Prophylactic ovariosalpingectomy using a prefemoral approach in eastern box turtles (*Terrapene carolina carolina*)

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OVARIOSALPINGECTOMIES have been performed on captive chelonians for a variety of reasons, including follicular stasis, egg retention, ectopic eggs, salpingitis and dystocia (McArthur 2000, Innis and Boyer 2002, DeNardo 2006). Until recently, surgical access to the coelomic cavity of chelonians has been achieved by performing a central plastron osteotomy (Mader and others 2006). This procedure requires the temporary removal of a section of bone from the plastron, and is thus associated with an extended healing time, and possible complications due to osteomyelitis.

An alternative approach to a central plastron osteotomy for ovariosalpingectomy is an approach via the soft tissues of the flank, through an incision made in the prefemoral fossa (Brannian 1984, Gould and others 1992, Mader and others 2006). This approach has been used for larger chelonian species with smaller plastrons, and thus a larger prefemoral fossa (Nutter and others 2000), and with smaller chelonian species, using an endoscope to visualise and manipulate the tissues (Innis and others 2007). While ovariosalpingectomies and oophorectomies using endoscopic techniques have been quite successful, most general practitioners do not possess endoscopic equipment, thereby preventing them from performing a relatively simple and beneficial procedure.

This short communication describes prophylactic ovariosalpingectomies in three eastern box turtles (*Terrapene carolina carolina*), using a prefemoral approach without the aid of endoscopic equipment for visualisation and manipulation of the tissues.

Three adult female eastern box turtles of unknown age were surrendered by a local resident to the North Carolina State University College of Veterinary Medicine (NCSU-CVM) Turtle Rescue Team (Lewbart and others 2005) with unilateral firm swellings of the tympanum. All three turtles were living in the courtyard of a local retirement community with at least 15 other eastern box turtles. Owing to a lack of locality data from when they were in the wild, and the possibility of transferring disease to free-living turtles, the decision was made to place the turtles in permanent foster homes instead of returning them to the retirement community or releasing them into the wild. Owing to the potential for development of reproductive problems that are common in captive female turtles, it was decided to perform prophylactic ovariosalpingectomies before releasing the turtles to their foster homes.

Initial evaluations showed all three turtles to be in good body condition, weighing 406, 417 and 462 g, with unilateral aural abscesses. The animals were medicated preoperatively with 0.5 mg/kg butorphanol (Butorphanol Tartrate; Fort Dodge Animal Health), administered intramuscularly. Anaesthesia was then induced in each animal with 5 mg/kg propofol (Propofol; Abbott Laboratories), administered intravenously in the dorsal occipital sinus, and maintained with 1.5 to 2.0 per cent isoflurane in oxygen via an endotracheal tube, delivered using a non-rebreathing circuit. The heart rate was monitored with a Doppler probe placed over

FIG 1: Ovariosalpingectomy of an eastern box turtle (*Terrapene carolina carolina*). The anaesthetised turtle is in left lateral recumbency and the right hindlimb is restrained in extension using tape to expose the prefemoral fossa. The ovary is being exteriorised using forceps and an ovariohysterectomy hook

the carotid artery. Positive pressure ventilation (three to four breaths per minute) was used to provide adequate ventilation for each animal.

Once a surgical plane of anaesthesia was reached, a sterile surgical preparation was made around the aural abscess. An incision was made through the entire thickness of the tympanum along the ventral border, exposing the tympanic cavity. After removal of the caseous abscess, the tympanic cavity and Eustachian tube were flushed with sterile saline to remove inflammatory debris and then packed with triple antimicrobial ointment (Neomycin and Polymyxin B Sulfates and Bacitracin Zinc Ophthalmic Ointment; E. Fougera and Co). The incisions were allowed to heal by secondary intention (Holladay and others 2001, Willer and others 2003).

After surgical removal of the aural abscess, the turtles were placed in lateral recumbency, with the uppermost hindlimb restrained in extension using tape to expose the ipsilateral prefemoral fossa. The prefemoral fossa, hindlimb and surrounding shell were cleaned aseptically, draped with sterile disposable surgical drapes and prepared for surgery.

Weitlaner retractors were placed to keep the caudal plastron hinge open, allowing access to the prefemoral area. A cranial to caudal skin incision, 1.5 to 2.0 cm long, was made in the middle of the fossa. The subcutaneous tissue and fat were bluntly dissected to expose the abdominal oblique muscles and transverse muscles. The coelomic cavity was entered by bluntly penetrating the musculature with mosquito haemostats and then incising the coelomic membrane.

The ovary was located easily and, with gentle manipulation using an ovariohysterectomy hook, the ovarian follicles and the oviduct were exteriorised (Fig 1). Blood vessels in the mesovaria and mesosalpinx were double-ligated using 4-0 polydioxanone (PDS; Ethicon). Double transfixion ligatures were placed around the oviduct using 4-0 polydioxanone before it was transected and removed along with the ovary. The abdominal musculature and the coelomic membrane were closed as a single layer with a continuous pattern using 4-0 polydioxanone, followed by a skin closure using 3-0 nylon (Sherwood Medical) in a horizontal mattress pattern. The remaining ovary was removed in the same manner through the contralateral prefemoral fossa.

All the animals recovered from anaesthesia uneventfully; they received 1.0 mg/kg butorphanol intramuscularly every 24 hours for three days and 20 mg/kg ceftazidime (Fortaz; GlaxoSmithKline) intramuscularly every 72 hours for 18 days. The tympanic cavities of all three turtles were flushed

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daily with sterile saline and repacked with antimicrobial ointment until the incisions healed.

Two of the turtles were placed in permanent foster homes, and their skin sutures were removed six weeks after surgery. The third turtle had a recurrence of the aural abscess and developed a mucopurulent nasal and ocular discharge within 30 days of surgery. This turtle underwent a second surgery to remove inflammatory debris from the tympanic cavity. It was found dead in its cage the following day, and was examined postmortem. This turtle had developed bronchopneumonia, which was suspected to be secondary to the aspiration of inflammatory debris. Additionally, an iridoviral infection had probably contributed to the development of pneumonia and respiratory disease (De Voe and others 2004). Evidence of sepsis was also noted in this turtle during postmortem examination, with scattered inflammatory foci observed in the heart, intestine and liver.

The pet reptile trade in the USA is a multimillion dollar business, and reptiles are becoming more commonly presented to veterinary practices (Bridges and others 2001, Fiskett 2005). With the advancements in reptile medicine that have been made during the past 15 years, clients are expecting the same standards of care that they receive for dogs and cats (Divers 1999).

This report describes a practical method for prophylactic ovariosalpingectomy using a prefemoral approach in smaller chelonian species without the aid of endoscopic equipment. The technique described decreases the recovery and healing times and the likelihood of postoperative complications associated with the more typically performed central plastron osteotomy, and is relatively safe and practical for most practitioners to perform. The prefemoral approach for prophylactic ovariosalpingectomy provides a surgical method of neutering to prevent the risk of reproductive problems commonly associated with captive female chelonians.

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