ULTRASONOGRAPHIY OF THE EYE IN SHEEP

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ABSTRACT

The intent of this study were to explain the normal anatomy of Iraqi sheep eye by using the ultrasonography. Ocular ultrasonographic inspection were achieved on 15 young sheep (8-12 months) from local breed. ultrasonographic images were obtained with a 7.5 MHz linear probe in the sagittal plane. The results of this study showed that the Axial Globe Length (AGL) was (20.05 mm), Anterior Chamber Depth (ACD) was (1.85 mm), Vitreous Chamber Depth (VCD) was (9.82 mm), Scleroretinal Rim Thickness (SRT) was (1.07 mm), Lens Thickness (LT) was (8.95 mm) and Corneal Thickness (CT) was (1.14 mm) respectively. The values of the dimensions of the normal eye components which obtained from this study by using ultrasonography give excellent guide to practitioners in the evaluation of ocular diseases in sheep.

INTRODUCTION

Ovine play an important role in the economy of the developing countries. Ovine are used for wool and meat production. Ocular diseases in food-producing animals (like sheep) play a significant role in economic losses (1&2). In sheep, outbreaks of ovine infectious keratoconjunctivitis (pink eye) which cause swelling of the conjunctiva, lacrimation and staining of the face and in some cases corneal ulceration (2).

Corneal edema is a common clinical sign of corneal ulceration, keratitis and anterior uveitis, which handicap the direct visualization of intraocular structures by ophthalmoscopy, so under such conditions, alternative diagnostic methods for intraocular diseases must be explored (3&4), forthat ultrasonography enables evaluation of intra-ocular structures in opaque eyes (5).

In human medicine the ocular sonography was one of the early uses of the ultrasound machine in diagnosis of eye diseases (5). Ultrasonography uses high-frequency sound waves to examine and measuring the dimensions of the optical components. It is based on the principle of the reflection of sound waves at the boundary or interface between two tissues of different acoustic impedance. Ocular biometry is useful for the assessment of abnormalities and many systemic diseases (7&8).

Therefore present study was performed to assess the feasibility of ultrasonographic appearance and measurements of the normal Iraqi sheep eye, this information could serve as a basis for further clinical investigations of ocular abnormalities in ovine.

MATERIALS AND METHODS

Fifteen trans palpebral ocular ultrasonographic examinations were performed on 15 young healthy Iraqi (local breed) sheep eye (mean age 8-12 months).

Examinations were performed with the animals restrained, without the use of sedation or topical analgesia. Ultrasonographic examinations were performed with an ultrasound machine (Edan D6, Edan Instrument, Inc, China) using a 7.5 MHz linear transducer.

The transducer was placed in a longitudinal plane and the ocular dimensions were recorded by which scanning is performed through the upper eyelid by using coupling gel being applied directly to the eyelid and the images were saved.

The globes of eye were examined in a sagittal plane. Ocular distances were measured from the standard views using caliber of the ultrasound machine. Optimal B-scan images along the central optic axis enabled to record six intraocular dimensions: Axial Globe Length (AGL, was measured from the anterior corneal surface to the retina), Anterior Chamber Depth (ACD, was measured as the distance between echoes from the posterior corneal surface and the anterior lens surface), Vitreous Chamber Depth (VCD, was the distance between echoes from the posterior lens surface and the retina), Scleroretinal Rim Thickness (SRT), Lens Thickness (LT, was the distance between echoes from the anterior and posterior lens surfaces) and Corneal Thickness (CT, was measured between the echoes from the anterior and posterior corneal surfaces).

The mean and standard deviation for each set of measurements were calculated and ocular dimensions and data are presented as mean ± standard deviation.

RESULTS

On ultrasonographic images of sheep eye of this study appeared as well-defined, ovoid structures with mostly anechoic contents. the aqueous and vitreous humors (fluid filled the vitreous body) as well as the lens cortices and center, appeared anechoic.

The anterior chamber (the chamber trapped between the rear part of cornea and anterior lens capsule) appeared as a single, anechoic space, while the vitreous chamber (the chamber trapped between posterior lens capsule to the retina region) appeared as a homogeneous, anechoic region (Fig. 1).

The hyper echoic regions in this study represented by the cornea, anterior lens capsule and posterior lens capsule. The cornea appeared as then binary ribbon echo (have two then surface), while the anterior and posterior lens capsules appeared as two hyperechogenic lines confined between it an anechoic area called a lens.

The posterior ocular wall (the boundaries of retina region) had a good echogenicity encountered, while the three layers of the scleroretinal rim ultrasonographically images could not be well differentiated, generally the scleroretinal rim appeared as a concave hyperechogenic line (Fig. 2). The echobiometric measurements of eye components are recorded as follows the axial globe length (AGL) was (20.05 mm), anterior chamber depth (ACD) was (1.85 mm), vitreous chamber depth (VCD) was (9.82 mm), scleroretinal rim thickness (SRT) was (1.07 mm), lens thickness (LT) was (8.95 mm) and corneal thickness (CT) was (1.14 mm) respectively (Table 1).

Parameter	Mean
Axial Globe Length (mm)	20.05 ± 0.32
Anterior Chamber Depth (mm)	1.85 ± 0.1
Vitreous Chamber Depth (mm)	9.82± 0.25
Scleroretinal Rim Thickness (mm)	1.07 ± 0.09
Lens Thickness (mm)	8.95 ± 0.31
Corneal Thickness (mm)	1.14 ± 0.08

Table 1. The Descriptive Statistics of Echobiometric Values of Eye Components (mean ± SD)

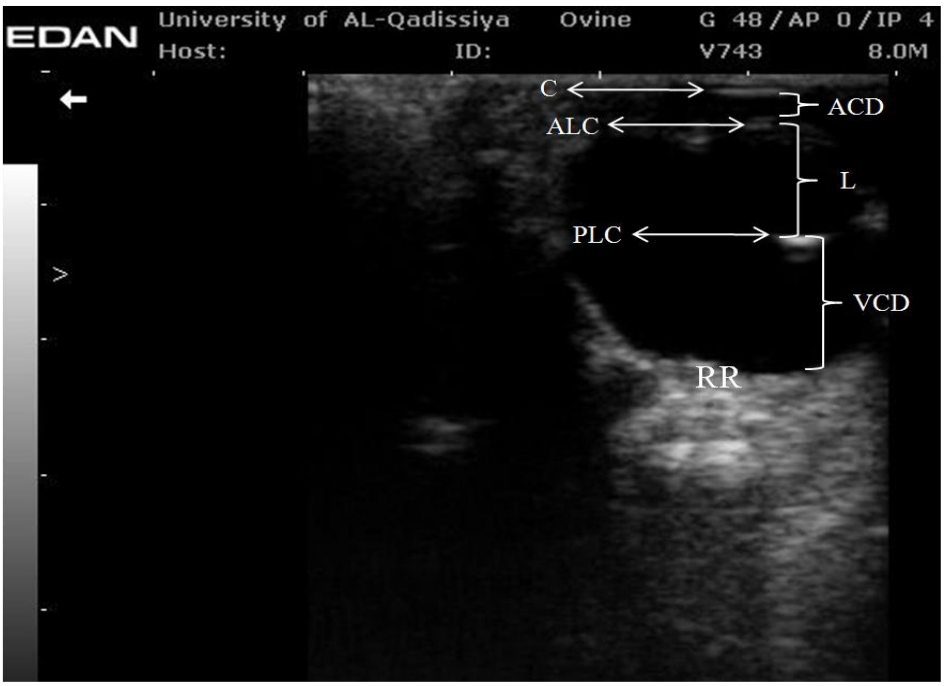

Fig. 1. Ultrasonographic image (Sagittal B-mode view) of a sheep eye. In the part of this scan showed, The Cornea (C), Anterior Lens Capsule (ALC), Posterior Lens Capsule (PLC), Anterior Chamber Depth (ACD), Lens (L), Vitreous Chamber Depth (VCD) and the Retina Region (RR).

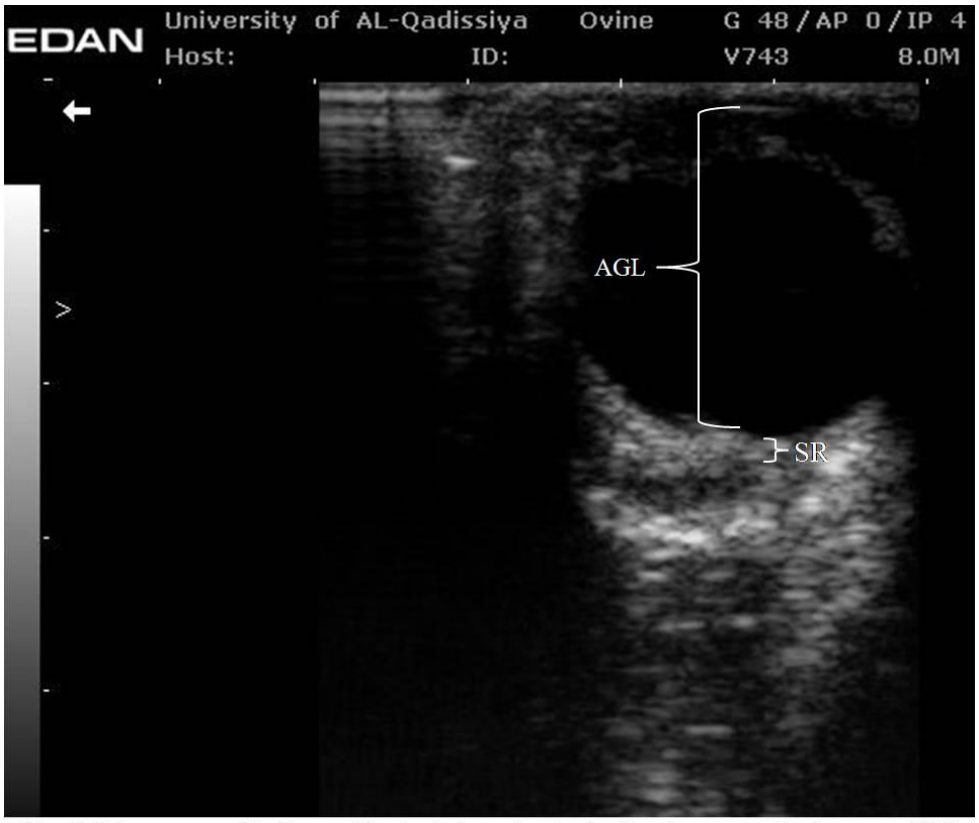

Fig. 2. Ultrasonographic image (Sagittal B-mode view) of a sheep eye. In the part of this scan showed, The Axial Globe Length (AGL) and The Scleroretinal Rim.

DISCUSSION

There a little ultrasonographic anatomy and echobiometry of the eye have been investigated in sheep in Iraq. The ultrasound views give an excellent way to evaluate the eye and orbit (10,11&12).

The B-mode display of ultrasonographic scanning of the present study revealed that the ovoid nature of the globe of the ovine eye are similar in that in bovine and caprine (4&5).

The ultrasonic measurements for the axial globe length, vitreous body depth, corneal thickness, scleroretinal rim thickness and lens thickness reported by this study showed many similarities to those described for cattle, dogs, Buffalo and horses, with some variations in the shape and dimensions (5,7,9and10).

The hyperechogenicity of the cornea, scleroretinal rim and lens capsule (anterior & posterior capsule) came similar to that which imaged in buffalo and bovine, but in different measurements due to the size of animals (5and 7).

The anterior chamber and vitreous chamber appeared as homogenous, anechoic regions due to it filled with aqueous fluids (the velocities which across the

aqueous fluids are similar to that in water, therefore appeared as anechoic region), this result came in agreement with (4,5,13and14)

The result of this study revealed that echobiometric measurements of sheep eyes can be achieved in a similar way to those of other farm animals (7, 13). In this study, ultrasonographic evaluation of the eye was done in a sagittal position, with a 7.5 MHz liner probe provides better depth of penetration approximately 2–5 cm, and it can be used in ocular ultrasonography. Other studies that achieved echobiometric measurements of live animals showed that the measurements were similar to those reported from cadaveric specimens (1). But the direct gross anatomical measurements of many ocular structures which have been reported in other studies (buffalo an bovine and ovine) (11–13) were probably affected by postmortem changes, so that, the ocular measurements were affected due to these changes, also the difference in actual calibrated tissue velocity may lead to some discrepancy between ultrasonographic and gross anatomical measurements. Therefore, in our study we depended only on lived animal (12,13and14).

This study aimed to provide the normal ultrasonographic guide (echobiometry measurements) of the sheep eye by using a widely available and valuable diagnostic tool (ultrasonographic machine), which provided well baseline information for the study of pathologic conditions affecting the eyes of sheep.

التشريح الفوق الصوتي للعين في الأغنام

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الخلاصة

تهدف الدراسة الى بيان التركيب التشريحي الطبيعي للعين في الأغنام المحلية العرق, باستخدام جهاز الموجات الفوق الصوتية (السونار), أجريت الدراسة بالموجات الفوق الصوتية للعين على (15) عينة لأغنام بأعمار يافعة (8 – 12 شهر) و تم الحصول على صور جهاز الموجات الفوق الصوتية باستعمال مسبار (Probe) و بقوة هرتزية وصلت الى (7,5) ميغا هرتز و بالوضع السهمي (Sagittal Plane). أظهرت نتائج الدراسة إن المحور الطولي لكرة العين بلغ (20,5 ملم) و عمق الحجرة الأمامية للعين بلغ (1,85 ملم) و عمق

الجسم الزجاجي (9,82 ملم) و عمق الحيد الشبكي الصلبي بلغ (1,07 ملم) و سمك العدسة بلغ (8,95 ملم) و سمك قرنية العين بلغ (1,14 ملم) على التوالي. أن قيم و أبعاد مكونات العين الطبيعية التي تم الحصول عليها من هذه الدراسة باستخدام جهاز الموجات الفوق الصوتية تعطي دليلا ممتازا للممارسين السريريين في تقييم و تشخيص أمراض العيون.

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