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Ocular Echo-Morphometry in Sheep

[1]A. Aissi, [2]R. Bouzid, [2]F Alloui and [2]D. Khalef

[1]Veterinary and Agronomic Institute, Surgery and Veterinary Imaging Service, Batna University, Algeria
[2]National Veterinary College, Large Animal Department, Algiers

Abstract: Trans-corneal ultrasonographic scanning of both eyes of live healthy 10 sheep aged 11.0±5.5 months and body weight 7-27 kgs were performed to standardize the echo-morphometric measurements of various ocular structures. Echo-morphological details of various intra-ocular structures were standardized performed using real time B-mode linear array transducer (6-18 MHz). The anterior chamber depth cornea , lens axis vitreous axis and ocular axis measured, in mm were 3.71±0.15, 0.73±0.08, 7.69±0.41, 13.83±0.32 and 22.18±0.69, respectively.

Key words: Echo-morphometry · Eye · Sheep

INTRODUCTION

Ultrasonography has became an important non- invasive clinical assessment of various ocular and orbital diseases [1, 2]. With understanding of the indications for ultrasonography and proper examination technique, one can gather a vast amount of information not possible with clinical examination alone. Ocular sonography is most useful when direct visualization of intraocular structures is difficult or impossible. Situations that prevent normal examination include lid problems due to severe edema, partial or total tarsorrhaphy, keratoprosthesis, corneal opacities, scars, or vitreous opacities resulted from hemorrhage and inflammatory debris [3, 4]. Ultrasonography is a useful tool to evaluate the contents of the globe and orbit routinely in companion animal medicine [5]. Knowledge of the ultrasonographic appearance and normal dimensions of the eye would serve as a basis for ultrasonographic examinations when ocular disease may have caused alterations in the dimensions and appearance [6, 7]. For this reason, the aim of this research was to study the echo-morphometry of eye of adult sheep.

MATERIALS AND METHODS

Animals and Clinical Examination: Ten male sheep aged 11.0±5.5 months; weighing 17-27 kilograms local breed included in this study. . All animals were examined at the Surgery and Veterinary Imaging Service, Batna University, Algeria (June, 2015-June, 2016). All the animals were subjected to a pre-study ophthalmic examination to confirm the eyes were normal. The left and right eyes of sheep were scanned ultrasonographically using a Mylab Seven Ultrasound Machine equipped with a real time B-mode linear array transducer of 6-18 MHz (Figure 1) under xylazine sedation with 0.2 mg/kg.

To avoid trapping air between the transducer and the patient, the palpebral hair was thoroughly wetted before the normal saline was applied. After using enough saline on the upper eyelids, trans-corneal scanning was started while the globe was imaged in both horizontal and vertical planes through the visual axis on the upper eyelid and perpendicular to the upper palpebral fissure respectively for a complete examination (Figure 2, 3).

Fig. 1: Ultrasonographic examination of eye

Corresponding Author: A Aissi, Veterinary and Agronomic Institute, Surgery and Veterinary Imaging Service, Batna University, Algeria.

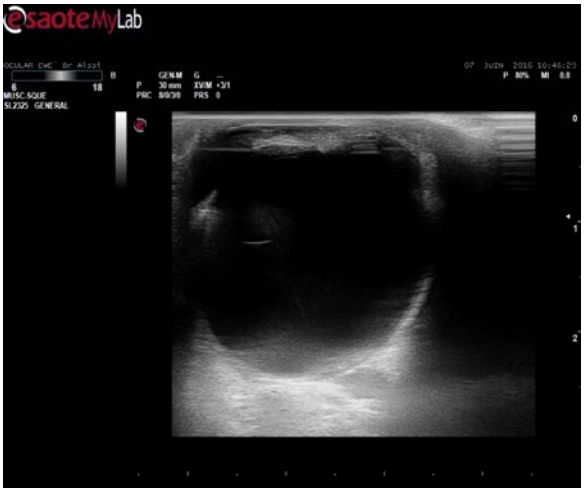

Fig. 2: Normal ultrasound sheep eye

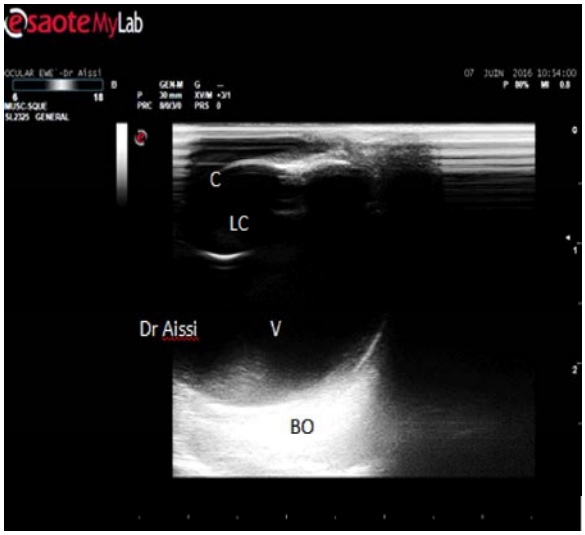

Fig. 3: Normal sonographic appearance of the sheep globe obtained with a freqency of 10.0 MHz. lens capsule (LC), vitrous humor (V), bony orbit (BO)

Fig. 4: Measurement of cornea (0.70mm)

Fig. 5: The measurement of long axis is of 21.2mm, lens capsule axis is of 7.4mm and Vitreous axis from theequaton [Long axis - Lens capsule (21.2-7.4=13.8mm)]

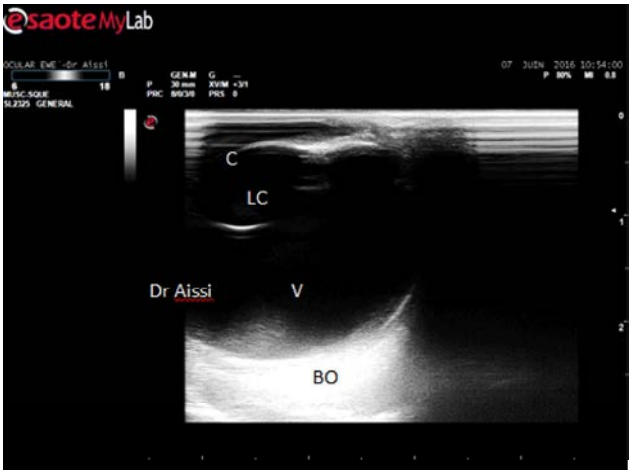

Fig. 6: Different eye structure c; cornea LC; lens capsule V vitrous BO; bone orbit

Table 1: Measurement of the anterior chamber, cornea, lens axis, vitrous and ocular axis of the left and right

	Anterior chamber (mm)		Cornea (mm)		Lens axis (mm)		Vitreous axis (mm)		Ocular axis (mm)	
CASE	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
Sheep1	3.6	3.7	0.71	0.68	8.00	8.20	14.0	13.9	21.0	21.2
Sheep2	3.9	3.8	0.56	0.59	7.70	7.70	13.7	13.5	22.3	22.5
Sheep3	4.0	3.9	0.83	0.76	8.30	8.80	14.1	13.9	22.1	22.3
Sheep4	3.5	3.6	0.71	0.90	7.70	7.90	13.9	13.5	22.6	22.7
Sheep5	3.9	3.8	0.67	0.80	7.80	8.90	14.1	13.7	21.9	21.3
Sheep6	3.4	3.7	0.81	0.83	7.00	7.00	13.6	14.1	22.3	22.6
Sheep7	3.9	3.5	0.73	0.82	7.20	7.40	13.2	13.5	21.4	21.6
Sheep8	3.6	3.6	0.75	0.79	7.60	7.50	14.1	14.5	23.1	22.9
Sheep9	3.8	3.7	0.80	0.75	7.40	7.30	13.5	13.7	23.5	23.7
Sheep10	3.5	3.6	0.75	0.82	8.20	7.40	14.0	13.6	22.6	23.1
Mean±SD	3.71±0.15		0.73±0.08		7.69±0.41		13.83±0.32		22.18±0.69	

The ultrasonography procedure for interpretation of the images were achieved according ultrasonography literature data By two-dimensional (2D) ultrasonography the following ocular structures were measured: cornea (Figure, 3, 4), anterior chamber, lens thickness, vitreous body and axis (Figure 5, 6).

RESULTS

In B-mode ultrasonography, four major echoes include cornea, anterior lens capsule, posterior lens capsule and retina-choroid sclera complex were easily seen (Figures 2-5). The cornea was represented as a curved hyper parallel echoic interface immediately under the eyelid. Anterior chamber of the eye, lens cortex and nucleus and the vitreous were anechoic. Other echoic structures including ciliary body, iris and optic disc could also be distinguished.

The lens thickness ranged from 7.0 to 8.9mm in adult sheep. The vitreous thickness ranged from 21.1 to 23.7 mm. The thinnest central cornea was 0.73±0.08 mm. The parameters of the left and right eye insignificantly differed.

DISCUSSION

Ocular ultrasound is an addition tool to but, not a replacement to routine ophthalmic examination including assessment of menace, blink and papillary light response, fluorescein staining, nasolacrimal evaluation, determination of intraocular pressure and examination of anterior and posterior segments using a bright focal light source and direct and indirect ophthalmoscopy or bio - microscopy, respectively [8, 9]. Several studies had performed eye ultrasonography in different animals [species [8-10]. The most common clinical indicationss for using ultrasound are to evaluate for the presence of a retinal detachment in eyes with a cataract, intraocular lesions including lens displacement, intravitreal hemorrhage and intraocular foreign bodies. In addition, orbital evaluation can be performed in instances of exophthalmoses or orbital trauma [11-14]. In the currente study, anterior-posterior length of the eye axis, lens diameter, depth of the anterior chamber and depth of vitreous were measured in normal eyes of sheep to establish mean and standard deviation values.

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