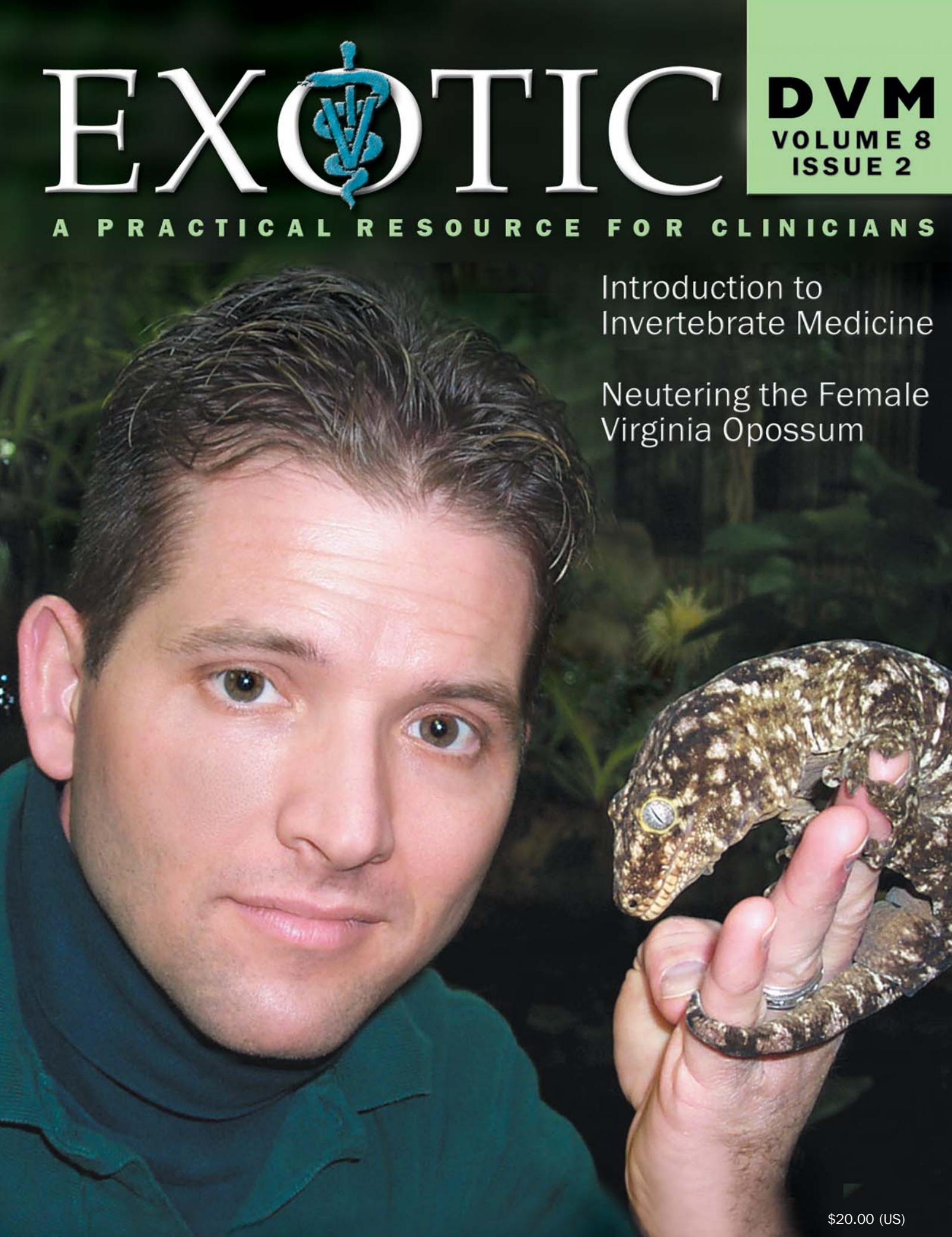
EXOTIC DVM

VOLUME 8
ISSUE 2

A PRACTICAL RESOURCE FOR CLINICIANS

Introduction to Invertebrate Medicine

Neutering the Female Virginia Opossum



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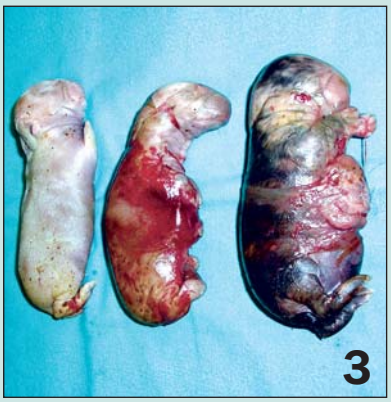

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Special Feature

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Surgical Technique for Neutering the Female Virginia Opossum

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Mammal species belonging to the order Marsupialia are occasionally encountered in veterinary practice. The Virginia opossum (*Didelphis marsupialis virginiana*) (Fig 1), which is native to much of North America, can be a satisfactory pet. Therefore, preventive medicine and surgery is a concern for this species. It should be noted that some states in the United States may regulate or prohibit the possession of native wildlife as pets.

Anatomy and Physiology of the Urogential Tract

The practitioner considering neutering the female Virginia opossum must understand that the urogenital tract of marsupials presents significant anatomic differences from that of placental mammals. The ontogeny of the marsupial urogenital apparatus is thought to be more primitive than that of most placental mammal species. The abdominal pouch, or marsupium (Fig 2), is an external anatomic peculiarity of marsupials not present in other orders of mammals.

Fig 1. The Virginia opossum.

Fig 2. The abdominal pouch or marsupium.

The Virginia opossum is polyestrous with a 23- to 28-day estrus cycle. The gestation period is very short at 12-13 days, after which newborn young climb to the pouch and stay about 70-100 days before emerging.

The anatomy of the reproductive tract of the Virginia opossum is shown in Fig 3. In marsupials, the ureters pass medially to the genital ducts, while in placental mammals they pass laterally. The presence of the ureters prevents fusion of the distal part of the genital ducts into a single uterine body, as is present in most placental mammal species. As such, the uterus is completely paired, divided into two uterine horns (or uterine bodies). The two separated genital ducts continue distally, forming two separate vaginas. Due to the presence of the ureters on the medial side, the two vaginas cannot fuse together but become united just ventral to the ureters into an anatomical structure called the "median vagina." The two paired vaginas, which in the opossum appear more lateral than distal, are termed "lateral vaginas." Actually, the name "median vagina" is controversial, because this structure continues distally into the urogenital sinus.

The uterine horns present two separate cervices as in the rabbit, and enter the median vagina. The urinary bladder is positioned ventral to the median vagina and the urogenital sinus. The division is marked by the urethra, which opens caudoventrally, and by connective tissue between the median vagina and the urogenital sinus. In most marsupial species, the birth canal is transient and is recreated at each birth, while in other species it remain patent after the first birth.

The distal tracts of the ureters enter the urinary bladder, crossing the median vagina laterally. The urogenital sinus opens externally through the urogenital opening.

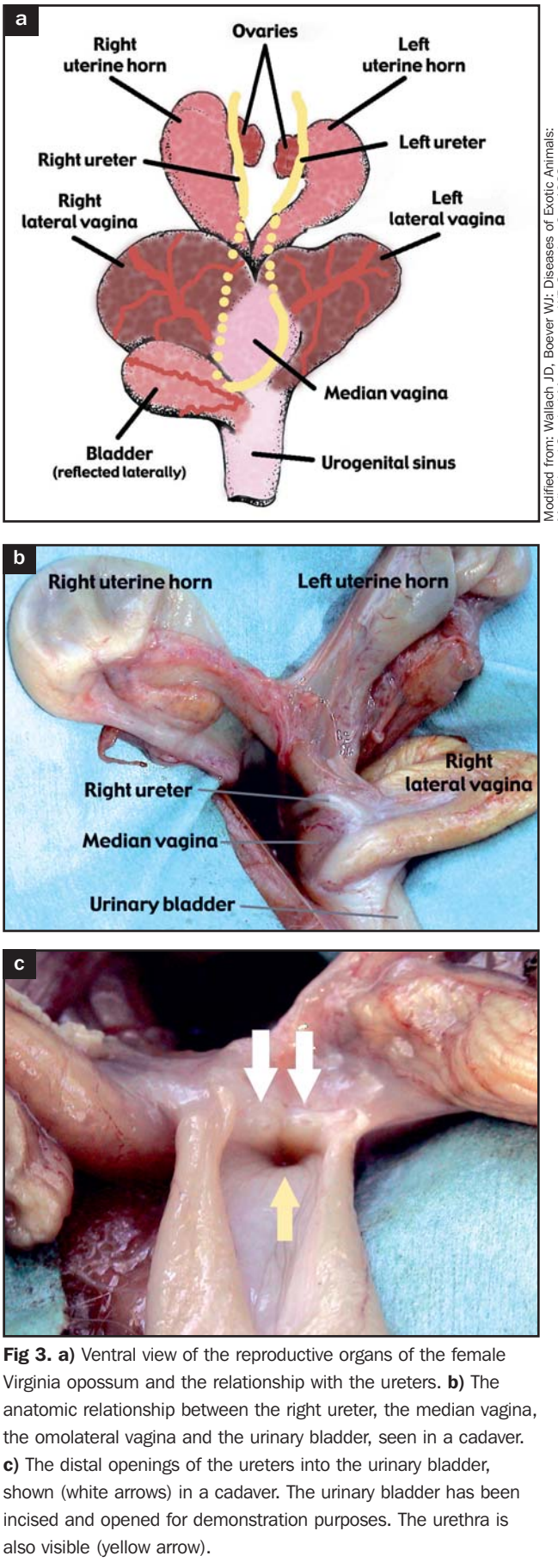

Fig 3. a) Ventral view of the reproductive organs of the female Virginia opossum and the relationship with the ureters. **b)** The anatomic relationship between the right ureter, the median vagina, the omolateral vagina and the urinary bladder, seen in a cadaver. **c)** The distal openings of the ureters into the urinary bladder, shown (white arrows) in a cadaver. The urinary bladder has been incised and opened for demonstration purposes. The urethra is also visible (yellow arrow).

Indications and Surgical Technique

Anecdotally reported infections of the genital tract of female captive opossums suggest that elective neutering may be important in pets of this species. Neutering of the opossum, as with rabbits, is best performed via an ovario(salpingo)hysterovaginectomy. The position of the ureters and their anatomic relationship with the vaginas make excision of the entire reproductive organ in one section impossible. Therefore, ovariohysterectomy is performed in conjunction with sperate vaginectomy of the paired lateral vaginas.

Step-By-Step Surgical Procedure

Anesthesia is induced with a combination of butorphanol (0.5 mg/kg SC), medetomidine (70 µg/kg IM) and ketamine (10 mg/kg deep IM) and maintained with isoflurane (0-2%) and oxygen delivered by face mask. The patient is positioned in dorsal recumbency and monitored as per routine.

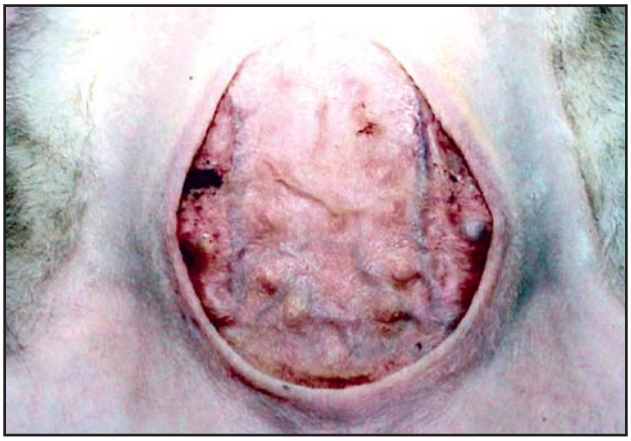

Fig 4. The fur over the abdomen is shaved, taking care to avoid damaging the margins and delicate skin of the pouch.

Fig 5. The skin of the pouch is gently scrubbed with dilute clorhexidine, and the surgical field is covered with a sterile transparent drape.

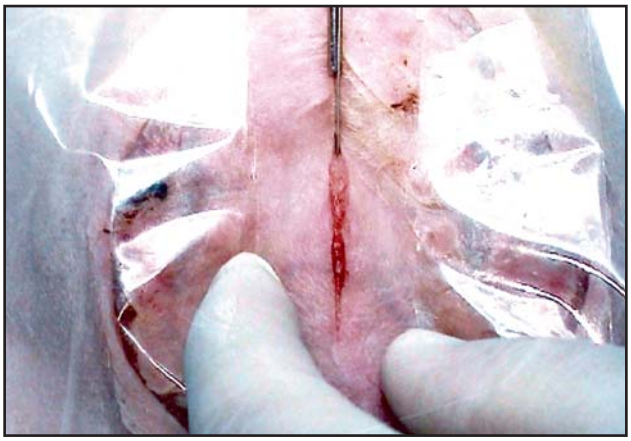

Fig 6. A midline incision is made through the skin and then the abdominal wall.

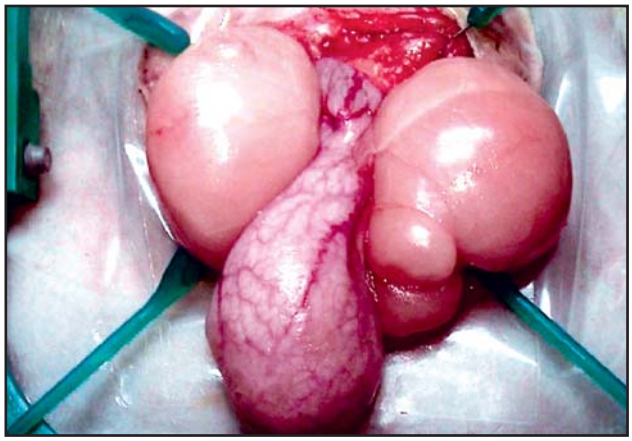

Fig 7. Once the abdominal cavity is accessed, a stay retractor is placed. The Lone Star Retractor works well for this purpose. The urinary bladder is exteriorized. Note that in adult females, the fat surrounding the genital tract can be abundant.

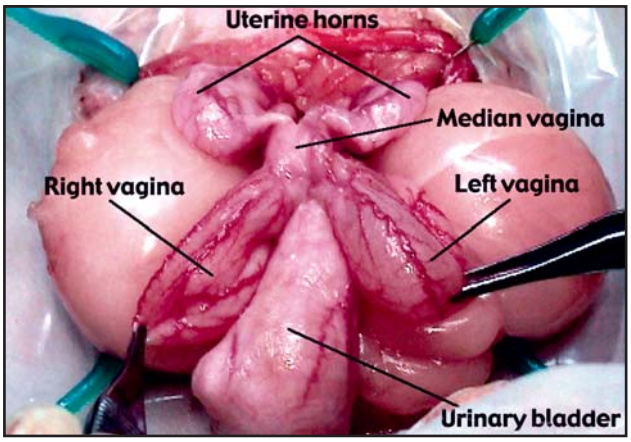

Fig 8. The urogenital tract is exposed. The lateral paired vaginas are shown; these may resemble the urinary bladder in appearance.

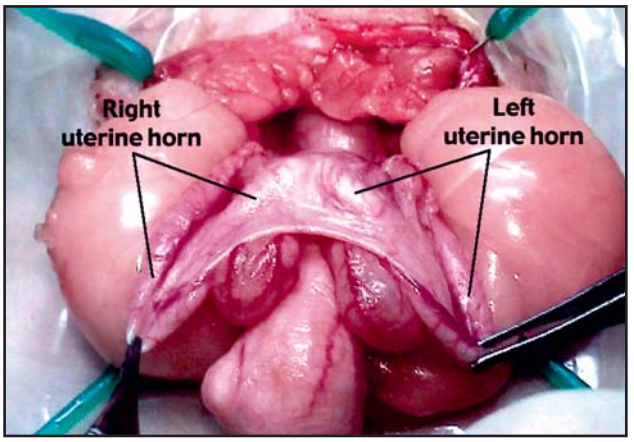

Fig 9. The uterine horns, the salpinges and ovaries are exteriorized.

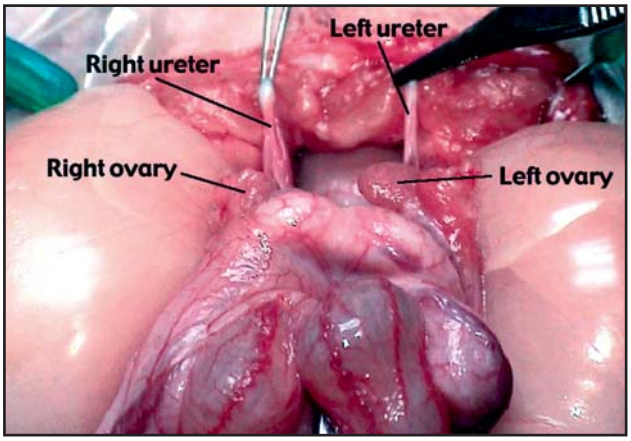

Fig 10. The ureters are identified. Because the ureters pass medially to the genital tract, they must be identified carefully in order to preserve them.

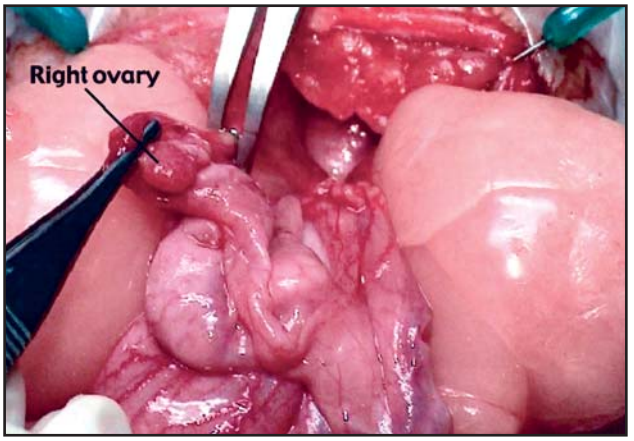

Fig 11. The right ovarian artery is double ligated using medium-sized Hemoclips (placement of the first Hemoclip is shown).

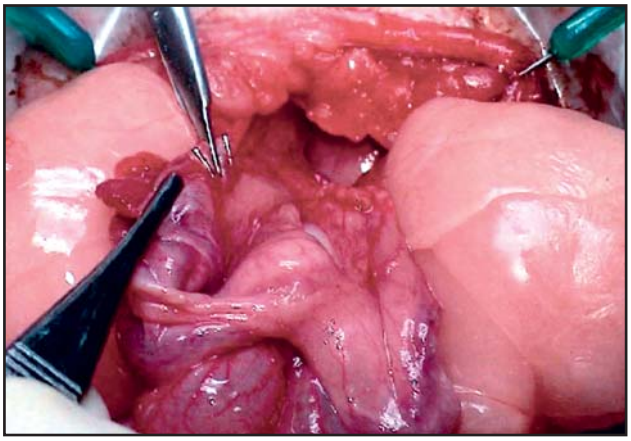

Fig 12. The ovarian ligament is dissected.

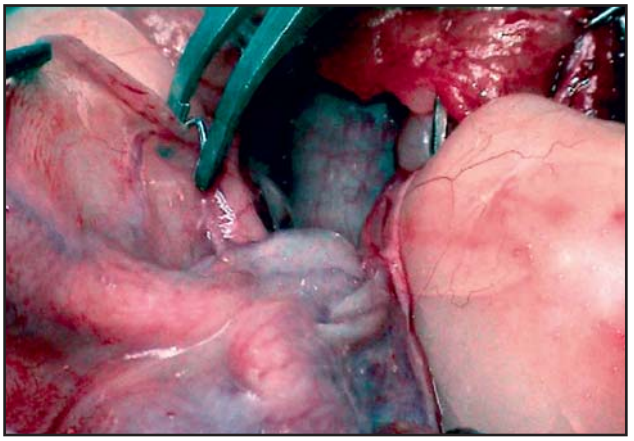

Fig 13. The uterine artery supplying the broad uterine ligament is identified and ligated. The broad uterine ligament is then dissected distally up to the junction with the median vagina.

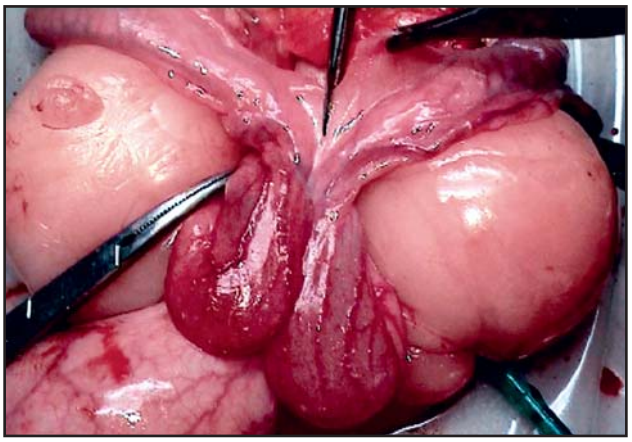

Fig 14. To make the excision of the uterine horns easier, the broad intercornual ligament is dissected.

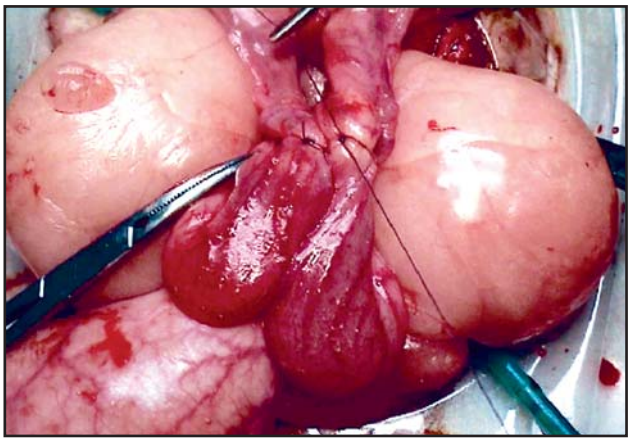

Fig 15. The distal end of the uterine horns is ligated at the junction with the median vagina, paying careful attention to avoid ligation of the ureters entering the median vagina. Ligation can be performed with a circumferential or transfixing suture, using 2-0 to 3-0 monofilament absorbable suture.

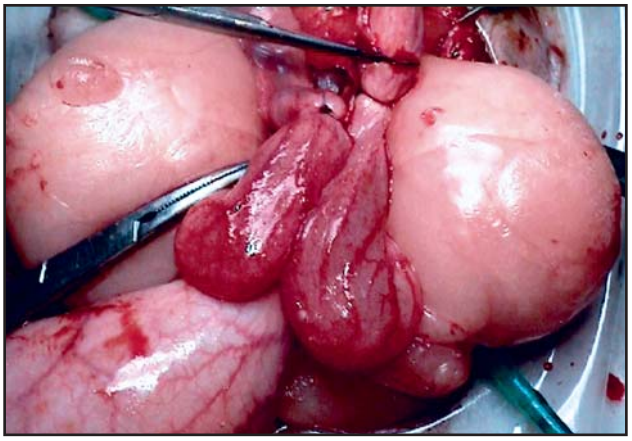

Fig 16. The distal end of the uterine horns is dissected. The ovaries, salpinges and uterine horns are removed.

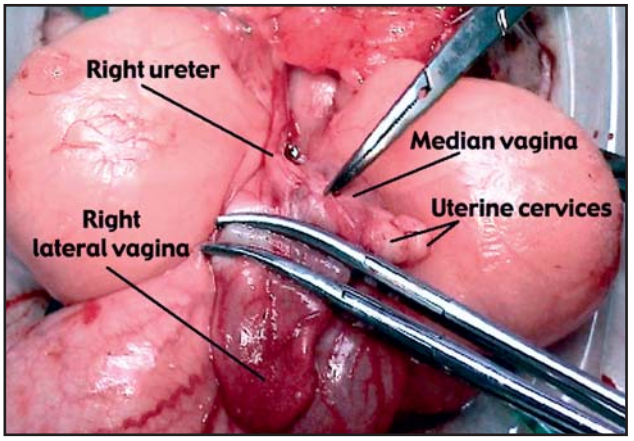

Fig 17. In order to remove the entire reproductive tract, vaginectomy of the paired lateral vaginas is performed. The right lateral vagina is double clamped before dissection.

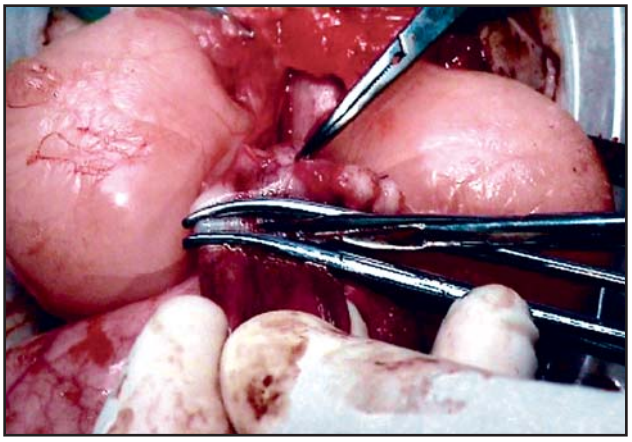

Fig 18. The proximal end of the right lateral vagina is dissected between the two clamps.

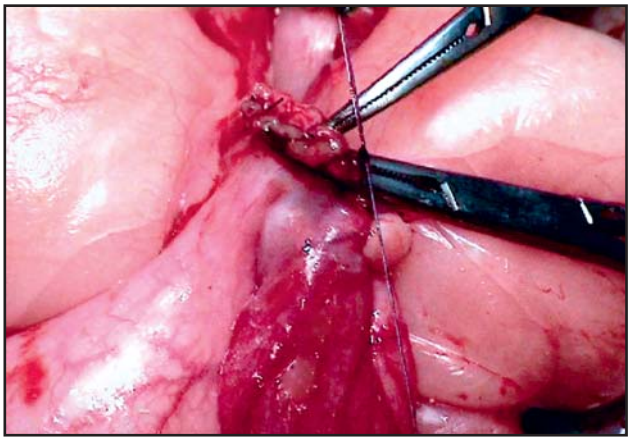

Fig 19. The stump is sutured in a continuous pattern using 3-0 absorbable monofilament.

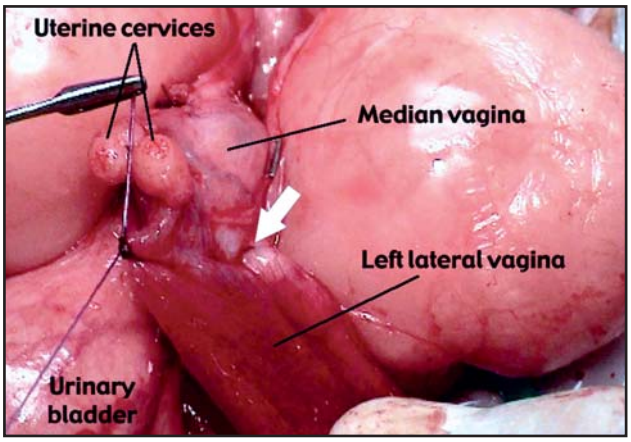

Fig 20. Alternatively, the lateral vagina can be ligated before dissection using two transfixing sutures. Here, the first knot (arrow) has already been placed laterally on the left lateral vagina, and the second knot is being placed medially.

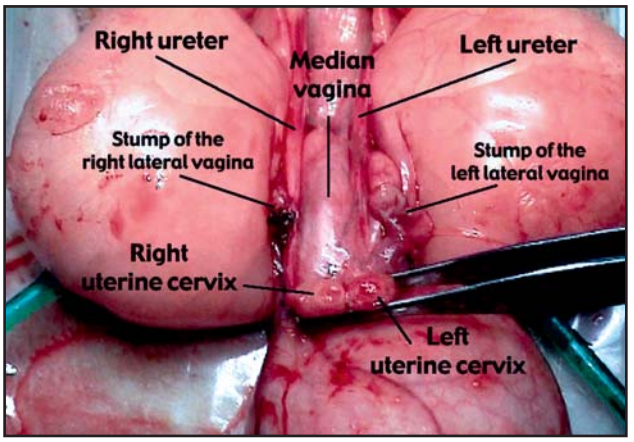

Fig 21. The left lateral vagina has been dissected and removed. The two stumps of the uterine cervices entering the median vagina are shown.

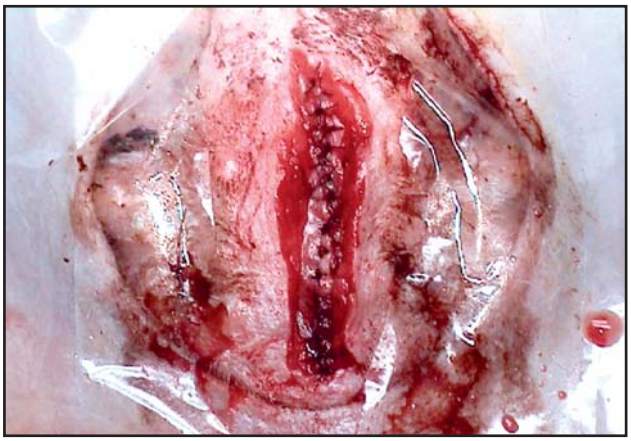

Fig 22. The urinary bladder is repositioned in place, and the abdominal wall is sutured in a simple interrupted pattern using 2-0 absorbable monofilament.

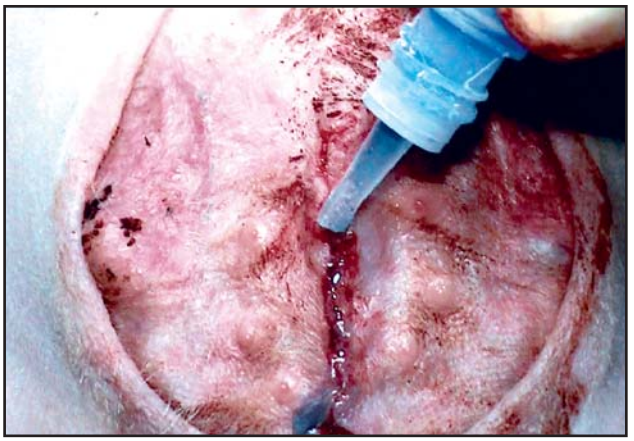

Fig 23. The skin is sutured in a continuous pattern using 4-0 absorbable monofilament. Tissue glue may be applied.

Fig 24. Follow-up examination should take place 10 days post surgery. The healing process for this Virginia opossum appears normal. Small crusts are present on the wound as a result of insufficient flushing and cleansing.

References and Further Reading

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