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Follicular stasis in tortoises

During normal reproductive cycling, female tortoises produce follicle from both ovaries that form the central yolk of their eggs. These follicles are ovulated in spring or summer each year and pass into the oviduct where egg white and then shell are added to each yolk and the eggs are then laid.

This process can be disrupted by factors that are thought to include lack of contact with a male tortoise of the same species, lack of the right environmental temperatures, lack of available calcium (Or Vitamin D needed for calcium regulation) or lack of a suitable nesting site. In 2021 where seasonal weather changes weren't following usual patterns we saw a big rise in cases of follicular stasis so environmental temperatures and seasonal variation may be a key part of this.

When follicles fail to ovulate they accumulate on the ovaries and continue to enlarge. Normal follicles tend to be a maximum of 1-1.5cm in diameter (depending on tortoise size and maturity), but retained follicles grow larger filling up with more yolk material and can get as large as 3cm each! Not only do these clusters of up to 50 follicles take up a lot of space in the coelom (the body cavity inside the shell) they require a lot of energy, fluid and protein to make and can result in tortoises becoming debilitated. However, the longer the follicles are held on the ovaries the more damaged their fragile outer surface becomes and the yolk proteins start to leak into the coelom and this irritant material can cause a lot of discomfort and inflammatory reaction internally. Bacteria may take advantage of this rich food material leaking from the ovaries and lead to infections. Often the early stages are difficult to identify as changes are slow and subtle with only slight decreases in activity and appetite seen. As the process progresses tortoises become weaker, reluctant to move, stop eating and may develop septicaemia or organ failure as inflammatory proteins and bacteria cause internal damage.

Follicular stasis is often identified when tortoises are brought in for showing these non-specific signs, or at pre-hibernation or other routine health checks where external changes are not yet obvious.

Blood tests may show an elevation in calcium, fat and protein levels as the tortoise is in an abnormally prolonged status of making the base requirements for egg formation available. Liver enzymes may be elevated as the liver struggles to produce all the yolk material or develops fat accumulation with high circulating fat levels. Although, as fluid filled structures, the follicles don't show on x-rays we sometimes have other clues that there may be ovarian problems – such as tortoises having eaten lots of stones as part of their search to boost calcium levels.

Ultrasound scans are the best way to identify this problem and are recommended as part of any health check of a female tortoise for this reason. Scans show clusters of follicles on the ovaries, which can be measured and the presence of fluid (indicating leakage and inflammation) can also be determined.

Unfortunately once this process of ovulation fails and follicles are retained there is no medical treatment that will stimulate the follicles to ovulate and progress. The only option is to surgically remove the ovaries. Surgery carries a fair success rate with approximately 90% of tortoises we treat recovering well and getting back to good health. Those that have very advanced follicle degeneration, infections or secondary organ failure unfortunately can struggle as their bodies are not capable of dealing with the pressures of anaesthesia and healing. Although we are very experienced in both tortoise anaesthesia and surgery and minimise the risks unfortunately some tortoises are still not able to survive, but these are the minority and we will discuss the individual risk of your tortoise with you before planning the course of action.

In some larger tortoises where the process is not very advanced and follicles are not too large yet, endoscope assisted ovarian removal can be carried out through incisions in the skin at the base of both of the hind legs. However, in most cases by the time this problem is found the follicles are too large to physically fit through the small access point between shell and thigh. In the majority of tortoises we need to perform a 'plastronotomy' – this is the removal of a square of shell from the underside of the tortoise to access the coelom and remove the abnormal ovaries. It is a major surgery that is technically quite challenging and requires specific surgical and anaesthetic equipment that is not found in normal veterinary practice. We create an angled incision through the keratin and bone of the shell that will allow the bone trapdoor to be replaced securely afterwards. Then the ovaries are identified and removed through the plastronotomy site. Titanium clips are used to seal the blood vessels and the ovaries and all their follicles are removed. Any other concerns such as egg retention in the bladder or oviduct or large or excessively numerous stones in the intestinal tract can also be addressed at the same time. The soft tissues under the shell are sutured closed and the shell fragment is replaced. A sterile wound gel is placed around the shell trapdoor to give a good seal and a resin overlay is placed to hold the shell piece in place. We will usually place a feeding tube into the neck which allows administration of food and medication without restraint as these tortoises have been through major surgery and will need pain relief and often antibiotic and assist feeding support in the weeks after surgery. Most tortoises take 4-6 weeks to recover and get back to normal activity and feeding, indeed often owners are surprised how perky they are when back to full health as they have often been subtly ill for many months.

We will provide the liquid pain relief, feeding solution and any other medication they need and will run through how to use the feeding tube. It is very important to make sure tortoises are kept warm after surgery as their metabolic rate and healing capacity depends on temperature. They will need a basking spot of around 40C, and the cool end of the enclosure not dropping lower than 22C, even at night. This may require some revamping of enclosures as they will need this ready for as soon as they come home (usually the same day, or the day after surgery). We will then arrange weekly check ups to make sure all is going well and once your tortoise is eating by themselves we will reduce the quantity of food that is being given by the tube. Once they are able to hold their body weight for a minimum of a 2 week period with no liquid feeding then we can remove the tube and let them get fully back to normal.

The resin cover will hold the shell fragment in place to allow it to heal, but in tortoises nothing happens quickly! Over the next few years the shell underneath will heal and the resin will come away, it should be left in place and not removed prematurely. If you have any concerns with the appearance of the shell (discolouration, irregular shape or anything else) then we can review this at any time.