APPROACHING LIZARD COELIOTOMY

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William Lewis provides a working knowledge of lizard anaesthesia and coeliotomy, with an emphasis on performing ovariectomy/ovariosalpingectomy and orchidectomy on these popular pets

INDICATIONS for performing a coeliotomy in lizards include:

• foreign body removal;

• relief of chronic constipation/obstipation;

• cystotomy – for the removal of bladder stones; and

• organ biopsies of the liver, kidneys, gut and other organs.

Pre-operative evaluation

A thorough pre-operative evaluation should be performed. This may be as simple as a physical examination and assessment of the patient's hydration status, or it may include a more detailed work up, such as haematology, biochemistry, radiography, ultrasonography and intraosseous or intravenous fluids.

Anaesthesia

Propofol given intravenously in the tail vein is the induction agent of choice. If the tail vein cannot

be accessed then the midline abdominal vein may be used with caution (it may be difficult to control bleeding if the vein is inadvertently lacerated). Propofol may also be administered by the intraosseous route.

Other drugs that may be used include combinations of medetomidine and ketamine or masking down with isoflurane or sevoflurane. Conscious intubation and gassing down may also be possible, especially in small and medium-sized patients. The usual recommended dose of propofol is 10-13mg/kg. Divers (1999) recommends 5-10mg/ kg, and this seems to work well in practice. Heard (2001) recommends 3-5mg/kg. If venous access is not possible, a combination of 150ug/kg of domitor and 10-15mg/kg of ketamine may be used. Atipamezole may be used for reversal.

Small lizards and geckos may be placed in a sealed bag that has been filled with five per cent isoflurane and oxygen and left until sedated enough to be intubated. Lizards weighing as little as 15g may be intubated using intravenous catheters.

Endotracheal intubation is performed so that intermittent positive-pressure ventilation (IPPV) may be performed, as lizards tend to undergo apnoea after induction and revert to anaerobic metabolism. Noncuffed tubes or various urinary or intravenous catheters may be used depending on the size of the patient. Spraying the glottis with lidocaine makes intubation easier. For small species, lidocaine can be sprayed on a cotton bud and applied to the glottis. Tape is placed around the tube and secured to the lizard’s jaw – taking care to avoid the eyes. Additional pieces of tape can be used to attach a tongue depressor to the head and body. This helps to secure the tubes and prevents accidental extubation if the patient moves suddenly.

Neither propofol nor isoflurane have analgesic properties, so it is imperative to administer appropriate analgesia. Carprofen may be used at 2-4mg/kg intramuscularly every 24 to 72 hours, ketoprofen at 2mg/kg every 24 to 48 hours, butorphanol at 0.4mg/kg, meloxicam at 0.1mg/ kg every 24 hours or buprenorphine at 0.01mg/kg. Meloxicam oral solution may be used for ongoing treatment if indicated.

For the induction of anaesthesia the lizard is placed in dorsal recumbency. Light digital pressure on the globes stimulates the vasovagal reflex, which usually has a calming effect on the patient. Cotton wool balls placed over the globes and secured with Vetwrap or Co-Flex may also be used. The ventral surface of the tail is scrubbed with iodine using a soft toothbrush.

The tail vein lies ventrally against the caudal vertebrae. The needle is inserted on the midline at about 20° to the vertical and pointing cranially. For any lizard heavier than about 1.0kg, a 1.5in 23-gauge needle should be used. Make sure to choose a point on the tail that will allow the needle to reach the vertebrae – don’t start too far cranially on the tail. In large lizards it may be necessary to go quite a long way caudally. Using a needle with a blue or green hub will allow you to see the back flash of blood when the vein is entered. This is more difficult if the hub is black.

The needle is gently advanced in the midline until contact is made with the bone of the ventral surface of the vertebrae. Gently aspirate; blood should appear in the hub of the needle. If not, withdraw the needle very slightly and aspirate again. If blood is still not visible, it means the needle has not been inserted exactly on the midline and it should be repositioned slightly. Once blood is aspirated, the propofol may be injected. Initially, use half the dose, but frequently the full dose is necessary. An alternative method to access the tail vein is the lateral approach as described by Taylor and Campbell (2000).

The vein may also be accessed with the patient in ventral recumbency and with the tail lifted upwards. This may be more comfortable for the lizard, but I find it a more difficult method to perform. Another method is to allow the patient to hold on to a vertical wire frame and to access the vein through the mesh. The tail vein should not be used in species that regularly undergo autotomy, such as leopard geckos. Bearded dragons and Chinese water dragons are species that can readily be anaesthetised in this manner.

The lizard is then placed on a heat mat in dorsal recumbency and aseptically prepared for surgery. Tape should be used to secure the legs, body and tail so correct positioning is maintained. Small sand bags may also be useful. The lizard should be positioned on the table, offcentre towards the side that the surgeon will be standing.

Intraosseous catheters, rectal thermometers, dopplers, oesophageal stethoscopes, ECGs and other monitoring equipment may now be attached.

Anaesthesia is maintained with isoflurane at two to four per cent and with an oxygen flow rate of 1.0L to 1.5L per minute. A ventilator should be used if at all possible. The unit marketed by Vetronics is ideal for this function. If a ventilator is not available, manual ventilation by an assistant will suffice.

The level of isoflurane may be reduced once the coeliotomy procedure is nearing completion. The patient should then be kept on oxygen for a short time. Bursts of CO_2 seem to simulate the respiratory system and lead to a more rapid recovery. Ventilation with an Ambu bag and room air containing CO_2 seems to promote a more rapid recovery.

Surgery preparation

The ventral skin surface is prepared for surgery by thoroughly scrubbing with iodine using a soft toothbrush. The iodine is then wiped off and adhesive spray is sprayed on to the skin and left for 30 seconds before a clear plastic drape is positioned. It is easier if the creases in the drape do not lay over the incision site. Ordinary cloth or paper drapes may also be used. Prophylactic antibiosis is not used for routine reproductive surgeries, but may be indicated for intestinal surgery, or in cases where peritonitis accompanies reproductive disease in female lizards.

A paramedian incision is made with the aim of avoiding the midline abdominal vein. Caudally, the vein lies close to the abdominal wall, but, cranially, it is suspended by a ligament and, consequently, lies further from the abdominal wall as it dips down towards the heart. Grab the skin with two fingers, tenting it upwards, then grasp with a rattooth forcep.

The incision should be made 4mm to 6mm off the midline and a stab incision made through the skin using a number 15 scalpel blade that has been inverted so the cutting movement is outwards. The skin of iguanas is pretty tough. The incision may be extended cranially and caudally using scissors, taking care to remain close to the skin surface, thereby avoiding the vein. An incision of 4cm to 8cm should provide adequate exposure for most surgeries.

Stay sutures or two Allis tissue forceps attached to the skin on either side provide adequate surgical exposure. Alternatively, wound retractors or a Lone Star retractor may be used. Mader (1996) recommends a midline incision, taking care to remain superficial, thereby avoiding the midline vein. I have found this approach more difficult and have had problems with bleeding due to laceration or tearing of the vein. Chameleons need to be approached differently because they are laterally flattened. They are placed in lateral recumbency and a lateral approach to the coelomic cavity is used.

• Ovariectomy/castration

These procedures are routinely performed in green iguanas and may be performed in lizards, such as bearded dragons and water dragons too.

The left ovary or testicle is attached by a ligament to the left vena cava. The left adrenal gland lies within this ligament and should be preserved if possible. The right ovary or testicle is much more closely situated to the right vena cava, and the right adrenal gland is situated on the opposite side of the vena cava. Hemoclips are the method of choice for ligation, but other materials, such as polydioxanone (PDS) or monocryl may be used.

Radiosurgery, Ligasure or laser surgery are other possible methods to ligate or cauterise the blood vessels. There are two methods of ligating the blood vessels for removal of the gonads:

– a series of windows are created in the ligament and the individual blood vessels are ligated with the hemoclips or suture material; or

– two clips may be placed and the ligament between transacted. This is then continued in a caudal or cranial direction as needed.

Anecdotal evidence seems to suggest that the inadvertent removal of one adrenal gland is not a problem, but every effort should be made to retain both adrenal glands. It is absolutely essential to remove all ovarian/ testicular tissue, otherwise regrowth may occur. If the vena cava is

inadvertently lacerated during the surgical procedure, hemoclips may be placed horizontally along the wall of the vein to close the tear. A slight narrowing of the vein does not seem to create any problems.

• Cystotomy

Bladder stones are not uncommon. They are diagnosed by palpation and radiography and are removed using a routine approach to a cystotomy.

• Gut impactions

Gut impactions sometimes require surgery if the contents are so hard they cannot be broken down or removed with an enema. Closure is as per cats and dogs.

• Foreign bodies

Foreign bodies of all sorts may be encountered and it may be necessary to perform a gastrotomy or enterotomy to remove them.

• Neoplasia

Certain neoplasia may be amenable to surgical resection. These include masses in the intestinal tract, stomach, liver, kidneys and the reproductive tract.

• Biopsies

Biopsies may be taken of organs, such as the liver, using standard techniques used in other small animals.

• Closure of the incision

In larger lizards it may be possible to oppose the muscle layer, but this is not essential as most of the strength of the wound closure is from the skin. The muscle layer of smaller lizards has very poor suture-holding capacity and tends to tear as the sutures are placed. In larger lizards a continuous suture pattern of 2/0 or 3/0 PDS, monocryl or vicryl may be used.

The skin is sutured with PDS or nylon in a horizontal mattress pattern using a swaged-on needle. This everts the skin layer and results in good apposition and healing. Surgical staples may also be utilised. A spray bandage, such as OpSite, may be sprayed over the wound to protect it from possible contamination with substrate or faecal material.

Postoperative care

Postoperatively, the lizard should be placed in a clean vivarium with newspaper as a substrate. Branches and other tall cage furniture should be removed for about a week to allow wound healing to take place. Heat lamps and ultraviolet lights may need to be lowered to cater for the lower position of the patient during this period.

Sutures can usually be removed at between six and eight weeks. Often they will be shed out with normal ecdysis.

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