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Following her VN training, Amy worked in a referral practice for two years. She then took a year out to travel and work in Australia and Namibia. Amy is currently working at the PDSA in a busy 'charity' environment.

Feline hyperthyroidism – managing the surgical patient

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ABSTRACT: When presented with a hyperthyroid patient, medical treatment should always be instigated prior to surgical stabilisation to reduce the anaesthetic risks involved. However, stabilisation prior to surgery is not always an option owing to cost and the fact that medical treatment may not always be successful.

The following case describes an unstable hyperthyroid feline patient undergoing surgery for a total thyroid removal. The surgery was performed in a 'charity' environment and it therefore outlines the essential equipment required when cost is an issue.

Jasmine, a 13-year-old, female, neutered, domestic short-haired cat was admitted for thyroidectomy surgery. Although pre-stabilisation is advised, medical treatment proved unsuccessful. So Jasmine presented with hyperaesthesia, and tachycardia and she was under weight with a body score of 2, giving an anaesthetic risk factor of 3 (Table 1).¹

Pre-anaesthetic checks

Compromised renal function can occur with hyperthyroidism, so blood urea nitrogen (BUN) was measured with normal results.² Concurrent renal disease can, however, be masked owing to cardiovascular compromise originating from the condition causing increased cardiac output and vasodilation and, therefore, increasing renal blood flow.³

This normally indicates a requirement for intravenous fluid therapy (IVFT) to encourage renal blood flow.⁴ However, the

risks of further cardiac deterioration can sometimes outweigh this requirement.

Tachycardia presented in this case, indicating a degree of cardiovascular compromise.⁵ So IVFT was avoided.

Ideally, blood samples should be obtained for a full biochemistry, haematology and electrolyte check. As with most hyperthyroid cases, this patient was geriatric, therefore, any underlying problems should be ruled out prior to anaesthesia to reduce the risks involved.

Electrocardiography (ECG) was performed prior to pre-medication in order to detect cardiac arrhythmias. No obvious abnormalities were detected, so pre-medication was administered. A thorough evaluation of the thoracic cavity should also be obtained by means of radiography and ultrasound, where possible, to enable any other abnormalities to be highlighted.

Anaesthesia drugs

The patient was difficult to restrain because of the hyperaesthesia suggesting the requirement for heavy sedation. However, owing to the increased metabolic rate, a lower dose of the pre-medication using acepromazine (ACP 2mg/ml, Novartis Animal Health) and buprenorphine (Vetergesic 0.3mg/ml, Alstoos Animal Health) was administered intramuscularly.²

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Table 1. Pre-Anaesthetic Risk Categories (Source: Orpet and Welsh (2011))

Category 1	Normal, healthy, no detectable disease	Elective neutering
Category 2	Slight/moderate systemic disease showing no obvious incapacity	Localised infection, fractures, skin tumours
Category 3	Mild to moderate systemic disease causing mild symptoms	Anaemia, dehydration, fever, cachexia
Category 4	Extreme systemic disease causing a threat to life	Toxemia, emaciation, uraemia, decompensated CHF
Category 5	Moribund/dying patients unlikely to survive 24hrs	Severe trauma, shock, terminal malignancy



Figure 1. The exteriorised enlarged thyroid gland

An induction dose of propofol (Vetofol 1.0w/v, Norbrook Laboratories) was administered intravenously to effect, 30 minutes post pre-medication. Propofol can result in vasodilation leading to hypotension, so diazepam or midazolam should have been considered.⁶ Minimal restraint, with use of a towel, was used for induction to reduce catecholamine release resulting from stress which would increase tachycardia and blood pressure (BP).⁵

Anaesthesia monitoring

Hyperthyroidism results in stronger myocardial contractions and increased oxygen demand, often causing left ventricular hypertrophy which, combined with increased metabolic rate, introduces a risk of hypoxia.⁵ Mean arterial oxygen saturation (SaO₂) was, therefore, monitored throughout anaesthesia to maintain normal levels of 95% and above.

Calculated oxygen flow rates and intermittent positive pressure ventilation (IPPV) to maintain normal respiration rate should be used to maintain this.

The enlarged thyroid gland can put pressure on the trachea thereby compromising respiration and increasing circulating carbon dioxide levels resulting in hypercapnia.⁵ So in this case, end-tidal carbon dioxide (ETCO₂) was monitored to maintain a level less than 50mmHg.⁴

Again, IPPV should be performed to maintain this level, as well as careful monitoring of the depth of anaesthesia. BP was monitored and maintained at a mean arterial pressure between the ranges 60mmHg and 120mmHg.⁴ To maintain normal BP parameters, care should be taken with vasoconstrictors and IVFT in hyperthyroid patients owing to their cardiovascular effects.⁶ Neither was administered in this case.

A decrease in BP occurred which may have been caused by deep anaesthesia, the effect of anaesthesia drugs or incorrect BP cuff size.^{4,7} A Doppler monitor should be used to obtain accurate and reliable results.⁸

Electrocardiography (ECG) was used throughout the anaesthetic to detect any arrhythmias or rate and rhythm abnormalities. This was monitored alongside pulse rate to detect any deficits.

Although monitoring equipment provides valuable information in these patients, it is essential that this is not relied upon to the exclusion of manual techniques. Auscultation of the chest, central and peripheral pulses and respiration depth should all be closely monitored alongside mucous membrane colour (mm) and capillary refill time (CRT).

These parameters, along with heart and respiratory rate can highlight other complications, as well as confirming readings from monitoring equipment. The use of an anaesthesia chart is advised to record all findings and drug administration.

Postoperative monitoring

Jasmine was slightly hypothermic on recovery, so heat pads were used to attain and maintain normothermia. Temperature, pulse, respiration were monitored, along with other vital signs such as mucous membrane colour and CRT until the patient was fully awake, alert and sitting up.

A Buster collar was avoided owing to the possibility of its pressure on the wound, and intradermal sutures were placed to reduce the risk of interference. Analgesia was administered parentally throughout

the duration of hospitalisation and then continued orally for 10 days on discharge. There were no problems with the wound and recovery was smooth and uneventful.

Following surgery, the sudden decrease in metabolic rate and BP can result in underlying renal disease presenting in approximately 30 per cent of cases.⁵ BUN was, therefore, monitored regularly during the following weeks, along with blood calcium; because accidental removal of the parathyroid gland can affect these levels.²

The owner was advised to monitor for signs of hypocalcaemia, such as twitching, restlessness and dyspnoea.⁵ It is also recommended to monitor for a hyperthyroid relapse.¹

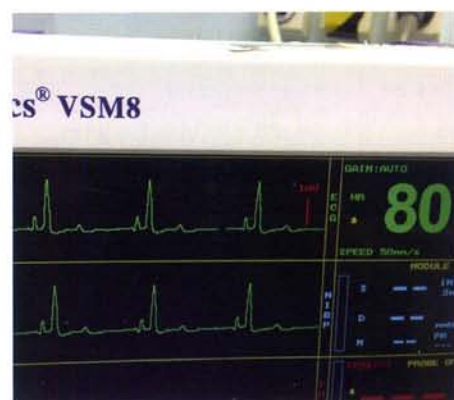
Conclusion

When possible a hyperthyroid patient should be stabilised prior to surgery to reduce the risk of complications and to help in the delivery of smooth anaesthesia, with few complications.

The majority of hyperthyroid cases presented are geriatric; so a full biochemistry, haematology and electrolyte blood screen should be performed to rule out any concurrent diseases. However, if this is not an option, renal function blood tests should be considered essential along with a full cardiac examination involving radiographs, auscultation and ECG.

Anaesthetic monitoring of BP, SaO₂ and ETCO₂ are recommended because of the risks involved, especially in an unstable patient. Postoperative monitoring is also essential to detect early presentation of complications. [v](#)

Figure 2. Anaesthetic monitoring of BP, SaO₂ and ETCO₂ are recommended because of the risks involved, especially in an unstable patient



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