



## Reversible Vasectomy

This technique has been used successfully in thousands of lab rodents and humans (90% success rate in more than 4,000 cases: Silber & Grotjan 2004), but has only been attempted in a few exotic species, so should be considered experimental. Reversals have been accomplished in bush dogs (DeMatteo et al. 2006) and most recently in a Przewalski's Horse. Initial vasectomies have been performed in chimpanzees but reversals not yet attempted. Thus, the procedure should not be used in males likely to be recommended for subsequent breeding until more experience is gained with a broader range of species.

To increase the chance of successful reversal, it is important that an "open-ended" vasectomy be performed, leaving the distal (testicular) end open to permit leakage, which allows a pressure-relieving granuloma to form, minimizing vas or epididymal damage (Silber 1977a). The proximal (abdominal) end can be cauterized, providing an effective seal which prevents spontaneous recanalization (Silber 1976, 1977a,b).

Reversal surgery is possible subsequent to other vasectomy procedures but requires a very difficult anastomosis of the vas to the epididymis to reverse. The "open-ended" vasectomy permits reversal via the much simpler vasovasostomy (Silber 1977a, 1978, Silber et al. 1977).

### Open-Ended Vasectomy Procedure

The typical midline incision used in neutering results in difficulty freeing the proximal end of the vas deferens during the subsequent reversal procedure. Rather, the vas should be isolated from the cord via a small incision in the upper scrotum or at the external inguinal ring. Because the thickness of the scrotal skin may preclude the scrotal approach used for humans, a 1- to 1.5-cm incision should be made over the external inguinal ring. The vas deferens should be kept moist by pulsatile irrigation with heparinized saline (2500U heparin/500 ml NaCl) to avoid post-operative scarring. After the vas deferens is transected, the abdominal (proximal) cut end should be cauterized by inserting a needle electrode about 1 cm internally. If only the mucosa is cauterized, leaving the muscle is unharmed, a very tight seal will form to achieve blockage. The distal end should be left open for leakage to release pressure.

### Vasovasostomy

Dr. Sherman Silber, the physician who pioneered the technique, has offered his services to the zoo community to perform reversals. In general, the procedure entails making an incision over the upper scrotum and external ring similar to the original incision for the vasectomy, exposing the vas deferens longitudinally by blunt dissection, facilitated by placing a small Penrose drain underneath the vas. The distal and proximal ends of the vasa are held with vasovasostomy clamps and the scarred ends of both sides are resected. Translucent fluid is aspirated from the distal cut end with 22 g medicut and 1-cc syringe to check for the presence of sperm. Absence of sperm in the fluid may indicate an epididymal blockage which makes successful vasovasostomy unlikely. However, if the original vasectomy was open-ended, this complication is very unlikely. The vasovasostomy is performed using 9-0 nylon interrupted mucosal sutures and 8-0 nylon interrupted muscularis sutures.

### **Latency to Effectiveness**

Latency to disappearance of sperm following vasectomy will depend on the species and individual, perhaps as long as 2 months, until residual sperm either degenerate or are passed.

### **Precautions**

Vasectomy is not recommended for species with induced ovulation because mating will result in female pseudopregnancies with prolonged periods of progesterone elevation, which can cause pathology of uterine and mammary tissue. Endogenous progesterone and progestin contraceptives cause similar disease.

**Contact for More Information** - Contact the AZA Reproductive Management Center (contraception@stlzoo.org; 314-646-4595) who will coordinate the procedure with Dr. Silber.

### **References**

DeMatteo, K.D., Silber, S., Porton, I., Lenahan, K., Junge, R., Asa, C.S. 2006. Preliminary tests of a new reversible male contraceptive in bush dogs (*Speothos venaticus*): Open-ended vasectomy and microscopic reversal. *J. Zoo Wildl. Med.*

Silber S.J. 1976. Microscopic technique for reversal of vasectomy. *Surg. Gynecol. Obstet.* 143: 630.

Silber S.J. 1977a. Sperm granuloma and reversibility of vasectomy. *Lancet* 2:588-589.

Silber S.J. 1977b. Perfect anatomical reconstruction of vas deferens with a new microscopic surgical technique. *Fertil. Steril.* 28:72.

Silber S.J. 1978. Vasectomy and vasectomy reversal. *Fertil. Steril.* 29:125-140.

Silber S.J., Galle, J., and Friend, D. 1977. Microscopic vasovasostomy and spermatogenesis. *J. Urol* 117:299.

Silber S.J., and Grotjan, H.E. 2004. Microscopic vasectomy reversal 30 years later: a summary of 4010 cases by the same surgeon. *J. Androl.* 25:845-859.

Silber, S.J., Barbey, N., Lenahan, K., and Silber, D.Z. 2013. Applying clinically proven human techniques for contraception and fertility to endangered species and zoo animals: a review. *J Zoo and Wildlife Medicine* 44(4s): S111-S122.