

BEECROFT medicalbrief

VETERINARY SPECIALIST & REFERRAL HOSPITAL

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THE USE OF NERVE LOCATORS FOR REGIONAL ANESTHESIA



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Effective pain management is essential for optimal patient care. Alleviating pain enhances a patient's ability to resume normal function, improves quality of life and facilitates faster recovery times (Grubb and Lobprise, 2020b). In recent years, targeted nerve blocks have continued to gain popularity as adjuncts to systemic analgesics. Multimodal pain management strategies reduce individual medication dosages and in turn reduce the incidence of adverse drug reactions. While numerous nerve blocks have been described, the efficacy and safety has historically been reliant on the practitioners' knowledge of the anatomy and an element of luck when injecting locally. The more widespread use of nerve locators and other guidance techniques improves both safety and efficacy when delivering local analgesics.

The most widely used veterinary analgesics including NSAIDs and opioids. NSIADs, while effective, can cause potentially significant gastrointestinal and/or renal side effects. Opioid boluses and infusions can result in nausea, postoperative ileus, and urine retention. Whilst young and healthy patients often tolerate these drugs well, elderly patients with decreased mobility, underlying renal, and/or gastrointestinal disease may be at increased risk. This is especially relevant for patients undergoing more invasive and painful interventions.

Preventing pain is often more effective than treating it "after the fact". The value of blocking pain at its source was recognised in the Ebers Papyrus, an ancient Egyptian medical document from 1550 BC. The use of opium poppy extracts to relieve surgical pain was described (Fascha, 2011). In the late 1800s, cocaine found to have a localised numbing effect. Synthetic local anaesthetics such as bupivacaine and lidocaine have since been developed (Ruetsch et al., 2001). Bupivacaine and lidocaine inhibit the nociceptive inputs by selectively blocking the transmission of pain signals from a specific nerve group.

While nerve blocks are generally considered safe, some potential complications can arise from their administration. Nerve injury from direct trauma from the needle, injection of local anaesthetic into the nerve or nerve sheath, or pressure-induced ischemia represent risks.



Femoral nerve block.

Nerve injuries may result in varying degrees of sensory or motor deficits, such as numbness, weakness, or paralysis in the affected limb. Using local anaesthetics in nerve blocks can sometimes result in systemic toxicity if the drug is inadvertently administered in excessive doses or directly into the bloodstream (Otero and Portela, 2019). In severe cases, this can lead to central nervous system (CNS) signs, cardiovascular effects, and seizure or cardiac arrest. Prompt recognition and appropriate management are crucial in preventing serious complications. Nerve locators can help reduce the risk of complications.

The following outlines the patient preparation and administration strategy we utilise at Beecroft when using the Stimuplex HNS 12 (B. Braun):

- The injection site is clipped and surgically prepped with aseptic solution (e.g., Chlorhexidine or iodine solution).
- A sterile drape is placed, just exposing the injection site and the necessary anatomical landmark.
- The positive electrode of the nerve stimulator is placed on the skin distal to the injection site (stifle or elbow).

- Prefill the extension line with local anaesthetics (Lidocaine or Bupivacaine HCl).
- Set the nerve stimulator to the desired current (1mA, 0.1 ms., 1-2 Hz).
- Guided by the necessary anatomical landmarks, the needle (Stimuplex insulated needle) is slowly advanced to the target nerve.
- Once the needle tip is at close proximity of the target nerve, the desired muscular response (e.g., tarsus flexion and extension or carpus extension) is observed.
- Extravascular and extraneural positioning of the needle tip is confirmed by drawing the syringe plunger and adjusting the current intensity to 0.3 mA or less.
- The desired dose of local anaesthetics is then delivered.

The following locoregional blocks are commonly performed at Beecroft:

- Ulnar nerve block
- Ulnar, median, and musculocutaneous nerve block
- Sciatic nerve block
- Femoral nerve block

Like any intervention other potential risks exist including delayed hair growth, infection, hypersensitivity reactions and/or hematoma formation. We feel strongly that the benefits of nerve blocks outweigh the potential complications associated with the procedure. We see enhanced post-procedure function, faster recovery, and decreased risk of complications and utilise peripheral nerve blocks extensively for both our soft tissue and orthopaedic patients.

Delayed hair growth:

- In some regional blocks (i.e., epidural and spinal anaesthesia), Temporary hair loss or delayed hair growth may occur at the injection site (Troncy et al., 2002). This could be attributed to the trauma to the hair follicles during the procedure or the effects of local anaesthetics on the hair growth cycle. This hair loss is usually localized and self-limiting, with the hair typically regrowing within a few weeks to months. Monitoring the area for signs of infection or persistent hair loss is recommended.

Infection:

- Infection is a potential risk associated with any invasive procedure, including nerve blocks (although very rare). Sterile technique and proper disinfection of the injection site are essential to minimise the risk of introducing bacteria into the tissue. Signs of infection may include swelling, redness, discharge, or fever (Campoy and Read, 2013).



Radial Ulnar Median and Musculocutaneous (RUMM) block.

Local anaesthetic toxicity:

- Using local anaesthetics in nerve blocks can sometimes result in systemic toxicity if the drug is inadvertently administered in excessive doses or directly into the bloodstream (Otero and Portela, 2019). In severe cases, this can lead to central nervous system (CNS) signs, cardiovascular effects, and seizure or cardiac arrest. Prompt recognition and appropriate management are crucial in preventing serious complications.

Hematoma formation:

- Hematomas, a localised collection of blood, can occur at the site of the nerve block due to vascular injury during needle placement (Tanner and Hubbell, 2019). Hematomas can cause pain and swelling and potentially compromise nerve function if they exert pressure on the nerves. Close monitoring of the injection site and appropriate, including potential drainage or surgical intervention, may be necessary.

Nerve injury:

- Although rare, nerve injury can occur during nerve block administration. It can be caused by Proper technique, knowledge of anatomy, and careful needle placement are critical to minimise the risk (Campoy et al., 2019).

Allergic reactions:

- Dogs and cats may potentially develop hypersensitivity or allergic reactions to the local anaesthetics used in nerve blocks (Eggleston and Lush, 1996). Signs of an allergic reaction may include swelling, hives, itching, respiratory distress, or collapse. Immediate recognition and administration of appropriate medications, such as antihistamines or epinephrine, may be necessary to manage the allergic response.

It is important to note that complications associated with nerve blocks are relatively rare when performed by skilled and experienced veterinary professionals. Moreover, the use of specialised equipment such as ultrasound and nerve stimulators could mitigate the occurrence of the complications mentioned above.

Conclusion

The utilisation of nerve locators in veterinary medicine has brought about a significant transformation in the field of pain management. This approach has dramatically improved patient care, enhanced quality of life, and expedited recovery by facilitating targeted nerve blocks in conjunction with systemic analgesics. The administration of nerve blocks offers numerous advantages, including the ability to administer lower

medication dosages, reduced risk of adverse reactions, and the prevention of pain at its source. Commonly employed locoregional blocks have become standard practice in providing effective pain relief for soft tissue and orthopaedic patients. Although potential complications may arise, their occurrence is infrequent when performed by skilled professionals, and any associated risks can be minimised by using proper techniques and specialised equipment. The benefits of nerve blocks far outweigh the potential complications, establishing them as an indispensable tool within comprehensive pain management strategies. Continuous advancements in this area will further enhance the safety and effectiveness of nerve block administration within the realm of veterinary medicine.

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EGG BINDING IN PET BIRDS



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Egg binding, or dystocia, can be defined as an abnormal rate of passage through the oviduct and an obstruction of the caudal salpinx/cloaca respectively.¹ The first point to note is the need for clarity from the client on the gender of their bird on arrival, as most owners are unaware due to absent or subtle sexual dimorphism in companion birds.

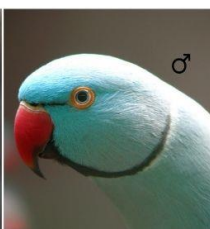
A simplified visual guide to common birds with sexual dimorphism is shown on the right, but it is not exhaustive.

Presentation and history commonly given

Egg bound birds will commonly present with lethargy, depression, anorexia, an abnormal stance, paresis of pelvic limbs, in advanced cases paralysis or even fracture of pelvic limbs, coelomic cavity swelling, varying degrees of respiratory distress, and cloacal prolapse.² Common causes of egg binding are malnutrition, lack of exercise, obesity, lack of UVB, myopathies, systemic disease, oversized eggs, or injury from previous dystocia.³

An initial approach to ascertaining if an egg is present is through a thorough history taking, but with special focus on:

- Sexual behaviours
- Number of clutches or eggs laid
- Time since last egg laid
- Time since straining first noticed OR
- Start of any of the above presenting signs.



Visual guide of some common sexually dimorphic companion bird species.

Physical examination

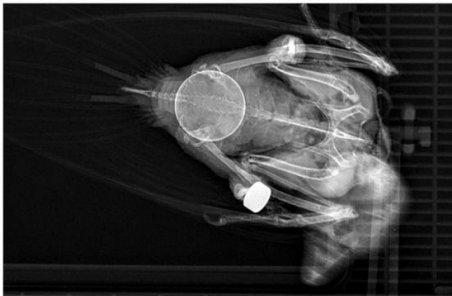
Before a physical examination is started, it is prudent to focus on the respiratory effort of the patient. As birds lack a diaphragm there will be a high risk of asphyxiation and collapse with prolonged handling, thus flow by oxygen supplied by nursing staff is recommended. During exam, gentle palpation of the coelomic window with the index finger will in most cases allow recognition of a calcified egg by pressing cranio-dorsally. However, in some cases, the egg may be present too far cranio-dorsally to palpate, and excess force can iatrogenically rupture a poorly calcified egg.

Initial diagnostics

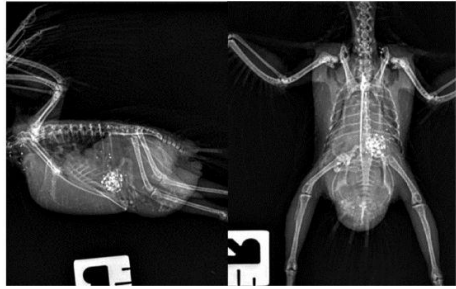
Our recommendation for owners at this stage are to pursue further diagnostics which include serum biochemistry, complete blood count, positional radiography, and ultrasonography.

The diagnostics are staggered based on patient size, stability and relevant usefulness of information expected to be received from each test. Diagnostics are either forgone or postponed if the pet is not stable.

An initial non-invasive imaging approach can be undertaken via a dorso-ventral radiograph, or commonly referred to as a 'Bird-in-box' radiograph as seen in Figure 1. This allows assessment of calcified egg presence and can give an understanding if more than one egg is present. However, this does not allow the clinician to assess for complications such as an egg that is external to the reproductive tract due to retroperistalsis or uterine tears.



If an egg is not clearly seen, but egg binding remains suspected due to coelomic distension with soft tissue/fluid opacity on radiography as in Figure 2, An ultrasound is then required to visualise the egg structure within the salpinx. This will appear as a bullseye effect, with a hyperechoic centre (yolk), hypoechoic outer ring (albumin) and thin hyperechoic circumferential margin (membrane) as seen in Figure 3. Viewing the egg structurally using this approach also aids in assessing if the egg has become degenerative.



A common finding of positional radiography, serum biochemistry and complete blood count respectively will include hyperosteotic cortices and medulla of the long bones, hypercalcemia, varying degrees of metabolic abnormalities dependent on duration of binding, and stress leukogram.

Initial medical therapies and hospitalisation

Following this triage and diagnostics assessment, an initial treatment is recommended to be given up to 12 hours. A standard approach is as follows (with alteration dependent on biochemistry/ complete blood cell count findings):

- Incubator or warmed/humidified enclosure (30 degrees) with dimmed lighting or covered to allow semi darkness.
- Oxygen therapy (as needed)
- Butorphanol 2-4 mg/kg IM q1.5-4h
- Subcutaneous fluid therapy - 35-50ml/kg of Plasma-lyte
- Calcium gluconate 50-100mg/kg IM
- Small volume easily digestible energy source by gavage feeding i.e., Polyaid-Aid Plus (Vetfarm, Australia)

Anecdotal use of oxytocin has been described but the drug has not been added to the above triage list due to two main factors, the first being that it is not considered an avian hormone. There is currently no scientific evidence supporting therapeutic effectiveness of oxytocin,⁴ and the second factor to consider is that if the uterovaginal sphincter is not open then forceful contractions will cause pain, risk of uterine tearing and even death. Other safer hormonal therapies include Arginine Vasotocin,⁵ and Prostaglandin E2Q but at this point these drugs are not available locally.

Assessment for referral

Following medical management, if no progress is seen and the egg is not passed, a case for referral is warranted unless you are comfortable to further treat these patients.

Manual manipulation and removal under anaesthetic

Removal of the egg is performed routinely under isoflurane anaesthesia. This allows control of respiration via intubation in birds over 100g or via adequate oxygen administration by mask, as well as removal of patient stress and smooth muscle contraction during egg manipulation. The cloaca is assessed at first by application and exploration using two lubricated cotton tips with sterile water-based lubricant. If the egg is not visible within the cloaca/vagina, then dorso-cranial digital compression is applied to the cranial aspect of the egg, and it is moved caudally to allow visualisation of the exteriorised vagina. Careful monitoring of patient respiratory rate is needed by nursing staff due to the compression on the caudal thoracic and abdominal air sacs. The opening of the uterovaginal sphincter is often visualised as a <1mm diameter white circular area due to the presence of eggshell. A small amount of dilation can be achieved by manual gentle stretching with instruments or cotton tip application.

Percloacal oocentesis

Percloacal oocentesis is employed at this time with an expected success rate of 80%.⁹ An 18-gauge, 1-inch (25 mm) needle, with 3ml leurlock syringe, is gently bored into the eggshell and the contents aspirated. The needle is not manipulated inside the egg or angled as this may cause iatrogenic puncture cranially. Once the egg is drained sufficiently, the needle is withdrawn, and firm digital pressure is applied on lateral aspects until collapse occurs. If this is not occurring easily, a second bore hole is created to allow a more focal point of weakness and then collapsing is reattempted.

Following collapse of the egg it is important to maintain dorso-cranial pressure of the eggshell so that visualisation of the uterovaginal sphincter is not lost. The eggshell is then gently exteriorised by either placement of a cotton tip in the egg lumen and a

scooping motion applied, or by use of ring tip forceps to remove egg fragments. Gentle warm saline flushing of the cloaca to remove any debris can then be performed. The salpinx itself is not irrigated to avoid retropulsion of content.

In a small number of cases, the eggshell cannot be retrieved, or visualisation of the uretero-vaginal sphincter is lost. When this occurs, the eggshell may be left within the salpinx and the patient recovered from general anaesthetic. With continued supportive care for up to 24-36 hours, the majority of eggshell remnants are expected to pass unaided. Passage of remaining fragments is confirmed by repeated radiographs.⁷ If this does not occur, and the patient is stable, a repeat general anaesthetic to attempt removal of remaining fragments may be pursued.

In cases of a diseased uterus, observable uterine tearing, stricture with inability to pass eggshell, or severe adhesions of shell to the uterine lining, it is recommended to pursue salpingohysterectomy. This surgery carries significant risk especially if the bird is debilitated. After the uterus is removed there is still a need to manage ongoing risk of ectopic ovulation as the ovary cannot be safely surgically excised. Salpingotomy, or avian caesarean section, is also possible in select cases.

Post removal medical hormonal management

Following egg removal, it is strongly advised to place a Suprelorin 4.7mg (deslorelin acetate), a GnRH-receptor agonist, implant subcutaneously. This will prevent further recurrence of egg binding and allow time for discussion of husbandry factors that have led to this occurrence in the pet bird presented. Reports of duration of action include 10 weeks in Japanese quail, 5 weeks in pigeons, 6 weeks in mallard ducks, 6 months in chickens, 4-5 months in cockatiels, 9 months in budgerigars, and 10 months in sun conures.⁸ Leuprolide acetate depot injection is a GnRH-receptor agonist alternative; however, this requires repeat dosing every 2-3 weeks⁹ and may not be financially suitable long term.

Conclusion

Egg laying can be a very challenging and frustrating disease process to manage. The risks of extracting an egg should be discussed thoroughly with owners but its urgency should be also highlighted. It is unlikely for a sick bird to pass an egg naturally if it does not do so after 12-24 hours of supportive care. It is imperative that the avian vet has an extensive discussion regarding husbandry and causal factors of egg laying in companion birds for long term prevention. The cage setup, daily routine, diet, and owner interactions with the bird should be altered if needed to reduce stimulation of chronic egg laying.

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VETERINARIANS' CONTINUING EDUCATION LUNCHEON

A big thank you to everyone for making the event a successful one.



"We are encouraged and inspired by your presence, and like you, we aim to continuously grow in our profession to better serve the animals."

◀ DR RINA MAGUIRE





UPDATES & announcements



DR RINA MAGUIRE'S NEW CREDENTIALS

Exotic Companion Mammal specialist, Dr Rina Maguire, has been certified as a Diplomate by the American College of Exotic Pet Medicine (ACEPM). This certification is awarded to exotics specialists to recognise their expertise in treating a broad range of species including avian, exotic small mammals, reptiles and amphibians.



INSTALLATION OF BEECROFT'S MRI FACILITY

Construction for our new MRI suite is set to be completed by the fourth quarter this year. We will be sharing details on our social media nearer our launch. In the meantime, please contact info@beecroft.com.sg for more information.



VISITING CARDIOLOGY SPECIALIST

Cardiology specialist Dr Christophe Bourguignon will be our visiting cardiologist in July 2023 and will work closely with internal medicine specialist Dr Anne-Claire Duchaussoy. Dates will be shared on our social media and referral bookings will be available online at www.beecroft.com.sg or via the QR code above.



SURGICAL SPECIALIST DR DESMOND TAN

It has been a pleasure working with surgical specialist Dr Desmond Tan this past June. We deeply appreciate the value he brings to Beecroft, assisting with complex orthopaedic cases like total hip replacement and arthroscopy. We look forward to our continued collaboration with him.



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