılı şekilde ameliyat edildi. Kısraklardan bir tanesinde kızgınlığın gecikmesi ve ensizyon hattında abse oluşumu gözlemlendi. Bir kısrahta ovariektomi sonrası karşı taraftaki ovarium küçük ve inaktif kaldı. Histopatolojik inceleme sonrasında etkilenen ovarium için fibrothecoma tanısı kondu. Söz konusu kısrağın ovariektomi sonrası infertil kaldı. Diğer kısraklar ameliyat sonrasında östrus (ortalama: 154 ± 30 gün) gösterdi ve üreme yeteneğine kavuşarak normal davranış gösterdiler. Bu kısrakların ovariumları için histopatolojik inceleme sonrasında granulosa theca hücre tümörü (GTCT) tanısı kondu. Kısrakların aşımaları için bir sonraki üreme sezonu beklendi. Bu kısraklar çiftleştirilmelerini (ortalama: ameliyat sonrası 296 ± 20 gün) takiben gebe kaldılar ve sorunsuz olarak sağlıklı taylar doğurdular.

Anahtar sözcükler: Ovariectomy, GTCT, fibrothecoma, kısrağ

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Reasons for ovariectomy among mares include behavioral problems and ovarian tumors (1,2). The most frequent indication for the removal of a pathologic ovary is a granulosa theca cell tumor (GTCT). Other ovarian tumors (teratoma, cystadenoma, adenocarcinoma, dysgerminoma, and ovarian lymphosarcoma) occur much less commonly in mares (3).

Ovarian fibrothecoma is a rare, benign tumor that occurs before and after menopause, growing from the connective tissue of the ovarian cortex in humans. Ovarian fibrothecoma, if hormonally active, causes various clinical problems. For instance, high levels of estrogen produced and maintained by the tumor may cause defects in ovulation or implantation, leading to infertility. It is extremely rare that thecoma develops during pregnancy (4,5). Ovarian fibrothecoma has not been reported in mares.

Progressive increase in tumor size, abnormal hormone production and associated behaviors, and infertility necessitate removal of ovarian tumors. Removal of the affected ovary can enable the usually quiescent, contralateral normal ovary to return to reproductive function immediately or up to 2 years later (2,6). The concurrent or nonconcurrent occurrence of bilateral GTCT in mares appears to be rare (7).

Many surgical approaches are available for the removal of ovaries from the mare, including laparoscopic ovariectomy; colpotomy; flank approach with mare standing; or flank, ventral midline, and diagonal paramedian with the animal under general anesthesia (8-11). The flank approach with the mare anesthetized and positioned in lateral recumbency can be used for removal of granulosa cell tumors smaller than 25 cm in diameter (12) This technique is useful for unilateral removal of the ovaries. Care is taken to avoid the cecum if a right flank approach is used (13).

The objective of this report is to evaluate the complications and prognosis following ovariectomy under general anesthesia using the flank approach, including the subsequent reproductive status of these mares.

Seven mares aged 6-14 years were used. One was an Arabian mare, while the remaining 6 were

thoroughbreds. All mares were evaluated for a 2-year history of infertility; 6 mares showed persistent anestrus while 1 mare showed persistent estrus. The presumptive clinical diagnosis of the tumors was made by rectal palpation and ultrasonographic imaging of the ovaries. Six mares with GTCT had multiple small anechoic areas separated by echogenic trabeculae. The ovary affected with fibrothecoma palpated very hard in some areas and had uniformly hyperechogenic areas on the ultrasonography.

The mares had feed withheld for 24 h to reduce distention of the gastrointestinal tract. Water was allowed ad libitum. Flunixin meglumine (1 mg/kg, IM) (Flumeglin[®], Teknovet, Turkey) and Procaine Penicillin G (20,000 IU/kg, IM) (Reptopen[®], Sanofi-Dif, Turkey) were administered preoperatively. Induction to anesthesia included xylazine (1.1 mg/kg, IV) (Rompun[®], Bayer, Turkey) and ketamine (2.2 mg/kg, IV) (Alfamine[®], Egevet, Turkey). Anesthesia was maintained by 2% isoflurane (Forane[®], Abbott, Turkey) delivered in 100% oxygen. The mares were positioned in lateral recumbency with the affected side up, and the paralumbar fossa was routinely clipped, shaved, and prepared for sterile surgery.

The flank approach technique was used in all mares. A vertical or slightly oblique incision was made at a point centered between the tuber coxae and the last rib (Figure 1). For ovaries greater than 10 cm in diameter or in mares with a small paralumbar fossa, the incision was extended 10-15 cm ventrally. The external oblique, internal oblique, and transverse abdominal muscles were manually separated from the center of the incision toward the dorsal and ventral aspects. Mayo dissecting scissors were used to perforate the peritoneum, and the opening was enlarged manually. A gloved hand was introduced into the peritoneal cavity and extended in a caudal direction to locate the abnormal ovary. The ovary was then exteriorized through the incision (Figure 2). Transfixion ligation of the ovarian pedicle was performed with size 2 polyglactin 910 (Vicryl, Ezgi Pet, Turkey) using multiple ligatures (Figure 3). These sutures were also overlapped to ensure that no vessels escaped ligation. Once ligation was complete, the ovarian pedicle was transected distal to the ligatures, the ovary was removed, and the mesovarium and pedicle were examined carefully for hemorrhage.

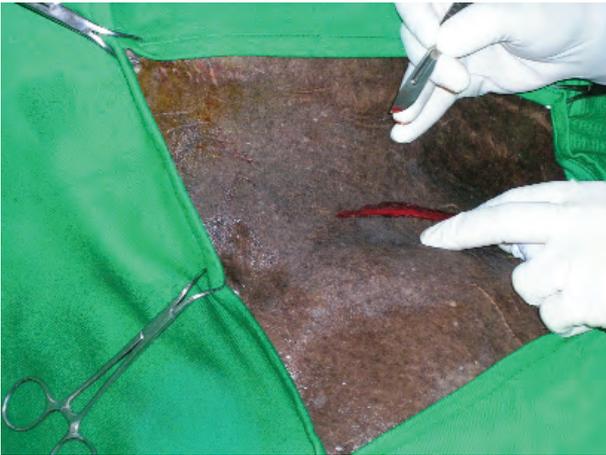


Figure 1. Operation site and incision line.

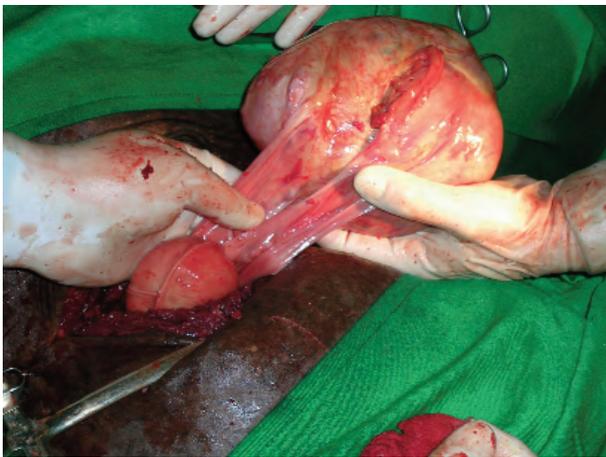


Figure 2. Ovary before removal.

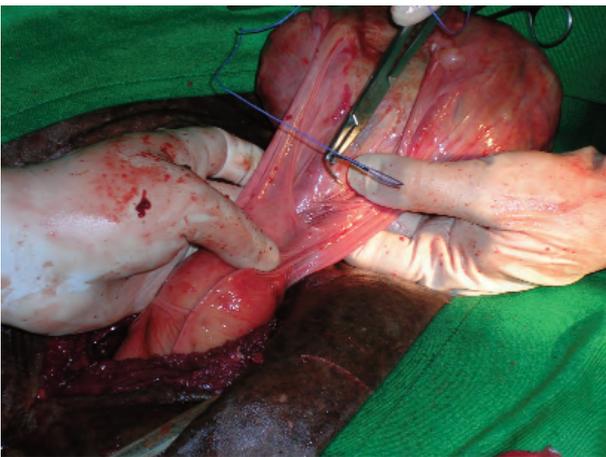


Figure 3. Ligation.

The flank incision was closed in 5 layers. The peritoneum and transverse abdominal muscles were closed with simple interrupted sutures of size 0 polyglactin 910. The internal oblique muscle was closed with simple interrupted sutures of size 0 polyglactin 910. The external oblique was closed with simple interrupted sutures of size 2 polyglactin 910. The subcutis was closed with a simple continuous suture of size 0 polyglactin 910. The skin was apposed with simple interrupted size 2 prolene sutures (Prolene, Ezgi Pet, Turkey). Recovery from anesthesia was uncomplicated for all mares.

Procaine Penicillin G therapy was continued postoperatively (20,000 IU/kg q 12 h, IM for 7 days). Flunixin meglumine (1 mg/kg q 12 h, IM for 5 days) was used for discomfort and signs of endotoxemia. Skin sutures were removed 10 days after the surgery.

All mares were operated on successfully. One mare had delayed healing and abscess formation in the incision line. The infected incision was cleaned with diluted povidone-iodine solution every day and parenteral antibiotic (Procaine Penicillin G, 20,000 IU/kg q 12 h, IM) was administered for 12 days postoperatively.

In another mare, the contralateral ovary remained small and inactive following surgery. In this mare, the removed ovary was diagnosed histopathologically as a fibrothecoma. Multiple cystic follicles, wide hemorrhagic areas, and mainly well-differentiated fibroblasts and fibrous collagen bands characterized the neoplastic tissue. The mare remained infertile after the ovariectomy for the duration of a 1-year follow-up.

The other mares returned to estrus (average: 154 ± 30 days), were capable of breeding, and exhibited normal behavior after the surgery. However, these mares were not bred until the subsequent breeding season. These mares' ovaries were diagnosed histopathologically as GTCT. After breeding, these mares became pregnant (average time to successful conception: 296 ± 20 days after the surgery) and gave birth to normal foals uneventfully.

The distribution of mare breeds and ages, the sizes of the affected ovaries, the histopathological results, and the reproductive status of the mares are shown in the Table.

Table. The distribution of mare breeds and ages, sizes of affected ovaries, histopathological results, and the reproductive status of the mares (GTCT = granulosa theca cell tumor).

Mare	Breed	Age	Size (cm)	Histopathological result	First estrus after surgery	Days to successful breeding for pregnancy	Number of breedings for pregnancy
1	Thoroughbred	10	14 × 10 × 8	Fibrothecoma	-	-	-
2	Thoroughbred	7	15 × 10 × 6	GTCT	195	237	2
3	Thoroughbred	13	9 × 7 × 5	GTCT	89	367	3
4	Thoroughbred	12	8 × 6 × 5	GTCT	76	312	2
5	Thoroughbred	14	17 × 9 × 7	GTCT	225	294	3
6	Thoroughbred	6	10 × 7 × 5	GTCT	242	242	1
7	Arabian	6	8 × 6 × 3	GTCT	98	325	1

Differentiation of thecoma from other ovarian tumors by ultrasonography and computed tomography is not possible in many cases in humans (14,15). Currently, the measuring of serum tumor markers is a very important tool in the diagnosis of malignant ovarian tumors. CA125 is a useful tumor marker to predict the benign or malignant nature of ovarian tumors, and serum CA125 levels are elevated in 80%-85% of patients with epithelial ovarian cancer. High serum levels of CA125 are generally found with thecomas in humans (16). We did not measure any tumor markers in the mares in this report, but this may be a useful technique to consider in the future. Currently, measurement of such markers in the mare is not possible.

Surgical approaches available for ovariectomy in the mare include the ventral midline, the diagonal paramedian, the flank, and the vaginal wall. Selection of the most appropriate approach depends on the ovarian size (13) and the temperament of the mare.

The flank approach technique can be done with the mare under general anesthesia or standing. The increased vascularity of tumescent ovaries dictates complete ligation of engorged vessels in the ovarian pedicle, and this can be very difficult to do in the standing animal using the open flank approach. Excessive traction on the ovary to expose the ovarian pedicle and associated vessels causes intense pain and may cause the mare to rear or fall (17). The approach under general anesthesia is dictated by the size of the tumor and the paralumbar fossa (18). This technique is useful for the unilateral removal of ovaries up to 15 cm in diameter. In this study, the flank approach technique under general anesthesia was preferred because anesthesia relaxes the muscles of the flank and eliminates movement during ligation of the ovarian pedicle. In this series of mares, the flank approach provided an effective method for removal of the affected ovary, and postoperative complications were few.

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