ULTRASONOGRAPHIC PATTERN OF UNILATERAL RETINAL DETACHMENT IN HORSES

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ABSTRACT

In this investigation, three horses with unilateral blindness were admitted separately to Department of Animal Medicine, Faculty of veterinary medicine, Beni-Suef, Cairo University. The history of each case was not helpful. Clinical examination including some eye reflexes revealed unilateral complete blindness. It was recommended to examine these cases by ultrasonography. B-mode ultrasonography with 7.5 MHz transducer was used by applying the transducer in eyelid of both eyes of each case after preparation of the horse for examination. The echo pattern of normal horses eyes (the cornea, the anterior chamber, ciliary body, lens, vitreous chamber and retina) was described. Comparatively the echo pattern of the diseased eye in each was recorded revealing a complete retinal detachment. In case No. 1, the retinal detachment associated with cataract was diagnosed by ultrasound. This study provided accurate details of complete retinal detachment which may not be seen by any ophthalmic means of examination. Moreover, it provided a solution for the common problem of examination of inner part of eye specially the retina in cases associated with opacity of the anterior part of eye. This opacity precludes examination of inner part of eye by normal ophthalmic means.

INTRODUCTION

Sonography has become an important adjunct in ophthalmic diagnosis. The eye is especially amenable to ultrasonic evaluation due to its superficial location and fluid content. Diseases within the eye are generally diagnosed by direct light vision. These become impossible when any of the usually clear ocular media becomes opaque e. g. as in cataract, **Salem, (1984)**.

Eye ultrasonography has been used to diagnose intraocular conditions e.g. retinal detachment, intraocular mass and foreign body when opacity of the anterior segment precluded examination of deeper structure within eye

(**Dziezyc and Millichamp, 1987**). Similarly, diseases in the orbit can not be seen with direct vision. Ultrasound provides a sensitive and accurate mean for diagnosis lesions within opaque globes and in the orbit and can be also determined the internal characteristics of visible lesions (**Salem, 1984**).

Retinal detachment is separation of the retina from the underline choroid, which usually occurs between the photoreceptor and the pigment epithelium. The outer layers of the retina are separated from their source of nutrition in the choroid, and photoreceptors are separated from the pigment epithelium. The intimate contact between the rods and cones and pigmented epithelium is disrupted. Metabolites are no longer available from the choroid, nor can end products of metabolism be removed. Severe irreversible changes in the retina begin early because of its high metabolic rate (the retina is the most metabolically active tissue in the body, as indicated by its high oxygen consumption) (**Slatter1990**).

Slatter, (1990) classified retinal detachment according to cause and type into, congenital detachment, serous detachment; (accumulation of fluid beneath the retina), traction detachment, solid detachment; (extra ocular pressure occur as in focal pressure from tumors, severe trauma, severe intra ocular inflammation and vitreous degeneration) and rhegmetogenous detachment (detachment associated with holes).

The purpose of this paper was to record the echo pattern of retinal detachment in clinically diseased horses versus to echo pattern of normal horses eyes.

MATERIAL AND METHODS

In clinic of Faculty of veterinary medicine Beni-Suef, Cairo University, three droughting horses were separately admitted because of unilateral blindness. The collective history of these different cases was not helpful. It failed to detect for how long the animal suffered from unilateral blindness, the manner through which blindness developed, due to probable trauma or even concurrent diseases or problems associated with the case.

Case No. 1:- A horse of about eighteen-years old suffered from opacity of left eye.

Case No. 2:- A three-year-old horse suffered only from left eye blindness.

Case No. 3:- A one-year-old horse suffered form right eye blindness.

Through visual examination and palpation of the eyes and orbit were carried out for evidence of eye abnormalities or fractures or foreign bodies. Some ocular reflexes as menace and pupillary light reflexes were carried out according to **Speirs and Wrigley, (1997)**.

Ultrasonographic examination:

With quit horse, it is sufficient to have head restraint but resentful horses should be administered ***Combelen®*** (acetopromazine 0.5 mg/kg i.v. from *Bayer leverkusen- Germany*) according to **Speirs and Wrigley, (1997)**

A real-time electronic sector scanner with 7.5 MHz transducer was used *(240 Parus Vet from Pie Medical, Netherlands)*. Images were recorded on floppy disks. A series of horizontal and vertical views of both orbits for each animal under examination was obtained by applying the transducer on the eyelid after applying ultrasound coupling gel according to **Mettenleiter, (1995 A)**.

It is preferred to use sterile coupling gel as K-Y lubricating sterile jelly, from *Johnson & Johnson- New Brunswick, NJ,* to avoid irritation of the eye if the gel inter the eye especially in hot weather. In horizontal position the mark on the transducer referred to medial (Nasal) side and another end of transducer referred to lateral (Temporal bone). In vertical section the mark of the transducer referred to ventral and another end of transducer referred to dorsal.

The eye being examined should be scanned in oblique section gradually between horizontal and vertical section to complete examination of the eye. The opposite eye provided control unless abnormal findings were scanned.

RESULTS

Clinical examination:

A part of opacity of the left eye in case No. 1 was observed, there were no pathological changes in the eyes of different cases. The affected eyes of the three cases showed no response to menace test or pupillary light reflex. Their pupils were fixed and dilated when compared with the opposite normal eye of the animal.

Ultrasonographic examination:

B-mode sonograms are showing in Figs. (2 – 5).

Figure (1) represents a diagram of normal horse's eye to act as a guide for identification of sonogram.

It is essential to clarify that in horizontal section the left side of the image represents medial (Nasal) side of the eye and the right side of the image represents lateral (Temporal) side. While in vertical section the left side of the image represents ventral part of the eye and the right side represents the dorsal part.

DISCUSSION

Diagnosis of diseases of the inner eye of the horse is problematic, especially in cases where ophthalmoscopic examination is impaired or prevented by cloudiness of the optical apparatus (Cornea, aqueous humor, lens and vitreous humor). In addition, examination of retrobulbar affection normally only allows indirect conclusions on localization and extent of alteration. By the use of ultrasound on diseases horse eyes a detail examination of the inner eye with retrobulbar structure is possible (**Mettenleiter, 1995 A**).

By B-mode Ultrasonography, it is possible to scan the normal horse eye (Fig. 2). Cornea could be seen as fine hyperechoic line in rostral part of the image preceded by high pitching hyperechoic area due to near field artifact created by interface of transducer and eyelid (**Hager *et al., 1987)***. Anterior chamber appeared as anechoic area in-between the cornea and hyperechoic spot representing the anterior capsule of the lens. The both sides of anterior chamber demarcated by high pitching hyperechoic area are representing the ciliary bodies (Fig. 2). The normal lens of the horse appeared as anechoic area in-between two hyperechoic spots representing the anterior and posterior lens capsules (Fig. 2). Vitreous chamber appeared normally as anechoic area dominates the most of the eye.

Increasing far-field gain during real-time examination is essential for proper examination of the vitreous chamber (**Van der Woerdt *et al.*, 1993**). The normal wall of posterior globe appeared as high pitching hyperechoic smooth, regular curve in the caudal part of the image (Fig. 2). The echo pattern of the normal horse eye was identical to that reported by **Mettenleiter, (1995 A)**.

Ultrasonography of the case No. 1 represented the ideal indication for using Ultrasonography in veterinary ophthalmology. The cataract developed in the lens of this case (Fig. 3) precluded examination of the fundus of the eye by ophthalmoscopical means {(**Van der Woerdt *et al.*, (1993)** and **Mettenleiter, (1995 B)**}. Accordingly, retinal detachment in case No. 1 could be diagnosed only by ultrasonography.

In cases No. 2 and 3, sonogram showed clear details about the detachment and structure of inner eye. Retinal detachment in both cases was in the optic disk. It is worthy to mention that the three cases of this study appeared in real-time examination as linear structure attached from one side to optic disk or to ora serrata of the retina and the free end move freely in vitreous. **Dziezyc and Hager, (1988)** described these findings as a complete retinal detachment. They added if the detachment was incomplete, two points of attachment could be seen one at optic disk and the other at the ora serrata of retina. They described this type of detachment as bullous detachment. Clinically in this study the complete retinal detachment was emphasized by

blindness. The incomplete retinal detachment (bullous detachment) result in loss the degree of vision from the focal lesion, site affected but not blindness **(Slatter, 1990)**.

In conclusion, this study presented the normal echo pattern of horse's eyes. It demonstrated through sonogram the method of examination of eye. Additionally, it yielded important information about retinal detachment; such information is of great value in diagnosis and prognosis in veterinary ophthalmology.

REFERENCES

Dziezyc, J. and Hager, D. A. (1988): Ocular Ultrasonography in veterinary medicine. Seminars in veterinary medicine and surgery (small animals), vol. 3, 1.

Dziezyc, J.; Hager, D. A. and Millichamp, N. J. (1987): Two-dimensional real-time ocular ultrasonography in the diagnosis of ocular lesions in dogs. J. American Animal Hospital Association, 23.

Hager, D. A.; Dziezyc, J. and Millichamp, N. J. (1987): Two-dimensional real-time ocular ultrasonography in dog: Technique and normal anatomy. Veterinary radiology, 28, 2.

Mettenleiter, E. N. (1995 A): Sonographic diagnosis (B-mode techniques) for the eye in horse: 1- Method and normal findings. Tierarztl parax, Oct., 23 (5).

Mettenleiter, E. N. (1995 B): Sonographic diagnosis (B-mode techniques) for the eye in horse: 2- Pathological cases. Tierarztl parax, Dec., 23 (5).

Salem, S. (1984): ultrasound in medical diagnosis. Radiat. Phys. Chem., 24, 3/4.

Slatter, D. (1990): Fundamentals of veterinary ophthalmology. 2nd Ed., W. B. Saunders Company.

Speirs, V. C. and Wrigley, R. H. (1997): Clinical examination of horses. *W.* B. Saunders Company.

Van der Woerdt, A.; Wilkie, D. A. and Mayer, W. (1993): ultrasonographic abnormalities in eyes of dogs with cataracts: 147 cases (1986 - 1992). JAVMA, 203.6.

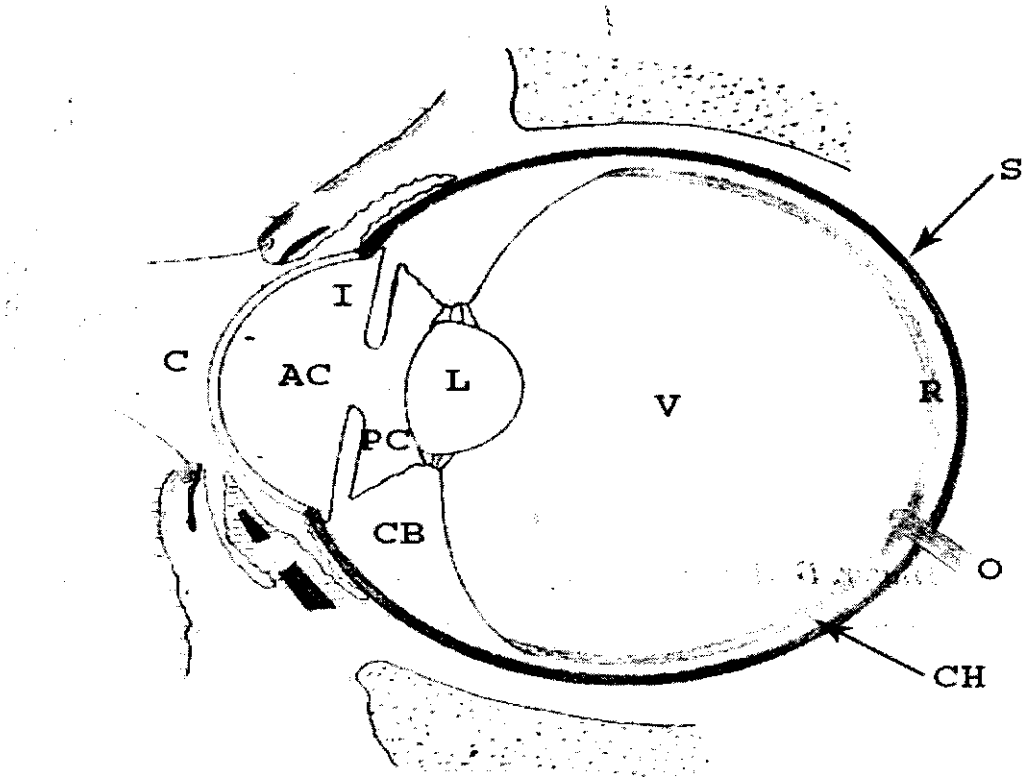

Fig. (1): Diagram showing the normal structure of hose eye.

Cornea (C), anterior chamber (AC), iris (I), posterior chamber (PC), ciliary body (CB), lens (L), vitreous chamber (V), retina (R), choroid (CH), sclera (S), optic nerve (O)

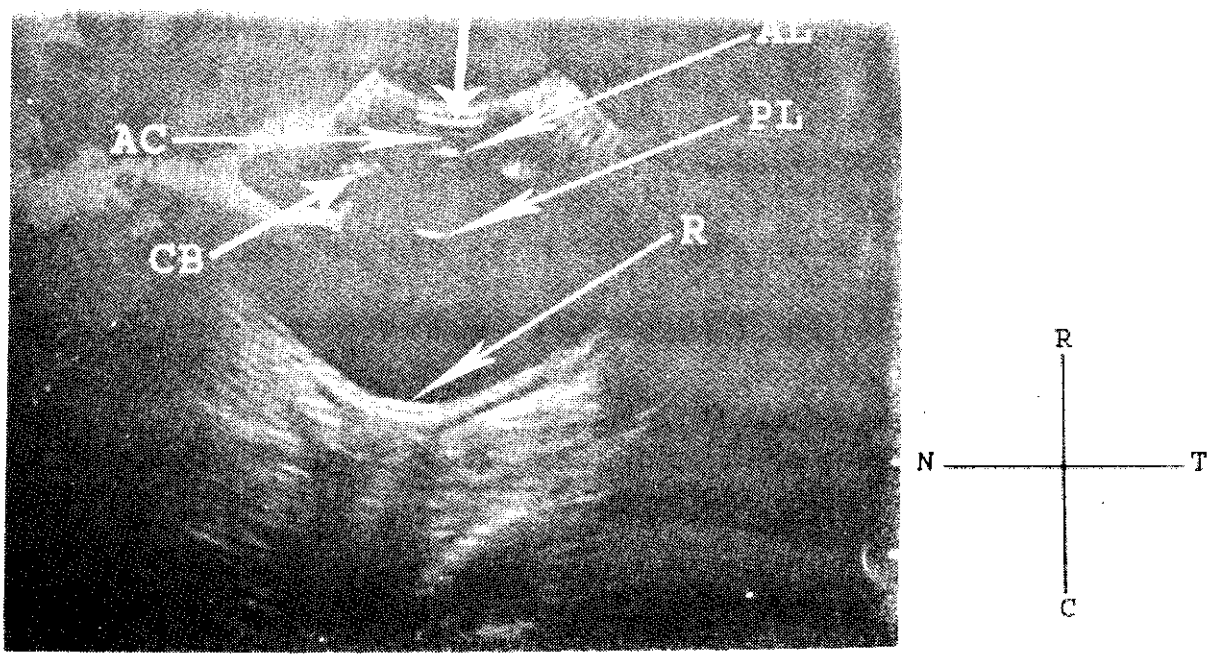

Fig.(2): B-mode horizontal sonogram of normal horse's eye showing cornea (C), anterior chamber (AC), ciliary body (CB), anterior lens capsule (AL), posterior lens capsule (PL), and retina (R).

Directional terms: R = Rostral, T = Temporal, N = Nasal, C = Caudal.

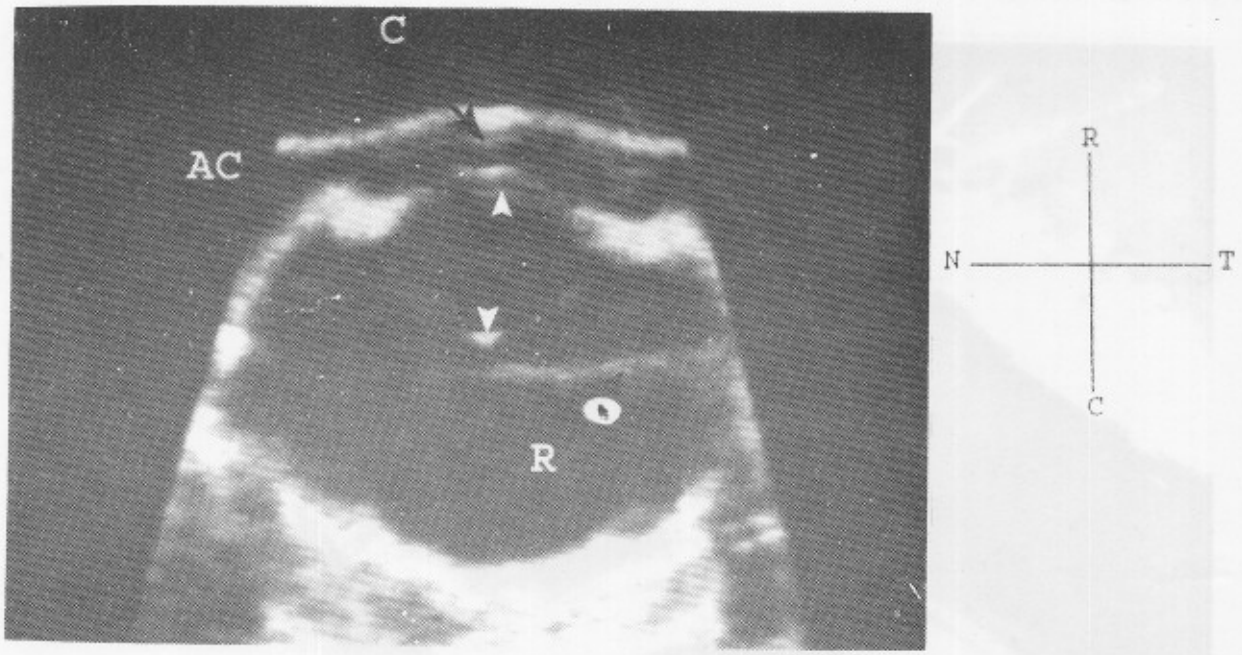

Fig. (3): Fig.(2): B-mode horizontal section sonogram of case No. 1 showing complete demarcation of the lens with hypoechoic limits (white head arrows) between anterior and posterior lens capsules referring to cataract. Detached retina (R) which is still attached to ora serrata retinae. Cornea (C) and anterior chamber (AC) are seen in rostral part of image.
Directional terms: R = Rostral, T = Temporal, N = Nasal, C = Caudal.

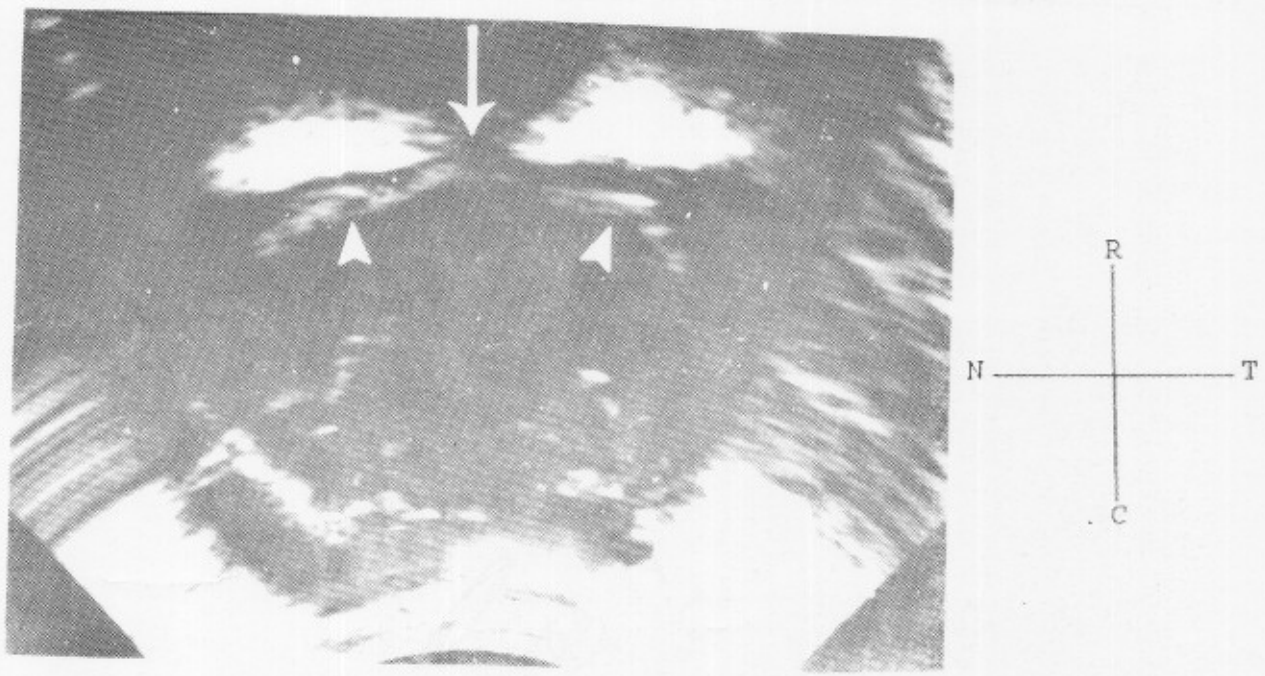

Fig. (4): B-mode horizontal section sonogram of case No. 2 showing retinal detachment (white head arrows) which is still attached to optic disk (long arrow).
Directional terms: R = Rostral, T = Temporal, N = Nasal, C = Caudal.

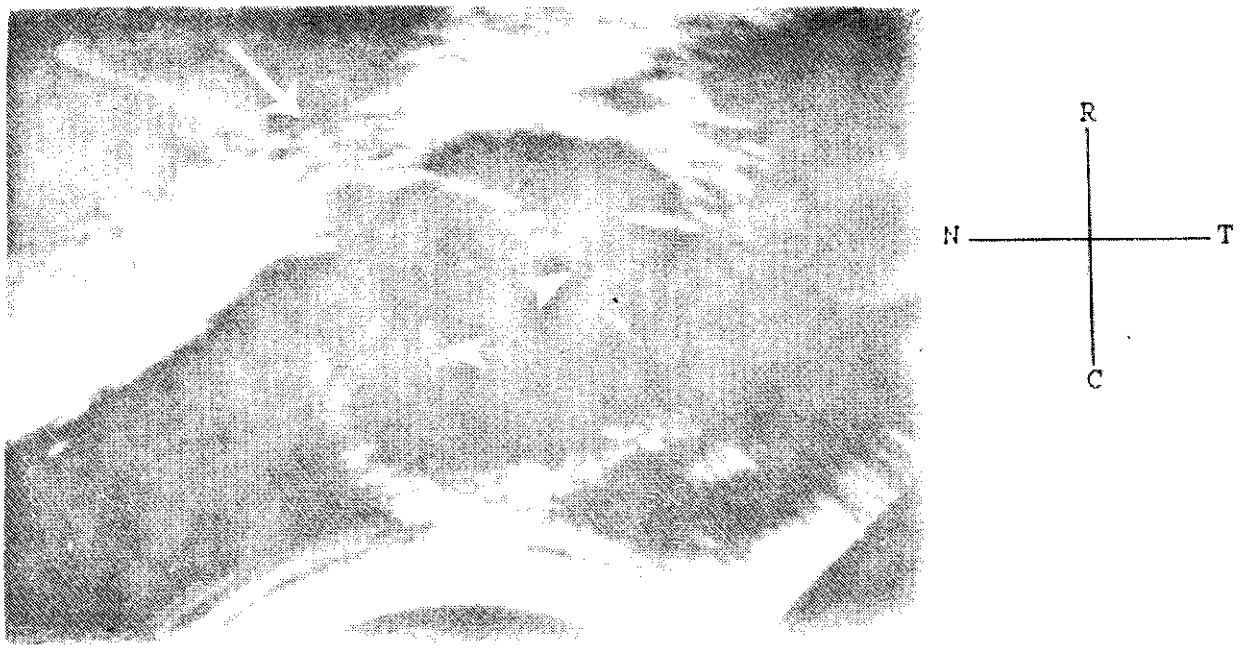

Fig. (5): B-mode horizontal section sonogram of case No. 3 showing detached retina (white head arrows) at the optic disk, the hypoechoic area (long arrow) represents the shadow of the optic nerve.

الملخص العربى

نمط الانفصال الشبكي أحادي الجانب بالموجات فوق الصوتية في الخيول

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تم في هذه الدراسة فحص ثلاثة خيول كل يعانى من العمى في إحدى عينيه و ذلك بقسم طب الحيوان كلية الطب البيطري – بنى سويف- جامعة القاهرة. تفاصيل التاريخ المرضى لكل هذه الحالات لم يكن معروفا" و بإجراء الفحوص الإكلينيكية و خاصة تلك التي تقيس رد الفعل المنعكس للعين أثبتت وجود عمى كلى في العين المصابة. تم إعداد هذه الحالات للفحص بجهاز الموجات فوق الصوتية ثنائيّ الأبعاد و ذلك باستخدام مجس (٧,٥ ميجاهرتز) بوضعه على جفن العين المراد فحصها هذا و قد تم تسجيل الخصائص الصوتية للقرنية و الحجرة الأمامية و الجسم الهدبي و العدسة و الجسم الزجاجي و الشبكية و ذلك في العين السليمة ثم تم فحص العين المصابة و تسجيل خصائص الانفصال الشبكي بأكامل بوضوح تام بالموجات فوق الصوتية في الحالات الثلاثة كما تم أيضا" تشخيص الكتراكت في الحالة الأولى. هذه الدراسة قدمت خصائص العين السليمة في الخيول بالموجات فوق الصوتية كما قدمت خصائص الانفصال الشبكي أيضا" بالموجات فوق الصوتية. و قد أثبتت هذه الدراسة أن بالموجات فوق الصوتية يمكن فحص الجزء الخلفي من العين خاصة في الحالات المصحوبة بالعتامة في الجزء الأمامي من العين مثل الكتراكت كما في الحالة الأولى و التي لا يمكن فحصها بطرق فحص العين المعتادة و ذلك لان العتامة تعوق الفحص.