

## DIAGNOSIS AND MANAGEMENT OF SOME TESTICULAR AFFECTIONS IN EQUINE

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### ABSTRACT

The present retrospective study was carried on a total number of 25 equines suffered scrotal enlargement admitted to the Surgery Clinic of the Fac. of Vet. Med., Mansoura University in the period from April 2000 to March 2002. Clinical examination as well as surgical management were recorded and evaluated. Confirmative ultrasonography, histopathology of the specimens as well as a serum testosterone level were performed.

The recorded lesions were 2 seminomas, 4 scrotal hernia, 7 hydrocele and 12 chronic orchitis. These cases were treated by either unilateral or bilateral orchidectomy. Ultrasonographic picture of normal testicular parenchyma was evenly echogenic; testicular seminoma produces area of decreased echogenicity; hydrocele produce hyperechoic image (testis) and hypoechoic foci (fluid) with testicular adhesion; scrotal hernia showed hyperechoic image (testis small) with hypo and isoechoic image surrounding to testis; chronic orchitis produce hyperechoic testicular tissues with numerous hypoechoic foci (2-5 mm diameter). The normal level of testosterone ranged from 2-8 ng/ml while in cases of hydrocele (1-7.5 ng/ml), scrotal hernia (2.5-6.5 ng/ml), seminoma (1-3.5 ng/ml) and chronic orchitis (0.25-1.25 ng/ml).

### INTRODUCTION

Testicular neoplasia is uncommon in horses; seminoma is the most common testicular neoplasm. Malignancy is uncommon and most tumours involve both normally descended testes as well as cryptorchid ones (Gibson 1984 and Caron et al 1985). Although rare, primary testicular neoplasm of horses are much more common than secondary neoplasm (Morse & Whitmore 1986 and Johnson & Steinberg 1989).

Neoplastic enlargement of the testis must be differentiated from other cause of scrotal enlargement caused by orchitis, epididymitis, hydrocele, hematocele, inguinal and scrotal hernia. There-

fore ultrasonography is of useful diagnostic tool (Varner and Schumacher 1991).

The aim of the present study was to record the most common testicular affections causing scrotal enlargement, with special reference to the use of ultrasonography, as a noninvasive technique, histopathology, serum testosterone profile in the diagnosis of the recorded cases as well as to evaluate the benefit of surgical management of such cases.

### **MATERIALS & METHODS**

A total number of 25 equines (3 horses, 7 mules and 15 donkeys) with scrotal enlargement were admitted to Surgery Clinic of the Fac. of Vet. Med., Mansoura University through the period from April 2000 to March 2002. These animals were premedicated with Acepromazine (Vetrtranquil 1%, Ilibourne cedex - France) in adose of 0.05 mg / Kg B.W. The case history, physical examination of the scrotum; inspection and palpation of the testicle and associated structure with special emphasis to size, shape, texture, temperature and evidence of pain were recorded. Right and left testicles were compared. Surgical management of such cases was undertaken. Confirmative ultrasonography, histopathology as well as serum testosterone level were performed.

#### **Ultrasonography :**

Ultrasonography of the specimens were performed in the private ultrasonographic unit to report the common ultrasonographic features of each testicular affection causing scrotal enlargement by B- mode gray scale 2 D - imaging system using a 5-7.5 MHz linear transducer was used.

#### **Histopathological examination :**

Histopathological examination of specimens from each case were fixed in 10% neutral buffered formalin, dehydrated in serial grades of ethylalcohol, cleared in xylene, embedded in paraffin wax, sectioned at 4-6 microns and stained with H&E and examined microscopically after Bancroft et al (1990).

#### **Serum testosterone Profile :**

Blood sample (5ml) were taken by juglar venepuncture from 10 normal animal as well as from the affected ones with scrotal enlargement. After centrifugation of the collected blood at 3000

rpm for 15 minutes; serum was separated and kept at - 20°C until hormonal assay. Serum testosterone level was measured by the double antibody radioimmuno assay technique using testosterone coated tube kit (Abraham et al 1977).

#### **Surgical technique :**

Surgical management were performed under the previous tranquilization and chloral hydrate anaesthesia 10 % solution (5-6 gm/50 kg, B.W.). For seminoma, scrotal hernia, chronic orchitis and hydrocele, either unilateral or bilateral open covered castration was adopted. The animal was secured in semidorsal recumbency with the upper hind limb flexed and pulled forward. For cases in which preoperative soft tissues is compromised and swelling has been excessive the postcastration wound was managed by using temporary packing and allowing healing by second intention while a primary closure technique is used in other cases to minimize local inflammation and swelling.

The scrotal region was carefully prepared aseptically. The skin and tunica dartos were longitudinally incised parallel to median raphe. The testes was grasped with the left hand and a blunt dissection of loose connective tissues of tunica subdartos was performed by right hand. The tunica vaginalis was left intact. The neurovascular portion of the spermatic cord was ligated independently by making a small incision in the vaginal tunic and elevating the vessels from the tunic. A separate transfixation ligature was then placed around the musculofibrous portion of the cord before distal emasculation.

In cases of primary closure, partial or total ablation of the scrotum was used to eliminate local dead space; the spermatic fascia was closed in two layers using No. 2 catgut; subcuticular skin was closed in one layer using No. 1 vicryl. In cases of hydrocele skin was incised directly over the fluid - filled sac and the sac is bluntly dissected from adherent fascia, the cord was crushed, ligated and transected with emasculators as proximal as possible. A prophylactic dose of antitetanic serum was given with hand walking exercise was provided for 10-14 days.

### **RESULTS**

In the present work 25 equine (3 horses 7 mules 15 donkeys) showed acquired testicular affection (Table I). These cases were examined, diagnosed, treated and followed up.

The normal level of testosterone ranged from 2-8ng/ml while in cases of hydrocele (1-7.5ng /ml), scrotal hernia (2.5-6.5 ng/ml), seminoma (1-3.5 ng/ml) and chronic orchitis

(0.25-1.25 ng /ml).

The ultrasonographic picture of the normal testicular parenchyma was evenly echogenic (Fig1)

#### **Case No.1 & 2 :**

A 11 and 13 years old stallions were presented with a history of a developed unilateral swelling of the left testicle of the first case and bilateral insidious scrotal enlargement of the second one. The involved testis were retracted into the inguinal region heavier than normal. Open covered castration of the involved testes were performed. The cross sectional surface of the removed testes was lobulated, homogenous, and grayish white in colour. (Figs. 2 A,B,C,D, 3 A,B&C). Microscopically, masses or clusters of large polygonal cells with rounded hypochromatic vesicular nuclei, sometimes showing mitotic figures and prominent nucleoli were seen. The neoplastic cells showing some degree of cytologic differentiation and surrounded connective tissue bands. Absence of spermatogenesis was evident. (Fig.3D) The sonographic picture of the removed testes showed a diffusely heterogeneous parenchyma and hypoechoic with ill defined regions of hyperechogenicity giving the appearance of hypoechoic nodules throughout the testicular parenchyma. No normal testicular tissues was identifiable. An echogenic band representing a pseudocapsule could be seen surrounding the testicle(Fig.4) It could be diagnosed as a seminomas.

#### **Cases No.3-6 :**

Reducible scrotal hernia was seen in a mule and 3 donkeys. In the mule the condition was bilateral and voluminous while in donkeys the condition was unilateral in two donkeys and bilateral in one. Palpation of the scrotum elicits a sensation of crepitus; peristalsis was noted by movement of the skin overlying the bulge(Fig. 5 A,B) The ultrasonographic picture of the testicular tissues showed hyperechoic image (testis small) hypo and iso-echoic images surrounding to the testes (Fig.6 C) Microscopically, the testes were apparently normal with or without spermatid and spermatozoa (Fig. 6.D)

#### **Cases No 7-13 :**

Hydrocele could be diagnosed in a stallion accompanied a seminoma, 3 mules and 3 donkeys. A fluctuating fluid in the vaginal cavity and a small to normal sized testes in the scrotal cavity were palpated. The scrotum was enlarged, the animals were discomfort and the temperature rises. Centesis of the vaginal space revealed a serous straw yellow- coloured fluid. Aseptic aspiration of the fluid was unsuccessful where the fluid were returned within 48-72 hours. For

these cases covered castration with resection of the vaginal cavity was performed. (Fig. 7A & B). The ultrasonographic picture revealed that hyperechoic image (testis) with hypoechoic foci (fluid). (Fig. 8).

#### Cases No. 14 & 25 :

Chronic orchitis was diagnosed in 3 mules and 9 donkeys. The testes were hard in texture, adhered to the scrotal sac and slightly painful. These animals were either neglected acute cases or mal-interfered from the owners (Figs. 9A,B&10A). Microscopically, fibrosis and mononuclear cells infiltration in the interstitium resulting in its widening and atrophy of seminiferous tubule were demonstrated. Sometimes fibrous tissue undergo maturation and hyalinization which may extended to tubular basement membrane. Some necrotic tubules suffered from dystrophic calcification were seen (Fig.10B) ultrasonography revealed the presence of hyperechoic testicular tissues and numerous hypoechoic foci (2-5 mm diameter) (Fig.11 ).

### DISCUSSION

The prevalence of the primary testicular neoplasia is believed to be low because of few entire males are available for observation or most male horse are castrated at an early age (Gelberg & McEntee 1987 and Reifinger 1988) .

Primary testicular tumors are usually divided into germinal (seminoma, teratomas, teratocarcinomas and embryonic carcinomas) and non germined types (sertoli cell and leydig cell tumors). Cryptorchism appears to play a role in the development of the equine testicular tumors (Smith et al 1973, Caron et al 1985, Ladd 1985, Morse & Whitmore 1986, Cullen et al 1987, Brinsko 1998, Duncan 1998, Allison & Moeller 1999, May et al 1999 and Vastag 1999) .

Horses with seminoma of the scrotal testis were presented with painless, firm, tenderness, insidious gradular enlargement of the involved testes. Similar observation were reported by Peterson (1984) and Caron et al (1985). The ultrasonographic findings of seminoma in the present study are similar to those reported by Nachtsheim et al., (1983) Varner and Schumacher (1991), Schumacher (1999) and Beck et al., (2001) as normal testicular parenchyma is evenly echogenic while testicular neoplasia produces area of decreased echogenicity.

It was found that palpation alone was insufficient to differentiate neoplastic enlargement of the testis from other enlargement of the scrotum caused by orchitis, epididymitis, hydrocele, and scrotal hernia. In these cases confirmative diagnosis was aided by biopsy, ultrasonography, his-

topathology and measurement of serum testosterone level. Similar recommendations were advised by **Leopold et al., (1979) Keller (1986) Vogelzang (1986) Threlfall & Lopate (1987), Traub, Dargatz et al., (1991) and Varner & Schumacher (1991).**

Seminoma was diagnosed in older stallions aged 11-13 years. The swelling was soft and on cut section was grayish white lobulated and glistening and when squeezed the cut surface exude milky fluid. Thick fibrous trabeculae divide the seminoma into multiple large lobule. The same results were reported by **Jubb & Kennedy (1970), Moulton (1978), Galofaro & Di-Guardo (1986), and Smith et al (1989).** Microscopically the excised masses showed cords of round or polygonal cells with large nuclei and prominent nucleoli. These findings are in agreement with those reported by **Kundsen & Schoutz (1963), Schonbauer & Schonbauer Langle (1983), Smith et al (1989), Veeramachaneni & Sawyer (1998).**

Seminoma arise from germinal cells of seminiferous tubules and are the most common of testicular tumors of older horses (**Moulton 1978, Vaillancourt et al 1979 and Caron et al 1985**). Meanwhile, testosterone level showed slight increase or within normal level as reported by **Jubb & Kenneedy (1970) and Smith et al., (1973)** who said that these tumor do not produce hormone while the least recorded level of testosterone were manifested in cases of chronic orchitis which accompanied by atrophy, hyaline degeneration, necrosis and calcification of the seminiferous tubules.

In the present work the two cases of seminomas were reported in older horses with normally descended testes while **Moulton (1978), Pandolfi & Roperto (1983) and Caron et al., (1985)** found that seminomas of horses appear with greater frequency in cryptorchid testicles **Hoagland (1986)** declared that neoplasia of the testis may cause temperature that induced dysfunction of spermatogenesis in the other testis. However removal of the neoplastic testis may cause the remaining testis to undergo compensatory hyperplasia this may allow the testis to regain normal spermatogenesis therefore fertility is generally maintained following hemiorchidectomy.

Unilateral castration salvages the function of one testicle and maintains the semen quality as a requirement of some owners. Hemiorchidectomy was adopted in the present work in cases of unilateral seminoma, scrotal hernia, chronic orchitis, hydrocele as described by **Vaughan (1984), Barber (1985), Hoagland (1986), Trotter et al (1988), Brinsko (1998) and Searle et al (1999)** who added that the remaining testicle hypertrophies to supply about 75 percent of the original sperm output. Freidman et al (1991) mentioned that a sterile surgical technique should be employed as the heat from the second intention healing of castration will be detrimental to sperm production from the normal testicle

Scrotal hernia is one of the common causes of scrotal enlargement. It was diagnosed in a

mule and three donkeys. These cases were reducible, voluminous and elective. Palpation of the scrotum elicits creptation with movement of the skin overlying the bulge due to peristalsis. It could be differentiated from chronic orchitis by careful palpation, ultrasonographic examination of the content of the scrotum and by lack of raised temperature. Recovery was achieved by unopened tunic procedure. Similar results were reported by **Miskin & Bain (1978)**, **Cox (1984)**, **Vaughan (1984)**, **Trotter (1988)** and **Vander Velden (1988)**.

Hydrocele or vaginocoele was recorded as a fluid filled painless swelling in the scrotum that appeared from accumulation of sterile straw yellow coloured fluid in the vaginal sac. Similar findings were reported by **Shabaan et al., (1985)**, **Cox (1987)** and **Nouh et al., (1989)** in native ram. They added that this condition is uncommon and idiopathic but open castration predisposes to the condition because the vaginal tunic is not removed. In the present work none of the recorded cases of hydrocele were castrated. It was diagnosed in mules and donkeys than in horses. This agreed the results of **Breazile (1971)** and **Habel (1981)**.

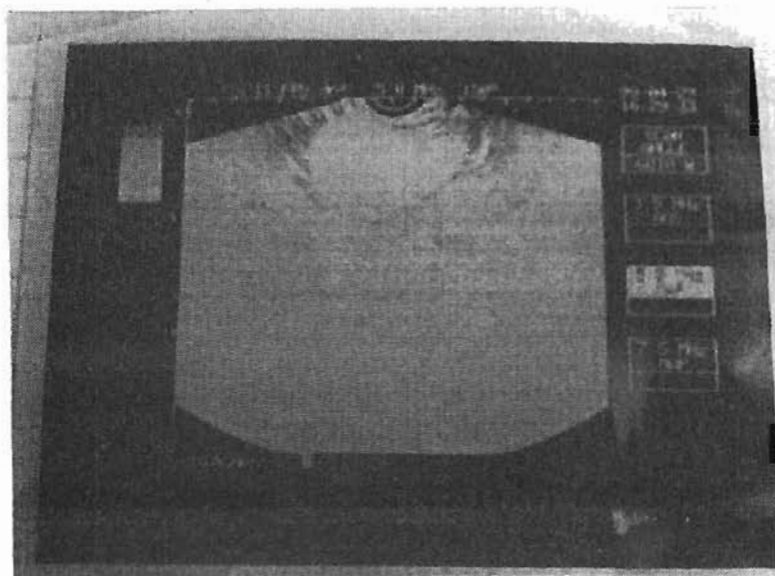
It was found that hydrocele accompanied one case of seminoma. Similar case was reported by **Schumacher (1992)** who declared that hydrocele may develop acutely or insidiously. Palpation and ultrasonography could be differentiate between hydrocele and chronic orchitis as described by **Traub Dargatz et al., (1991)** and **Varner and Schumacher (1991)** that the sonographic picture revealed hyperechoic image (testis) with hypoechoic foci (fluid).

It was found that all the testicular affections included in the present work were acquired. Chronic orchitis was prevalent in donkeys, the testes were hard in texture adhered to the scrotal wall and slightly painful. Such observation similar with that of **Helmy et al., (1965)**, **Youssif (1971)** **Smith et al., (1973)** and **Shabaan et al., (1985)** who said that chronic orchitis was observed mostly in neglected acute cases.

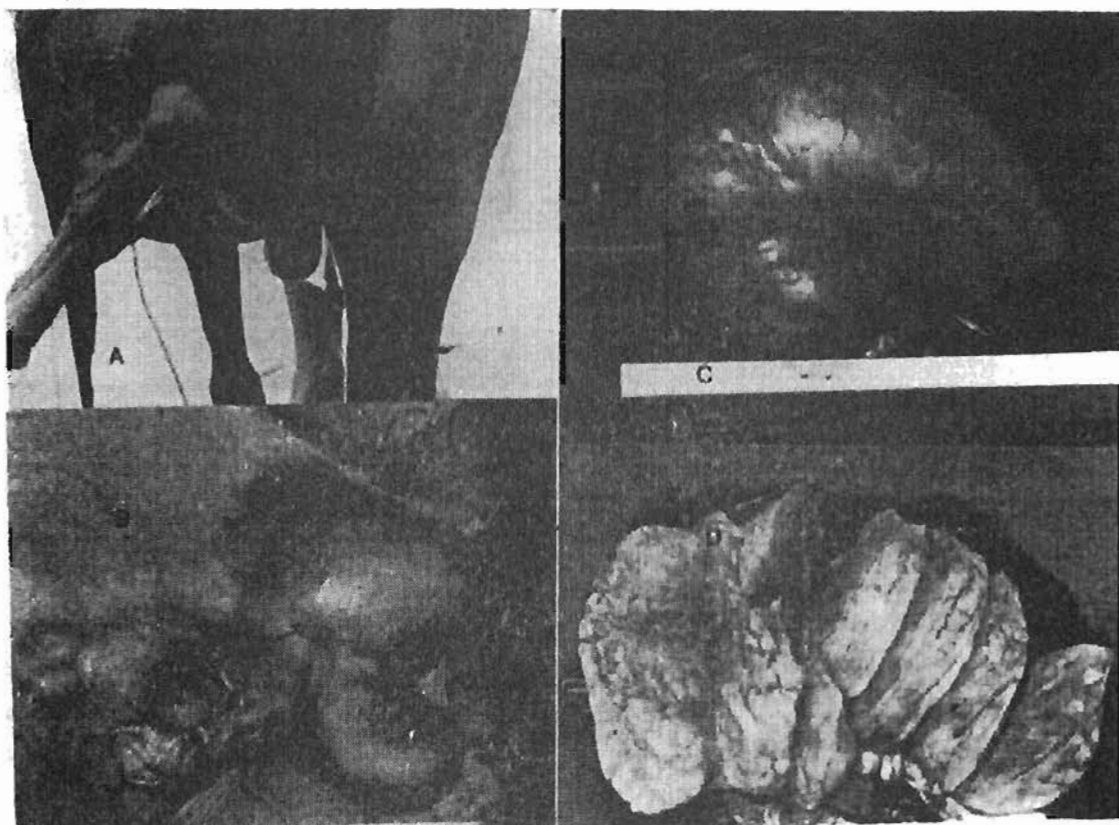
Generally, despite of the clinical examination; ultrasonography, histopathology and serum testosterone profile are very useful tools in the diagnosis of such testicular affections.

**Table (1) : Distribution of different testicular affections among equidae .**

	<i>Horses</i>	<i>Mules</i>	<i>Donkeys</i>	<i>Total</i>
<i>Seminoma</i>	2	-	-	2
<i>Scrotal hernia</i>	-	1	3	4
<i>Hydrocele</i>	1	3	3	7
<i>Chronic orchitis</i>	-	3	9	12
<i>Total</i>	3	7	15	25

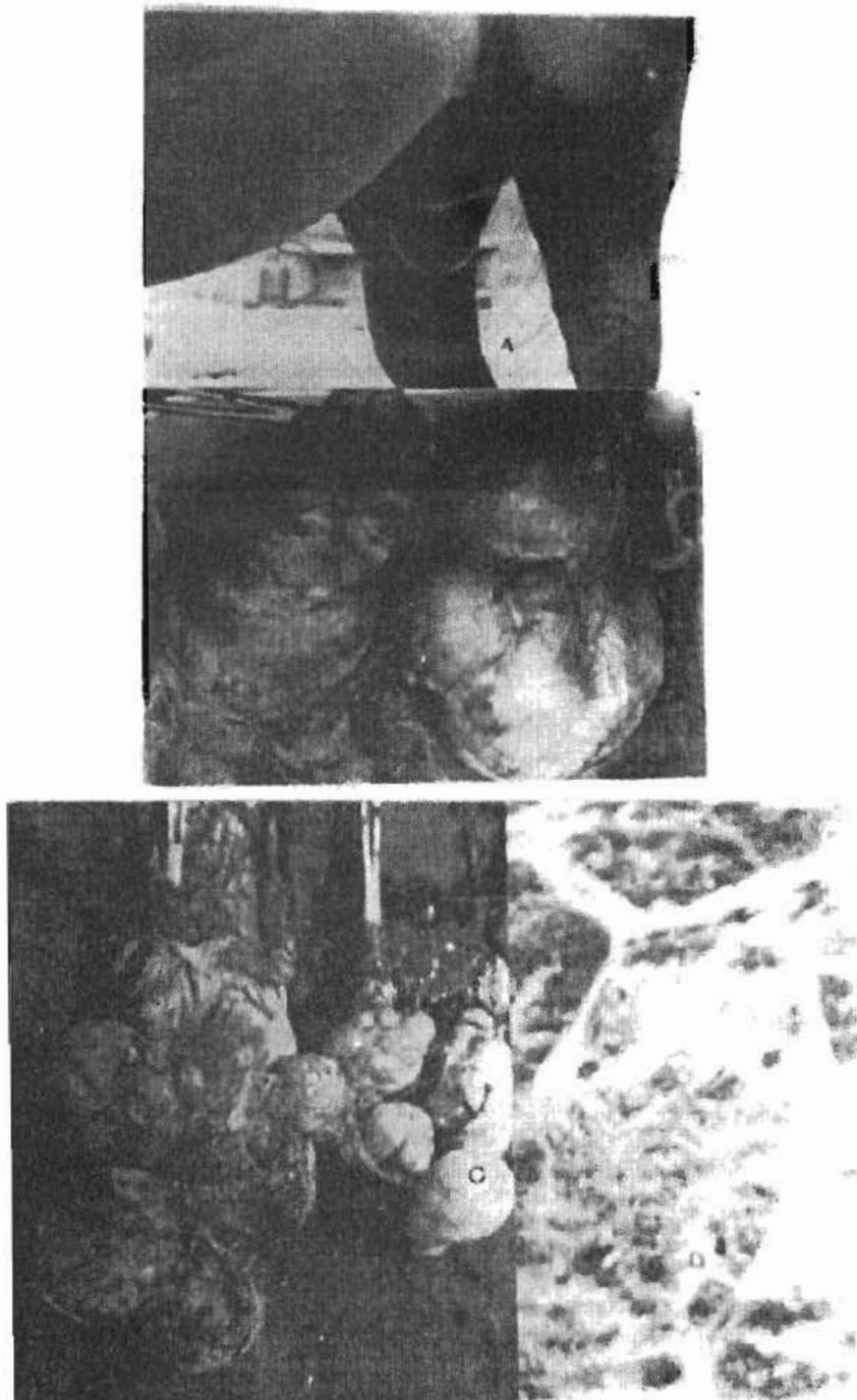


**Fig 1 :** Ultrasonography of normal testis showing that the testicular parenchyma was evenly echogenic.

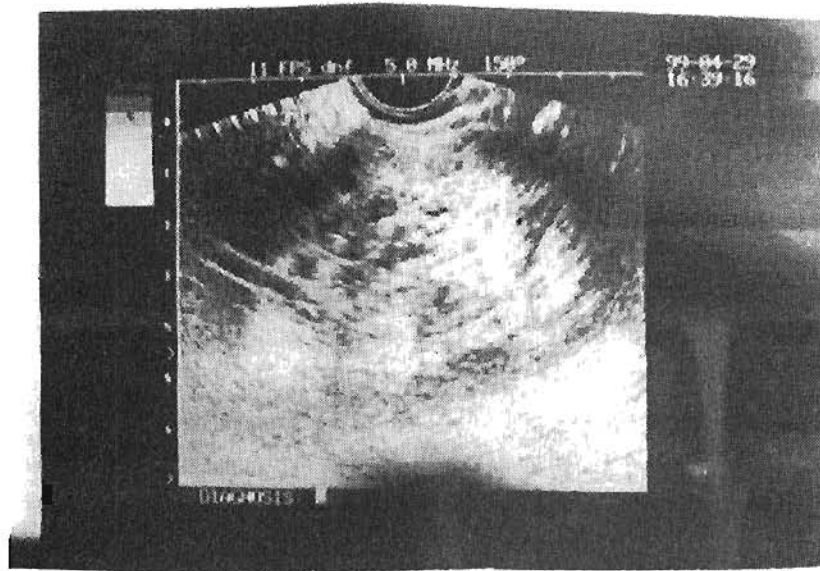


**Fig. 2 :** (A) photograph of 11 year old stallion with unilateral seminoma of the left testis (B) The same animal in semidorsal recumbency (C) The tumor mass after unilateral covered castration (D) The cross section of the neoplastic testis.

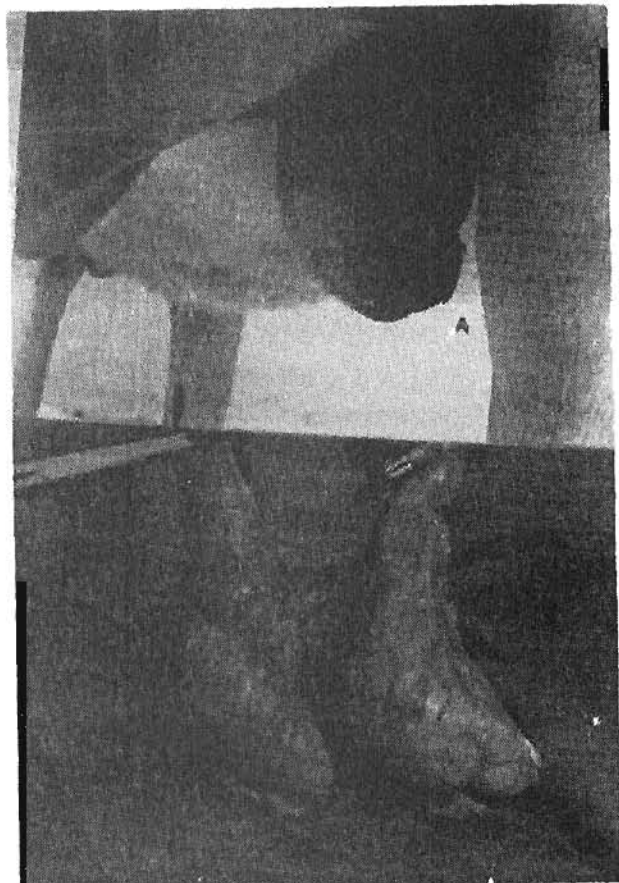




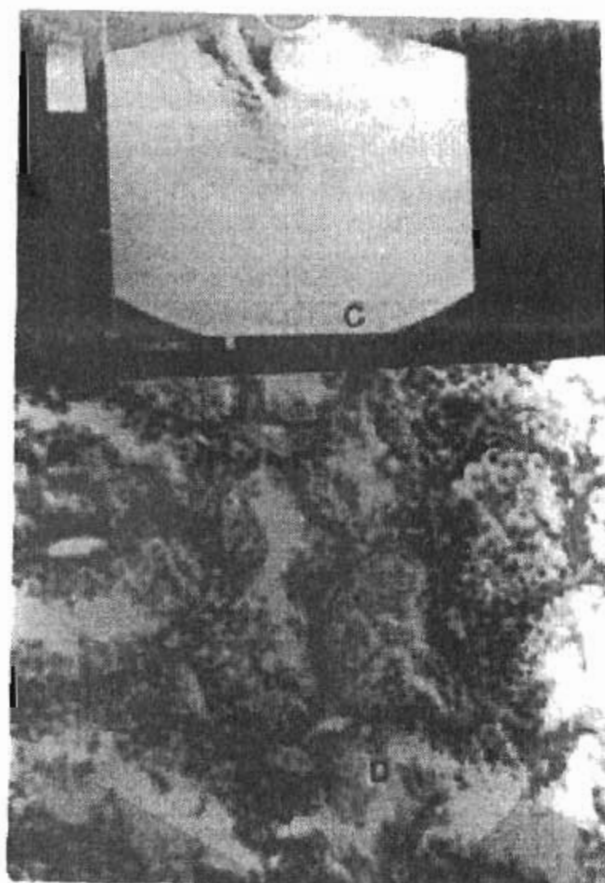
**Fig. 3:** A) Photograph of a 13 years old stallion showing bilateral testicular seminoma. B) The neoplastic testes after bilateral covered orchidectomy. C) The cross section of the seminoma showing grayish white lobulated masses. D) Microscopic picture of seminoma consisting of round or polygonal cells with hypochromatic vesicular nuclei and prominent nucleoli; note absence of spermatogenesis.



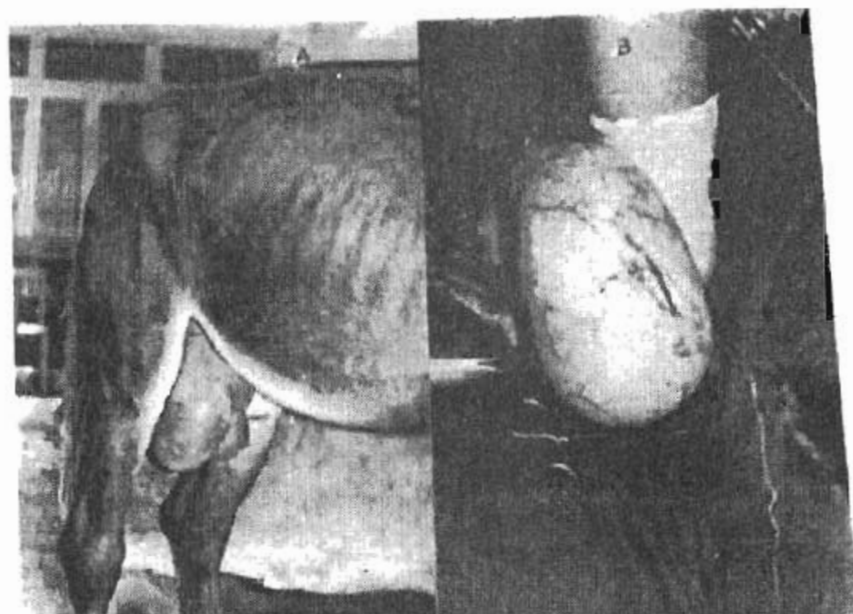
**Fig. 4 :** Ultrasography of the testicular seminoma revealed a diffusely heterogeneous parenchyma with hypoechoic nodules through the testicular parenchyma. No normal testicular tissue was identifiable.



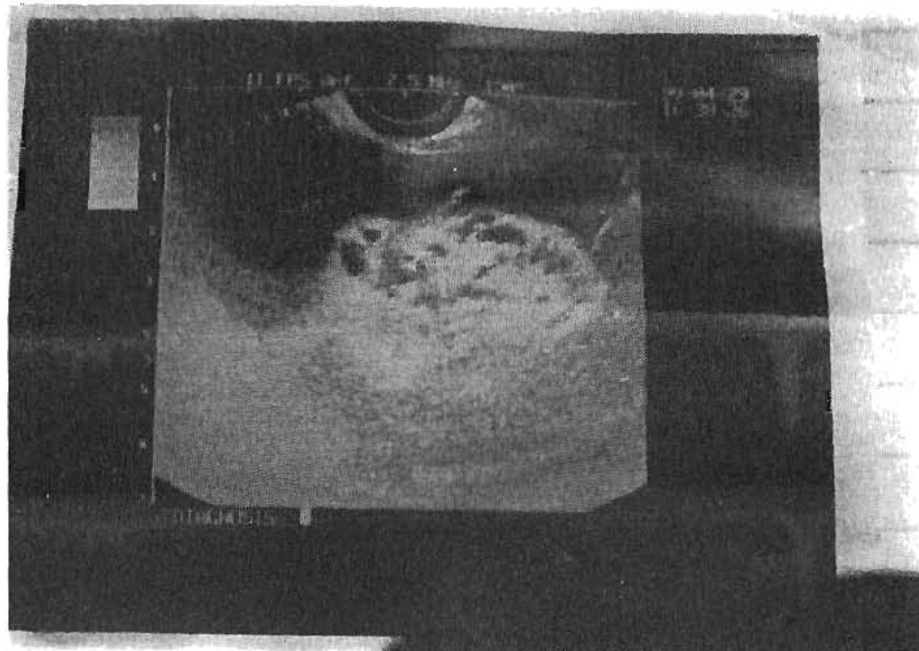
**Fig 5:** A) : A donkey with scrotal hernia. B) The testes of scrotal hernia after bilateral open covered castration.



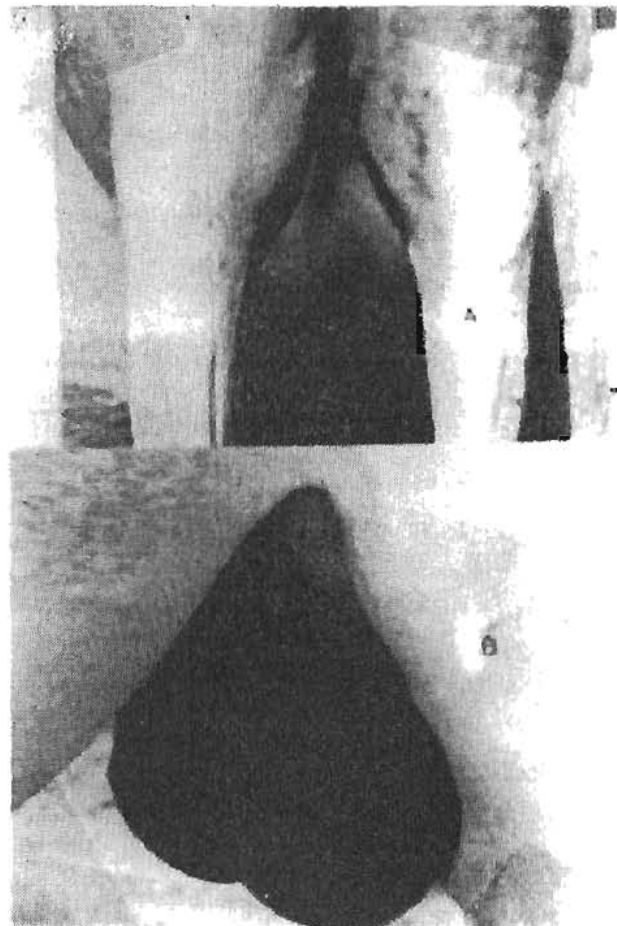
**Fig. 6 :** (C) The ultrasonography of the testes of serotal hernia showing hyperechoic testicular tissue (testes small) with hypo and iso-echoic images surrounding to the testes. (D) Microscopic picture of the removed testes showing apparently normal testicular tissues.



**Fig. 7:** (A) A mule with hydrocele. (B) The exposed testis after opened covered castration



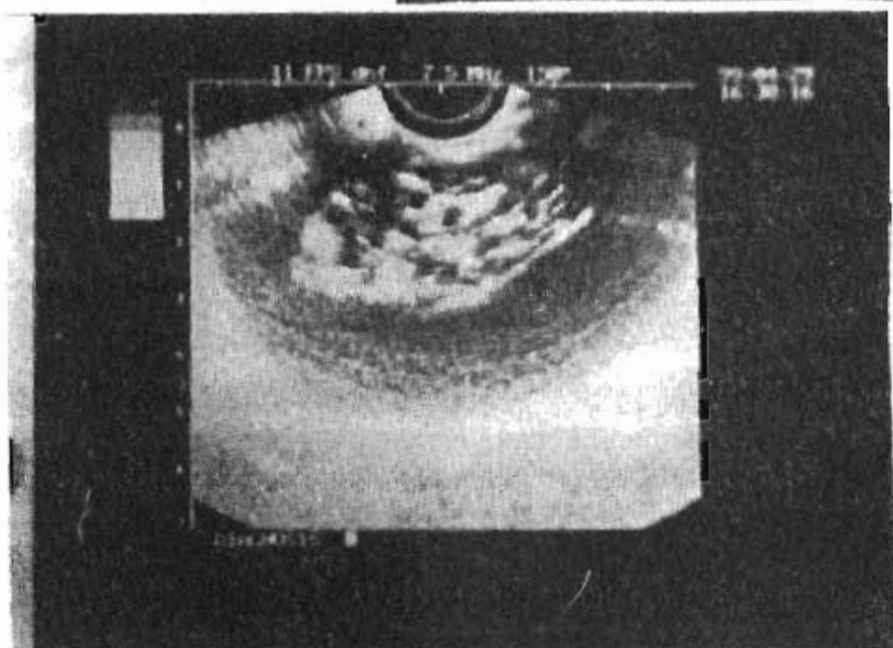
**Fig. 8 :** Ultrasonography of the testicular hydrocele showing hyperechoic image (testis) with hypoechoic fluid (fluid).



**Fig.9 :** (A&B) A 7&8 years old donkeys with chronic orchitis.



**Fig. 10 :** (A) A mule with chronic orchitis . (B) Microscopic picture of testes with chronic orchitis showing atrophy, fibrosis and hyalimination of the seminiferous tubule



**Fig. 11 :** Ultrasonography of the testes suffered chronic orchitis showing hyperechoic testicular tissues and numerous hypoechoic foci (2-5 mm diameter).

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## الملخص العربي

## التشخيص والعناية الجراحية لبعض إصابات الخصيتين في الفصيلة الخيلية

## المشركون في البحث

جمال إبراهيم عبدالفتاح قروف جمال شوقي

قسم الجراحة والتخدير والأشعة - كلية الطب البيطري - جامعة المنصورة

قسم التوليد والتلقيح الاصطناعي - كلية الطب البيطري - جامعة الزقازيق

أجريت هذه الدراسة بفرض استخدام الموجات فوق الصوتية في التشخيص لبعض إصابات الخصيتين في الفصيلة الخيلية، وفي هذا الخصوص فقد تم تشخيص ٢٥ حالة من إصابات الخصيتين والتي كانت تؤدي غالباً إلى تورم كيس الصفن وذلك من خلال الحالات التي وردت إلى قسم الجراحة بكلية الطب البيطري جامعة المنصورة.

تم عمل فحوصات إكلينيكية لكيس الصفن، والخصيتين والأنسجة المحيطة وخصوصاً شكل وحجم الخصية مع وجود ألم أو زيادة في درجة حرارة أي من الخصيتين وذلك بمقارنة الخصية اليسرى باليمنى.

تم قياس هرمون التستستيرون لعدد عشرة من الحيوانات الطبيعية وكذلك للحالات المصابة، وتم فحص الخصيتين والأنسجة المحيطة باستخدام الموجات فوق الصوتية بعد أزالتها جراحياً كما تم عمل فحص نسيجي لهذه الحالات.

وقد أثبتت الفحوصات الإكلينيكية والهيستوباثولوجية والموجات فوق الصوتية وجود عدد إثنين من الحالات بها ورم بزرى (Seminoma)، أربع من الحالات بها فتق إربي (Scrotal hernia)، وسبع حالات تعاني من القيلة المائية (Hydrocele) وإثنى عشر حالة بها التهابات الخصيتين المزمن (Chronic Orchitis) هذا وقد تم التعامل جراحياً مع هذه الحالات:

وقد سجلت قراءات هرمون التستستيرون في الحيوانات السليمة ٢-٨ نانوجم/مل بينما كانت في حالات الفتق الإربي ٢٥ - ٦٥ نانوجم/مل أما في حالات القيلة المائية كانت النسبة ١-٧٥ نانوجم/مل بينما سجلت أقل قراءة في حالات التهابات الخصيتين المزمن حيث كانت ٢٥-١٢٥ نانوجم/مل.