Thyroidectomy with Parathyroid Implantation: Is It an Easy Technique?

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ABSTRACT

Background: Feline hyperthyroidism is the most common endocrine disorder in cats. Cats may not reach the disease control and/or have side effects with medical therapy. Thyroidectomy is a definitive treatment and the only option when radioactive iodine is not available. Extracapsular thyroidectomy with transplantation of the external parathyroid gland is the surgical technique that minimizes the risk of postoperative hypocalcemia when it is compared to others. The aim of this study is report the difficulty in visualizing parathyroid gland during extracapsular thyroidectomy with transplantation of the external parathyroid gland technique in hyperthyroid cats.

Materials, Methods & Results: Thirty hyperthyroid cats were evaluated and submitted to extracapsular thyroidectomy with transplantation of the external parathyroid gland. Blood samples were collected to hematologic, biochemical and hormonal (total thyroxine) analysis. On physical examination, at least one cervical thyroid lobe was palpable. Cats were treated with methimazole. Thyroidectomy was recommended when adverse effects of medication occurred or medical hormonal stabilization was not achieved. The excised thyroid and a sample of external parathyroid gland were histologically examined. Thirteen castrated males and seventeen spayed female cats in age ranging from eight to nineteen years (mean age 13.3 years) were indicated to surgery. Twenty three cats were Brazilian domestic short hair, six were Siamese and one was Oriental. Thyroid palpable cervical nodule was unilateral in eight cats and bilateral in twenty two cats. The reasons for surgery included adverse effects of methimazole (14/30), difficulty in medicating, owners’ interest in surgical treatment (6/30) and inability to stabilize with medical management (10/30). None developed any anesthetic or postoperative complications. The parathyroid gland was implanted in sixteen cats, because it wasn’t identified in the other fourteen cats during surgery. Twenty-six cases were diagnosed as thyroid adenoma and four as thyroid hyperplasia.

Discussion: The extracapsular thyroidectomy with transplantation of the external parathyroid gland was the chosen technique because it minimizes the risk of postoperative parathyroid failure resulting in life threatening hypocalcemia. Staging thyroidectomies reduce or prevent the incidence and duration of postoperative hypocalcemia, hospitalization, and further oral supplementation of calcium and calcitriol because transplanted parathyroid tissue returns to its normal function within twenty-one days of surgery. Therefore, hyperthyroid cats were submitted to this surgical technique. However, the major concern of this technique was the difficulty in identifying external parathyroid gland. Parathyroid gland autotransplantation was performed in only sixteen cats because it was not visible in the other fourteen cats. The difficulty in identifying the parathyroid gland during thyroidectomy was not previously reported. In most cats, the external parathyroid gland is on the cranial one-third of the thyroid lobe while in others, it is about mid thyroid level or even on the caudal pole. One cat of this study had external parathyroid gland localized on caudal pole. Probably, external parathyroid gland was cranial in thyroid lobe and not found in fourteen cats. The identification of the parathyroid is easier when it is located in the ventral part of the thyroid gland and difficult when located elsewhere. Although extracapsular thyroidectomy with transplantation of the parathyroid gland is an easy surgical technique, external parathyroid gland may not be identified during surgery. Cat must be hospitalized in the second surgery when the parathyroid gland is not reimplanted in the first surgery due to possibility of threatening hypocalcemia postoperatively.

Keywords: cats, hyperthyroidism, parathyroid transplantation, thyroidectomy, extracapsular.
INTRODUCTION

Feline hyperthyroidism is the most common endocrine disorder in cats [5-7]. Medical therapy, radiation therapy and surgery are options for its treatment [3,6-8,11]. Radiation therapy is a safe and effective treatment [5,10]. However, it is not readily available to many practitioners and clients. Surgical techniques have been described, including extracapsular and intracapsular thyroidectomy [2,4,7,13]. Extracapsular thyroidectomy with transplantation of the external parathyroid gland minimizes the risk of postoperative hypocalcemia, which can be life-threatening [8]. But, there are no previous reports about the difficulty in identifying the parathyroid gland in cats during surgery.

The aim of this study is report the difficulty in visualizing parathyroid gland during extracapsular thyroidectomy with transplantation of the external parathyroid gland technique in hyperthyroid cats.

MATERIALS AND METHODS

Thirty cats were diagnosed with hyperthyroidism in a veterinary private clinic in Rio de Janeiro. Blood samples were collected to hematologic, biochemical and hormonal (total thyroxine) analysis. On physical examination, at least one cervical thyroid lobe was palpable. Cats were treated with methimazole 1. Thyroidectomy was recommended when adverse effects of medication occurred or medical hormonal stabilization was not achieved. They were submitted to extracapsular thyroidectomy with transplantation of the external parathyroid gland [8].

The cats were anesthetized according to clinical evaluation and concurrent medical problems. After endotracheal intubation, anesthesia was maintained with isoflurane 2 in oxygen. Surgical technique employed was unilateral extracapsular thyroidectomy with transplantation of the external parathyroid gland within the sternohyoid muscle [8]. A skin incision was made on the ventral midline from about the level of the thoracic inlet. Incision continued through the median raphe of the sternohyoid and sternothyroid muscles and trachea was exposed. Thyroid lobe and external parathyroid gland were identified (Figure 1A). A Parker blade was used to excise the external parathyroid gland from the surface of the thyroid lobe. Parathyroid gland was placed on a gauze sponge soaked with normal saline solution. Thyroid lobe was excised after vessels ligation. A 0.5 to 1.0 cm incision in the belly of the ipsilateral sternohyoid muscle was made. A fragment of parathyroid gland was separated to histopathological examination. Parathyroid gland was placed in the myotomy and it was closed with nylon 4-0 to mark the site. The larger thyroid lobe was surgically removed. Postoperatively, tramadol 3 (2 mg/kg body weight, BID, subcutaneously, for five days) was administered for analgesia. The excised thyroid and the sample of external parathyroid gland were histologically examined.

If the second lobe was abnormal, it was planned to be removed in a second surgery in a similar fashion about 30 days after the first surgery. However, only two cats were submitted to second surgery.

Figure 1. Extracapsular thyroidectomy in hyperthyroid cats. A. Parathyroid gland (black arrow) is on the cranial one-third of the thyroid lobe. B. Parathyroid gland (black arrow) is on the caudal pole. C. Thyroid lobe. Parathyroid gland wasn’t identified. D. Thyroid lobe with adjacent white tissues. Parathyroid gland was not identified.
RESULTS

There were 13 castrated males and 17 spayed female cats in age ranging from 8 to 19 years (mean age 13.3 years). Twenty three cats were Brazilian domestic short hair, six were Siamese and one was Oriental. Thyroid palpable cervical nodule was unilateral in eight cats and bilateral in twenty two cats.

The reasons for surgery included adverse effects of methimazole (fourteen cases), difficulty in medicating, owners’ interest in surgical treatment (six cases) and inability to stabilize with medical management (ten cases).

All cats had normal hematologic testing. Two cats were mildly azotemic and twenty four cats had abnormally high serum activities of alanine aminotransferase. Serum total thyroxine level was increased in 73% of hyperthyroid cats after methimazole.

The cats recovered from anesthesia without any surgical complication. In one cat of this study, the parathyroid gland was localized on caudal pole (Figure 1B). The parathyroid gland was implanted in sixteen cats, because it wasn’t identified in the other fourteen cats during surgery (Figure 1 C & D).

None of the hyperthyroid cats developed any anesthetic, postoperative complications or died during 21 days after surgery. Twenty-six cases were diagnosed with adenoma and four with hyperplasia.

Two cats were submitted to a second surgery, with the same technique. One cat had hypocalcemia postoperatively because parathyroid gland wasn’t identified and transplanted at first surgery. This cat had parathyroid gland transplanted on the second surgery, and received oral supplementation of calcium and calcitriol for three weeks. The other cat had normal calcium levels after second surgery because parathyroid gland was successfully transplanted at first surgery.

DISCUSSION

Feline hyperthyroidism is the most common endocrine disorder in middle aged and older cats [6,7]. The mean age was 13 years old in the reported cats.

Definitive management options include radioactive iodine therapy or thyroidectomy [1,2,5-7]. Radioactive iodine is safe and effective, but it is not yet available in Rio de Janeiro. For these cats, surgery was the only definitive treatment option. The extracapsular thyroidectomy with transplantation of the external parathyroid gland was the chosen technique because this surgical technique minimizes the risk of postoperative parathyroid failure resulting in life threatening hypocalcemia [8]. Staging thyroidectomies reduce or prevent the incidence and duration of postoperative hypocalcemia, hospitalization, and further oral supplementation of calcium and calcitriol because transplanted parathyroid tissue returns to its normal function within twenty one days of surgery [8,9]. The cats were submitted to ventral unilateral thyroidectomy to avoid hypocalcemia postoperatively and second surgery was planned to occur after 30 days. Staged bilateral thyroidectomy was realized in two cats. Parathyroid gland was identified in one cat at first surgery and the cat didn’t develop hypocalcemia postoperatively on the second surgery. Therefore, the first transplanted parathyroid gland became functional. The other cat had hypocalcemia postoperatively after second surgery and received calcium and calcitriol supplementation for three weeks. This cat didn’t need to continue with medication because the parathyroid gland transplanted at second surgery became functional and calcium levels were maintained after 21 days postoperatively.

The major concern of the chosen surgery technique was the difficulty in external parathyroid gland identification. Parathyroid gland autotransplantation was performed in only sixteen cats because it was not visible in the other fourteen cats. Norsworthy [8] transplanted parathyroid gland in ten cats without difficulty. In most cats, the external parathyroid gland is on the cranial one-third of the thyroid lobe while in others, it is about midthyroid level or even on the caudal pole [8]. One cat of this study had external parathyroid gland localized on caudal pole. Probably, external parathyroid gland was cranial in thyroid lobe and not found in fourteen cats. The parathyroid gland is white and looks like fat tissue, which can be confusing. Tissue cranial to thyroid lobe is similar and it has white rounded tissues. The identification of the parathyroid is easier when it is located in the ventral part of the thyroid gland and difficult when located elsewhere.

Hyperthyroidism associated with benign thyroid adenoma is the most frequently diagnosed endocrinopathy in feline geriatric patients [7,12]. Thyroid carcinoma is considered rare [5-7]. Histological examination results were available for 30 cats and adenoma was detected in 26 of them and adenomatous hyperplasia in four of them.
CONCLUSIONS

Although extracapsular thyroidectomy with transplantation of the external parathyroid gland is an easy surgical technique without complications, external parathyroid gland may not be identified during surgery. Cat must be hospitalized in the second surgery when the external parathyroid gland is not identified in the first due to the risk of life-threatening hypocalcaemia.

REFERENCES


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