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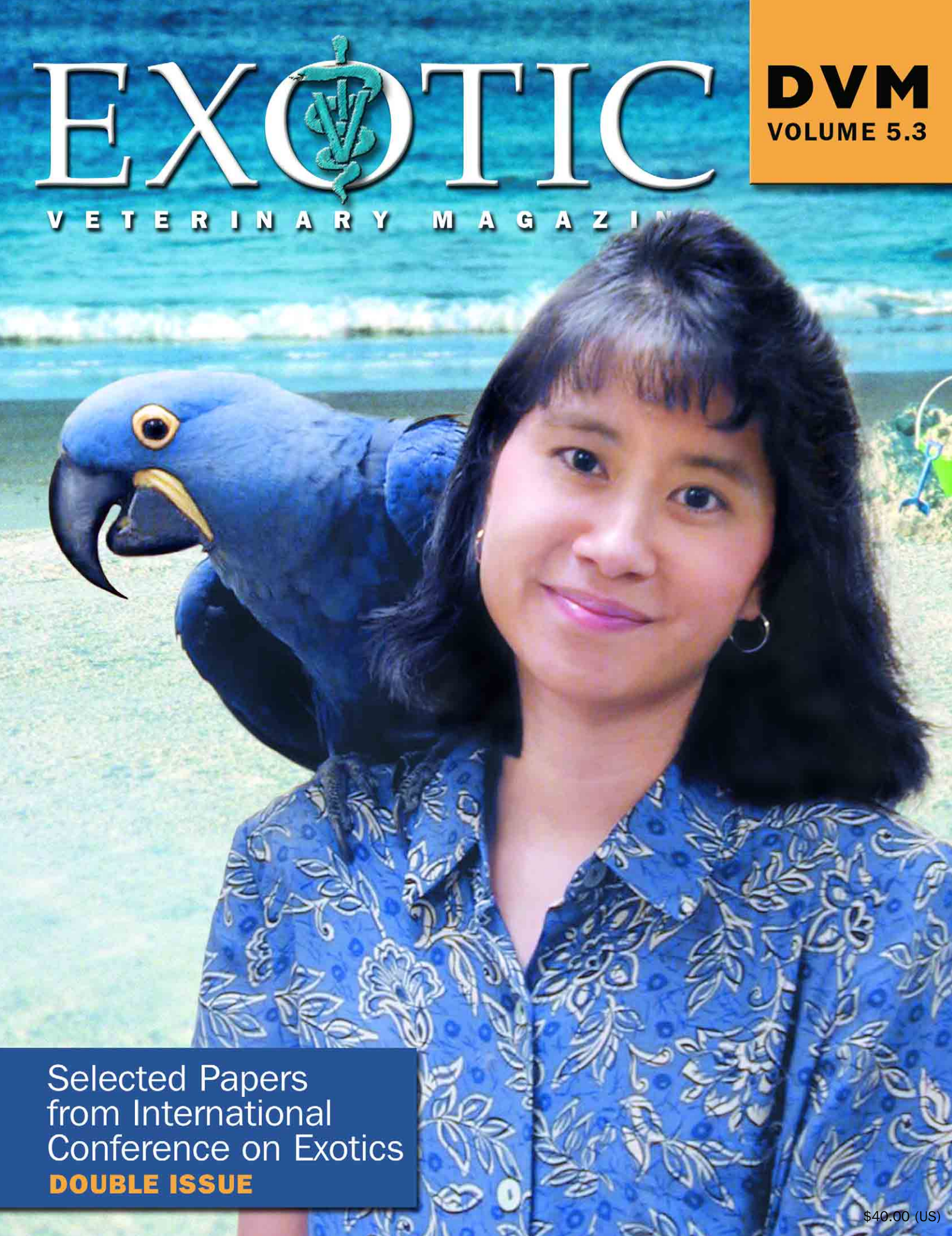
VOLUME 5.3



Selected Papers from International Conference on Exotics

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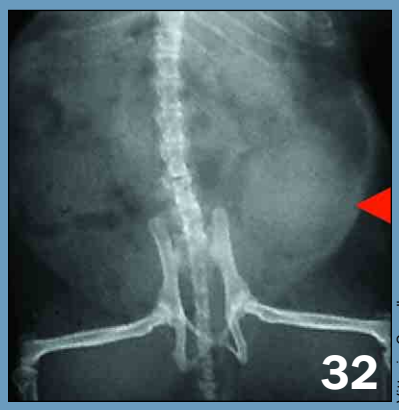

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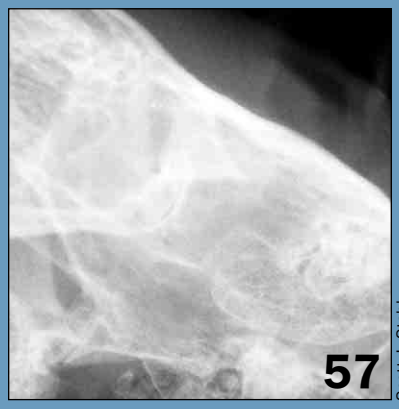

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Surgical Techniques in Pet Hamsters

by **Vittorio Capello**, DVM

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ANESTHESIA

Fig 1. Facemasks used for hamster anesthesia should be transparent so the mucous membrane color of the nose and tongue can be easily checked. For the very small Russian hamsters (body weight ~28 g), a properly cut and contoured syringe may be used as a facemask.

Fig 2. Cardiac activity can be easily monitored in anesthetized hamsters with a vascular Doppler system. The probe is positioned on the chest and held in place by the anesthetist or by the adhesive drape. Rectal temperature is also monitored by a very small probe. In the author's experience, pulse oximetry is difficult to apply to the hamster. Transparent drapes are mandatory for hamster surgery to allow for monitoring respiration.

Fig 3. This radiograph illustrates the correct positioning of a 25-ga needle in the medullary cavity of the tibia, which is being used for fluid administration to a 100 g golden hamster. Special attention must be paid to maintain the position of the needle.

Table 1. Anesthetic and Analgesic Agents in Hamsters

Preanesthesia	▪ **Acepromazine** - 0.05-0.1 mg/100 g IM (do not administer preanesthetic to geriatric patients or those at increased anesthetic risk)
Induction	▪ **Isoflurane** - 3-4% in oxygen (mask directly for patients at increased anesthetic risk or for Russian hamsters) ▪ **Ketamine + xylazine** - ketamine (3-5 mg/100 g IM) + xylazine (0.3-0.5 mg/100 g IM) ▪ **Ketamine + medetomidine** - ketamine (3-5 mg/100 g IM) + medetomidine (5 mcg/100 g IM)
Maintenance	▪ **Isoflurane** - 1-3% in oxygen; delivered by facemask
Analgesia	▪ **Butorphanol** - 0.05-0.1 mg/100 g SC q4h

Note: Particular attention must be paid to proper dilution of all preanesthetic, anesthetic and analgesic agents.

CELIOTOMY

Extraordinary care must be taken with anesthesia and basic surgical principles when performing a celiotomy in a hamster. Heating devices are mandatory. If possible, intraosseous fluids should be administered to the patient. Fur should be shaved to create a wide surgical field, and transparent adhesive drapes are recommended (Figs 4,5).

The abdominal wall is closed with 4-0 to 6-0 absorbable monofilament suture. A simple continuous suture pattern reduces surgical time, but a simple interrupted pattern can be used instead. The subcutis does not need to be sutured in a separate layer. The skin is sutured with 5-0 to 6-0 absorbable or non-absorbable material (e.g., nylon) in a simple interrupted pattern.

Most hamsters, except those with very calm behavior, will attempt to remove skin sutures, and an Elizabethan collar is not an option. Therefore, 5-0 absorbable monofilament suture is used in a subcuticular pattern, and tissue glue is applied to the skin incision.

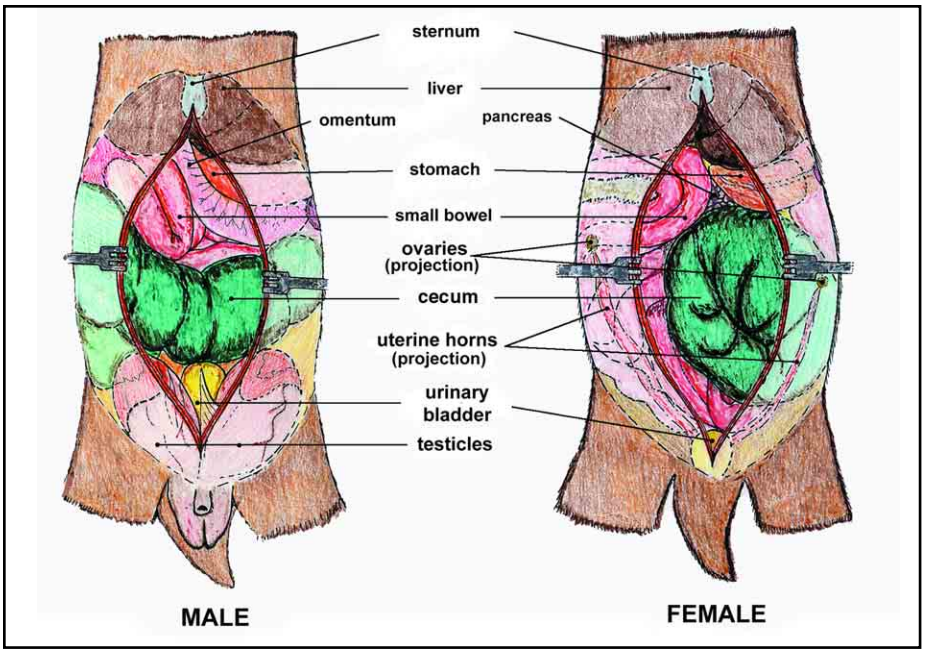


Fig 4. Gross anatomy of abdominal organs as they appear during celiotomy.

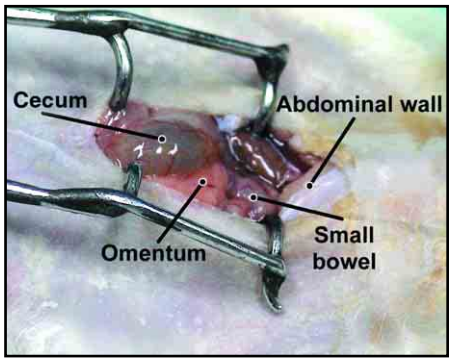


Fig 5. The large cecum lies immediately beneath the linea alba; however, it is easy to see because of its greenish color. Retraction of the abdominal wall with forceps will prevent unintentional incision of the cecum. During surgery, abdominal tissues and organs should be kept moist by instilling warm saline into the abdomen.

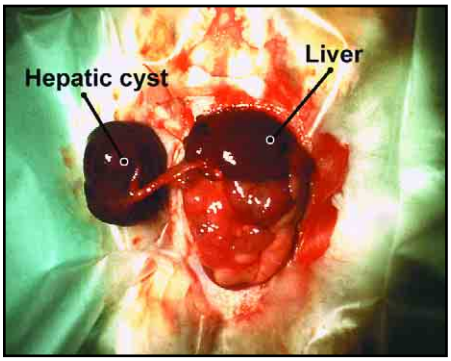


Fig 6. A large hepatic cyst is detected and isolated during explorative celiotomy in a 2-year-old female golden hamster. The cyst was attached to the liver by a thin strip of tissue. The stalk was ligated, and the entire cyst was removed.

Fig 7. Hemangiosarcoma was found in the spleen of this Russian hamster.

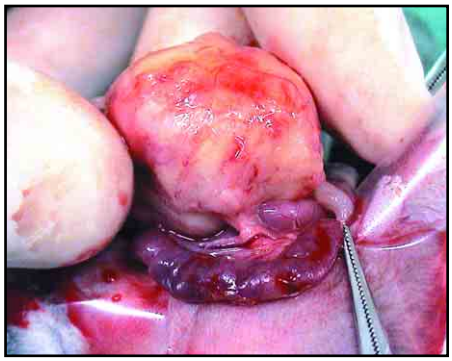


Fig 8. The testicle in this Russian hamster is abscessed.

OVARIOHYSTERECTOMY

Therapeutic ovariohysterectomy is indicated in case of ovarian cysts, pyometra or uterine neoplasia (Figs 9,10). After the abdominal wall is incised, the cecum must be gently retracted to expose the uterine horns. In cases of pyometra or uterine neoplasia, the horns can appear immediately under the linea alba.

The primary therapeutic indications for orchiectomy in hamsters are abscessation or neoplasia involving the testicle or epididymis (Fig 11). The author prefers to perform bilateral orchiectomy, even if only one testicle is affected.

ORCHIECTOMY

EXCISION OF SKIN AND OTHER SOFT TISSUE TUMORS

Skin and soft tissue tumors are common in hamsters. Even large tumors can be excised due to the hamster's loose subcutaneous tissue. The prognosis for surgery is related to the hamster's age and condition as well as characteristics of the tumor, such as position, extension, vascular supply and adhesion to surrounding tissues (Figs 12,13).

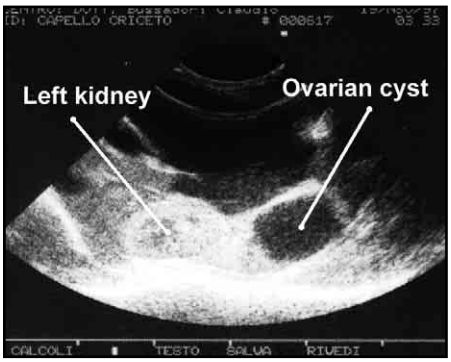
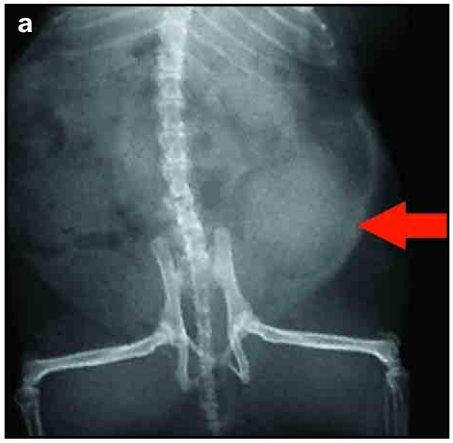
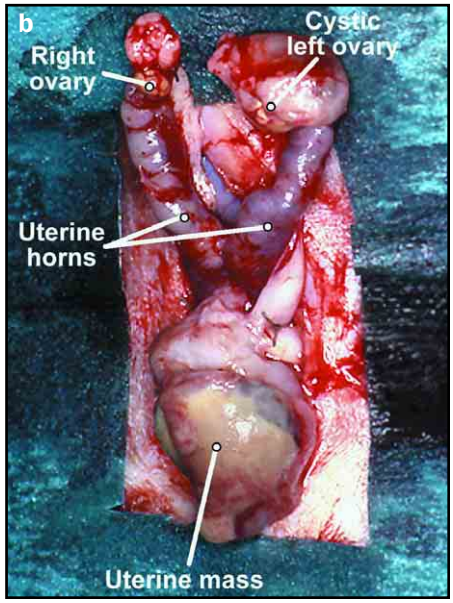


Fig 9. This sonogram from a 17-month-old golden hamster reveals an ovarian cyst, which is caudal to, and nearly as large as, the kidney.





Figs 10 a,b. A 2-year-old golden hamster was presented for anorexia and hunched posture. Bloody vaginal discharge was evident on physical examination, and palpation of the abdomen revealed a rounded mass, which was easily detected on radiographs (a, arrow). During celiotomy, a large uterine mass was encountered (b). The uterine horns were larger than normal, and a large cyst was present in the left ovary. Ovariohysterectomy was performed. The histopathologic diagnosis was a uterine fibroma.

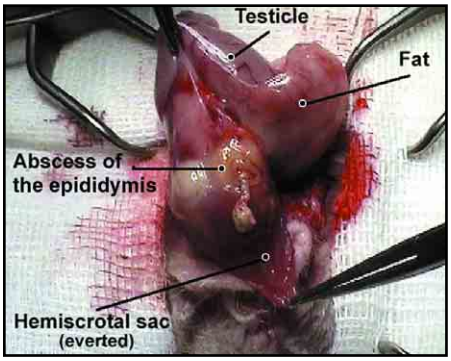


Fig 11. The epididymis in this 13-month-old golden hamster is abscessed.

Fig 12. A Russian hamster is anesthetized for excision of a large skin mass.

Fig 13. This 8-month-old golden hamster has a sarcoma of the scrotal skin.

CHEEK POUCH SURGERY

Diseases of the cheek pouch include impaction, prolapse, abscessation and neoplasia.

Impaction is often the result of feeding inadequate or inappropriate food (such as chocolate or extremely large or small seeds) or using cotton, paper or other improper bedding materials. Sometimes forelimb agenesis or amputation can lead to impaction, because the hamster cannot adequately empty the cheek pouch. Prolapse and abscessation are common sequelae to impaction.

Cheek pouch prolapse, due to overfeeding, is relatively common in Russian hamsters. Retained food becomes adherent to the mucosal lining of the cheek pouch, and when the hamster attempts to empty it, the pouch prolapses along with the food. If the prolapse is recent and there are no lesions on the mucosal surface, repositioning can be attempted (Figs 14-17).

Cheek pouch amputation is considered in cases of severe mucosal lesions, recurrent pouch prolapse or neoplastic disease. After surgery, it is impossible to prevent the hamster

Fig 14. The right cheek pouch is prolapsed in this Russian hamster.

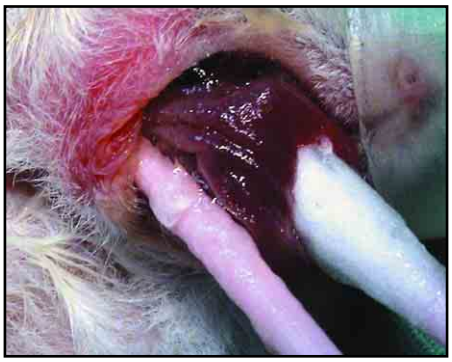


Fig 15 The mucosal surface is lubricated, and the pouch is gently replaced using cotton swabs.

Fig 16. A suture transfixes the skin and the cheek pouch mucosa to prevent relapse.

Fig 17. This is the same hamster 2 days later. The transfixing suture can remain in place up to 10-12 days to ensure prevention of relapse.

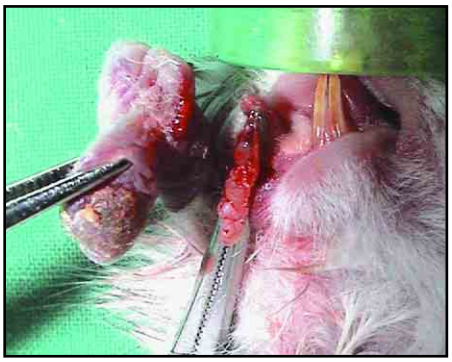


Fig 18. In another case, the cheek pouch is completely everted. A hemostat is placed at the base of the pouch, and the tissue is transected with a blade or scissors.

Fig 19. A simple interrupted suture is placed using absorbable 5-0 material.

Figs 20 a,b. This hamster had a sarcoma of the cheek pouch (a). The same hamster is shown 10 days after cheek pouch amputation (b).

from breaking down sutures by trying to fill the cheek pouch, so the author tube feeds formula (Critical Care for Herbivores) and removes all other food and bedding for 24-36 hours (Figs 18,19).

ABSCESSES

Similar to rabbits, treatment of abscesses requires total excision including the abscess capsule. Antibiotic therapy depends on culture and sensitivity results from the capsule wall (Fig 21).

ENUCLEATION

Enucleation is indicated for cases of severe monolateral panophthalmitis caused by traumatic injuries, bites or bacterial infection (Figs 22-23). If infection is suspected, systemic antibiotics and local therapy should be administered for 5-7 days prior to performing surgery. In the author's experience with some cases of pasteurellosis, bilateral panophthalmitis can occur, therefore, surgery should be delayed for several days until risk of bilateral infection has passed.

Depending on the condition of the eyelids, enucleation can be performed using a transpalpebral or transconjunctival technique. Using the latter technique, eyelids can be surgically debrided and sutured using 4-0 to 6-0 absorbable suture in a continuous or interrupted pattern. Conjunctival mucosa, sclera and external muscles of the globe are bluntly dissected. Hemorrhage is controlled by ligation, norepinephrine-moistened cotton swabs or a radiosurgical unit.

RECTAL PROLAPSE/ INTUSSUSCEPTION

This is a surgical condition, because the prolapse (Figs 24 a,b) is always accompanied by bowel intussusception (Figs 24 c). Reduction only of the prolapsed intestine, when possible, is always ineffective. It is mandatory that a celiotomy be performed that includes a reduction or resection of the prolapsed intestine and intestinal plication to prevent recurrent prolapse. Unless the problem is diagnosed very early, prognosis is poor.

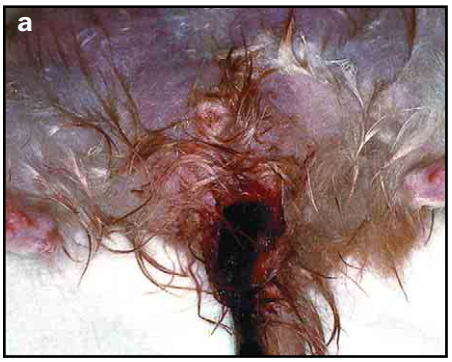
INTRAMEDULLARY PINNING OF TIBIAL FRACTURES

in hamsters often due to entrapment of the foot in the cage or wheel bars. In the author's experience, splinting does not promote bone healing.

Fig 21. An ear abscess in this Russian hamster is being excised.

Fig 22. This 12-month-old male golden hamster has severe panophthalmitis involving the left globe.

Fig 23. The eyelids have been sutured after enucleation using the transconjunctival technique.



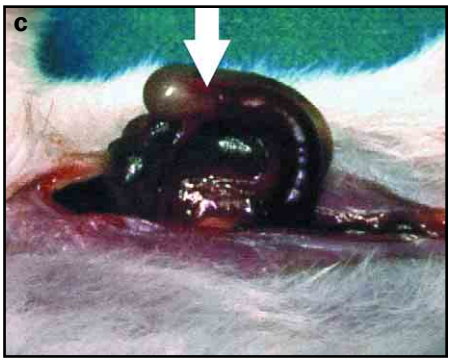
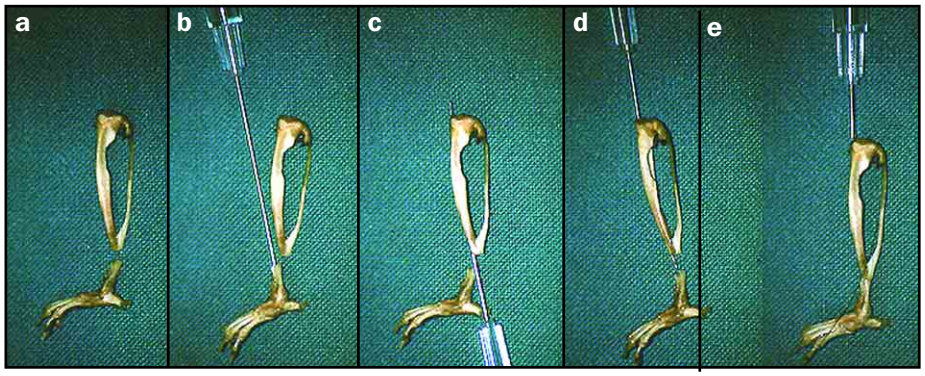


Fig 24 a-c. Prolapse of the rectum (a) or colon (b) and bowel intussusception (c) represent severe pathology in the golden hamster. These conditions are predisposed by intestinal parasitism, proliferative ileitis ("wet tail") and diarrhea. The author has not seen rectal prolapse in Russian hamsters.

Figs 25 a,b. The radiographs show a midshaft tibial fracture in a golden hamster before (a) and after (b) IM pinning.



Figs 26 a-e. The needle from a 22-gauge intravenous catheter becomes the IM pin used to repair this tibial fracture in a hamster (a). The fracture site is exposed, and the IM pin is checked for size against the medullary cavity of the distal bone fragment (b). Another pin is inserted from the fracture site retrograde through the proximal bone fragment to make a hole in the proximal tibial surface and is then removed (c). The IM pin is inserted normograde using the hole previously created in the proximal tibia (d). The fracture is reduced and stabilized by gently driving the IM pin into the distal bone fragment (e).

Fig 27 a-c. A 21-month-old female golden hamster was presented for severe lameness and a large mass involving the left hind limb (a). Amputation of the entire limb was performed at the level of the hip as indicated in this radiograph (b). Histopathologic examination revealed a soft tissue fibrosarcoma. At the time of follow-up, the hamster walked without discomfort, leaning on the base of the tail (c).

Moreover, the typical distal metaphyseal fracture is often exposed. Intramedullary (IM) pinning is the simplest and most practical method of fixation (except for comminuted fractures), even if a slight rotation of the foot cannot always be prevented (Figs 25, 26).

HINDLIMB AMPUTATION

Hindlimb amputation is indicated in case of severe fractures, foot necrosis due to constriction injuries (e.g., cotton threads) severe abscessation due to bite wounds, and neoplasia. Amputation can be performed at different levels: hip, knee or midshaft femur or tibia (Fig 27).

Acknowledgment

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