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CALCIUM CHLORIDE, CASTRATION IN DONKEYS
(An experimental study)
(With 2 Tables & 4 Figs.)

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دراسة تجريبية لخصي الحمير بكلوريد الكالسيوم

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أجريت هذه الدراسة على ذكور الحمير التي تتراوح أعمارهم بين ١ - ٢ سنة حيث تم حقن الخصية بكلوريد الكالسيوم كمادة تؤدى الى التصلب والتنكز في أنسجتها مما يساعد على خصي الحيوانات وعدم وجود الحيوانات المنوية بها. ولقد وجد من التجربة أن هذه الطريقة من الخصي الكيميائي يمكن استخدامها على نطاق واسع في حيوانات المزرعة مثل العجول والخراف وذلك لسهولة تطبيقها وتوافر المادة المستخدمة ورخصها.

SUMMARY

Intratesticular injections of 5 ml calcium chloride (as sclerosing agent) dissolved in distilled water in conc. 25%, 50% and 70% induced probably irreversible azoospermia in donkeys. This reagent is inexpensive and does not seem to cause undesirable effects. The technique is easy to apply and appears suitable for large scale sterilization programme in farm animals as bulls and rams.

INTRODUCTION

Practical applications of calcium chloride as a necrotizing agent were used for the destruction of superficial hyperplasia and neoplasia (warts, sarcoids and tumors) particularly if encapsulated and/or pedunculated (KOGER, 1977). ALBERS and THEILEA (1985) concluded that the calcium chloride 10% solution appeared to be the fastest

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acting and most effective than 10% sodium chloride, 96% ethanol or 10% formalin in treatment of subcutaneous lipomas in dogs. Other chemosurgical benefit for calcium chloride was, dehorning of young calves as used by KOGER (1976, 1977). Chemical castration by injection of sclerosing agents (1.5% chlorhexidine gluconate, 1.5% chlorhexidine gluconate in 50% dimethyl sulfoxide and 4.0% chlornexidine diacetate in 1.0% ethylcelluosoive) into the vasa deferentia was reported in dogs by FREEMAN and COFFEY (1973) and PINEDA, et al. (1977). Chemical castration in rams by using Formaldehyde as a necrotizing agent was reported by (PLANT, et al. 1979 and TORELL, et al. 1979).

In large animal, sclerosing agents injected into the caudae of the epididymides induced azoosperima in bulls (BIERSCHWAL and EBERT, 1961 and FREEMAN and COFFEY, 1973).

The purpose of the present study is to evaluate the possibility of inducing sterility in donkey by intratesticular injection of calcium chloride in different concentrations.

MATERIAL and METHODS

Fifteen adult male donkeys, 1.5 to 2 years old and varied between 80-150 kg. body weight were used in this study. The animals were classified into 3 groups, each of five donkeys. Testicular volume was estimated before and after treatment periodically (3, 15, 30 and 90 days) by measuring the length, width and thickness x 0.52 with caliper after OSMAN (1970).

The animals recieved intramuscular injection of combelen 0.2 mg/kg.b.wt. as a tranquilizer. The scrotal area was washed several times and disinficted with tincture iodine. The testicle was secured firmly against the skin of the scrotum. The site of injection was near the tail of the epididymis. Bilateral intratesticular injections of 5 ml calcium chloride dissolved in distilled water in conc. of 25%, 50% and 70% were used in group I, II and III respectively. The injection of calcium chloride was performed by using a long needle with small gauge (20-27 ga). The solution was infiltrated into all parts of testicular tissue by changing the direction of the needle during injection.

Testis, epididymis and scrotal part of the vas deferens were dissected through a surgical castration 3 months postinjection for recording the gross changes in these structures. Testicular function was evaluated by a direct smear prepared from the aformentioned structures. The tissues were squeeased on clean dry slide and diluted with few drops of sodium citrate 2.9%. Smears from the mixture were taken and examined according to OSMAN and EL-AZAB (1974). Smears from the testis, edididymis

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and vas deferens were examined microscopically to determine the number of specimen with a positive sperm content. While other smears were examined to evaluate the epididymal sperm motility and viability using Eosin stain 1% (BEARDIN and PUQUAY, 1980) in the positive specimen.

RESULTS

Clinical observation:

Variable signs of discomfort were observed in all animals after injections in parallel to the concentrations of calcium chloride. Periodical palpation of the testes after injection revealed a symptom of acute orchitis with a distinct and firm enlargement in all groups. The orchitis was subsided and less prominent after two weeks. The testicular volume was highly significantly reduced at 90 days postinjection (table 1).

Morphological observations:

In group I in which the animals were treated with 25% calcium chloride, adhesions between the scrotum and the testicle during the surgical removal were observed. The blood vessels of the tunica albugenia appeared as a white tree like appearance as a result of calcium precipitation (fig. 1). Cutting of the testicular tissues and epididymes revealed a grigting sound and the tubular appearance of the normal parenchyma was disturbed to some extent.

In group II the parenchyma of the testicules became soft and friable. On cross section inspissated parenchymatous tissues were observein about 2/3 of the testis (fig. 2). In group III, complete marked liquifaction of the testicular parenchyma was observed with atrophy (fig. 3 & 4). Tunica albugenia in the last group was wrinkled due to the significant reduction in the testicular size.

Testicular function:

Testicular functions represented by the presence of sperm were demonstrated in 2 testicular speciments (20%) in group I while there was no sperms in the other groups (table 2). In epididymal speciment, 6(60%), 2(20%) and 0(0%) were positive for the precense of sperms in groups I, II and III respectively. Concerning epididymal sperm motility, the results showed 16.5% and 8.1% in group I and II respectively. However, epididymal sperm viability, the results showed 15% and 7.8% alive sperms in group I and II respectively.

Table (1)
Testicular volume (cm³) before and after injection of calcium chloride during 90 days

Group No.	CaCl ₂ Conc.	Before		After			Reduction (%)
				3 days	15 days	30 days	
I	25%	64.9±6.6	90.6±8.5*	76.4±1.9	65.1±6.2	39.8±4.80**	40
II	50%	128.8±12.3	206.1±18.6**	172.2±15.5	142.4±1.9	72.8±7.04***	60
III	70%	136.2±16.4	277.0±44.8**	213.7±33.3	143.9±25.2	57.2±10.20***	80

* P = 0.05 ** P = 0.01 *** P = 0.001

Table (2)
Sperm evaluation after surgical removal of the testis, epididymes and scrotal portion of the vas deferences at different groups

Group No.	No. of Sp.	No. of sp. with +ve sperm content		Epididymal sperms (%)	
		Testis	Epididymis	Motility	Dead
I	10	2(20%)	6(60%)	16.5	85.0
II	10	--	2(20%)	08.1	90.0
III	10	--	--	--	--

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DISCUSSION

Discrete destruction of specific target tissues by small amounts of local injections of calcium chloride, a common, non toxic, inexpensive reagent, and without open surgical wounds with their consequent complications appeared to have many possibilities as chemosurgical alternatives (KOGER, 1977).

From the clinical and gross appearance of the present study, it was found that calcium chloride in various concentrations in aqueous solution were effective. Moreover, high concentration (70% CaCl²) resulted in complete destruction of the testicular tissues with their atrophy.

Azoospermia in different animal species induced by injection of sclerosing agent into testicular tissue and caudae of the epididymides was described by many authors to be an effective, easy to apply and apparently safe for sterilization (BIERSCHWAL and EBERT, 1961; FREEMAN and COFFEY, 1973; KOGER, 1977 and PINEDA, *et al.* 1977). As this trial was performed only on male donkeys without complications to the health of the animal, this revealed that calcium chloride in high concentration caused destructive liquifactions of the testicular tissue. Thus, it may be easily applied for other farm animals avoiding the undesirable sequelae of surgical castration.

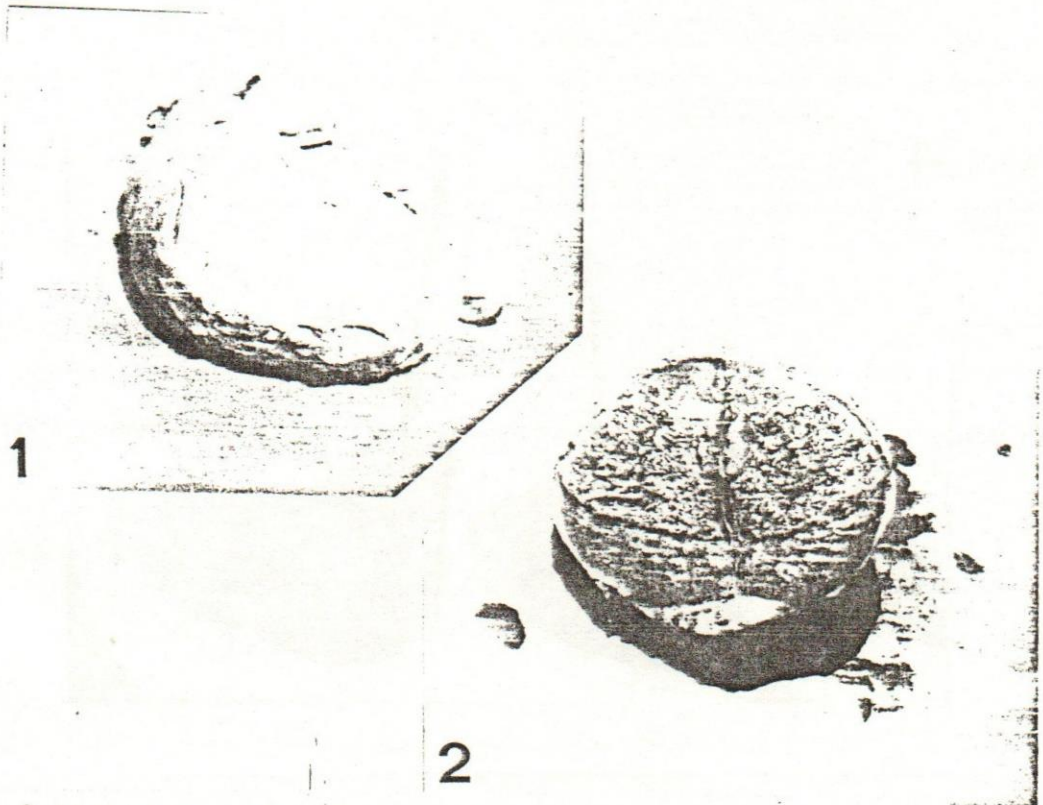
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LEGENDS

- Fig. (1): Showing sclerosis of the testicular tissues and its blood vessels after injection of 25% CaCl_2 .
- Fig. (2): Gross section of testicle showing inspissated tubular content of about 2/3 of the testicular tissue after injection of 50% CaCl_2 .
- Fig. (3): Complete liquifaction of the testicular tissue and epididymides after injection of 70% CaCl_2 .
- Fig. (4): Marked testicular reduction after injection of CaCl_2 , A (50%) and B (70%).



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