Causes and management of hyperthyroidism in cats

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Emma Garnett VN, looks at why cats can become hyperthyroid and what the various treatment routes involve

THE thyroid gland is a small gland consisting of two lobes, one on either side of the trachea in the neck, (Figure 1). The gland produces thyroxine as the main thyroid hormone (T4) and a small amount of hormone called triiodothyronine (T3). The production of the thyroid hormones is controlled by thyroid-stimulating hormone (TSH). This is produced by the pituitary gland, which is located at the base of the brain. Together, these hormones regulate the body's metabolic rate and affect every system in the body.

What is hyperthyroidism?

Hyperthyroidism is the most common endocrine disorder that affects older cats, usually seen in cats in excess of 10 years old. It is caused by a benign tumour (adenoma) of the thyroid gland, which results in excessive amounts of thyroid hormone, T4, being produced. This is then converted in the body to T3, which is the active form of the hormone. Only three to fi ve per cent of hyperthyroid cats have a cancerous thyroid growth. This increase in hormone production impacts on all body systems and, if left untreated, can result in heart or kidney failure.

How do I know if a cat is hyperthyroid?

The median age for acquiring the disorder is just under 13 years of age. Only fi ve per cent of hyperthyroid cats develop the disease before they are eight years old. There is no breed or sex

predilection.

If any of the following signs in a cat are noted by the owner, it may be worth advising the client to bring the cat in to see the vet for a check up and further tests:

• Increased appetite, but, despite this, quite signifi cant weight loss. This is the most common sign.

• Behavioural changes; vocalisation, restlessness, inability to settle, hyperactivity, staring into space.

• Persistent/recurrent diarrhoea, vomiting, excessive drinking and increased urination are also sometimes seen.

• Unkempt coat.

• Eye abnormalities.

Less common symptoms can include decreased appetite, weakness, laboured breathing and coughing.

Veterinary diagnosis

Where hyperthyroidism is suspected, a veterinary surgeon will ask questions of the owner regarding the occurrence of any of the clinical signs listed. A thorough physical examination can then be carried out. The vet will be able to detect a fast and distinct heartbeat. In some cases, an enlarged thyroid gland may be palpable in the neck (goitre). Figure 2 shows an enlarged thyroid gland in a cat's neck, which would be easily palpable by a veterinary surgeon.

In the early stages of the condition this may not be palpable, and normally the thyroid gland in the cat cannot be palpated. Sometimes the gland may become so large it actually "sinks" into the chest cavity and cannot be felt. There may also be other instances where the thyroid gland tissue can be found in other areas of the chest and neck. This is called ectopic thyroid tissue.

Blood tests are then routinely carried out to confi rm the diagnosis of hyperthyroidism, by determination of serum (blood) thyroid hormone levels. In most affected cats, both T4 and T3 are elevated. The normal total T4 range in cats is 15-40nmol/litre. In hyperthyroid cases it can be three times this amount. Since many of the signs of hyperthyroidism can also be associated with other diseases, such as diabetes mellitus, kidney failure, heart disease or liver disease, other laboratory tests such as CBC, serum chemistry and urinalysis can be performed to determine if these diseases are present. Other, less-common, tests include T3 suppression test, thyrotropinreleasing hormone stimulation test, measurement of free T4, and thyroid radionuclide uptake and imaging.

The tests results would then infl uence which treatment option would be most appropriate.

Treatment options

Once hyperthyroidism has been confi rmed, there are currently three main treatment options available for cats:

1. Medical treatment with anti-thyroid drugs, such as methimazole or carbimazole.

2. Surgical removal of the affected gland.

3. Treatment with radioactive iodine.

All the treatment options have advantages and disadvantages, dependent on the different ages and disease presentations. If diagnosis is made in the early stages of the disease, the cat may be stabilised relatively quickly. However, if the condition has manifested for some time before diagnosis, other organ systems may be affected, thus, adding complications and reducing treatment options available.

1. Medical therapy

Anti-thyroid drugs reduce the production of thyroid hormone; they don’t provide a cure, but allow long-term control of hyperthyroidism. Some side effects can occur.

Carbimazole affects the thyroid gland by being metabolised by the liver in to methimazole. A veterinary surgeon will take all the factors into consideration before deciding on an appropriate drug therapy regime.

Routine blood tests must be carried out during treatment to monitor the thyroid levels and any potential side effects. Once the thyroid levels are stabilised, and if the cat is in good enough physical health to undergo a general anaesthetic, a thyroidectomy may be performed.

2. Surgery (thyroidectomy)

Thyroidectomy is the surgical removal of all the affected thyroid gland tissue. It can provide a permanent cure; however, signs of hyperthyroidism can recur at some point in the future due to an increase in activity of previously unaffected thyroid tissue.

The cat must ideally be stabilised on anti-thyroid drugs prior to surgery to reduce anaesthetic complications.

Surgery may not be an option for cats with associated heart and kidney problems, so lifelong

medical therapy may be the only treatment option for these cases. If a cat with associated problems cannot be medicated with the thyroid drugs, and surgery is then the option, beta-blockers can be given prior to surgery. Figure 3 shows a thyroidectomy in a cat with bilateral thyroid adenomas.

Complications of surgery

a) Persistence of hyperthyroidism

This can be due to leaving small amounts of diseased thyroid tissue behind, or where both of the thyroid glands are diseased and only one gland is removed. In both these cases, hyperthyroidism will persist.

b) Hypocalcaemia

Hypocalcaemia is too little calcium in the blood, and is a serious potential complication with thyroid removal. The parathyroid glands produce a hormone to regulate calcium in the blood. There are two parathyroid glands located at the tip of the thyroid glands. During a thyroidectomy, the veterinary surgeon must identify the parathyroid glands as any damage to them can result in a reduction in parathyroid hormone secretion. This can cause a life-threatening fall in blood calcium. It is most commonly seen when both thyroid lobes are removed at the same time.

Hypocalcaemia can be seen up to fi ve days after surgery, so cats should ideally be kept hospitalised for several days following surgery for observation and signs of hypocalcaemia. If the cat is sent home then the owner should be made aware of signs to look out for. These include:

• muscle twitching;

• loss of appetite;

• vocalisation;

• irritability; and

• convulsions.

The cat must be brought immediately to the surgery if any of these symptoms are seen.

c) Hypothyroidism

Hypothyroidism is a lack of thyroid hormones. This can occur after surgical removal of both thyroid glands, but it is not usually the case. The thyroid hormone can fall very low after surgery, but after

several weeks or months it can return to normal levels. The reason for this is thought to be the presence of accessory thyroid tissue. In the foetus, the thyroid glands develop near the heart and migrate up to the neck. During migration a few cells are left behind. These cells are inactive in the normal cat, but when the thyroid hormone falls so low, the accessory thyroid tissue becomes active and produces thyroid hormone. Only where notable signs of hypothyroidism are reported should additional thyroid hormones be given. These signs include:

• lethargy;

• obesity;

• hair loss; and

• loss of appetite.

Other, less-common, complications can include paralysis of the larynx, alteration in voice, Horner's syndrome and haemorrhage.

3. Radioactive iodine treatment

Radioactive iodine treatment can be used to treat hyperthyroidism, but it can be an expensive treatment option. The radioactive iodine is taken up by active thyroid tissue, resulting in the destruction of diseased thyroid tissue, and normal thyroid tissue is left unharmed, as it does not absorb the iodine. It would also destroy any ectopic thyroid tissue that is inaccessible to surgery. Also, it does not affect the parathyroid glands.

The treatment is administered by a single injection under the skin, and, in 95 per cent of cases, is curative. The treatment can be repeated if hyperthyroidism persists. Very occasionally, a permanent reduction in thyroid hormone levels (hypothyroidism) can occur following treatment, but thyroid hormone supplementation is rarely needed. A higher dose of the treatment can be given in the same way to treat thyroid adenocarcinoma (malignant), which is the rarer form of the condition.

Prior to treatment, anti-thyroid drugs must be stopped as these reduce the effectiveness of the treatment. Beta-blockers can be given to control the symptoms while awaiting an appointment. After treatment it can take between one to six months for a cat's thyroid hormone levels to return to normal, so retreatment should not be given too early.

The procedure carries no significant risk to the patient; there is no general anaesthetic, but precautionary protective measures are required for people coming into close contact with the cat.

This usually means the cat should be hospitalised for approximately six weeks following treatment, and handling kept to a minimum.

Licensed facilities currently offering this treatment in the UK include the university veterinary schools at Bristol and Glasgow, The Animal Health Trust at Newmarket and Barton Veterinary Hospital in Canterbury.

Conclusions

Hyperthyroidism is a common disease in older cats that can be successfully treated. However, the treatment choice depends entirely on assessment of each individual case. The factors to consider are age and temperament, along with any underlying or associated diseases that may be present. Taking these factors into account will enable the veterinary surgeon to choose the most suitable treatment option for a cat.

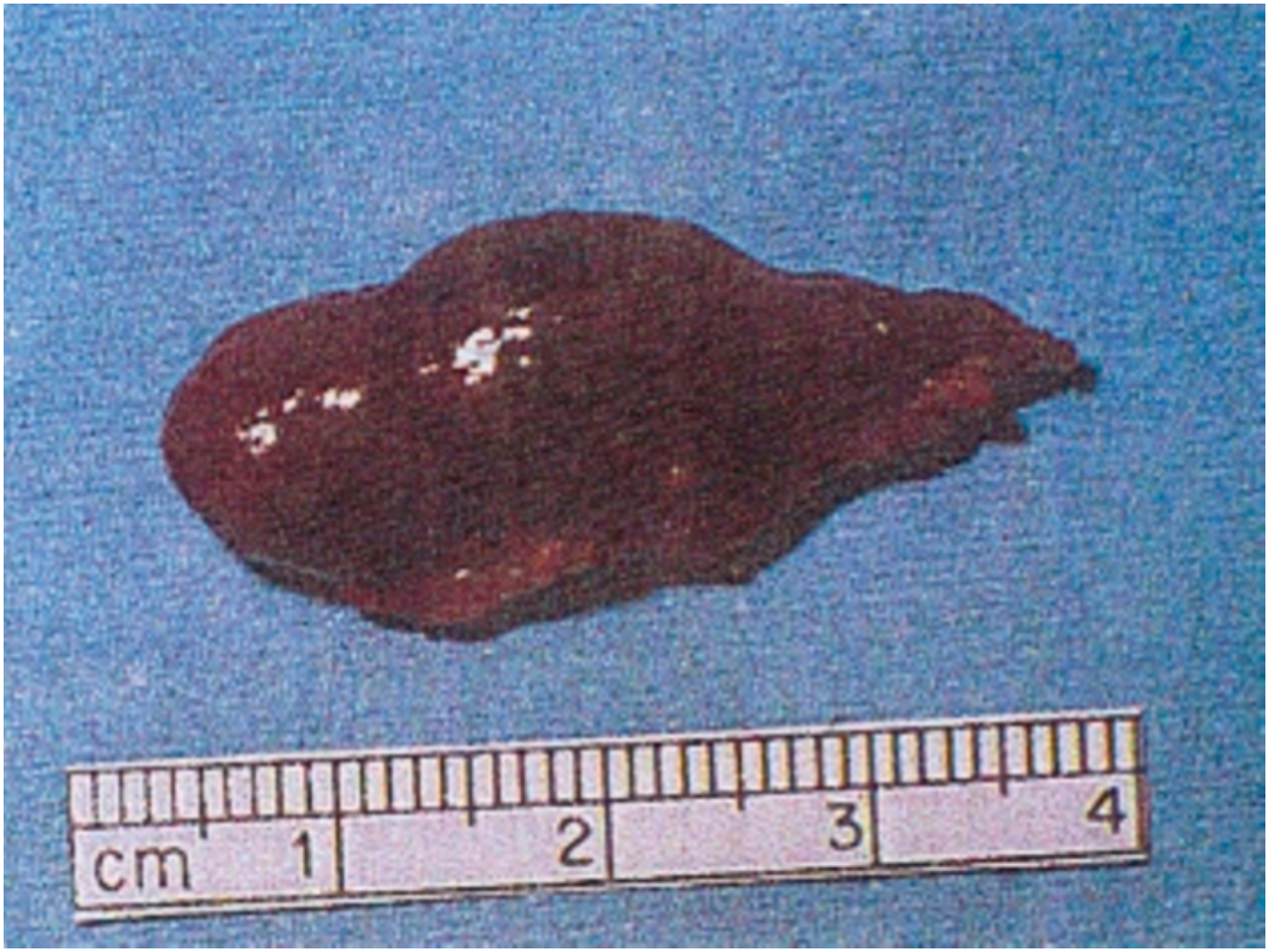
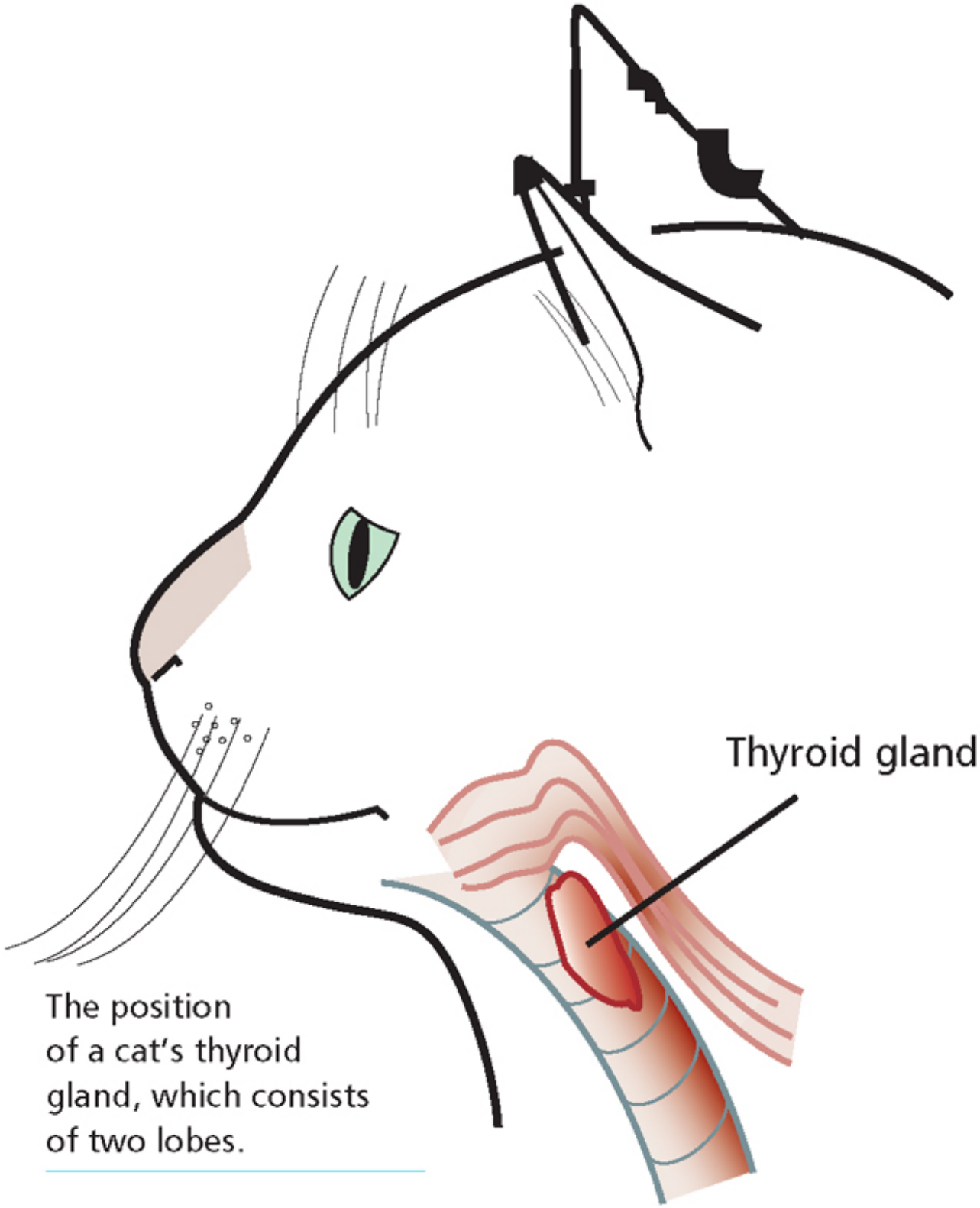


Figure 3. Sequence showing a thyroidectomy in a cat with bilateral thyroid adenomas.



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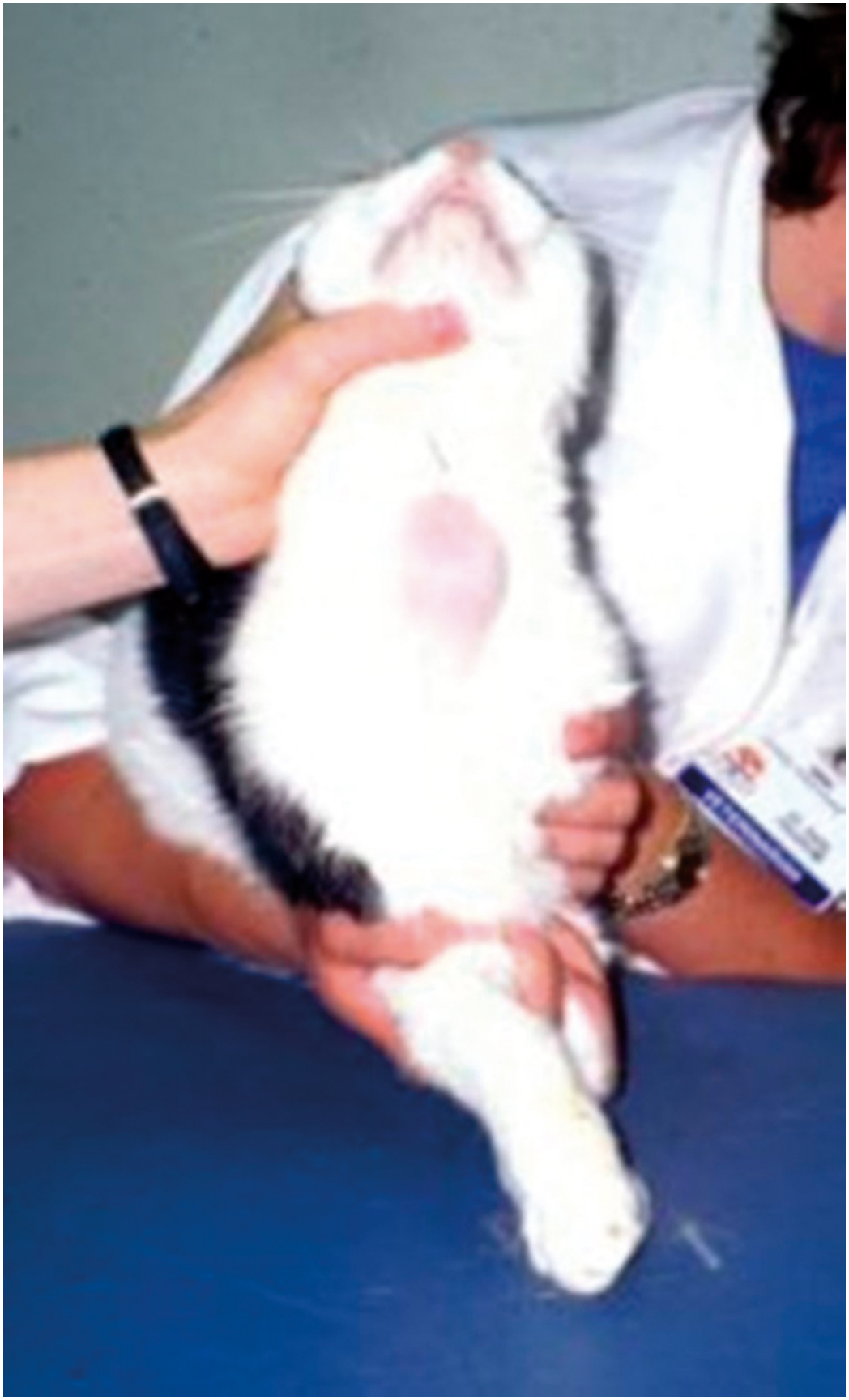

In some hyperthyroid cases, an enlarged thyroid gland, or goitre, may be seen/ palpable in the neck.

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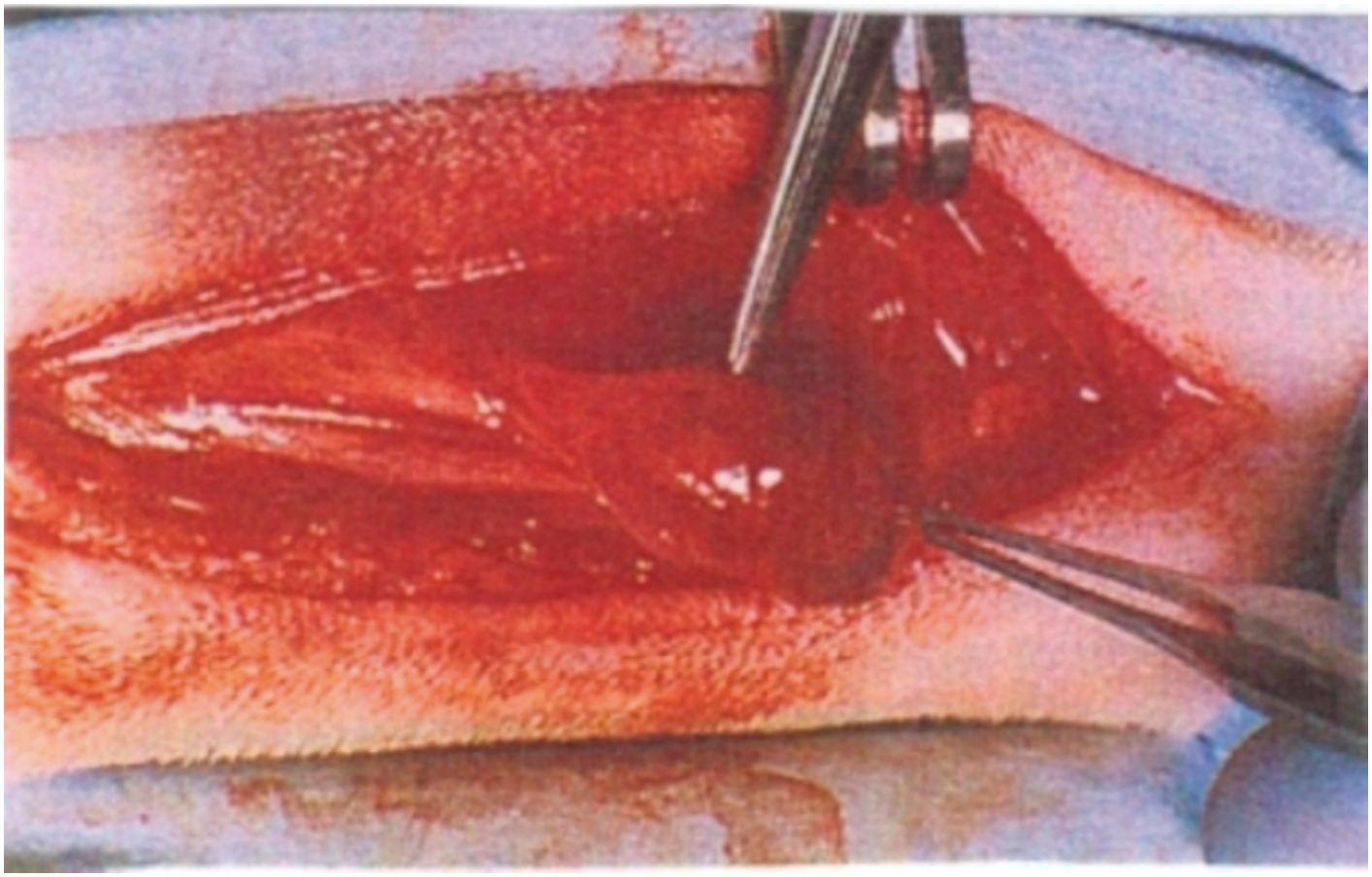

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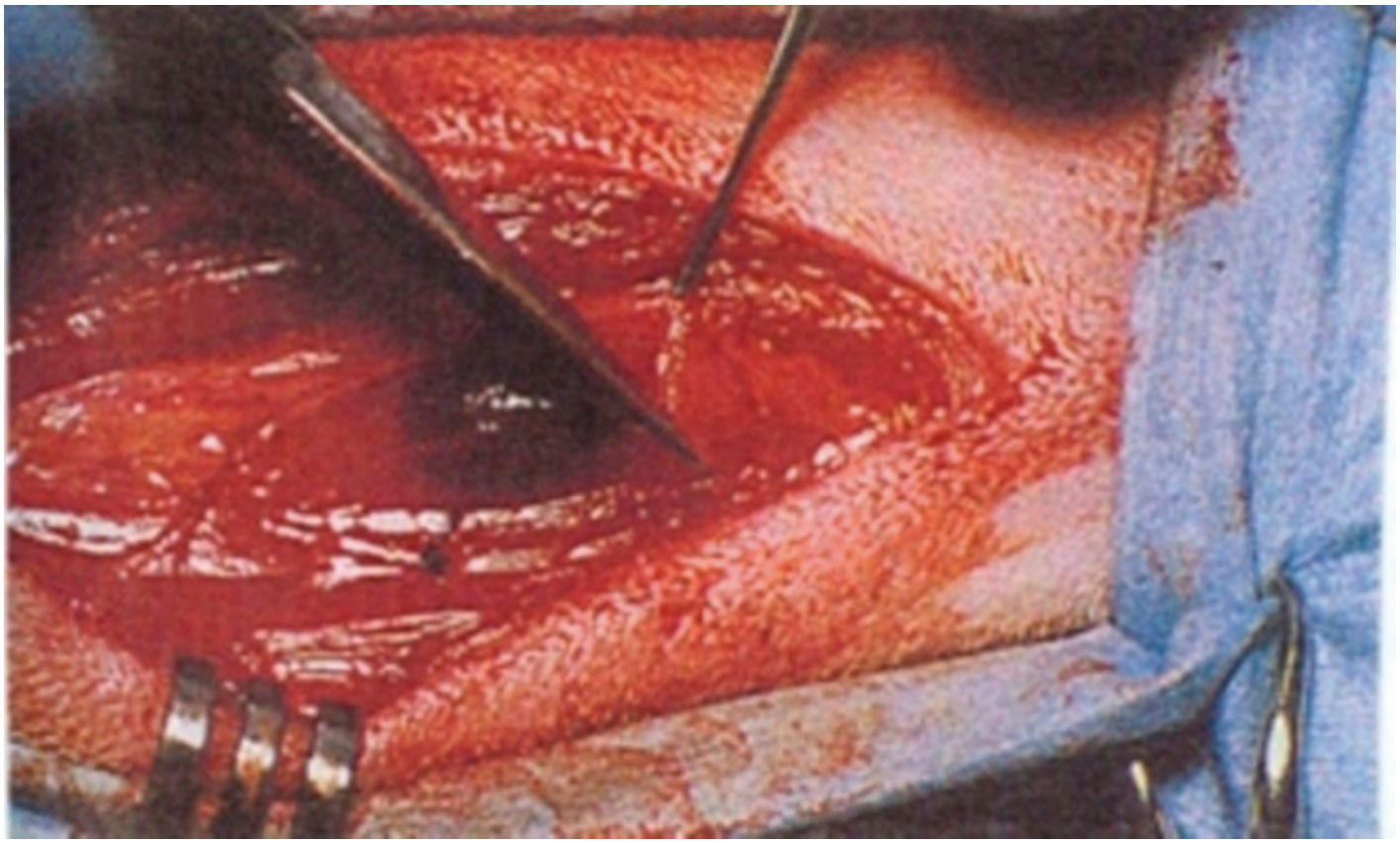

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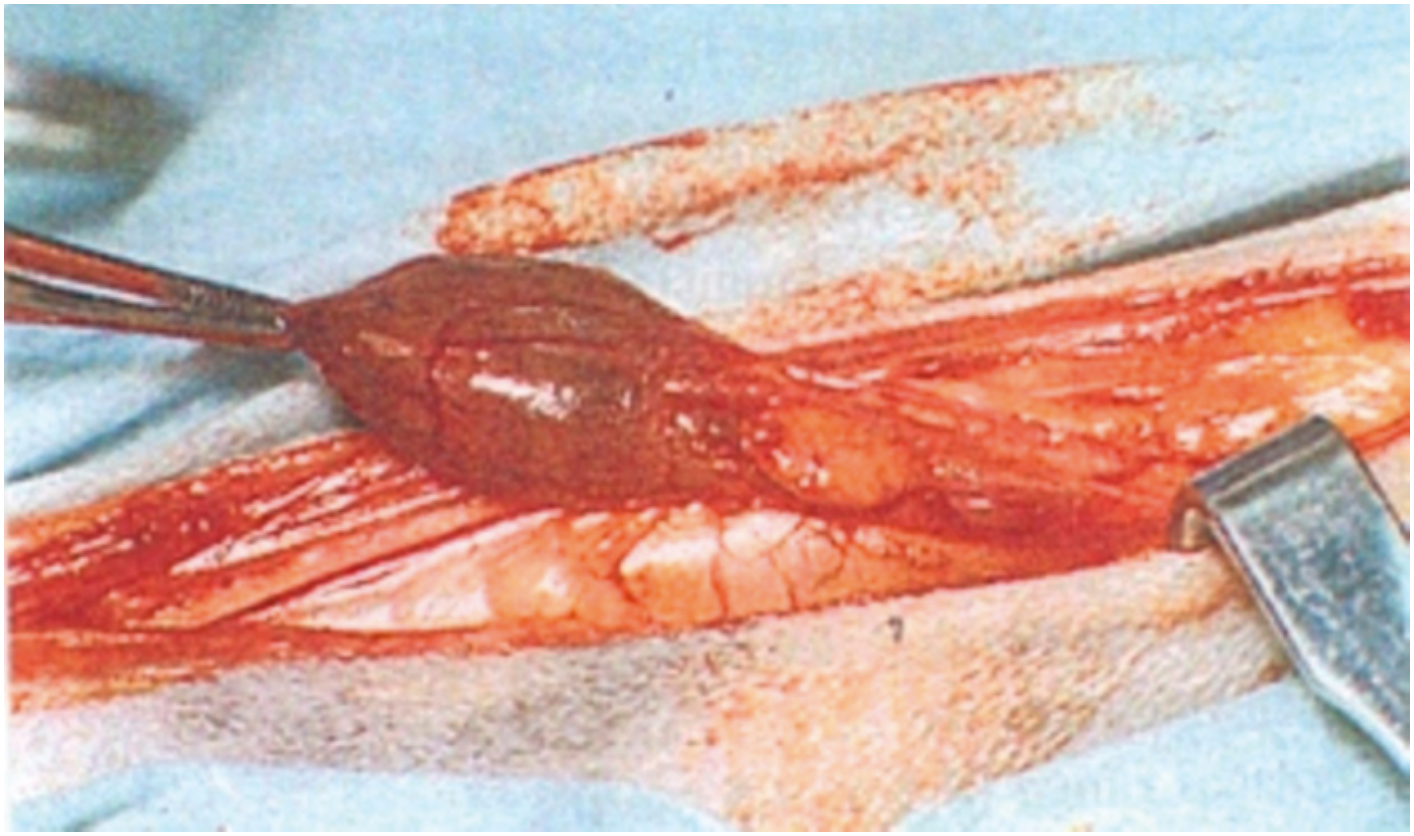

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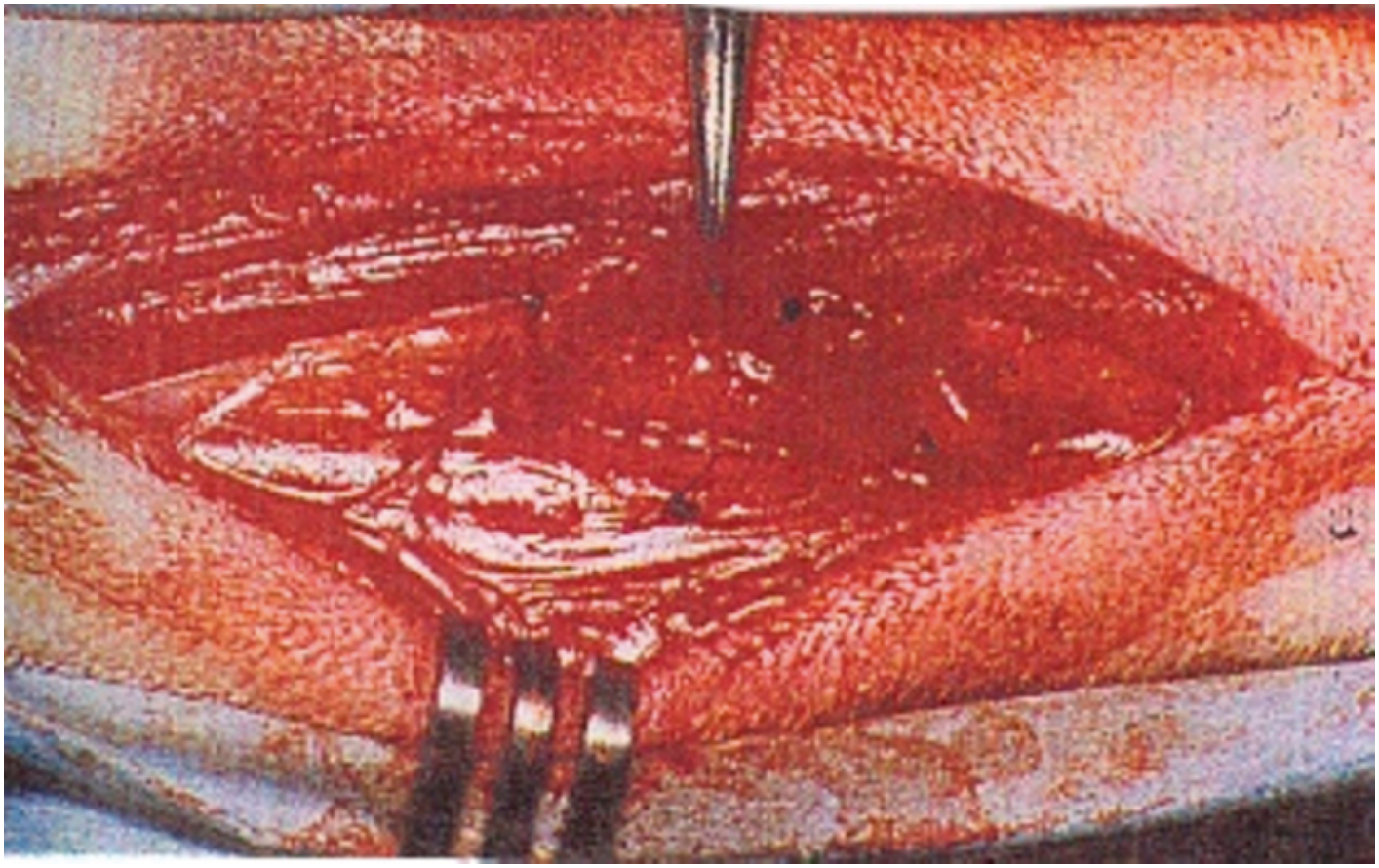

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