Cairo University

Faculty of Veterinary Medicine

Control of Cat Reproduction

Thesis presented by

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(BVSc, Cairo University, 2017)

For the degree of master

(Theriogenology)

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Supervision sheet

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Abstract

The objectives of the current studies were the investigation of several methods of contraception in male cats (Either surgical or chemical) and in female cats (Using recent generations of synthetic progestins). Male cats were subjected to either surgical neutering; Group1 (n=10) cats were subjected to bilateral orchidectomy, Group2 (n=6) were subjected to bilateral vasoligation of testicular blood supply, or chemical sterilization using intratesticular injection of either 0.5 ml or 1ml glycerol (for Group3 n= 7 cats and Group4 n=7 cats). Concerning female cats, two studies with two different contraceptive drugs were used, firstly, Group1 (n=6); received 0.075 mg desogestrel per os daily for 21 days. Group 2 (n=6); received 0.0375 mg desogestrel per os daily for 21 day and group 3 (n=6) ; was reserved as control. In the other study, Group 1 (n=6); received 30 µg ethinylestradiol /3 mg drospirenone per os for 21 days, Group 2 (n=6); received 15 µg ethinylestradiol /1.5 mg drospirenone per os daily for 21 days and Group 3 (n=6); was reserved as control. Blood samples were withdrawn from jugular vein for estimation of serum testosterone levels in male cats and serum estrogen and progesterone in female cats. Average testicular length, epididymal sperm count and histopathological findings were recorded for male cats. Ultrasonographic examination was performed on all females before beginning the study then weekly throughout the study. The studies showed that serum testosterone level was significantly ($P<0.01$) decreased after vasoligation and intratesticular injection of 0.1 ml of glycerol (1.71 ± 0.34 ng/mL and 1.32 ± 0.21 ng/mL, respectively). The epididymal samples collected from groups (2 and 4) showed azoospermia. Results of female studies showed that serum estrogen level was significantly ($P<0.05$) decreased to (8.25 ± 0.69 pg/mL) after desogestrel treatment and no obvious reproductive disorders were recorded throughout conducting our study. In contrast, drospirenone and ethinyl estradiol study showed that serum estrogen level increased not decreased and there were some reproductive disorders recorded in the uterus and ovary. In conclusion, a bilateral intratesticular injection of 1.0 mL glycerol (70%) as a chemical method of tomcat sterilization can replace the surgical orchidectomy and gave better results than using the intratesticular injection of 0.5 mL glycerol. Desogestrel can be used for minimizing the estrous signs in cats and inhibiting their follicular growth. While drospirenone is not recommended for use as a contraceptive in female cat in both doses (30 µg ethinylestradiol /3 mg drospirenone and 15 µg ethinylestradiol /1.5 mg drospirenone).

Key words: Tomcat sterilization; Glycerol; Desogestrel; drospirenone; Oral contraceptives.

DEDICATION

To my dear parents, lovely husband, my sisters and friends who always encourage and support me. I love to dedicate this work to all of you and To all those who taught me.

Thank you for everything.

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Introduction

The fecundity of many felid species has necessitated sterilization or contraception to prevent over population. Contraception as a form of reproduction control also is increasing in free-living wild felid and feral domestic cat populations, because of its preference by the public over lethal methods. If easily-delivered, safe, and effective contraceptives were readily available for domestic cats, catteries producing animals for the pet trade and some pet owners likely also would choose these methods over surgical sterilization. However, to date, wide spread use of contraceptives has been limited in felids by safety concerns and the lack of effective choices **(Munson, 2006)**.

One reason to castrate pets is the elimination of secondary sex characteristics, such as mounting, aggression, and urine marking (spraying) **(Hart *et al.*, 1993).** Additionally, sterilization contributes to pet population control.

Surgical sterilization was the commonly used manner for controlling tom cat aggressive behavior and the undesirable urine dissemination especially during the breeding season **(Yates, Yeates and Roberts, 2013)**. Chemical sterilization is considered as a non-surgical line for neutering either through arresting androgenesis or spermatogenesis. This procedure is not demanding technically, inexpensive, and suitable for mass sterilization programs in both domestic and wild animals **(Kutzler and Wood, 2006)**.

Reproduction control and avoidance of pet overpopulation are the predominant reasons for the suppression of fertility in feral and privately owned cats and a key tool for cat welfare. Further reasons for suppression of fertility are unwanted male tom cat behaviour, unwanted female oestrous behavior (increased vocalization, rolling on the ground and very short interoestrous interval) and roaming of male and female cats due to sexual activity. Surgical spaying/neutering is the most commonly performed

procedure as a method of contraception to address the pet overpopulation problem **(Howe, 2006)**.

There is increasing interest in using reversible contraception, especially when temporary and non-surgical method of fertility control are preferred. Unfortunately, the choices are limited. Due to the high cost of bringing pharmaceutical products to market, the simplest option is frequently extra label use in dogs and cats of drugs tested and approved for human application. Synthetic progestins, such as, megestrol acetate, melengesterol acetate, medroxy progesterone acetate, and proligestone (orally, implants or as depot injections) are considered effective in preventing pregnancy. However, long-term use is associated with endometrial hyperplasia, endometrial cancer, and mammary cancer **(Munson, 2006)**.

New oral contraceptives are being developed in order to improve tolerance whilst ensuring efficacy and good cycle control. Two approaches are commonly being investigated, first, to lower the steroid dose of both the estrogen and progestogen components and, second, to utilize new progestogens with a more favorable pharmacological profile **(Huber *et al*., 2000)**.

The present study aimed to:

1- Comparison between conventional bilateral orchiectomy and bilateral vasoligation of the testicular blood supply.

2- Compare between using a single bilateral intratesticular injection of two different volumes of glycerol as a method of chemical sterilization and surgical castration using two different protocols in tom cats.

3- Study the effect of using new generation from progestin (desogestrel) as oral contraceptive and their undesirable effects on uterus and mammary glands.

4- Study the effect of using new generation from progestin with estrogen (drospirenon and ethinyl estradiol) as oral contraceptive and their undesirable effects on uterus and mammary glands.

Chapter (2)

Review of literature

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Review of literature

1. Contraception and Sterilization in Male Cats

There are different surgical approaches to control undesirable behavior in tom cats during the breeding season (aggressive behavior and the undesirable urine dissemination). The most common protocol is the conventional bilateral orchiectomy, which is carried out under complete general anesthesia via the application of two surgical incisions in the scrotum above each testicle, dissecting the tunica vaginalis, and cutting the spermatic cord attaching with each testicle after the surgical crushing of the spermatic cord with forceps and double ligation with the aid of absorbable surgical suture material **(Tobias, 2010; Porters *et al.*, 2014)**.

Veterinarians are still practicing the open surgical method of castration which is the most effective and the only means of sterilization for male animals. Yet, castration by open surgery requires post-operative care to minimize the risk of hemorrhage and infection. Besides, this method has some disadvantages: it is not cost-effective and time-consuming with risk of severe post-surgical complications **(Jana and Samanta, 2007)**.

Sterilization by chemical agents is a nonsurgical approach to male contraception. Chemical agents injected into the testis, epididymis, or vas deferens cause infertility by inducing azoospermia **(Kutzler and Wood, 2006)**. Satisfactory outcomes related to chemical sterilization in cats have been reported; azoospermic semen was induced following intra-epididymal chlorhexidine gluconate injection **(Pineda and Dooley, 1984)**, potential contraception was recorded following intra-testicular injection of calcium chloride in cats **(Jana and Samanta, 2011)**.

1.1.Intratesticular and intraepididymal injections

Chemical castration is another non-surgical approach to male contraception. The technique is not technically challenging, is inexpensive and