INTRATESTICULAR CHEMICAL CASTRATION WITH ZINC CHLORIDE IN MALE CATS

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Introduction

Chemical castration is a solution for pet overpopulation and for non-surgical methods of male sterilization. Surgical castration has some disadvantages: it is not cost-effective and is time-consuming with risk of post operative complications. The aim of this study was to evaluate the clinical safety and efficacy of a single intratesticular injection of zinc chloride in causing sterility of male adult cats.

Material and Methods

Sixteen male cats of mixed breed aging from one to three years old and weighing between 3.5 and 5.0 kg were selected in this study. Sixteen male cats divided into four groups equally.

Four male cats of each treatment group were given a single bilateral injection of either **low dose (20 mg), middle dose (40 mg) or high dose (80 mg) $ZnCl_2$ 0.2 ml/per testis.** Two of four control male cats received only a single bilateral intratesticular injection with 0.2 ml sterile saline per testis and another two male cats were untreated. All animals were examined for testicular size (mm) with caliper and ultrasonographic measurement, blood serum cortisol and testosterone levels (ng/ml), urine parameters and spermatological traits were evaluated before $ZnCl_2$ injections, on day 0 (day of treatment) and then every 20 days for 60 days. Semen was collected from the male cats by means of a specially adapted electro-ejaculator (P-T Electronics, Model 302, Boring - Oregon, USA). All male cats were anaesthetized with either xylazine (2 mg/kg) in combination with ketamine-HCl (10 mg/kg) during the electro-ejaculation protocol and single dose intra testicular injection. Spermatological traits were evaluated for volume (ml), sperm motility (%) and abnormal morphological rates (%). After 60 days the testes were surgically removed. The right and left testis from each animal were used for histomorphological studies. General attitude, appetite, ability to walk, scrotal pain, rectal temperature, and scrotal evaluation beyond swelling were assessed daily on day's 1-7 post-injection.

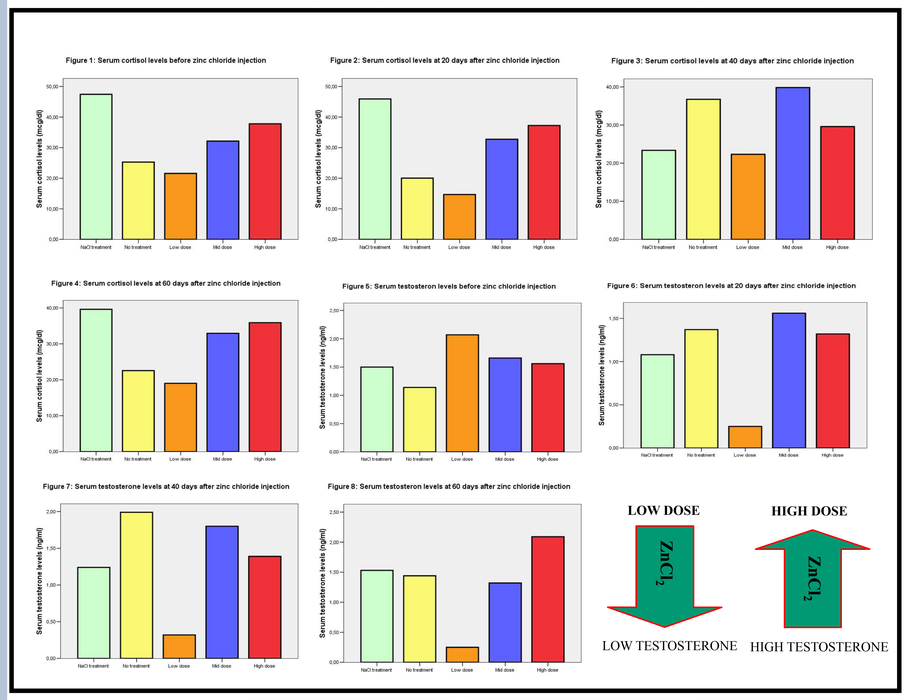
Results

No change in eating habits or body weight was observed following injection. No scrotal pain occurred on the first day post-injection. Mild swelling was observed in all male cats by 24 hours, reached a maximum at 48 hours after injection, and decreased by 20 days.

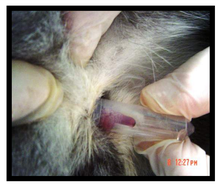
There was no significant change in rectal temperature on the 7 days post-injection. Abnormal attitude and abnormal appetite were not seen and no difficulty with walking after injection was recorded for any of the male cats. There were no significant changes in urine parameters at 20, 40 and 60 days post-injection.

The mean plasma testosterone concentrations were 0.25±0.33 ng/ml in the low dose at 60 days post-injection compared to mean plasma testosterone concentrations of 1.31±0.73 ng/ml and 2.09±1.13 ng/ml in the mid and high dose group at 60 days post-injection, respectively (p<0.05).

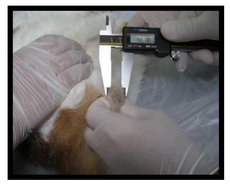
SERUM CORTISOL and TESTOSTERONE LEVELS

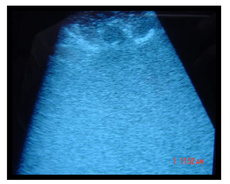


Intratesticular injection



Semen collection

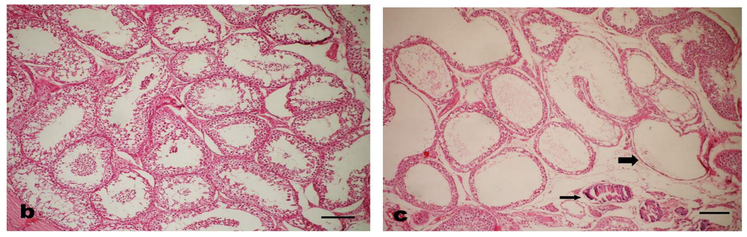




Testicular size with caliper and ultrasonograph

Table 1. Semen collection was attempted in all male cats at 20, 40 and 60 days post-injection. There were no spermatozoa in semen samples from any dose group.

Groups	20 days after injection	40 days after injection	60 days after injection
Low dose	*Ejaculate, sperm (+)*	*No ejaculate, sperm (-)*	*No ejaculate, sperm (-)*
Middle dose	Ejaculate, sperm (+)	No ejaculate, sperm (-)	No ejaculate, sperm (-)
High dose	*Ejaculate, sperm (+)*	*No ejaculate, sperm (-)*	*No ejaculate, sperm (-)*



Figures:
b) The majority of the germ cells are vanished in the tubulus seminiferus. Note the prominent vacuolization and dejenerative changes in the remaining germ cells and necrotizing cell clusters in the lumina.
c) The seminiferous tubules contain a few spermatogonia and sertoli cells with cytoplasmic vacuolization. Note the complete depletion of both the germ and sertoli cells in the lumina of some tubules, unveiling the basal membranes (thick arrow). Dystrophic calcification of the necrotizing areas are seen in the lumina of some tubules (thin arrow)

Testicular histology showed the degenerative changes associated with the low dose group and resulted in necrosis of the germinal epithelium of the semiferous tubules and interstitial Leydig cells but, mid and high dose groups showed only necrosis of the germinal epithelium (Figure b-c).

Table 2. Testicular size was reduced in low dose group but there were no significant changes in testicular size in mid and high dose groups at 60 days post-injection.

Groups	Testicular size at 20 days after injection				Testicular size at 60 days after injection			
	Caliper		*Ultrasonograph*		*Caliper*		*Ultrasonograph*	
	right	*left*	*right*	*left*	*right*	*left*	*right*	*left*
Low dose	*11.25*	*10.50*	*11.25*	*11.00*	*4.75*	*4.50*	*5.00*	*4.75*
Middle dose	*11.75*	*11.75*	*12.50*	*12.00*	*9.50*	*9.50*	*9.75*	*10.25*
High dose	*13.75*	*13.25*	*13.50*	*13.75*	*12.25*	*9.75*	*11.50*	*9.25*

Conclusion

We didn't expect the results of low testosterone level when treated low dose group. Zinc is a mineral that is protective effect of cell membrane. We guess high dose of $ZnCl_2$ may be protect and support the structure of leydig cells.

To understand of our hypothesis, we need investigate again same doses of $ZnCl_2$ and should look at testis structure by histopathology and testosterone levels on higher number of male cats.

Results indicate that intratesticular injections of low, middle and high dose zinc chloride are an extremely effective method for non-surgical chemical castration of male cats.